



**REPUBLIC OF CROATIA  
MINISTRY OF ENVIRONMENTAL AND NATURE PROTECTION**

**CALCULATION OF ASSIGNED AMOUNTS UNDER ARTICLE 7 PARAGRAPH 4  
OF THE KYOTO PROTOCOL IN ACCORDANCE WITH DECISION 13/CMP.1**

**Zagreb, June 2016**

## CONTENTS

<b>LIST OF TABLES.....</b>	<b>4</b>
<b>LIST OF ABBREVIATIONS.....</b>	<b>5</b>
<b>1. INTRODUCTION.....</b>	<b>6</b>
<b>2. COMPLETE INVENTORY OF ANTHROPOGENIC EMISSIONS BY SOURCES AND REMOVALS BY SINKS OF GREENHOUSE GASES NOT CONTROLLED BY THE MONTREAL PROTOCOL FOR ALL YEARS FROM BASE YEAR TO THE MOST RECENT YEAR AVAILABLE.....</b>	<b>8</b>
2.1. OVERVIEW OF SOURCES AND SINK CATEGORY EMISSION ESTIMATES AND TRENDS.....	8
2.2. BRIEF DESCRIPTION AND INTERPRETATION OF EMISSION TRENDS FOR AGGREGATED GREENHOUSE GAS EMISSIONS.....	11
2.2.1.EMISSION TRENDS BY SECTORS.....	12
2.2.2.EMISSION TRENDS BY GAS .....	15
<b>3. IDENTIFICATION OF BASE YEAR FOR HFCs, PFCs, SF<sub>6</sub>, and for NF<sub>3</sub> FOR THE SECOND COMMITMENT PERIOD .....</b>	<b>17</b>
<b>4. JOINT FULFILMENT UNDER ARTICLE 4 OF THE KYOTO PROTOCOL FOR THE SECOND COMMITMENT PERIOD .....</b>	<b>18</b>
<b>5. CALCULATION OF ASSIGNED AMOUNT PURSUANT TO ARTICLE 3, PARAGRAPHS 7 AND 8 .....</b>	<b>21</b>
<b>6. CALCULATION OF COMMITMENT PERIOD RESERVE IN ACCORDANCE WITH DECISION 11/CMP.1 .....</b>	<b>22</b>
<b>7. APPLICATION OF PARAGRAPHS 23 – 26 OF DECISION 1/CMP.8.....</b>	<b>23</b>
<b>8. INFORMATION RELATED TO LULUCF ACTIVITIES UNDER ARTICLE 3, PARAGRAPHS 3 AND 4 OF THE KYOTO PROTOCOL .....</b>	<b>25</b>
8.1. IDENTIFICATION OF THE SELECTION OF SINGLE MINIMUM VALUES FOR TREE CROWN COVER, LAND AREA AND TREE HEIGHT FOR USE IN ACCOUNTING UNDER ARTICLE 3(3) AND (4).....	25
8.2. THE IDENTIFICATION OF ELECTION OF ADDITIONAL ACTIVITIES UNDER ARTICLE 3(4) OF THE KYOTO PROTOCOL FOR INCLUSION IN THE ACCOUNTING FOR THE SECOND COMMITMENT PERIOD.....	25
8.3. IDENTIFICATION OF THE FREQUENCY OF ACCOUNTING FOR ACTIVITY UNDER ARTICLE 3, PARAGRAPHS 3 AND 4 OF THE KYOTO PROTOCOL.....	25
8.4. INFORMATION ON FOREST MANAGEMENT REFERENCE LEVELS AS INSCRIBED IN THE APPENDIX TO THE ANNEX TO DECISION 2/CMP.7 .....	25

8.5. INFORMATION ON HARVESTED WOOD PRODUCTS .....	26
8.6. INFORMATION ON EXCLUSION OF EMISSION FROM NATURAL DISTURBANCES .....	26
<b>9. DESCRIPTION OF NATIONAL SYSTEM IN ACCORDANCE WITH ARTICLE 5, PARAGRAPH 1 OF THE KYOTO PROTOCOL .....</b>	<b>27</b>
<b>10. DESCRIPTION OF THE NATIONAL REGISTRY .....</b>	<b>29</b>
<b>ANNEX A. NOTIFICATION OF THE TERMS OF THE AGREEMENT TO FULFILL JOINTLY THE COMMITMENTS OF THE EUROPEAN UNION, ITS MEMBER STATES AND ICELAND UNDER ARTICLE 3 OF THE KYOTO PROTOCOL FOR THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL.....</b>	<b>31</b>

