

REPUBLIC OF CROATIA

MINISTRY OF ENVIRONMENTAL AND NATURE PROTECTION

**INFORMATION ON LULUCF ACTIONS
IN ACCORDANCE WITH ARTICLE 10 OF
DECISION NO 529/2013/EU**

Zagreb, January 2015.

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1. INTRODUCTION

Pursuant to the provisions of Article 10 of Decision 529/2013/EU¹ and Article 4 of Regulation 525/2013/EU², EU Member States had to decide on the method of delivery of information on activities in the sector: Land use, land-use change and forestry (i.e. the LULUCF sector), through which they intend to maintain/reduce greenhouse gas emissions and to maintain/increase sinks in this sector by 2020. States were able to submit the requested information as a separate document, as a clearly identifiable part of their development strategy based on low levels of carbon dioxide, or as a clearly identifiable part of other strategies or plans in the LULUCF sector. Croatia decided that the activities in the LULUCF sector shall form an integral part of its Low carbon Development Strategy for the period up to 2030 with a view to the 2050, with Action plan (hereinafter: Low carbon Development Strategy) .

The first activities related to the preparation of the Low-carbon Development Strategy for the Republic of Croatia began with the implementation of the UNDP project 'Support to the Republic of Croatia in the preparation of the Low-emission Development Strategy (LEDS)' in the period 2012-2013, and continued through the two-year regional project (IPA II, *South East Europe programme*) **LOCSEE** (*Low carbon south east Europe*), in which one of the partners was the Ministry of Environmental and Nature Protection.

Within the LEDS project, several workshops were held for different sectors (including agriculture and forestry) with representatives of relevant institutions, in order to recognize activities that may contribute to the future development of Croatia, based on low carbon dioxide emissions. Furthermore, a draft Framework was prepared for preparation of a Low carbon Development Strategy that provides the perspective for low-carbon development of Croatia up to 2050, with particular emphasis on the possibility of adaptation of the economy, and some parts of this framework are included in the Plan for Air and Ozone Layer Protection and Climate Change Mitigation for the period 2013-2017³.

As part of its LOCSEE project activities, Croatia decided to prepare a document to define measures, as required by Article 10 of Decision 529/2013/EU. These measures are related to the activities carried out on the land categories of the LULUCF sector. Given that Croatia has not elected re-vegetation, wetland drainage and rewetting as activities on which it will report during the *Second commitment period*, and which may be voluntarily chosen pursuant to the provisions of Article 3 of Decision 529/2013/EC, in this document, the Republic of Croatia will not define measures to reduce emissions or increase sinks that may occur after the implementation of activities for these land types. The document will identify measures that will be implemented during the *Second commitment period* in areas that are the subject of activities in the agricultural and forestry sectors in the Republic of Croatia.

According to the data available in the National inventory report on greenhouse gas emissions in the Republic of Croatia for the period 1990-2012 (NIR 2014)⁴, forests⁵ in the Republic of Croatia covered 42% of the total surface area in 2012, and the categories of *Cropland* and *Grassland*

¹ 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

² Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC

³ OG 139/13

⁴ http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

⁵ According to the selected parameters for reporting under the Kyoto Protocol, forests are considered to be areas that meet the following conditions: they have minimum surface area of 0.1 ha, with a minimum crown coverage of 10% and can reach a minimum height of 2 m at maturity

covered 28% and 22% of the total area of Croatia. Of the total forest area, almost 99% of the area is in the category without land use change (*Forest land remaining forest land*), and the rest is in other categories of land converted to forest land. It is primarily a case of LUC of productive forest land without tree cover, which was subjected to afforestation or to the process of natural expansion of forests, which, according to the IPCC's (*Intergovernmental Panel on Climate Change*) definitions of land categories, belongs to the *Grassland* category. There is a very similar ratio of unconverted and converted lands in the *Cropland* category, while the percentage of converted land in the *Grassland* category is slightly higher (6%). Detailed data are presented in the following chapter, in Table 2.

In Croatia, according to the provisions of the Forestry Act⁶, sustainable forest management is defined as the fundamental principle of forest planning and management, and forests and forest land are recognized as assets of special interest to the Republic of Croatia, which, as such, in accordance with the provisions of the Constitution, have special protection.

Sustainable forest management in Croatia involves cultivation, protection and use of forests and forest lands and the construction and maintenance of forest infrastructure, according to the Pan-European criteria for sustainable forest management, such as:

- maintenance and appropriate enhancement of forest ecosystems and their contribution to the global carbon cycle
- maintenance of health and vitality of forest ecosystem
- maintenance and encouragement of the productive functions of forests
- maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems
- maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)
- maintenance of other socio-economic functions and conditions

Financial resources needed for the sustainable management of forests and forest lands, for ensuring the biological renewal of forests and for scientific papers and programs in the forestry sector have been provided from multiple sources. Measures that are implemented pursuant to the provisions of this act, as part of the biological renewal of forests, and for which it is estimated that they have a direct and/or indirect positive effect on climate change mitigation are:

- preparing habitats for natural regeneration of stands designated for natural renewal,
- filling, tending and clearing of all stands; for even-aged, high forests up to twenty years of age, or for the stands of soft broadleaves and coppice up to ten years of age, and for mixed age high forests, in stands in which group selection management has been introduced, up to twenty years of age of the group,
- thinning of stands up to the age of the one third of the determined rotation in cultivated stands, and in older stands only when necessary for cultivation,
- afforestation of clearings after clearcutting,
- recovery of burnt areas,
- restoration of degraded stands and their conversion to higher forest stands,

⁶ OG (140/05, 82/06, 129/08, 80/10, 124/10, 25/12, 94/14)

- forest preservation,
- selection and marking of trees for felling (hereinafter: tree marking) and supervision of the work referred to in item 2 of this Article,
- development of forest management plans and their revision and renewal,
- reconstruction and conversion of coppice forests, maquis, bushes and shrubberies
- afforestation of non-covered forest land and the establishment of plantations of fast-growing species on new areas
- preparation of habitats, cultivation of newly-established stands and cultures,
- protection against harmful organisms and fires,
- purchasing of forests or forest land,
- recovery and regeneration of forests damaged by disasters or war,
- design, construction and maintenance of the forest infrastructure.

The basic documents for the implementation of sustainable forest management are plans, which are prepared for this sector on a periodic level and which relate to the sections of each management unit. Pursuant to Article 41 of the Ordinance on forest management⁷ assessment of multifunctional forest functions is carried out at the level of stands and management units. The impact of forests is shown in a quantitative manner regarding: protection of soil, roads and other structures from erosion, torrents and floods; water regime and hydropower systems; soil fertility and agricultural production; climate; protection and improvement of the environment; oxygen production and purification of atmosphere; recreational, tourist and health functions, and the impact on fauna and hunting.

The provisions of the Forestry Act apply to all forests in the Republic of Croatia, regardless of the type of ownership (state forests managed by Hrvatske šume d.o.o., state forests managed by other legal entities, and private forests). Since 2002, Hrvatske šume d.o.o.⁸ has the FSC (*Forest Stewardship Council*) certificate for forest management, by which countries prove that they manage forests according to strict environmental, social and economic standards. From the expiry of the first certificate, it is regularly updated (every 5 years). According to currently available information⁹, the FSC certificate confirms the sustainable management of forests and forest land in the Republic of Croatia for more than 2.0 million hectares.

Currently, and throughout the Pre-accession period for full membership in the European Union, the Croatian forestry and agriculture sectors were under the authority of the same ministry. With the aim of transposing the EU legislation, strengthening the administrative capacity of the Ministry of Agriculture and transferring the necessary knowledge and experience for the purposes of effective implementation of legislation, many projects were initiated, financed by previously available funds, as well as the first component of the pre-accession fund IPA (*Instrument for Pre-Accession*). During the *Pre-accession* period, the Agriculture Act¹⁰ was aligned with the provisions of the relevant EU regulations, and agriculture was defined as a strategic activity, whereby its economic, environmental and social role must contribute to the

⁷ OG 111/06 and OG 141/08

⁸ Hrvatske šume d.o.o. manages approximately 80% of the total forest and forest land area in Croatia

⁹ Hrvatske šume d.o.o. <http://split.hrsume.hr/index.php/hr/component/content/article/1-latest-news/472-10-godina-fsc-certifikata-u-hrvatskim-umama>

¹⁰ OG 149/09, 127/10, 50/12, 120/12, 148/13

sustainable development of the Republic of Croatia. Furthermore, the *Act* establishes that the sustainable development of agriculture is promoted by the strengthening of an environment-conscious approach to resource management, development of an integrated production system, application of good agricultural practice, implementation of development and applied research, collaboration with professional and scientific institutions in agriculture, and the establishment of public and private consultant services.

The prescribed goals of the "European strategy for smart, sustainable and inclusive growth - EUROPE 2020", the economic, environmental and territorial challenges of the Union, manifested through the three stated objectives of the Common Agricultural Policy (competitiveness of agriculture, sustainable management of resources and balanced development of rural areas), are to be achieved in Croatia through implementing the measures defined in the Rural Development Programme of the Republic of Croatia for the period 2014-2020. This document (currently in the process of harmonization with the European Commission) has been prepared in accordance with the provisions of the *Regulation (EU) No. 1305/2013 of the European Parliament and of the Council on support for rural development from the European Agricultural Fund for Rural Development*, and it is the basic document for identifying and defining measures for maintaining/reducing emissions and maintaining/increasing sinks of greenhouse gases in the LULUCF sector.

By using renewable energy sources and co-generation, Croatia's interests are realized in the field of energy, as established by the Energy Strategy of the Republic of Croatia¹¹, laws and other regulations governing energy activities, in terms of efficient use of energy and reducing the impact of fossil fuels on the environment. The adoption of a legislative framework as part of the reform the energy sector, conducted during the *Pre-accession* period for Croatian accession to the European Union, enabled the development and exploitation of renewable energy sources. The Energy Act¹², the Electricity Market Act¹³ and the associated secondary legislation regulate the use, rights and obligations, incentive measures, as well as the organization and institutions related to the implementation of renewable energy sources in Croatia.

By the Regulation on amendments to the Regulation on the minimum share of electricity produced from renewable energy sources and cogeneration whose production is incentivized¹⁴ it was initially planned that by December 31st 2020, the minimum share of electricity produced from plants using renewable energy sources whose production is incentivized, would amount to 13.6% of the total final consumption of electricity. In accordance with Directive 2001/77/EC¹⁵, the Action Plan for renewable energy sources until 2020 was prepared, which determines the long-term prospects of renewable energy sources up until 2020, with an assessment of the period until 2030 and an action plan for the development of the infrastructure of renewable energy sources in Croatia, in accordance with the package of implementing measures for the EU goals on climate change and renewable energy for 2020. Some provisions of Directive 2009/28/EC are included in the Action Plan for renewable energy sources and some are already being implemented as part of the Act on bio-fuels for transportation. After the repeal of the Regulation on the minimum share of electricity produced from renewable energy sources and cogeneration whose production is incentivized, in February 2014, the Action Plan for

¹¹ OG 130/09

¹² OG 120/12, 14/14

¹³ OG 22/13

¹⁴ OG 8/2011

¹⁵ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

Renewable Energy Sources up until 2020 stated that the minimum share of renewable energy sources in the final gross energy consumption should be 20% in 2020.

2. THE PROCESS OF DEFINING MEASURES TO REDUCE EMISSIONS AND INCREASE SINKS OF GREENHOUSE GASES IN CROATIA

The fulfilment of the obligations defined by the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and relevant legislative acts of the European Union is envisaged at the national level through the implementation of the Environmental Protection Act¹⁶, the Air Protection Act¹⁷, the Regulation on the monitoring of greenhouse gas emissions, policies and measures for their reduction in the Republic of Croatia¹⁸ and the Ordinance on the monitoring of greenhouse gas emissions in the Republic of Croatia¹⁹.

Preparation and submission of reports on calculation of emissions of greenhouse gases to the UNFCCC Secretariat are within the competence of the Ministry of Environmental and Nature Protection (MENP). The Regulation on the monitoring of greenhouse gas emissions, policies and measures for their reduction in the Republic of Croatia and the Ordinance on the monitoring of greenhouse gas emissions in the Republic of Croatia prescribe the obligation and procedures for emission monitoring, which include assessment and reporting on all anthropogenic emissions and sinks. The monitoring of emissions of greenhouse gases is prescribed by Article 75 of the Air Protection Act.

The institutional organization of the preparation of the inventory of greenhouse gases in Croatia is set out in Part II of the *Regulation* entitled the National system for the estimation and reporting on anthropogenic emissions from sources and removals by sinks of greenhouse gases. The institutional organization for preparing an inventory in Croatia could be considered decentralized, where the services of external experts are used and in which authorization to carry out certain tasks is divided between the participating institutions, including the Ministry of Environmental and Nature Protection (MENP), the Croatian Environmental Agency (CEA) and the competent government authorities responsible for data collection. Preparation of the inventory has been entrusted to an Authorised Institution, which is elected in the procurement process, for a period of three years.

The MENP is the central national body under the UNFCCC. The following activities to ensure the sustainable functioning of the national system are within the jurisdiction of the Ministry:

- mediation and exchange of data on emissions and removals of greenhouse gases with international organizations and the parties to the Convention,
- mediation and exchange of data with the competent authorities and organizations of the EU in the manner and within the deadlines established by EU regulations,
- control of the methodology for calculation of emissions and removal of greenhouse gases in line with *good practice* and national circumstances,
- review and approval of the report on greenhouse gas inventory prior to its formal submission to the Convention Secretariat.

The following tasks of the functioning of the national system are within the jurisdiction of the CEA:

- organization of greenhouse gas inventory preparation in order to meet the deadlines set out in Article 12 of the Regulation

¹⁶ OG 80/13, 153/13

¹⁷ OG 130/11, 47/14

¹⁸ OG 87/12

¹⁹ OG 134/12

- collection of activity data from Article 11 of the Regulation
- preparation of a plan of quality assurance and control for the greenhouse gas inventory in accordance with *good practice* guidance of the Intergovernmental Panel on Climate Change
- implementation of quality assurance procedures for the greenhouse gas inventory in accordance with the plan of quality assurance and control
- archiving of activity data for the calculation of emissions, emission factors and documents used for planning, preparation, quality assurance and control for the inventory
- keeping records and reporting on authorized legal persons participating in the implementation of the flexible mechanisms of the Kyoto protocol (Emissions Trading, Clean Development Projects, Joint Implementation Projects)
- choosing the Authorized Institution for preparation of the inventory of greenhouse gases
- providing access to data and documents for technical audit

The *Authorized Institution* is responsible for the following activities in the preparation of the GHG inventory:

- calculation of all anthropogenic emissions from sources and removal by sinks of greenhouse gases and calculation of indirect greenhouse gas emissions in accordance with the methodology prescribed in the current guidelines of the Convention, guidelines of the Intergovernmental Panel on Climate Change, Instructions for reporting on greenhouse gas emissions, which are published on the website of the Ministry and on the basis of activity data referred to in Article 11 of the Regulation
- quantitative assessment of the uncertainty of the calculation from sub-paragraph 1 of this Article for each category of sources and removal of greenhouse gas emissions and for the inventory as a whole, in accordance with the guidelines of the Intergovernmental Panel on Climate Change
- identification of the main categories of emissions and removals of greenhouse gases
- recalculation of emissions and removal of greenhouse gases in the case of improvement in methodology, emission factors or activity data, inclusion of new categories of sources and sinks, or application of compliance methodologies,
- calculation of emissions or removal of greenhouse gases from mandatory and selected activities in the sector of land use, land-use change and forestry,
- reporting on the issue, holding, transfer, acquisition, cancellation and withdrawal of emission reduction units, certified emission reduction units, assigned amount units and units of removal and transfer to next commitment period of emission reduction units, certified emission reductions and assigned amount units, from the Registry in accordance with applicable decisions and guidelines of the Convention and related international agreements
- implementation and reporting on quality control procedures in accordance with the plan of quality assurance and control

- preparation of reports on greenhouse gas emissions, including any additional requirements in accordance with the Convention and supporting international agreements and decisions
- cooperation with the Convention Secretariat for the purpose of technical review and assessment of the greenhouse gas inventory

The process of preparing the report on the inventory of greenhouse gas emissions involves several steps starting with the collection of data based on the Data collection programme, followed by emissions estimation and recalculations in accordance with the IPCC methodology, and recommendations for improving the calculation obtained by a professional audit team, by compilation of an inventory including the report (National Inventory Report, NIR) and tabular presentation of emissions (Common Reporting Format, CRF) and parallel implementation of general and specific quality assurance and control procedures.

Implementation of the provisions of the UN Convention on Climate Change, the Kyoto Protocol and the related EU legislative acts was further strengthened at the national level in 2014 through the establishment of the Commission for inter-sector coordination for the National system for monitoring greenhouse gas emissions²⁰ and the Commission for inter-sector coordination for policies and measures to mitigate and adapt to climate change²¹, established by the Croatian Government.

According to the *Decision*, a commission was established for the national system to monitor the preparation of reports on greenhouse gas emissions, including removal by sinks, give its opinion on the report and participate in the review of these reports. The tasks performed by this commission are:

- preparation and submission of data from the sector needed to calculate greenhouse gas emissions in accordance with the set methodology,
- review of the calculation of greenhouse gas emissions from the sector,
- control of the reliability, consistency and transparency of data from the sector,
- review and help in answering the objections of experts from the United Nations Framework Convention on Climate Change and the European Commission, regarding the annual control of the Inventory of greenhouse gas emissions,
- participation in the periodic review of the Inventory of greenhouse gas emissions, answering the questions of the experts from the United Nations Framework Convention on Climate Change, related to the sources, reliability and consistency of data from the sector,
- review of the Report on the annual or periodic review of the Inventory of greenhouse gas emissions,
- reviewing and giving opinions on the recommendations of experts from the United Nations Framework Convention on Climate Change on improving data from the sector, the establishment and implementation of national emission factors, etc.,

²⁰ Decision on the establishment of the Commission for inter-sector coordination for the national system for monitoring the greenhouse gas emissions (OG 6/14)

²¹ Decision on the establishment of the Commission for inter-sector coordination of policies and measures to mitigate and adapt to climate change (OG 114/14)

- ensuring the quality of data on emissions and monitoring at the national level, quantification of uncertainties, reporting to promote transparency,
- consideration of options and giving a suggestion on methodology and the level of reporting,
- consideration of options and giving a suggestion on performance of recalculation of emissions,
- improving the quality of activity data, emission factors and methodology of calculation,
- other tasks as needed.

As the appointed members of this commission are representatives of various institutions in the Republic of Croatia (the Ministry of Environmental and Nature Protection, the Ministry of Agriculture, the Ministry of the Interior, the Ministry of Regional Development and EU Funds, the Ministry of Maritime Affairs, Transport and Infrastructure, the Ministry of the Economy, the Central Bureau of Statistics, the Croatian Environmental Agency, the Paying Agency for Agriculture, Fisheries and Rural Development, Environmental Protection and Energy Efficiency Fund and others).

The work of the Commission for inter-sector coordination of policies and measures is implemented through the work of the Coordination group and the Technical working group.

The coordination group, on the basis of the opinions and proposals of the Technical working group, makes recommendations to the Croatian Government on the overall policies and measures for mitigation of and adaptation to climate change, provides support in the implementation of policies and measures to mitigate and adapt to climate change and performs the following tasks:

- evaluates and recommends the preparation of strategic documents relating to policies and measures for mitigation of and adaptation to climate change to the Croatian Government, taking into account the long-term objectives and feasibility with regard to technical, economic, sociological limitations, compliance with the sectoral and local planning documents, and international commitments in all sectors;
- proposes objectives, policies and measures and ways of monitoring the effects of policies and measures;
- provides suggestions and support in promoting effective interdisciplinary and synergistic activities, policies and measures.

The chosen members of the coordination group were assistant ministers from various ministries in the Republic of Croatia, and the technical group was composed of representatives of various institutions (administrative, public, scientific, professional, non-governmental organizations, etc.) of the Republic of Croatia.

With the legislative framework set and the establishment of the above mentioned commissions, the Republic of Croatia has the intention to engage in extensive efforts to improve public awareness of the issue of climate change, institutional relations, better interdepartmental co-operation, and launch targeted joint activities concerning climate change issues during the *Second commitment period*. The LULUCF sector, the complexity of reporting in this sector, as well as the additional requirements of the European Commission regarding reporting, are the reasons why work in this sector in Croatia has already begun in this manner.

Consequently, a document with proposed measures in the LULUCF sector was submitted to the representatives of several divisions of the Ministry of Agriculture, members of the aforementioned commissions and other institutions in the Republic of Croatia. The implementation of the defined measures and progress in achieving the objectives and measures referred to in this plan are the subject of the joint work of the two ministries, as well as continued work for the purposes of improving the plan itself in future periods.

2.1 Improved communication and consultations between all relevant parties

In the Republic of Croatia, the competent authority for forestry is the Ministry of Agriculture, but for the forests in protected areas, according to the provisions of Article 26 of the Forestry Act²², the jurisdiction of this ministry overlaps with the Ministry of Environmental and Nature Protection (MENP). Given that the forestry sector is one with the largest sinks of carbon dioxide, in defining the list of relevant institutions to define the measures in the LULUCF sector, which maintain/reduce emissions and maintain/increase sinks, this sector was given extra attention. Table 1 gives an overview of the most important participants in the forestry sector, who were identified as relevant to this sector in view of their basic activities. In addition to the participants directly involved in the development of this document, the Ministry of Agriculture, the Croatian Environmental Agency (CEA), the Faculty of Forestry, and the Croatian Association of Private Forest Owners were included in the consultation process as key participants, and a series of bilateral discussions was conducted with these participants for the sake of better exchange of information on the provisions of Decision 529/2013/EU.

During this consultation process, an insufficient level of awareness was recognized in the industrial part of the forestry sector (private forest owners and the timber processing sector) of the regulations concerning the monitoring of emissions of greenhouse gases, as well as the strategic documents of the European Union, which define activities for development of the economy based on low level carbon dioxide emissions and adaptation to climate change. In addition, the need was recognized for more intensive cooperation between the MENP and the Ministry of Agriculture, because measures relating to Decision No. 529/2013/EC should be closely linked with the measures that will be adopted as part of the Rural Development Programme of the Republic of Croatia.

Consequently, in the coming period a series of bilateral meetings and workshops is planned, with the aim of increasing the awareness and active involvement of all key stakeholders in the process of improvement of measures in the LULUCF sector (Table 1).

²² Forestry Act (OG 140/05, 82/06, 129/08, 80/10, 124/10, 25/12, 94/14)

Table 1. Overview of the most important participants in the forestry sector in Croatia

Sector / activity	Participant
National administration	Ministry of Agriculture Ministry of Environmental and Nature Protection Ministry of the Economy Croatian Environment Agency Advisory service
Industry and clusters	Hrvatske šume Ltd. Ekoneg – institute for environmental protection and energy research, Ltd. Wood Cluster of North-western Croatia, Croatian Wood Cluster Wood Cluster of the Vukovar-Srijem county Viridis - Wood Cluster of Virovitica-Podravina county
Science and research	Faculty of Forestry Croatian Forest Research Institute Oikon Ltd. IRES Ltd.
Professional chambers	Croatian Chamber of Forestry and Wood Technology Croatian Chamber of Economy
Association	Croatian Association of Private Forest Owners Croatian Forestry Society Croatian Academy of Forestry Sciences Association of Producers of pellets, biomass and associated technologies

2.2 Overview of national circumstances

The Republic of Croatia is one of the richest countries in Europe with respect to biodiversity, thanks to its specific geographical location, at the crossroads of several biogeographic regions and characteristic ecological, climatic and geomorphological conditions. There is a great diversity of habitats in the lowland, mountain and coastal areas of Croatia. Its wealth of geomorphological forms, both above and below ground, creates a three-dimensional distribution of habitats, contributing to their richness²³. It is extremely rare to find such a diversity of habitats in a relatively small country such as Croatia.

Croatia is located in the southeast of Europe and its total area covers 87,661 km², of which the land area amounts to 56,594 km². Its land border is 2,028 km long, and the length of the coastline of the mainland is 1,777 km. Along the coast of the Adriatic Sea there are 1,246 islands, islets, rocks and reefs. According to the 2011 census, there are 4,284,889 inhabitants

²³ Biodiversity of Croatia. Jasminka Radović, Kristijan Čivić, Ramona Topić, Vida Posavec Vukelić (ur.). State Institute for Nature Protection, Croatian Ministry of Culture. 1-43.

in the Republic of Croatia. Croatia has a low average population density of 78 inhabitants/km², which is unevenly distributed and ranges from 10 inhabitants/km² in rural areas to 1,232 inhabitants/km² in the City of Zagreb²⁴.