## LIST OF TABLES

<i>Table 2-1: Emissions/removals of GHG by sectors for the period 1990-2005 (kt CO<sub>2</sub>-eq).....</i>	<i>9</i>
<i>Table 2-2: Emissions/removals of GHG by sectors for the period 2010-2014 (kt CO<sub>2</sub>-eq).....</i>	<i>9</i>
<i>Table 2-3: Emissions/removals of GHG by gases for the period 1990-2005 (kt CO<sub>2</sub>-eq).....</i>	<i>10</i>
<i>Table 2-4: Emissions/removals of GHG by gases for the period 2010-2014 (kt CO<sub>2</sub>-eq).....</i>	<i>11</i>
<i>Table 3-1: Emissions of HFCs and PFCs (kt CO<sub>2</sub>-eq) (1990 – 2014).....</i>	<i>17</i>
<i>Table 5-1: Annual Emission Allocation and its Adjustment for the period 2013 - 2020 .....</i>	<i>21</i>
<i>Table 5-2: Assigned Amount Units for the Republic of Croatia for the period 2013 - 2020 .....</i>	<i>21</i>
<i>Table 6-1: Commitment period reserve.....</i>	<i>22</i>
<i>Table 7-1: Total quantity of Kyoto Protocol units requested to be carried over from the first to the second commitment period.....</i>	<i>24</i>
<i>Table 10-1: Information of the registry administrator .....</i>	<i>30</i>

## LIST OF ABBREVIATIONS

AAUs	Assigned Amount Units
CAEN	Croatian Agency for the Environment and Nature
CERs	Certified Emission Reductions
CPR	Commitment Period Reserve
ERUs	Emission Reduction Units
EU	European Union
EU ETS	European Union's Emission Trading System
FAO	Food and Agricultural Organization
FMRL	Forest Management Reference Level
GHG	Greenhouse Gas
GWP	Global Warming Potential
HWP	Harvested Wood Product
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land Use, Land-Use Change and Forestry
NIR	Croatian National Inventory Report
MENP	Ministry of Environment and Nature Protection
OG	Official Gazette
PPSR	Previous Period Surplus Reserve
QELRCs	Quantified Emission Limitation Commitments

## 1. INTRODUCTION

This report constitutes the report to facilitate the calculation of the assigned amount of the Republic of Croatia, in accordance with the joint assigned amount of the Union, its Member States and Iceland ("the joint assigned amount") pursuant to Article 3(7bis), (8) and (8bis) of the Kyoto Protocol for the second commitment period and to demonstrate the capacity to account for the emissions and assigned amount in accordance with Decision 2/CMP.8 under the Kyoto Protocol period, also referred to as the 'initial report'.

The targets (quantified emission limitation commitments, QELRCs) for the Union and its Member States are listed in the Doha Amendment to the Kyoto Protocol with a footnote stating that those targets are based on the understanding that they will be fulfilled jointly by the European Union and its Member States, in accordance with Article 4 of the Kyoto Protocol. The Union, its Member States at the time, Croatia and Iceland also issued a joint declaration upon the adoption of the Doha Amendment, expressing their intention to fulfil their commitments in the second commitment period jointly.

Article 4 of the Kyoto Protocol requires parties that agree to fulfil their commitments under Article 3 of the Kyoto Protocol jointly to set out in the relevant joint fulfilment agreement the respective emission level allocated to each of the parties. Council Decision (EU) 2015/1339 on the conclusion, on behalf of the European Union, of the Doha Amendment to the Kyoto Protocol to the UNFCCC and the joint fulfilment of commitments thereunder ("the Ratification decision") sets out the terms of the joint fulfilment and the respective emission levels for the Union, the Member States and Iceland (Annex I to that Decision). Those emission levels were determined in line with the existing responsibilities under EU legislation contained in the Climate and energy package. The Agreement between the European Union and its Member States, of the one part, and Iceland, of the other part, concerning Iceland's participation in the joint fulfilment of commitments of the European Union, its Member States and Iceland for the second commitment period of the Kyoto Protocol to the United Nations Framework Convention on Climate Change was signed on 1 April 2015 and approved on behalf of the Union on 13 July 2015 ("agreement with Iceland") and it contains the same terms of the joint fulfilment as set out in Council Decision 2015/1339.

In the Ratification decision, the Commission is tasked to prepare the report to facilitate the calculation of the assigned amount of the Union and the report to facilitate the calculation of the joint assigned amount of the Union, its Member States and Iceland ("the joint assigned amount"). The Kyoto Protocol requires the parties to a joint fulfilment agreement to notify the Convention Secretariat of the terms of that agreement on the date of deposit of their instruments of ratification or approval. The Member States and Iceland have to submit their own initial reports, which will determine their assigned amounts as equal to their emission levels as agreed under the joint fulfilment.

This report generally follows the structure and the requirements set out in Annex I to Decision 2/CMP.8 (Implications of the implementation of decisions 2/CMP.7 to 5/CMP.7 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol) with additional information where found appropriate.

Key information provided by the Republic of Croatia is:

- Complete inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for all years from base year to the most recent year available
- Identification of base year for HFCs, PFCs, SF<sub>6</sub>, and for NF<sub>3</sub> for the second commitment period
- Description of the joint fulfilment under Article 4 of the Kyoto Protocol for the second commitment period
- Calculation of assigned amount pursuant to Article 3, Paragraphs 7 and 8
- Calculation of commitment period reserve (CPR) in accordance with Decision 11/CMP.1
- Application of paragraphs 23 – 26 of Decision 1/CMP.8
- Information related to LULUCF activities under Article 3, Paragraphs 3 and 4 of the Kyoto Protocol
  - Identification of the selection of single minimum values for tree crown cover, land area and tree height for use in accounting under Articles 3(3) and (4)
  - The identification of election of additional activities under Article 3(4) of the Kyoto Protocol for inclusion in the accounting for the second commitment period
  - Identification of the frequency of accounting for activity under Article 3, Paragraphs 3 and 4 of the Kyoto Protocol
  - Information on Forest Management Reference Levels (FMRL) as inscribed in the appendix to the Annex to Decision 2/CMP.7
  - Information on harvested wood products
  - Information on exclusion of emission from natural disturbances
- Description of national system in accordance with Article 5, Paragraph 1 of the Kyoto protocol
- Description of the national registry.

## **2. COMPLETE INVENTORY OF ANTHROPOGENIC EMISSIONS BY SOURCES AND REMOVALS BY SINKS OF GREENHOUSE GASES NOT CONTROLLED BY THE MONTREAL PROTOCOL FOR ALL YEARS FROM BASE YEAR TO THE MOST RECENT YEAR AVAILABLE**

A complete inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases for the base year 1990 and for all years from base year to 2014 is provided in the Croatian National Inventory Report 2016 (NIR 2016). The NIR is prepared in accordance with the UNFCCC reporting guidelines on annual Inventories as adopted by the COP by its Decision 18/CP.8. In accordance with the Decision 4/CMP.7, the methodologies used in the calculation of emissions are based on the *2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines)* and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC Good Practice Guidance)* prepared by the Intergovernmental Panel on Climate Change (IPCC). The calculation includes the emissions which are the result of anthropogenic activities and these include the following direct greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), halogenated carbons (HFCs, PFCs), sulphur hexafluoride (SF<sub>6</sub>) and nitrogen fluoride (NF<sub>3</sub>) and indirect greenhouse gases: carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), non-methane volatile organic compounds (NMVOCs) and sulphur dioxide (SO<sub>2</sub>). Greenhouse gas emission sources and sinks are divided into five main sectors: Energy, Industrial Processes and Product Use, Agriculture, Land Use, Land-Use Change and Forestry and Waste. Global warming potentials used to calculate CO<sub>2</sub> equivalent emissions are defined in Annex III of Decision 24/CP.19 Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention.

As recommended by the IPCC Guidelines, country specific methods have been used where appropriate and where they provide more accurate emission data.

The important part of the inventory preparation is uncertainty assessment of the calculation and verification of the input data and results, all this with the aim to increase the quality and reliability of the calculation. General (Tier 1) and source-specific (Tier 2) QC procedures for each QC activity outlined in *Good Practice Guidance and Uncertainty Management in National GHG Inventories* were followed. For the purposes of transparency of the emission calculation, inventory team has continued with preparation of Inventory Data Record Sheets which were introduced in 2001 submission.

### **2.1. OVERVIEW OF SOURCES AND SINK CATEGORY EMISSION ESTIMATES AND TRENDS**

Total emissions/removals of greenhouse gases for the period 1990-2014 and their trend in sectors are given in tables 2-1 and 2-2. The largest contribution to the greenhouse gas emission in 2014 has the Energy sector with 70.9 percent, followed by Industrial processes and product use with 12.5 percent, Agriculture with 10.0 percent and Waste with 6.6 percent. This structure is with minor changes consistent through all the observed period from 1990 to 2014. In the year 2014 the amount of removed emissions of the greenhouse gases by CO<sub>2</sub> from LULUCF sector was 28.5 percent.