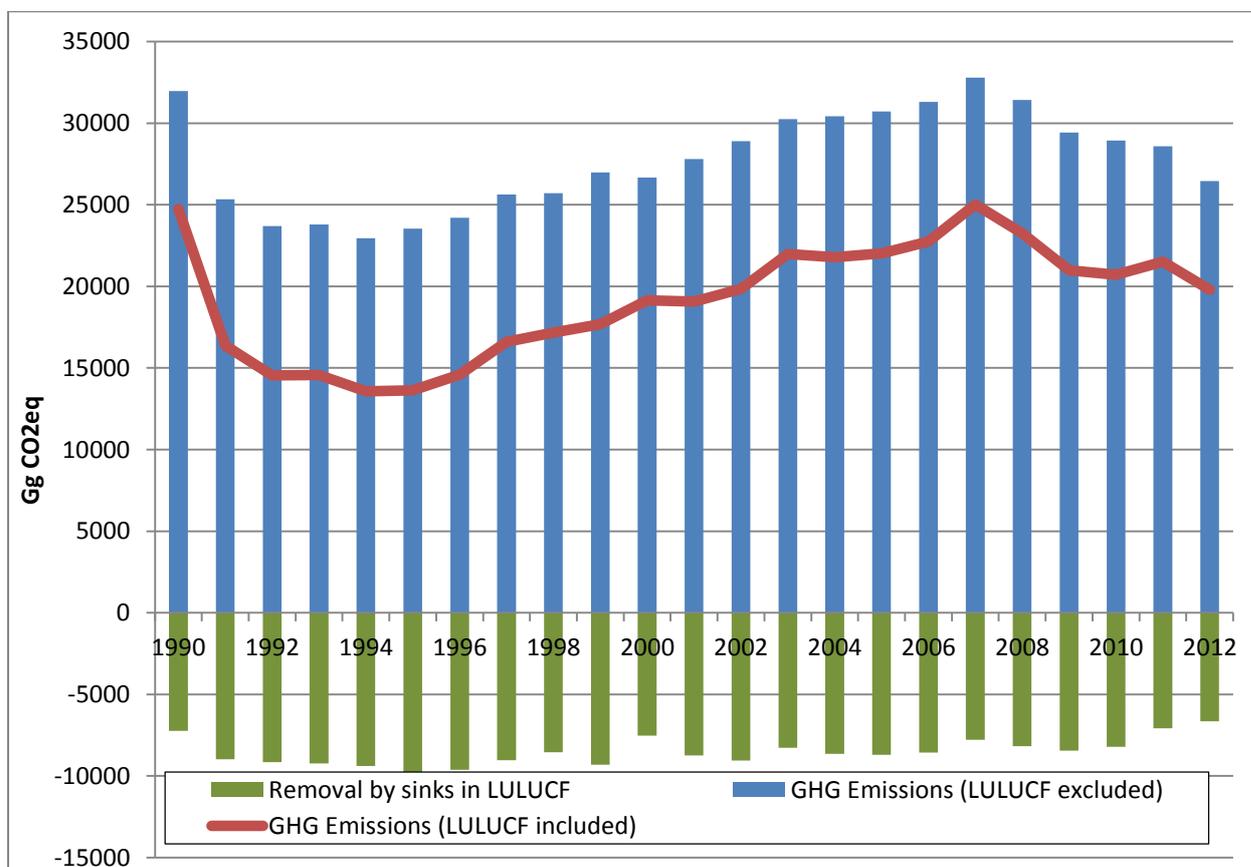


Figure 1. Total emissions and sinks in the period 1990-2012, including and excluding LULUCF sector

All this is the reason for the exceptional complexity of monitoring the carbon balance in the already demanding LULUCF sector. The impact/importance of this sector in the total amount of emissions/sinks in the Republic of Croatia is shown in Figure 1, which shows that sinks from this sector reduce total emissions from the remaining sectors by almost one third.

Within the LULUCF sector, the largest sinks of greenhouse gases are found in the category Forest Land, and partially in the category Grassland, which may be seen in Figure 2. In the remaining categories: Cropland, Wetlands and Populated areas greenhouse gas emissions occur.

²⁴ Rural Development Programme for the period 2014 – 2020, Ministry of Agriculture <http://www.mps.hr/ipard/default.aspx?id=1331> (23/12/2014)

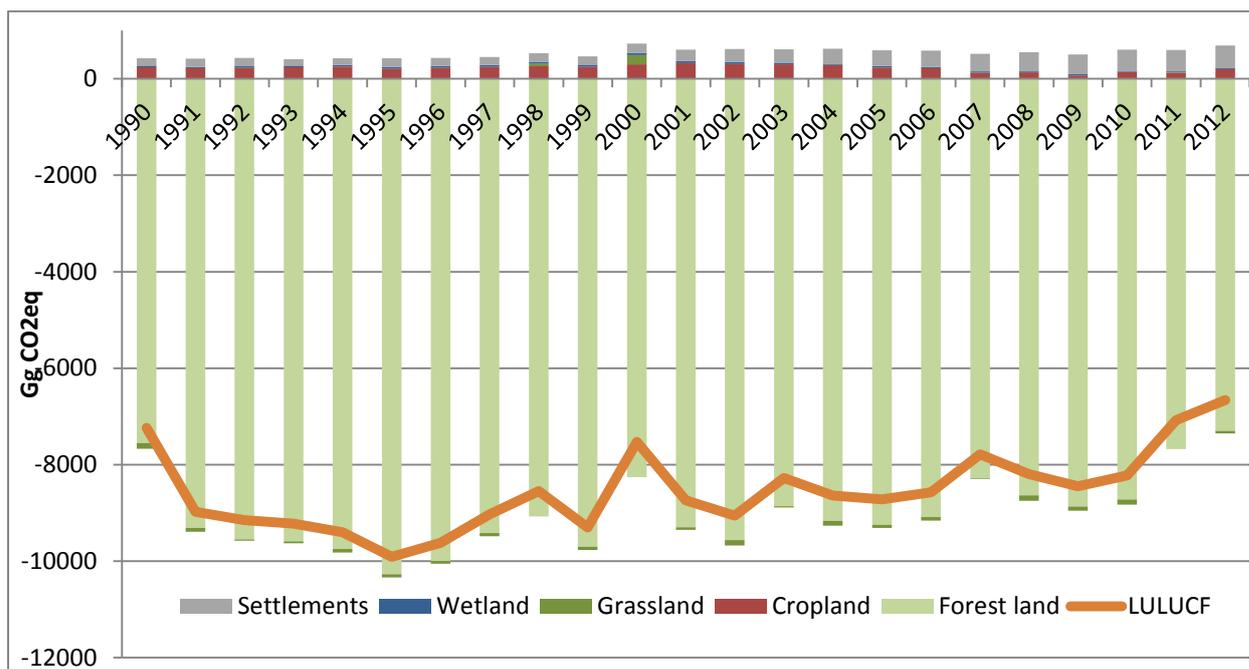


Figure 2. Emissions and sinks in LULUCF sector by categories in the period 1990-2012

Viewed cumulatively, LULUCF is the carbon storage sector. The amount of carbon stored deviated by about 20% to over 40% of the absolute emissions of greenhouse gases in the period from 1990 to 2012. Most sinks relate to the increase in the biomass of trees. Annual growth is increasing from year to year, and this implies an increase in the storage of CO₂. Levels, multi-year trends and variability of storage in the LULUCF sector for the most part depend on the dynamics of the Forest land category.

2.2.1 Forestry

The basic principles of Croatian forestry are sustainable management, with the preservation of the natural structures and diversity of forests, and a permanent increase in the stability and quality of the economic and beneficial functions of forests. Forests and forestland in Croatia are managed on the basis of the forest management plans, adopted for a period of 10 years. Currently, management is conducted pursuant to the plan adopted in 2006, which is valid until 2015. According to this document, the total area of forests²⁵ and forest lands in Croatia is 2,688,687 hectares, which is 47% of the land area of the country. Of this area, 2,106,917 ha are state-owned, while 581,770 ha are in private ownership. The majority of state-owned forests is managed by "Hrvatske šume" d.o.o. (2,018,987 ha)²⁶.

Under the current forest management plan²⁷, it was established that the growing stock in Croatia amounts to 398 million m³, of which 302 million m³ is in state forests, managed by Hrvatske šume; slightly more than 78 million m³ are privately owned forests and 17 million m³ are state forests used by other legal entities.

The annual increase of growing stock in Croatia is 10.5 million m³, of which 8 million m³ are forests managed by Hrvatske šume, and 2.1 million m³ are privately owned forests. Annually, in the forests managed by Hrvatske šume, less than the increment is used, thus ensuring the

²⁵ According to the national definition of forest

²⁶ Hrvatske šume d.o.o. <http://www.hrsume.hr> (23/12/2014)

²⁷ Forest management plans of the Republic of Croatia for the period 2006-2015

future of sustainable management. Etat (allowable cut) indicates the amount of wood biomass that is allowed to be exploited for commercial purposes. Annual plans are adopted each year, while taking care of the increment, which in recent years, as a rule, has been higher than the etat. This means that sustainable management, which will not disrupt the natural balance, is primarily taken into account. The annual etat in the forests managed by Hrvatske šume is on average 5.8 million m³.

Forests and forest lands absorb the greatest amount of carbon dioxide emissions (CO₂). Sink values ranged from -7.30 to -10.27 mil. t of CO₂ equivalent for the period from 1990 to 2012. The percentage of sinks from this LULUCF category for that period ranges from 23.60% to 43.63% of the total emissions in Croatia²⁸. Values differ, depending on the trends of emissions and forestry activities carried out in specific years.

2.2.2 Agriculture

The economic importance of agriculture in Croatia is relatively high and is particularly oriented towards family businesses²⁹. Agricultural activity in the Republic of Croatia is carried out by 233,280 private family farms that use about 1.3 million ha of agricultural land, i.e. an average private family farm in the Republic of Croatia uses 5.6 ha of agricultural land. The arable land of most family farms is very fragmented and plots are often very distant from each other, which is one of the reasons for the inefficiency of agricultural production.

In 2012, 93.2% of the manpower in agriculture included the farmers themselves and/or members of their families. Within the size structure of private family farms farms in the category of less than 2 ha (52.6%) are extremely dominant. Despite the present trend of an increase in the number of private family farms in categories of 20 to 100 ha (7.8%) and 100 to 750 ha (24.1%), their share is still small, i.e. within the size structure of private family farms, farms smaller than 20 hectares are still predominant.

The negative economic trends that marked the economy of the Republic of Croatia in 2012 have left their mark on agricultural production. The value of agricultural production in Croatia in 2012 amounted to 20.91 billion HRK, and, in comparison to the previous year, it decreased by 1.76%. Despite the declining trend in recent years, the agricultural sector accounts for 5.5% of the GDP. A high proportion of the population depends on agriculture and related activities³⁰.

According to data from the Central Bureau of Statistics, the physical volume of gross agricultural production in 2012 compared to 2011 decreased by 9.9%. In the total gross production in 2012, crop production accounted for 55.3% and livestock production 44.7%. The gross reduction of total production was caused by the reduction in crop production, which, in relation to 2011 decreased by 12.3%, while livestock production decreased by 6.8%. In 2012, the utilized agricultural area amounted to 1,330,973 hectares. With respect to the use of agricultural land, the greatest proportion comprised arable land and vegetable gardens, which account for 67.9% of utilized agricultural land, permanent grassland (meadows and pastures) that account for 26%, while orchards account for 2.3%, vineyards 2.2% and olive groves 1.4% of the utilized agricultural land. Compared to 2011, the area of utilized agricultural land increased by 0.4%.

²⁸ Report on greenhouse gases inventory of the RC for 1990-2014 (NIR 2014) Ekoneg d.o.o. Zagreb

²⁹ Research by Central Bureau for Statistics for 2010 (FSS)

³⁰ Rural Development Programme for the period 2014 – 2020. Ministry of Agriculture (Excerpt CBS).

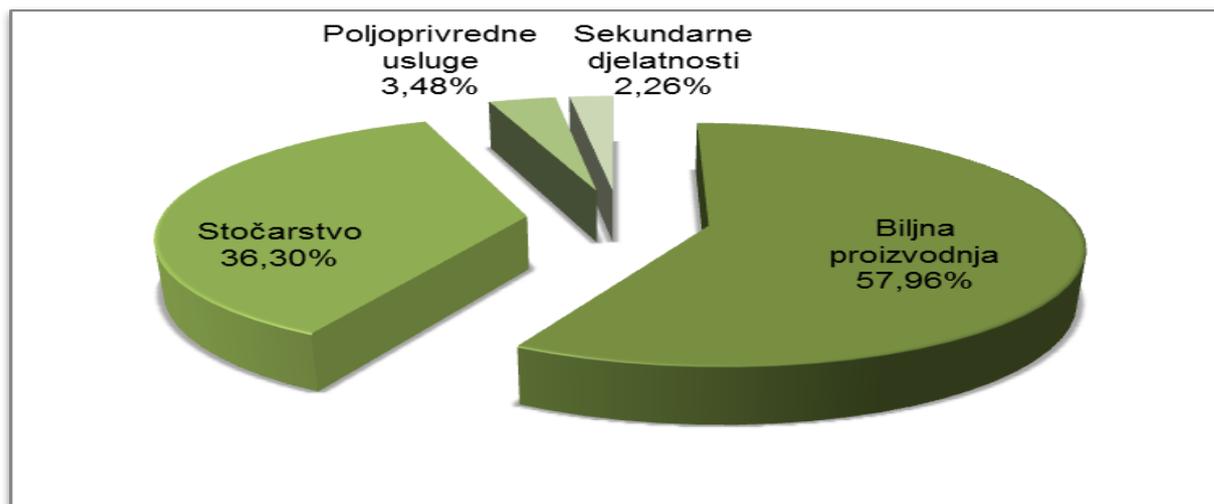


Figure 3. Structure of the value of agricultural production in the Republic of Croatia, 2007-2011 average³¹ (Agricultural services 3.48%; Secondary occupations 2.26%; Livestock 36.30%; Production of fruit and vegetables 57.96%)

Agriculture as an economic branch is represented in two sectors in the National inventory report on greenhouse gas emissions. These are the Agriculture and LULUCF sectors. Emissions from Agriculture sector in 2012 amounted to 3.394 mil. t of CO₂ equivalent. On the other hand, information on the features and areas of annual crops, perennial crops and grasslands, and their conversion to other land categories, included emissions and sinks in the LULUCF sector. Emissions from the Cropland category amounted to 206.93 Gg CO₂ eq in 2012 and sinks in the Grassland category amounted to -48.04 CO₂ eq.