Table 2-1: Emissions/removals of GHG by sectors for the period 1990-2005 (kt CO<sub>2</sub>-eq)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1995	2000	2005
	CO <sub>2</sub> equivalent (kt)			
1. Energy	21,750.4	16,066.2	18,267.6	21,660.9
2. Industrial processes and product use	4,628.8	2,468.5	3,178.8	3,628.0
3. Agriculture	4,171.5	3,021.9	2,837.5	2,951.8
4. Land use, land-use change and forestry	-6,647.8	-9,130.0	-8,134.9	-7,729.8
5. Waste	654.0	739.5	889.0	1,045.0
6. Other	NO	NO	NO	NO
<b>Total (excluding LULUCF)</b>	<b>31,204.6</b>	<b>22,296.2</b>	<b>25,173.0</b>	<b>29,285.8</b>
<b>Total (including LULUCF)</b>	<b>24,556.8</b>	<b>13,166.1</b>	<b>17,038.1</b>	<b>21,556.0</b>

Table 2-2: Emissions/removals of GHG by sectors for the period 2010-2014 (kt CO<sub>2</sub>-eq)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2010	2011	2012	2013	2014
	CO <sub>2</sub> equivalent (kt)				
1. Energy	19,813.8	19,419.8	17,726.8	17,187.3	16,241.4
2. Industrial processes and product use	3,480.3	3,250.6	2,976.6	2,706.6	2,871.3
3. Agriculture	2,593.7	2,668.1	2,597.5	2,432.5	2,300.1
4. Land use, land-use change and forestry	-7,158.5	-6,266.1	-6,173.6	-6,470.0	-6,515.1
5. Waste	1,392.4	1,435.4	1,433.7	1,444.1	1,486.0
6. Other	NO	NO	NO	NO	NO
<b>Total (excluding LULUCF)</b>	<b>27,280.2</b>	<b>26,773.8</b>	<b>24,734.6</b>	<b>23,770.6</b>	<b>22,898.9</b>
<b>Total (including LULUCF)</b>	<b>20,121.7</b>	<b>20,507.8</b>	<b>18,561.0</b>	<b>17,300.5</b>	<b>16,383.8</b>

The CO<sub>2</sub> is the largest anthropogenic contributor to total national GHG emissions. In 2014 the shares of GHG emissions were as follows: 76.7 percent CO<sub>2</sub>, 13.5 percent CH<sub>4</sub>, 7.1 percent N<sub>2</sub>O and 2.7 percent HFCs, PFCs and SF<sub>6</sub>. The contribution of the individual gases is given in tables 2-3 and 2-4.

Table 2-3: Emissions/removals of GHG by gases for the period 1990-2005 (kt CO<sub>2</sub>-eq)

GREENHOUSE GAS EMISSIONS	1990	1995	2000	2005
	CO <sub>2</sub> equivalent (kt)			
CO <sub>2</sub> emissions without net CO <sub>2</sub> from LULUCF	23,390.1	16,992.8	19,789.1	23,451.8
CO <sub>2</sub> emissions with net CO <sub>2</sub> from LULUCF	16,709.1	7,817.8	11,455.2	15,642.4
CH <sub>4</sub> emissions without CH <sub>4</sub> from LULUCF	3,770.7	2,986.6	2,785.3	3,029.5
CH <sub>4</sub> emissions with CH <sub>4</sub> from LULUCF	3,771.9	2,994.2	2,882.2	3,032.2
N <sub>2</sub> O emissions without N <sub>2</sub> O from LULUCF	2,793.1	2,248.3	2,387.7	2,405.3
N <sub>2</sub> O emissions with N <sub>2</sub> O from LULUCF	2,825.0	2,285.7	2,489.8	2,482.2
HFCs	NO	57.3	199.2	386.1
PFCs	1,240.2	NO	NO	NO
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO
SF <sub>6</sub>	10.5	11.1	11.6	13.0
NF <sub>3</sub>	NO	NO	NO	NO
<b>Total (without LULUCF)</b>	<b>31,204.6</b>	<b>22,296.2</b>	<b>25,173.0</b>	<b>29,285.8</b>
<b>Total (with LULUCF)</b>	<b>24,556.8</b>	<b>13,166.1</b>	<b>17,038.1</b>	<b>21,556.0</b>
<b>Total (without LULUCF, with indirect)</b>	<b>31,204.6</b>	<b>22,296.2</b>	<b>25,173.0</b>	<b>29,285.8</b>
<b>Total (with LULUCF, with indirect)</b>	<b>24,556.8</b>	<b>13,166.1</b>	<b>17,038.1</b>	<b>21,556.0</b>

Table 2-4: Emissions/removals of GHG by gases for the period 2010-2014 (kt CO<sub>2</sub>-eq)

GREENHOUSE GAS EMISSIONS	2010	2011	2012	2013	2014
	CO <sub>2</sub> equivalent (kt)				
CO <sub>2</sub> emissions without net CO <sub>2</sub> from LULUCF	21,183.7	20,614.4	18,776.4	18,359.5	17,607.3
CO <sub>2</sub> emissions with net CO <sub>2</sub> from LULUCF	13,937.9	14,231.6	12,452.5	11,801.4	11,007.0
CH <sub>4</sub> emissions without CH <sub>4</sub> from LULUCF	3,243.5	3,230.3	3,167.1	3,129.7	3,080.4
CH <sub>4</sub> emissions with CH <sub>4</sub> from LULUCF	3,245.3	3,248.9	3,206.0	3,131.7	3,080.7
N <sub>2</sub> O emissions without N <sub>2</sub> O from LULUCF	2,300.1	2,356.6	2,216.9	1,697.4	1,621.5
N <sub>2</sub> O emissions with N <sub>2</sub> O from LULUCF	2,385.6	2,454.7	2,328.3	1,783.6	1,706.5
HFCs	544.0	563.1	565.0	577.7	582.8
PFCs	0.0	0.0	0.0	0.1	0.1
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO
SF <sub>6</sub>	9.0	9.4	9.2	6.2	6.8
NF <sub>3</sub>	NO	NO	NO	NO	NO
<b>Total (without LULUCF)</b>	<b>27,280.2</b>	<b>26,773.8</b>	<b>24,734.6</b>	<b>23,770.6</b>	<b>22,898.9</b>
<b>Total (with LULUCF)</b>	<b>20,121.7</b>	<b>20,507.8</b>	<b>18,561.0</b>	<b>17,300.5</b>	<b>16,383.8</b>
<b>Total (without LULUCF, with indirect)</b>	<b>27,280.2</b>	<b>26,773.8</b>	<b>24,734.6</b>	<b>23,770.6</b>	<b>22,898.9</b>
<b>Total (with LULUCF, with indirect)</b>	<b>20,121.7</b>	<b>20,507.8</b>	<b>18,561.0</b>	<b>17,300.5</b>	<b>16,383.8</b>

## 2.2. BRIEF DESCRIPTION AND INTERPRETATION OF EMISSION TRENDS FOR AGGREGATED GREENHOUSE GAS EMISSIONS

In this chapter emissions and removals for the Republic of Croatia are presented for the period from 1990 to 2014. The results are presented as total emissions of all greenhouse gases in CO<sub>2</sub> equivalents over sectors and then as emissions for the individual greenhouse gas by sectors. Since the certain greenhouse gases have different irradiation properties, and consequently different contribution to the greenhouse effect, it is necessary to multiply the emission of every gas with proper Global Warming Potential (GWP). The Global Warming Potential is a measure of the impact on greenhouse effect of the certain gas compared to CO<sub>2</sub> impact which is accordingly defined as a referent value. In that case the emission of greenhouse gases is presented as the equivalent emission of carbon dioxide (CO<sub>2</sub>-eq). If the removal of greenhouse gases occurs (e.g. the absorption of CO<sub>2</sub> at increase of wood stock in forests) than it refers to sinks of greenhouse gases and the amount is presented as a negative value. Global warming potentials used to calculate CO<sub>2</sub> equivalent emissions are defined in Annex III of Decision

24/CP.19 Revision of the UNFCCC reporting guidelines on annual inventories for Parties included in Annex I to the Convention.

The total GHG emissions in 2014, excluding removals by sinks, amounted to 22,898.9 kt CO<sub>2</sub>-eq, which represents 26.6 percent emissions reduction compared to GHG emission in the year 1990.

Overall decline of economic activities and energy consumption in the period 1991-1994, which was mainly the consequence of the war in Croatia, had directly caused a decline in total emissions of greenhouse gases in that period. With the entire national economy in transition, some energy intensive industries reduced their activities or phased out certain productions which were considerably reflected in GHG emissions reduction. Emissions have started to increase in the 1995 at an average rate of 3.2 percent per year until 2007. In the wake of global economic crisis which led to 6-year recession in Croatia after 2008, combined with the application of the policy and measures for the reduction of GHG emissions, the emissions declined with the average rate of 3.9 percent annually until 2014. The largest contribution to the GHG emission increase has Energy and Industrial Processes.