³¹ Annual report on the state of agriculture in 2012 (Green report 2013), <http://www.mps.hr/default.aspx?id=9567> (23/12/2014)

3. TECHNICAL PART

3.1 Calculation and description of trends in emissions and sinks of greenhouse gases for the activities listed in Article 3 of Decision 529/2013 in the period from 1990 to 2012

The figures given below are based on the National inventory report on greenhouse gas emissions in the Republic of Croatia for the period 1990 to 2012 (NIR 2014). This document and related information were delivered to the UN Convention on Climate Change.

Table 2. Matrix of land use and land-use change in the period 1990-2012 in kha³²

Area in kha	1990	2012	2012-1990
5. A Forest land - Total	2,302.47	2,334.27	31.80
5 A 1. Forest land remaining forest land	2,298.93	2,298.63	-0.29
5A1a Forest land remaining forest land - coniferous	199.55	201.98	2.43
5A1b Forest land remaining forest land - deciduous	1,662.34	1,662.01	-0.33
5A1c Forest land remaining forest land - out of yield	437.04	434.65	-2.39
5 A2. LUC in Forest land	3.54	35.64	32.10
A2.1a Annual cropland in forest land	0.00	0.93	0.93
5A2.1b Perennial cropland in forest land	0.00	0.09	0.09
5A2.2 Grassland in forest land	3.54	34.62	31.08
5A2.3 Wetlands in forest land	0.00	0.00	0.00
5A2.4 Settlement in forest land	0.00	0.00	0.00
5A2.5 Other land in forest land	0.00	0.00	0.00
5.B Cropland - Total	1,623.77	1,539.81	-83.96
Cropland annual	1,479.23	1,416.39	-62.84
Cropland perennial	144.54	123.41	-21.12
5B1. Cropland remaining cropland	1,616.44	1,524.05	-92.39
5B1a Annual cropland remaining annual cropland	1,472.06	1,402.70	-69.36
5B1b Perennial cropland remaining perennial cropland	143.06	120.98	-22.08
5B1c LUC perennial cropland in annual cropland	0.43	0.19	-0.24
5B1d LUC annual cropland in perennial cropland	0.89	0.19	-0.70
5B2 LUC in cropland	7.33	15.75	8.43
5B2.1a Forest land in annual cropland	0.00	0.00	0.00
5B2.1b Forest land in perennial cropland	0.00	1.31	1.31
5B2.2a Grassland in annual cropland	6.74	13.51	6.77
5B2.2b Grassland in perennial cropland	0.59	0.94	0.35
5B2.3a Wetlands in annual cropland	0.00	0.00	0.00
5B2.3b Wetlands in perennial cropland	0.00	0.00	0.00
5B2.4a Settlements in annual cropland	0.00	0.00	0.00
5B2.4b Settlements in perennial cropland	0.00	0.00	0.00

³² Report on the greenhouse gas inventory of the Republic of Croatia for the period 1990-2014 (NIR 2014). Ekoneg Ltd., Zagreb.

5B2.5a Other land in annual cropland	0.00	0.00	0.00
5B2.5b Other land in perennial cropland	0.00	0.00	0.00
5. C Grassland	1,210.53	1,216.85	6.32
5C1. Grassland remaining grassland	1,178.66	1,147.30	-31.36
5C2. LUC in grassland	31.87	69.55	37.68
5C2.1 Forest land in grassland	0.00	0.00	0.00
5C2.2a Annual cropland in grassland	29.20	63.86	34.66
5C2.2b Perennial cropland in grassland	2.67	5.68	3.01
5C2.3 wetlands in grassland	0.00	0.00	0.00
5C2.4 Settlements in grassland	0.00	0.00	0.00
5C2.5 Other land in grassland	0.00	0.00	0.00
5. D Wetlands	72.32	74.37	2.05
5D1. Wetlands remaining wetlands	70.06	72.70	2.64
5D2. LUC in wetlands	2.26	1.67	-0.59
5D2.1 Forest land in wetlands	0.00	0.00	0.00
5D2.2a Annual cropland in wetlands	2.04	1.51	-0.53
5D2.2b Perennial cropland in wetlands	0.23	0.17	-0.06
5D2.3 Grassland in wetlands	0.00	0.00	0.00
5D2.4 Settlements in wetlands	0.00	0.00	0.00
5D2.5 Other land in wetlands	0.00	0.00	0.00
5. E Settlements	212.98	256.02	43.04
5E1. Settlements remaining Settlements	190.89	216.32	25.43
5E2. LUC in Settlements	22.09	39.70	17.61
5E2.1 Forest land in Settlements	0.23	2.91	2.68
5E2.2a Annual cropland in Settlements	12.89	16.56	3.66
5E2.2b Perennial cropland in Settlements	1.43	1.84	0.41
5E2.3 Grassland in Settlements	7.54	18.40	10.86
5E2.4 Wetlands in Settlements	0.00	0.00	0.00
5E2.5 Other land in Settlements	0.00	0.00	0.00
5. F Other land	237.34	238.09	0.75
5F1. Other land remaining other land	237.34	238.09	0.75
5F2. LUC in Other land	0.00	0.00	0.00
5F2.1 Forest land in Other land	0.00	0.00	0.00
5F2.2a Annual cropland in Other land	0.00	0.00	0.00
5F2.2b Perennial cropland in Other land	0.00	0.00	0.00
5F2.3 Grassland in Other land	0.00	0.00	0.00
5F2.3 Wetlands in Other land	0.00	0.00	0.00
5F2.5 Settlements in other land	0.00	0.00	0.00
Total area of Croatia	5,659.40	5,659.40	0.00

Articles 3.3 and 3.4 of the Kyoto Protocol include emissions and sinks from the LULUCF sector. Article 3.3 includes activities such as afforestation, reforestation and deforestation, and reporting on these activities is mandatory for all signatories to the Protocol, including the Republic of Croatia. Article 3.4 includes forest management, management of crops and management of pastures. For these activities, the signatories reported on a voluntary level

during the first accounting period, while during the second period (2013-2020), reporting on forest management is mandatory but reporting on other activities covered by Article 3.4 is still voluntary. The Republic of Croatia, therefore, for the purposes of the Protocol, reports on afforestation and reforestation (AR), deforestation (D) and forest management (FM).

Figures 4-6 show past trends of emissions and sinks of greenhouse gases for the activities of ARD and FM. Data are presented with emissions from forest fires included.

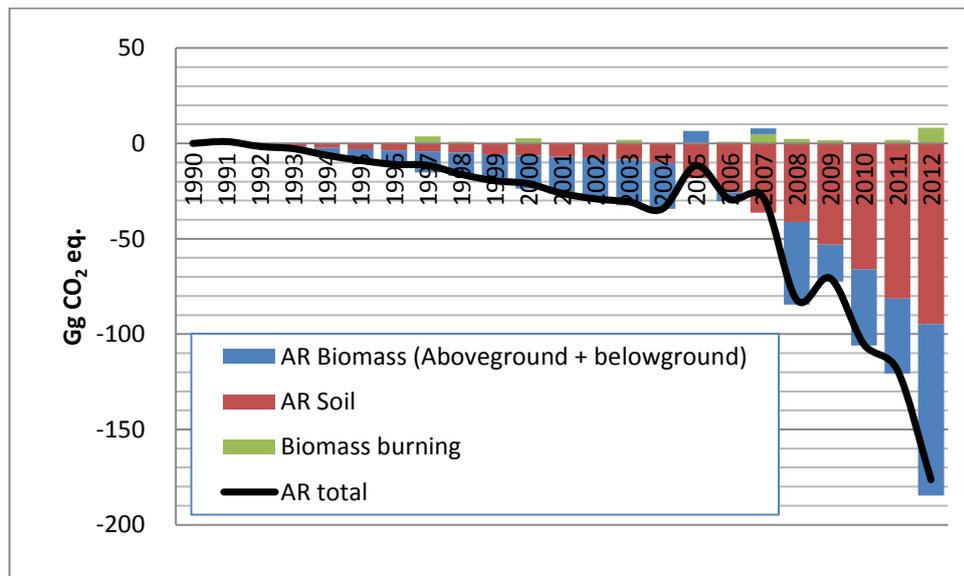


Figure 4. Emissions and sinks for afforestation activities (AR) under Article 3.3 in the period from 1990 to 2012 in Gg CO₂ eq

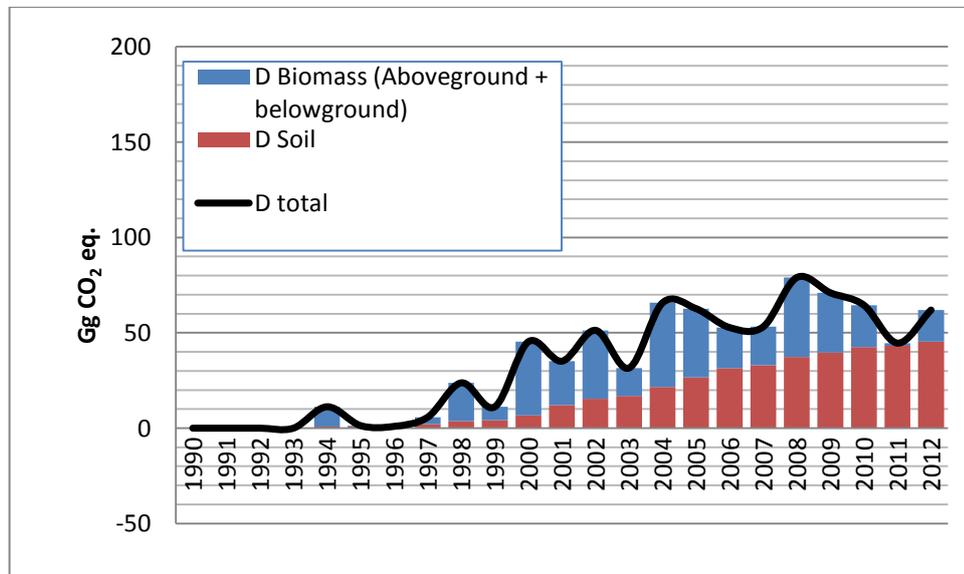


Figure 5. Emissions and sinks for the activity of deforestation (D) under Article 3.3 in the period from 1990 to 2012 in Gg CO₂ eq

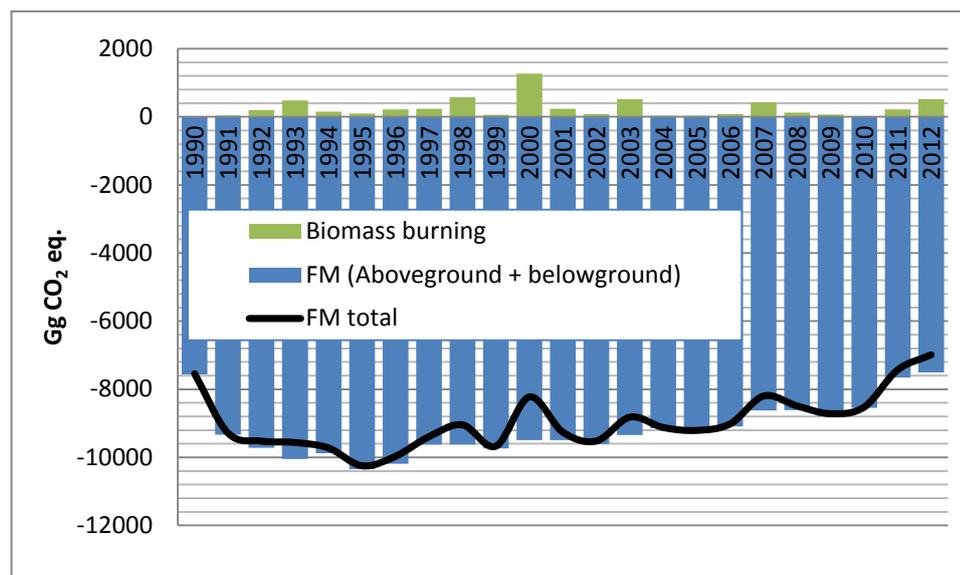


Figure 6. Emissions and sinks for the activity of forest management (FM) under Article 3.4 in the period from 1990 to 2012 in Gg CO₂ eq

For the activities of afforestation and reforestation (AR), dead wood does not represent a source of emissions and the forest litter pool is contained in the soil. In the case of deforestation (D), dead wood is covered in deforested aboveground biomass, while the litter in this case is also covered in the soil pool. Activities under Article 3.3, for most of the observed years from 1990 onwards, represent emissions, while significant sinks have only occurred since 2010 (-40.94 Gg CO₂ eq), and in 2012 they amounted to -114.46 Gg CO₂ eq.

Forest management showed a trend of sink increase from 1990 to 1995, after which sinks decreased and in 2012 amounted to -6,988.73 Gg CO₂ eq. The calculation included the above-ground and underground biomass, that is its increase, while dead wood and litter (included in the soil) are not a source of emissions. These values were calculated using the 1996 IPCC guidelines³³, and the 2003 *Good practice guidance for LULUCF*³⁴.

For the next report and calculation, according to the UNFCCC as well as EC, the new 2006 guidelines³⁵ and 2013 KP supplement³⁶ will be used.

The Republic of Croatia did not choose Cropland Management and Grazing land management for reporting during the first commitment period of the Kyoto Protocol.

Like every other member state of the European Union, Croatia will have to report on emissions and sinks arising as a result of activities carried out on Cropland management and Grazing land management surfaces after the First Accounting period. Given that the obligation of delivery of initial data and information on emissions and sinks to the European Commission, due to implementation of these activities, will start with the NIR 2015, Croatia is currently in the process of identifying areas that need to be reported as areas that are the subject of Cropland management and Grazing land management activities.

For the purpose of this plan, the only information currently available is from NIR 2014, relating to the conversion of *Forest land* to cropland and grassland. By conducting the detailed process

³³ *Revised 1996 IPCC guidelines for national greenhouse gas inventories*. Intergovernmental Panel on Climate Change, 1997.

³⁴ *Good practice guidance for land use, land-use change and forestry*. Institute for Global Environmental Strategies, 2003.

³⁵ *Agriculture, Forestry and Other Land Uses (AFOLU): 2006 IPCC/Guidelines for National Greenhouse Gas Inventories (Volume 4)*. Intergovernmental Panel On Climate Change, Institute for Global Environmental Strategies,

³⁶ 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol.

of identifying the areas (IPCC, *Approach 3*) that were the subject of reforestation and deforestation in the period 1990-2012, it was established that there was no conversion of *Forest land* to grassland. Conversion of *Forest land* to perennial cropland (FL-pCL) began in 2004, which was enabled by decisions of the Croatian Government and subsequently by the Forestry Act in 2005. In addition, the Agricultural Land Act (OG 39/13) enabled the conversion of *Forest land without tree cover* and land covered with initial or degraded development stages of forest stands (maquis, garrigue, shrubs, etc.), with the consent of the ministry responsible for forestry, into the type of land suitable for agricultural production. Annual land conversion and the related emissions and sinks are shown in Table 3.

Table 3. Annual land conversion and related emissions and sinks

FL-pCL	2004	2005	2006	2007	2008	2009	2010	2011	2012
Area (kha)	0.042	0.030	0.028	0.147	0.131	0.487	0.171	0.167	0.104
Emissions/sinks (GgCO ₂)	0.83	0.31	0.08	6.07	0.97	7.06	-2.26	-0.57	-5.02

3.2 Projections and assessment of mitigation potential

The Republic of Croatia does not have projections of emissions/sinks due to the implementation of the activities listed in Article 3 of the Decision 529/2013/EC, which would be prepared at the national level. Activities related to the transfer of knowledge necessary for strengthening the capacity of Croatian institutions for preparation of these projections, will be initiated during the *Second commitment period*.

3.2.1. Projections and assessment of mitigation potential in forestry

According to the guidance of the European Commission³⁷, the measures in the forestry sector, by which carbon dioxide sinks are maintained or increased, are classified into two main groups:

- A. Afforestation, reforestation and preventing deforestation
- B. Forest management

For the purposes of assessment of potential for reductions of greenhouse gas emissions by implementation of these activities, the Republic of Croatia has created projections of some of the parameters important for calculation of emissions/sinks from these activities.

A. AFFORESTATION, REFORESTATION AND PREVENTING DEFORESTATION

- **Afforesting environmentally suitable areas or degraded lands**

This measure is recognized as the measure that has the most significant effect on the impact on climate change mitigation and adaptation to climate change.

Pursuant to the provisions of the Forestry Act, afforestation of land without tree cover was carried out in the Republic of Croatia through sowing seeds and planting seedlings on areas that were predominantly degraded (rocky ground and sparse grasslands in the karst area).

³⁷ Guidance on Member State reports providing: 'Information on LULUCF actions' in accordance with Article 10 of EU Decision 529/2013/EU

From 1990 to 2012, a total of 4,917.64 ha were forested in this way in the Republic of Croatia, i.e. 213.81 ha on average per year, of which the karst area of the Mediterranean area accounts for about 3,000 ha or 61%. In addition to reforestation, the natural expansion of forests was possible on land without tree cover that was actually grassland and to a lesser extent on abandoned arable land and perennial cropland (mostly private land) prior to 1990. The total increase in the forest area in the 1990-2012 period is shown in Figure 7, and a projection of the increase in the area is given in Table 4.

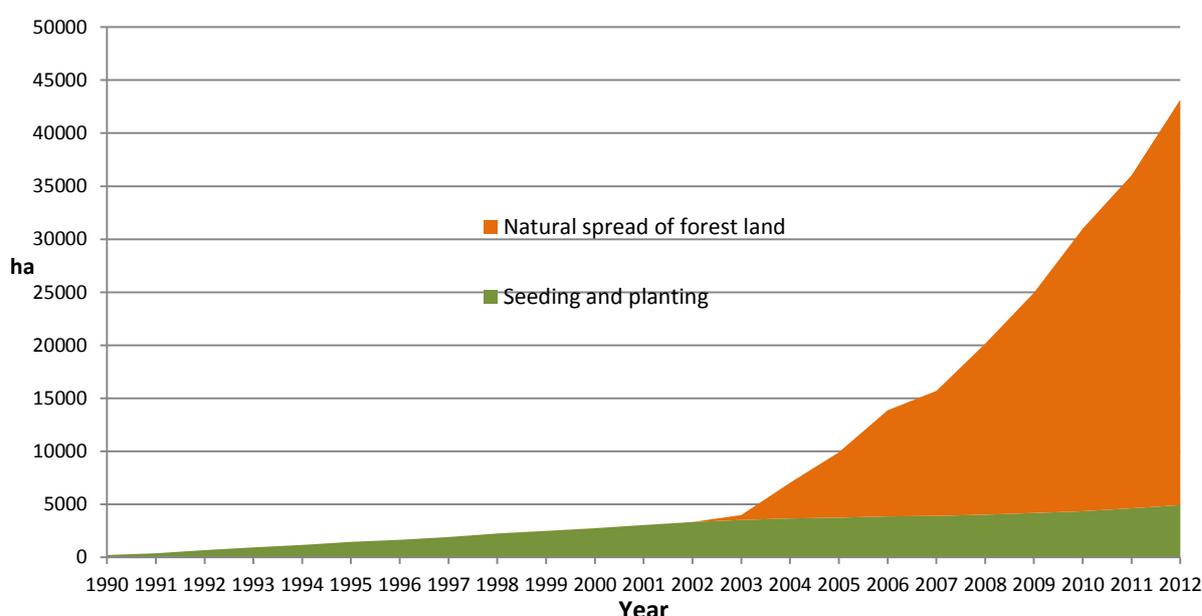


Figure 7. Graphical representation of the total increase in forest area from 1990 to 2012

Table 4. Overview of the increase in forest area so far, from 1990 to 2012 and projections according to 3 scenarios

2020 scenario	Increase in new surfaces	Period 1990-2012		Projection 2013-2020		Total 1990-2020	
		Deciduous	Coniferous	Deciduous	Coniferous	Deciduous	Coniferous
ha							
Without measures	Seeding and planting	1,295	3,623	89	248	1,384	3,870
	Natural expansion	34,809	3,440	3,029	299	37,837	3,740
With measures	Seeding and planting	1,295	3,623	478	1,337	1,773	4,960
	Natural expansion	34,809	3,440	12,071	1,193	46,880	4,633
With additional measures	Seeding and planting	1,295	3,623	997	2,787	2,292	6,410
	Natural expansion	34,809	3,440	24,215	2,393	59,023	5,834

- **Measures for preventing deforestation**

These measures have been successfully implemented since 1990 and are regulated by law. According to Article 35 of the Forestry Act, deforestation may be carried out with the special permission of the ministry competent for forests. Up to 2004, deforestation was carried out on a smaller scale, mainly due to the construction of infrastructure (mostly highways). Since 2004, by

the decisions of the former Government, the establishment of easements for forest land is allowed for growing perennial crops, which is regulated by the Forestry Act in 2005 and the *Regulation on the procedure and criteria for the establishment of an easement in forests or forest land owned by the Republic of Croatia to raise perennial crops* (OG 121/08), which was in force until the amendments to the Forestry Act (OG 94/14).

The scenario "with additional measures" (Table 5) implies the setting of statutory priorities in the case of expansion of agricultural land, or the exploitation of abandoned agricultural land as the first solution, and only after that the conversion of part of the forest land (productive forest land without tree cover on which afforestation is not prescribed and lower cultivated cover forms, which by the KP definition are not forests).

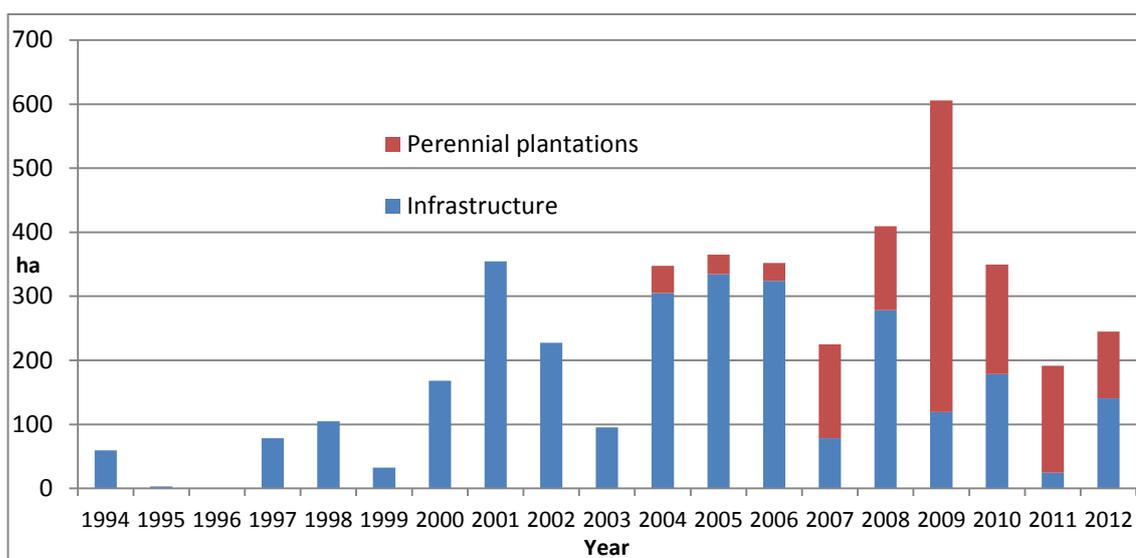


Figure 8. Graphical representation of deforested area, by use

Table 5. Deforestation projections until 2020

Scenario	Deforested 1990-2012			Projection 2013-2020			Total 1990-2020		
	Deciduous	Coniferous	Total	Deciduous	Coniferous	Total	Deciduous	Coniferous	Total
Without measures	3,534	680	4,215	4,214	811	5,025	7,748	1,491	9,240
With measures	3,534	680	4,215	2,107	405	2,512	5,641	1,085	6,727
With additional measures	3,534	680	4,215	1,053	203	1,256	4,587	883	5,471

B. FOREST MANAGEMENT

In order to determine emission reduction potential by implementation of this activity, two scenarios have been provided for projections. The "existing" scenario assumes that the current trend of increasing growing stock will continue. The increment would be somewhat reduced because of the "rearrangement" of the age groups of the main classes of regular forests (seed plants of beech, oak and sessile), where the growing stock was piled up in older age classes. Etat would continue with slight growth and in 2020 it would reach a value of about 6.5 million m³ (Tables 6 and 7).

The "lower" scenario assumes that the growth of growing stock will significantly slow down, the increment would fall below 10 million m³, and etat would slightly increase and reach a value of about 6.2 million m³. Here we take into account the significant increase in natural disasters such as the one which occurred in Gorski Kotar in early 2014. It was only possible to draw up projections of certain types of assortments up to 2020 for the scenario with existing measurements (BaU, Figure 9).

During 2015, the new Forest Management Area Plan for the period 2016-2025 will be prepared and it will include presentation of forest and forest land areas, assessment of growing stock and increment, a plan for biological forest regeneration and regulation of etat for the entire forest management area in Croatia.

Table 6. Overview of the initial and final growing stock and increment

Scenario	Group	Area	Condition in 2013		Condition in 2020	
			Growing stock	Increment	Growing stock	Increment
		ha	m ³	m ³	m ³	m ³
Existing	Deciduous	1,658,420	359,680,715	9,068,108	370,000,000	8,800,000
	Coniferous	205,913	53,047,076	1,175,974	54,300,000	1,200,000
	Total	1,864,332	412,727,791	10,244,082	424,300,000	10,000,000
Lower	Deciduous	1,658,420	359,680,715	9,068,108	364,000,000	8,650,000
	Coniferous	205,913	53,047,076	1,175,974	53,600,000	1,200,000
	Total	1,864,332	412,727,791	10,244,082	417,600,000	9,850,000

Table 7. Etat projections up to 2020

Scenario	Group	Cut in 2013	Projection to 2020	Annual average for the period 2013-2020
		m ³	m ³	m ³
Existing	Deciduous	5,039,718	5,550,000	5,294,859
	Coniferous	913,868	950,000	931,934
	Total	5,953,586	6,500,000	6,226,793
Lower	Deciduous	5,039,718	5,270,000	5,154,859
	Coniferous	913,868	930,000	921,934
	Total	5,953,586	6,200,000	6,076,793

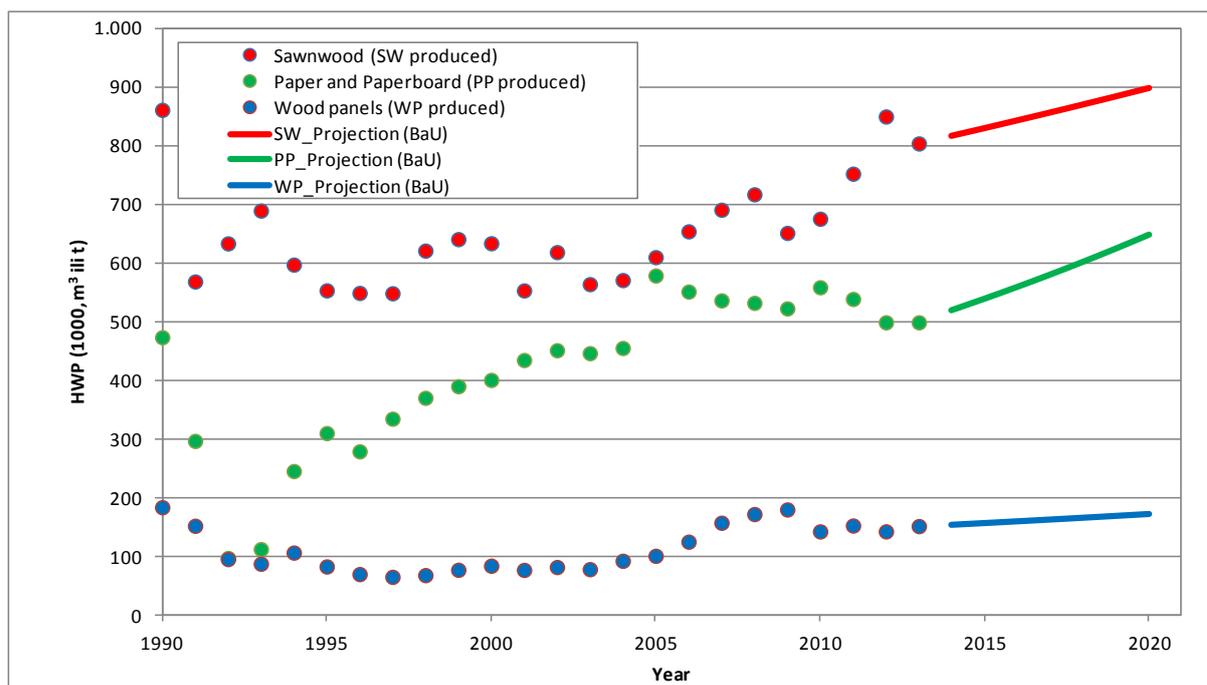


Figure 9. Wood assortments, production and projections

Due to the large deviations from the trend during the war years (1990-1993), projections of production of wood products from domestic resources are based on the 1994-2013 period. Based on the available data on production in the analysed period, chain indices have been calculated, and on that basis the average rates of change. Average annual rates of change for sawn wood (SW) amount to 1.58%, for wood-based panels (WP) 1.88%, and for paper and paperboard (PP) 3.80%. Projections of production of wood products up to 2020 are based on the values of the average annual rate of change of production. For all three components considered, there is a visible trend of increased production in the coming period.

Measures to ensure the maintenance/increase of carbon dioxide sinks in the forestry sector, which are appropriately recognized in the Rural Development Programme of the Republic of Croatia for the period 2014-2020 are shown in Table 8.

It is currently not possible to prepare a quantitative assessment of the technical potential to reduce emissions and increase sinks (i.e. the potential that can be maximally achieved taking into account the biophysical characteristics of the system) of the defined measures. Therefore, the estimate given by Smith et al. (2014) was applied. The assessment is given in a reduced form, without a detailed analysis of the measures and in relatively broad categories. Although the technical potential of all measures in forestry has been graded³⁸ as B (1-10 t CO₂ eq ha⁻¹ yr⁻¹), with the use of additional information from the national/regional level and expert opinions, it would be possible to narrow down the range for each measure, and thus improve the national assessment of the technical potential to reduce emissions and increase sinks, as well as the marketing (Smith 2012) potential of the selected measure.

³⁸ In the original Smith et al. (2014), the authors do not use grades but three shades of grey. For easier monitoring, shades of grey are replaced by grades A, B and C.

Table 8. Summary of potential for emission reduction and sink increase in the forestry sector (adapted Table 11.1 from Smith et al. 2014).

Categories	Practices and impact (on carbon – C; methane – CH ₄ and nitrous oxide – N ₂ O)	Technical mitigation potential*	Easiness of application**	Application time scale***
Reducing deforestation	C: Preservation of existing carbon pools in the forest vegetation and soil by controlling deforestation, conservation of protected forests, and control of other anthropogenic disturbances, such as fires and outbreaks of pests, reduction of slash and burn (clearing and burning of forests) agriculture, reduction of forest fires	B	B	A
	CH ₄ , N ₂ O: Protecting peatlands, reducing open fires.	B	C	C
Afforestation/ Reforestation	C: Increase in biomass stock by planting trees on agricultural land without tree cover. This may include monoculture or mixed species planting. These activities can provide a range of other social, economic and environmental benefits.	B	A	A
Forest management	C: Sustainable forest management for wood production, including the extension of rotation, reducing damage to residual trees, reducing wood waste, application of practices aimed at the protection of soil, fertilization and the use of wood in an efficient way, sustainable use of energy from wood.	B	B	A
	CH ₄ , N ₂ O: Fire spreading modifications.	B	C	B
Forest restoration	C: Protection of secondary forests and other degraded forests whose density of biomass and soil carbon is less than the maximum, in order to allow storing of carbon by natural or assisted restoration, repair of degraded land, long-term preserving of fallow land.	B	B	A
	CH ₄ , N ₂ O: Fire spreading modifications.	B	C	B
<p>* Technical mitigation potential (t CO₂ eq ha⁻¹ yr⁻¹): high > 10 (A); medium = 1–10 (B); low < 1 (C).</p> <p>** Ease of application (acceptance or adoption by land owner): Easy, i.e. universally applicable (A); medium (B), hard (C).</p> <p>*** Application time scale: immediately (technology is available) (A); medium term (experiments are set, within 5-10 years) (B); long term (currently at the level of research and development) (C).</p>				

3.2.2. Projections and assessment of mitigation potential for cropland management and grazing land management

The assessment of the technical potential for reducing greenhouse gases, emission reduction measures and increasing sinks of greenhouse gases for ***Cropland management and grazing land management*** is based on a selection of measures in three main areas:

- Promoting carbon storage
- Reduction of emissions of nitrous oxide
- Management of permanent grassland

The qualitative potentials are given below of greenhouse gas emission reductions through the implementation of measures relating to agricultural land categories, which are recorded in the various national laws and strategic documents, in view of the fact that the Republic of Croatia currently does not have data and information for the purposes of a quantitative display of the potential for reduction of individual measures, which would be the result of scientific research at the national level.

Measures to reduce emissions or increase sinks, which may occur due to the manner of management of cropland and grazing land, are defined in accordance with the Rural Development Programme of the Republic of Croatia for the period 2014-2020, and in accordance with national regulations, such as the Ordinance on cross-compliance³⁹.

A. MEASURES REQUIRED BY THE RULES OF CROSS-COMPLIANCE

- **GAEC 4. Minimum amount of soil covered.**

Leaving stubble and mulch (plant cover)

By applying the agrotechnical measure of not ploughing in crop residues, potential for carbon dioxide (CO₂) emission reduction is achieved since the soil is not exposed in the furrows. Whether it is a matter of the remains of cereal grain or mulched crop residues, *in-situ* soil carbon sequestration (SOC) as well as storage of biological carbon by microbial mass are achieved after the harvest. The mulch is also effective in preventing water and wind erosion, and it thus contributes to the preservation and conservation of humus and terrestrial carbon (Lal, 2008).

- **GAEC 5. Minimal management of agricultural land according to the specific characteristics of the soil**

On agricultural areas with a slope gradient equal or greater than 15% basic tillage must be carried out exclusively vertically to the slope.

This measure aims to prevent the erosion of agricultural land, that is the removal of humus and organic carbon precipitation. 46% of agricultural land in Croatia is exposed to high or medium risk of water erosion (Husnjak et al., 2002). Long-term measurement of water erosion recorded a soil loss ranging from 13.7 to 71.0 t/ha in Pannonian Croatia (Kisić et al., 2005). Measures of compulsory protection against erosion by water and wind are prescribed by the Agricultural Land Act⁴⁰, the Regulation on Agrotechnical Measures⁴¹ and the Ordinance on cross-compliance⁴².

³⁹ OG 27/14

⁴⁰ OG 39/13

- **GAEC 6. Management of crop residue**

Prohibition of burning crop residues.

Repeated use of crop residues for energy purposes, removal for other purposes (construction, paper production, etc.) or their burning on the parcel causes a negative balance of organic carbon in the soil, while reducing the amount of humus, or causing a decline in soil quality with adverse effects on the environment. The amount of crop residues can be roughly estimated with the help of the harvest index (ratio of biological and mercantile yield). The usual harvest index for wheat and barley is 1.5, for corn, soybeans and oats 1.0, and for potato and sugar beet 0.25. Therefore, with wheat yield of 5 t ha⁻¹ 7.5 t ha⁻¹ of straw is expected, with maize yield of 10 t ha⁻¹ the amount of crop residues is equal, while sugar beet yield of 60 t ha⁻¹ leaves 15 t ha⁻¹ of tops and leaves (Vukadinović, V., 2014). Measures prohibiting the burning of crop residues and leaving crop residues on agricultural soil are prescribed as mandatory and can significantly contribute to the increased storage of carbon in the soil.

- **SMR 1. Standards for nitrates**

Mandatory measures for farmers whose farms are located in nitrate-vulnerable zones

Limiting nitrogen input, as well as mandatory soil analysis for fertilization, in line with the needs of plants for nutrients and the available quantities of nutrients in the soil leads to the prevention of accumulation of nutrients and leaching or release into the atmosphere. Measures prohibiting application of animal manure during the winter period affect emissions of ammonia (NH₃) and nitrous oxide (N₂O). Indirectly, mandatory measures of storage of excess manure in the prescribed containers, reduces the emission of volatile nitrogen compounds into the atmosphere.

B. ADDITIONAL MANDATORY MEASURES REFERRED TO IN THE RULES OF AGRICULTURAL PRACTICES BENEFICIAL TO THE CLIMATE AND THE ENVIRONMENT, GREEN PAYMENT (GREENING)

- **Crop diversification**

The obligation of sowing (production of) different crops in production areas has a positive effect on reducing greenhouse gas emissions, particularly in the inclusion in legumes crop rotation. In an indirect way, by changing the crop culture, the occurrence of harmful organisms and the use of pesticides are reduced. Legumes in the soil bind nitrogen from the atmosphere and store it as a fertilizer, thereby reducing the need for use of synthetic nitrogen fertilizers.

- **Prohibition of conversion of permanent grassland into arable land**

This measure retains the existing greenhouse gas emissions within the existing margins. Any change in land use would cause direct and indirect emissions into the atmosphere. Direct emissions of CO₂ and N₂O would occur due to land cultivation, while indirect emissions would occur from agricultural inputs: fertilizers, pesticides, fossil fuel use for the equipment, etc.

- **Mandatory maintenance of 5% of ecological focus areas, for farms with more than 15 ha of arable land.**

⁴¹ OG 142/13

⁴² OG 27/14

Ecological focus areas related to green payments are ditches, hedges, individual trees, alleys, traditional terraces, green fallow, field edges, ponds, agro-forestry systems, energy crops, cover crops and legumes, and similar features. In accordance with the legislation, for private family farms, an area under organic farming is accepted as an equivalent. This measure is aimed at reducing arable land, which is a source of greenhouse gas emissions and storage of carbon dioxide.

Other liabilities for direct payments, which have an impact on reducing greenhouse gas emissions, and that are defined in accordance with the Regulation on direct payments⁴³ are:

- **Minimum requirements for maintaining agricultural land in a condition suitable for grazing**

Mandatory mowing of an area under permanent grasslands and pastures, at least once a year, encourages the growth of vegetation and storage of carbon in the biomass. Indirectly, the condition of keeping domestic animals of at least 0.2 conditional heads per hectare provides grassland fertilization and ensures the circulation of nitrogen and carbon in grasslands.

C. VOLUNTARY MEASURES IN THE RURAL DEVELOPMENT PROGRAMME OF THE REPUBLIC OF CROATIA FOR THE PERIOD 2014-2020

C.1. M10 – Agri-environment and climate

- **M10_01. Tillage on terrain with a 9-15% slope**

The measure aims at the focus area 4C⁴⁴ soil management and indirectly affects the focus areas 4B - water management and 5A - promoting efficiency in the use of water in agriculture. The measure affects: reducing the risk of erosion. The measure is to meet the mandatory obligations from GAEC-2 standards in cross-compliance. The mandatory drafting of a crop rotation plan additionally affects fertilization in accordance with the requirements of soil and cultures, thus avoiding unnecessary intake of excess fertilizer. Furthermore, the mandatory crop rotation plan has a positive effect on greenhouse gas emissions if there are legumes present in the rotation as fixators of atmospheric nitrogen. Given the high proportion of agricultural land exposed to erosion in the Republic of Croatia (Husnjak and al. 2002), this measure should include an even larger area and further reduce carbon losses from the soil.

- **M10_02. Grassing of permanent crops**

The measure aims at the focus area 5D - reducing greenhouse gas emissions. Indirectly, the measure also affects focus areas 4B, 4C, 5A and 5E. Grass-clover mixtures, which are mandatory, are beneficial for nitrogen fixation both from the soil and the atmosphere. In addition to binding terrestrial and atmospheric nitrogen, clover creates biomass, which additionally affects nitrogen and carbon storage. Studies have found that certain types of clover can, in different parts, fixate 85-250 kg of nitrogen per year, while alfalfa can fixate up to 300 kg of nitrogen per year (Leto, 2003). In Croatia, research has been conducted on white clover (lat. *Trifolium repens spp.*), which is mainly found in mixtures and whose contribution can be up to

⁴³ Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009

⁴⁴ The focus areas relating to the areas of the Rural Development Programme of Croatia in line with the objectives of the EU fund EARDF

250 kg N/ha. Indirectly, due to the lack of the use of machinery for inter-row processing, emissions of fossil fuel from processing machinery are reduced.

- **M10_03. Protection of grasslands of high natural value**

This measure aims at the focus area 4A – *Restoring, preserving and enhancing biodiversity*. Indirectly, the measure has an effect on focus area 5E - encouraging carbon storage and sequestration. Croatia is very rich in grasslands of high natural value, particularly in karst areas. Disturbance of the natural values of grasslands due to overgrazing, burning of biomass, occurrence of invasive plant species, and excessive application of fertilizers can disrupt the grassland carbon storage system (Smith, 2008). The measure also leads to a reduction in emissions of nitrous oxide and ammonia, primarily through the prohibition of mineral and organic fertilizers.

- **M10_04. Pilot measure for protection of the corncrake bird (lat. *Crex crex*) and M10_07 Pilot measure for protection of the blue butterfly population**

These measures are aimed at focus area 4A - *Restoring, preserving and enhancing biodiversity*. Indirectly, these measures have an effect on focus area 5E. These pilot measures have a limited impact on greenhouse gas emissions, but due to prohibitions of the use of fertilizers and pesticides, they can contribute to reducing emissions of nitrous oxide and ammonia.

- **M10_06. Establishment of field margin strips**

The measure aims at the focus area 4A - *Restoring, preserving and enhancing biodiversity*. Indirectly, the measure affects focus areas 5D and 5E. This measure has limited significance from the standpoint of reducing gas emissions and sequestration of carbon dioxide. Prohibition of fertilization and pesticide application indirectly reduces emissions of nitrogen gases in areas where the strips are located. Moreover, in areas under strips (grass or flowers), agrotechnical measures are not implemented and carbon is maintained in the soil.

- **M10_07. Maintaining traditional orchards**

The measure aims at the focus area 5E - encouraging carbon storage and sequestration. Indirectly, it affects focus areas 4A - *Restoring, preserving and enhancing biodiversity* and 5D - reducing greenhouse gas emissions. Traditional orchards, unlike modern intensive orchards, have more developed tree trunks and crowns and are thus greater carbon pools. Due to the developed crowns, the number of trees is lower per unit area and the grass between the trees is mowed or used for grazing.. By prohibition of the use of fertilizers and sludge, and limiting the density of livestock units per hectare, the emissions of nitrous oxide and ammonia are additionally limited.

- **M10_8. Maintaining extensive olive groves.**

This measure aims at focus area 4A - *Restoring, preserving and enhancing biodiversity*. Indirectly, it affects focus areas 5D and 5E. As with measure M_10 protection of traditional orchards, the use of mineral fertilizers and synthetic sludge is prohibited, while the application of pesticides used in organic farming is allowed. Maintaining the space between olive trees is achieved by grazing or mowing, and smaller branches are not burned. Application of this measure influences carbon storage in grass biomass and emissions of nitrogen are indirectly reduced.

C.2. M11 Organic farming

This measure aims at focus area 4A - restoration, preservation and increase of biodiversity. Indirectly, the measure affects focus areas 4B, 4C, 5D and 5E. Organic farming is a production system that directly leads to a reduction in greenhouse gas emissions and conservation of carbon in the soil. The mandatory requirements set by the legislation are: mandatory crop rotation, planting/seeding of varieties adapted to the soil and climate, a minimum level of tillage, use of compost as a basic organic form of fertilization, maintaining levels of humus in the soil, prohibition of the use of synthetic pesticides, establishment of mixed types of farms, etc.

According to the published reports, (IFOAM, 2009), organic farming has the sequestration potential of up to 32% of the total greenhouse gas emissions of conventional agriculture. Organic cropping, which includes fertilization with organic fertilizers, crop rotation and cover crops can sequester 0.2 to 2.3 t/ha/year, depending on the type of soil. The system of composting of plant and animal remains binds up to 1 t of carbon/ha/year. As the Action Plan of Organic Farming in Croatia 2011-2016 predicts an increase in areas under organic farming up to an 8% share in total agriculture, it can be considered to have great potential for reducing greenhouse gases.

INTEGRATED PRODUCTION, as a national measure, is not included in the rural development programme.

This measure is aimed at focus area 4B - management of fertilizer and pesticides. The agro-technical measures prescribed in the Technological Guidelines are aimed at reducing greenhouse gas emissions in integrated production. Crop rotation is mandatory, as well as a fertilization plan and selection of varieties adapted to the soil and climate.

4. POLICY ON A NATIONAL LEVEL

Although the provisions of the Environmental Protection Act⁴⁵ do not directly give guidance in terms of emission reduction/ increase of removal from the forestry sector, nor those related to preservation/enhancement of carbon storage, the *Act* prescribes the obligation of preparation of an environmental impact study for activities performed in the environment.

According to the provisions of the *Regulation on assessment of environmental impact*⁴⁶ an evaluation of the need for assessment of the environmental impact should be carried out for activities such as: the use of uncultivated or partly-natural land for intensive agriculture with an area of 10 ha or more, initial afforestation for conversion of land with an area of 50 ha or more, and deforestation for conversion of land with an area of 10 ha or more. These provisions indirectly include an assessment of the impact of specific activities on the existing carbon pools, and the impact on future carbon sink in those pools.

The Air Protection Act⁴⁷ establishes the obligation of adopting the Low-carbon Development Strategy of the Republic of Croatia, which gives the long-term direction of economic and social development towards a society with low greenhouse gas emissions. The Low carbon Development Strategy defines guidelines for long-term action by defining objectives in accordance with Article 4, paragraph 1 of Regulation (EU) No. 525/2013⁴⁸, and determining measures for their realization, taking into account the current situation and international obligations.

Given that some of the strategic plans were adopted prior to or at the beginning of the process of Croatia's accession to the European Union, and that they (e.g. the National Environmental Protection Strategy⁴⁹) do not contain provisions relating to the maintenance/increase of carbon pools in forest ecosystems and wood products, it will be necessary to revise them in the coming period and to align them with the provisions of the legislation adopted after the accession of the Republic of Croatia to the EU. Additionally, upon adoption of the Low-Carbon Development Strategy, certain modifications to strategic documents that are of particular importance on a horizontal level, e.g. the Sustainable Development Strategy of the Republic of Croatia, will be required⁵⁰.

Although the revision of some key documents is forthcoming in the Republic of Croatia, it should be noted that Croatia took significant steps in adopting regulations governing the issue of reducing greenhouse gas emissions and climate change mitigation, during and after completion of the process of joining the European Union.

One of the more important documents is the Plan for Air and Ozone Layer Protection and Climate Change Mitigation for the period 2013-2017⁵¹. Under this plan, the framework is defined for a Strategy of Low-carbon Development, including the LULUCF sector. This plan sets out the objectives, measures and priorities for, amongst other things, reduction of greenhouse gas emissions. The overall objective is: "C4. Reducing and limiting emissions of greenhouse gases and substances that deplete the ozone layer and maintaining the level of sinks of greenhouse gases ", with the individual objectives:

⁴⁵ OG 80/13

⁴⁶ OG 64/08

⁴⁷ Ibid

⁴⁸ *Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC*

⁴⁹ OG 46/02

⁵⁰ OG 30/09

⁵¹ OG 139/13

- C4.1 Reduction and limitation of emissions of greenhouse gases and substances that deplete the ozone layer in the period from 2013 to 2017 in accordance with Croatian obligations imposed by international treaties, especially the Kyoto Protocol and its amendments, and the *acquis communautaire*.
- C4.2. Additional reduction and limitation of emissions of greenhouse gases in accordance with the decisions and strategic documents of the EU and the path towards a low-carbon economy and development of a green economy in the Republic of Croatia.
- C4.3 Sinks of greenhouse gases in the sector of land use and land-use change and forestry (LULUCF), for the part relating to forest management (Article 3.4 of the Kyoto Protocol) – maintain them higher than the reference level for forest management activity (FMRL).
- C4.4 Integration of short, medium and long-term goals for reduction and limitation of greenhouse gases in the sectoral strategic, development, planning and implementation documents, in cooperation with the central state administration responsible for the areas of energy, industry, agriculture, forestry, water, sea, transport and tourism."

The *Plan* specifies Measures to reduce and limit greenhouse gas emissions (MSP), of which the most important for the forestry sector are the ones concerning the LULUCF sector:

- MSP-5 Improving reporting from the LULUCF sector
- MSP-6 Preparation of cost-benefit analysis for afforestation of new surfaces and biological regeneration of forests as a measure to increase sinks in the forestry sector
- MSP-7 Revision of the reference levels for forest management activity (FMRL) under Article 3.4 of the Kyoto Protocol for the Second commitment period
- MSP-8 Preparation of an Action Plan for the LULUCF sector (this document)

The implementing bodies for the above measures are the Ministry of Environmental and Nature Protection and the Ministry of Agriculture, with the support of the Croatian Environmental Agency and the *Authorized institutions*. Measure MSP-5 is defined as the first priority measure, which means that its implementation should start in the first year of adoption of the plan (2013/2014), while measures MPS-6, 7 and 8 are defined as second priority measures, whose implementation is scheduled for the middle of the planning period (i.e. 2014/2015). The implementation of some measures (MPS-5 and MPS-8) has started, and the implementation of other measures (MPS-6 and MPS-7) is expected, or in preparation. Bearing in mind the obligations that Croatia has according to Decision No. 529/2013 / EU, and the UNFCCC and KP, it is necessary to speed up the work on preparation and urgently start implementing the above measures, MPS-6 and MPS-7.

Financing for the implementation of measures is planned to be provided by the Environmental Protection and Energy Efficiency Fund in the amount of 6 million HRK.

Among other measures relating to the reduction of emissions, including those from the forestry sector, a measure from the category of cross-sectoral measures, which has already been carried out, and should be mentioned, is:

- MSP-19 Establishment of a Commission for inter-sector coordination of policies and measures to mitigate and adapt to climate change, and a Commission for inter-sector coordination of the national system for monitoring greenhouse gas emissions for the commitment period.

In addition, as mentioned above, a Framework for Low-carbon Development Strategy⁵² up until 2050 is given within the *Plan*, with a list of priority measures for the path towards low carbon development. The following measures are listed for the forestry sector:

- Completion and continuous upgrading of the system for monitoring and reporting on emissions/sinks according to the Kyoto Protocol and the UNFCCC.
- Afforestation
- Fast growing short rotation crops (particularly for energy purposes)
- An increase in growth of existing forest reserves
- Using wood products instead of energy-intensive construction materials (plastic, concrete, metals, glass, ..)
- Maintenance of fire prevention systems.

Currently, the biggest shortcoming of the above mentioned Framework for Low-carbon Development Strategy is the insufficiently precise definition of the person responsible for implementation, as well as the questionable sources of financing. According to the *Plan*, financing of the transition towards a low-carbon economy "... is not based on provision of funding from the Croatian budget. Funding should be provided through the consistent application of the "polluter pays" principle and internalisation of external cost. The main instruments are the fees for renewable energy sources, funds raised from auctioning of greenhouse gas emission allowances and the wide application of the ESCO concept (self-financing from energy savings). Implementation of the guidelines is based on the use of EU Structural Funds, the existing funds and earmarked funds in the Republic of Croatia (the Environmental Protection and Energy Efficiency Fund, 'Croatian Waters Ltd.', 'Croatian Forests Ltd.', the Croatian Bank for Reconstruction and Development) and the most important part - attracting private capital, national and foreign, as well as foreign investors in construction, development and technology transfer."

Of these measures for the path to development based on low carbon dioxide emissions related to forestry, with money gained from emission allowances trading, the funding is planned of a relatively narrow segment (*Research and development and professional assistance*). When it comes to the EU Structural Funds and the use of internal resources (e.g. those of 'Croatian Waters Ltd.', 'Croatian Forests Ltd.', additional elaboration will be necessary of the links to concrete plans for their use at the national level.

4.1 List of measures to be implemented to achieve emission reductions

In the tables below the measures are given which will be implemented in the Republic of Croatia in order to maintain/reduce greenhouse gas emissions and maintain/increase sinks up to 2020, which are associated with activities in the LULUCF sector. The basic document for identifying and defining measures in this sector is the Rural Development Programme of the Republic of Croatia for the period 2013-2020. The *Programme* is currently in the phase of harmonization between the Croatian Government and the European Commission.

⁵² Ibid

Table 9. List of measures, status of measures, deadlines for implementation and the required funding

Agricultural land categories – Basic requirements for direct payments						
Measure identification code	Measure name	Status	Implementation deadline	Required public funds for the financial period 2014-2020 in euros	Legal basis	Reduction /maintaining potential
GAEC 4	Minimum soil coverage	In implementation			Ordinance on cross-compliance (OG 27/14) Draft of the Ordinance on cross-compliance for 2015-2020 Since 2015 mandatory requirements (GAEC and SMR) according to Annex II. of the Regulation (EU 1306/2013)	*
GAEC 5	Minimum agricultural soil management according to specific soil characteristics	In implementation				**
GAEC 6	Prohibition of burning crop residues	In implementation				**
SMR 1	Standards for nitrates	In implementation				*
	Minimum conditions of maintenance of agricultural land in the state suitable for grazing	2015			Ordinance on the implementation of direct payments and IACS rural development measures (OG 145/12 and 29/13)	*

Agricultural land categories – Additional mandatory requirements for environmentally beneficial measures (<i>Greening</i>)						
Green payments (<i>Greening</i>)	Crop diversity	In process	2015	30% of funds from direct payment national envelope	Regulation EU 1307/2013 of the EU Parliament and Council.	*
	Permanent grasslands	In process	2015			*
	Ecological focus areas	In process	2015			*
Agricultural land categories – Voluntary measures – Rural Development Programme of the Republic of Croatia for the period 2013-2020 M 10 Agri-environment and climate						
Sub-measure 1.	Tillage and planting on sloping ground	In acceptance process	2015-2020	5,556,904	Article 28. of the Regulation (EU) no. 1305/2013 of the EU Parliament and Council	*
Sub-measure 2.	Grassing of permanent crops	In acceptance process	2015-2020	20,757,463		**
Sub-measure 3.	Protection of grasslands of high natural value	In acceptance process	2015-2020	3,776,536		**
Sub-measure 4.	Pilot measure for protection of corncrake (lat. <i>Crex crex</i>)	In acceptance process	2015-2020	659,196		*
Sub-measure 5.	Pilot measure for protection of blue butterflies	In acceptance process	2015-2020	809,258		*
Sub-measure 6.	Establishment of field margin strips	In acceptance process	2015-2020	4,046,289		*
Sub-measure 7.	Maintaining the extensive orchards	In acceptance process	2015-2020	4,154,190		*
Sub-measure 8.	Maintaining the traditional olive gardens	In acceptance process	2015-2020	16,469,475		*

Agricultural land categories - Voluntary measures – Rural Development Programme of the Republic of Croatia for the period 2013-2020						
M 11 Organic farming						
Sub-measure 1.	Period of transition to organic agriculture (transition period)	In acceptance process	2015-2020	61,824,301	Article 29. the Regulation (EU) no. 1305/2013 of the EU Parliament and Council	**
Sub-measure 2.	Maintaining ecological practices and methods	In acceptance process	2015-2020	61,824,301		**
Proposal of possible measures for further reduction of greenhouse gas emissions and carbon storage						
Proposal 1.	Establishment of agro-forestry systems	Plan	2015-2020		Regulation (EU) no. 1305/2013 of the EU Parliament and Council	**
Proposal 2.	Energy crops sowing	Plan	2015-2020			**
Proposal 3.	Reduced tillage combined with cover crops and crop rotation	Plan	2015-2020			**
Proposal 4.	Raising fire-protective belts along crops and plantations on the sub-Mediterranean and Mediterranean soil	Plan	2015-2020			**

Note: * limited impact on reducing greenhouse gas emissions and carbon storage

** significant impact on reducing greenhouse gas emissions and carbon storage

Table 10. Overview of measures, amounts of planned EU co-financing by priorities/focus areas of Croatian RDP related to forests and forest land (amounts and priorities /focus areas which for the most part relate to forestry are indicated in bold type)

Measure	Share of contribution EAFRD 2014-2020	Planned EU co-financing sum for 2014-2020 (€)	Priority / Focus area
M01 - <i>Knowledge transfer and information actions</i> (art 14)	90%	3 150 000.00	2A
		1 800 000.00	2B
		450 000.00	3A
		3 600 000.00	P4
M02 - <i>Advisory services, farm management and farm relief services</i> (art 15)	85%	3 000 000.00	2A
		600 000.00	2B
		8 400 000.00	P4
M04 - <i>Investments in physical assets</i> (art 17)	85%	333 137 565.46	2A
		81 719 453.91	3A
		76 816 286.67	5C
		64 830 766.77	5D
		10 895 927.19	P4
M06 - <i>Farm and business development</i> (art 19)	85%	67 800 000.00	2A
		0.00	2B
		113 000 000.00	6A
	90%	0.00	2A
		45 200 000	2B
		0.00	6A
M08 - <i>Investments in forest area development and improvement of the viability of forests</i> (art 21-26)	85%	31 600 000.00	5C
		31 600 000.00	6A
		31 600 000.00	P4
M16 - <i>Co-operation</i>	90%	4 050 000.00	2A
		450 000.00	3A
M17 - <i>Risk management</i> (art 36-39)	85%	55 034 562.05	-

Table 10a List of operations included in individual measures of the Rural Development Programme of Croatia relating to the forestry sector

Measure	Operation
M01	<i>O_05: Demonstration activities</i>
M02	<i>Advice on the forestry holdings</i>
M04	<i>O_08: Improvement of forest infrastructure</i>
M06	<i>O_02: Support for investments in establishing non-agricultural activities</i>
M08	<i>O_01: Conversion of degraded forest stands and forest cultures</i> <i>O_02: Establishment and improvement of walking trails, look-out points and other small-scale investments</i> <i>O_03: Modernisation of technologies, machines, tools and equipment for wood production and silviculture</i> <i>O_04: Modernisation of technologies, machines, tools and equipment for pre-industrial wood processing</i> <i>O_05: Marketing of timber and non-timber forest products</i>
M16	<i>O_02: Pilot projects and the development of new products, practices, processes and technologies</i>
M17	<i>O_01: Crop, animal, and plant insurance</i>

4.2 Identification of existing and planned policies for implementation of measures and assessment of their effects

The current trend of increasing greenhouse gas concentrations in the atmosphere, despite the emission reductions to which the developed countries have committed under the Kyoto Protocol, is a cause for concern. In an attempt to constrain this trend, at the 16th Conference of the Parties to the UNFCCC in Cancun (COP16) the goal was set of limiting the rise in global temperature to 2°C. The scientific body of the Convention, the International Panel on Climate Change (IPCC) found that this goal could be achieved with a reduction in greenhouse gas emissions in industrialized countries by 80-95 per cent in 2050, compared to the level of emissions in 1990. To achieve this goal, an agreement was reached by which the countries committed themselves to preparing low-carbon development strategies. Following the Cancun agreement, the European Union developed the Roadmap for moving to a competitive low-carbon economy in 2050 (COM/2011/112), in which scenarios for reducing emissions by 80-95% are discussed. Accordingly, a set of sectoral planning documents was adopted: the Energy Plan for 2050 (COM/2011/885), the Plan for Energy Efficiency (COM (2011) 109) and the White Paper on Transport (COM / 2011/144). In a document from 2013, 'Green Paper - A 2030 framework for climate and energy policies' (COM / 2013/169 final), the European Commission launched consultation on a new energy-climate package, regarding the objectives, instruments of policy implementation and general concepts of approach, in the context of job creation, preservation of competitiveness, security of energy supply and sustained economic growth.

Financial support for the implementation of these documents is provided through the EU funds and programs of the common strategic framework: the Framework programme for research and innovation (Horizon 2020), the Framework competitiveness and innovation programme (CIP), the European regional development fund (ERDF), the European social fund (ESF), the

Cohesion fund (CF), the European agricultural fund for rural development (EAFRD) and the European maritime and fisheries fund (EMFF).

Of the measures referred to in Annex IV of Decision 529/2013/EC, the measures listed in Table 11 relate to the forestry sector and are potentially applicable in the Republic of Croatia (original code number given in brackets).

Table 11. Measures from the Decision 529/2013/EU relating to forestry

Measure code no. in this document	Measure code no. and name in Decision 529/2013/EU
A	(a) Measures related to the management of agricultural land, such as:
A1	— stimulating agro-forestry practices and possibilities for cover/land use change.
F	(f) Rehabilitation of degraded land.
G	(g) Measures related to forestry activities, such as:
G1	— afforestation and reforestation,
G2	— conservation of carbon in existing forests,
G3	— enhancing production in existing forests,
G4	— increasing the supply of wood products,
G5	— improving forest management, including optimization of the composition of varieties, care and spacing, and soil conservation.
H	(h) Preventing deforestation.
I	(i) Strengthening the protection against natural disasters such as fires, pests and storms.
J	(j) Measures to replace energy raw materials with high emissions of greenhouse gases with wood products

Table 12 shows a list of measures from the forestry sector as defined by the European Commission⁵³ with a link to the measures from Decision 529/2013/EU given in Table 4.

⁵³ *Ibid*

Table 12 List of types of measures in forestry linked to the measures contained in Decision 529/2013/EU

Item no. of the measure in this document	Type of measure	Link to the measure in Decision 529/2013/EU
1	Afforestation, reforestation and prevention of deforestation	G1
2	Afforestation of environmentally appropriate areas or degraded land	F, G1
3	Reforestation of environmentally appropriate areas, restoration of forests damaged by fire and natural disasters or catastrophes	F, G1, I
4	Re-establishment of urban forests and trees	-
5	Preventing deforestation	H
6	Forest management	G
7	Preservation of carbon pools in existing forests (apart from deforestation prevention), e.g. by preventing the degradation of forests	G2
8	Protection from forest fires and avoiding damage in the forest due to pests and pathogens	I
9	Improving forest management, including optimization of the ratio of species, care and spacing, and the protection of soil	G5
10	Compensation to forestry in selected Natura2000 and the conditions of the Water Framework Directive due to limitations imposed by the users of the area	-
11	Agro-forestry (trees on farms)	A, A1
12	Improving the quality of forest products (e.g. with aim of increasing the share of wood products)	G3*, G4
13	Avoiding forest drying/ conversion of forest peatlands	-
14	Improving the resilience and adaptability of forests, particularly to climate change	I*
15	Improvement of fire protection	I

* Partially linked.

In addition to funding provided by the EU, for implementation of these measures and application of a development strategy based on low emissions of carbon dioxide, by means of the Plan for use of funds obtained from the sales of emission allowances through auctions in the Republic of Croatia for the period from 2014 to 2016 (OG 140/2014), the Republic of Croatia plans the allocation of significant resources (688 mil. HRK for the 2014-2016 period) for reduction of emissions, adaptation to climate change etc., according to Article 100 of the Air Protection Act⁵⁴. This Article defines the activities that are to be financed by the plan, in accordance with the LULUCF sector activities prescribed by Decision No. 529/2013/EU, as well as the Croatian Low-carbon Development Strategy, which is currently being prepared, and Regulation 525/2013/EU. Of all the areas segregated by the aforementioned Plan, the area Research and development

⁵⁴ Ibid

and professional assistance, which has been provided with 45 mil. HRK for the 2014-2016 period, partly refers to the LULUCF sector. The measures in this area concerning the LULUCF sector, i.e. forestry are:

IRSP-17: Improving reporting by the LULUCF sector

IRSP-18: Revision of the reference levels for forest management activity (FMRL) under Article 3.4 of the Kyoto Protocol for the second commitment period

IRSP-19: Research aimed at reducing emissions and increasing removals for the LULUCF sector

IRSP-20: Capacity development and provision of technical support for implementation and monitoring of climate policy and training for the purposes of the MENP and CEA

IRSP-21: Other measures in the area of research and professional support development

5. REFERENCES

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