### 2.2.1. EMISSION TRENDS BY SECTORS

According to the UNFCCC reporting guidelines and IPCC methodological guidelines, total national emission are divided into five sectors: Energy, Industrial Processes and Product Use, Agriculture, Land Use, Land-Use Change and Forestry and Waste. The total national GHG emissions and removals, divided by sectors, are presented in the Table 2-1, Table 2-2 and the Figure 2-1.

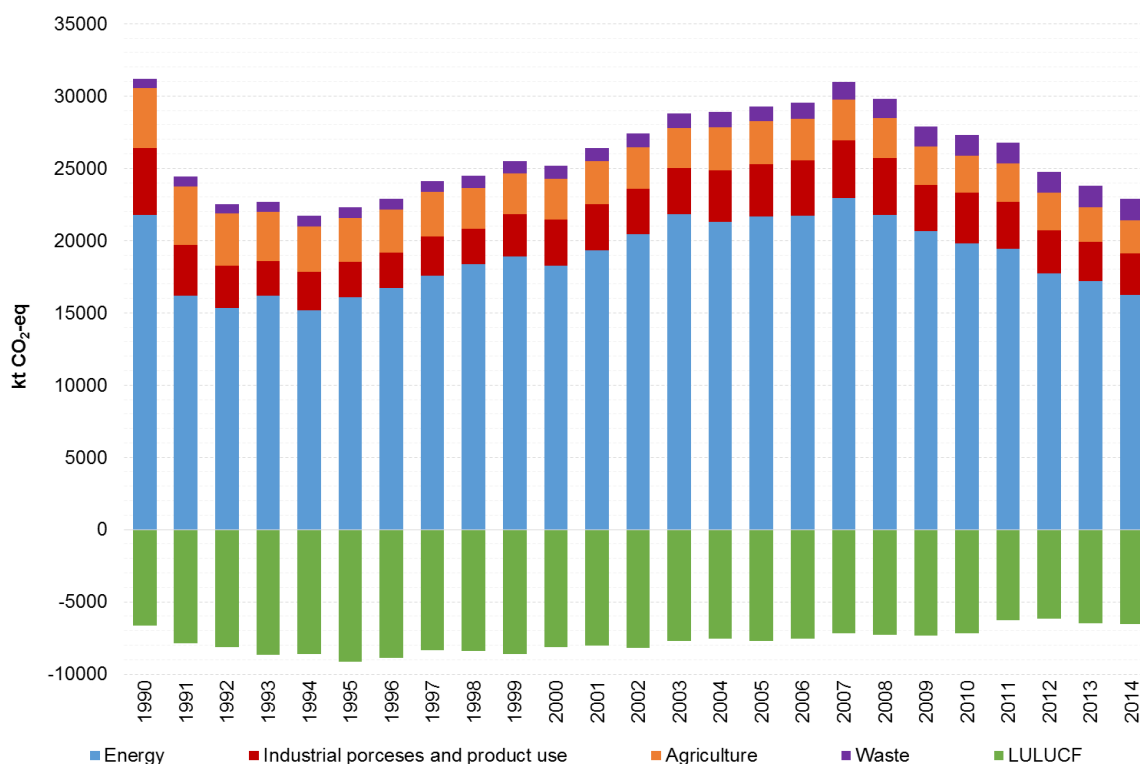


Figure 2-1: Trend of GHG emissions, by sectors

## Energy

Energy sector is the largest contributor to GHG emissions. In the year 2014, the GHG emission from Energy sector was 5.5 percent lower in relation to 2013 and 25.3 percent lower in relation to 1990.

Energy sector covers all activities that involve fuel combustion from stationary and mobile sources, and fugitive emission from fuels. The Energy sector is the main cause for anthropogenic emission of greenhouse gases. It accounts approximately 75 percent of the total emission of all greenhouse gases presented as equivalent emission of CO<sub>2</sub>. The contribution of carbon dioxide (CO<sub>2</sub>) emission from Energy sector in total CO<sub>2</sub>-eq emission is around 65%, contribution of methane (CH<sub>4</sub>) emission is substantially smaller (8 percent) while the contribution of nitrous oxide (N<sub>2</sub>O) emission from Energy sector in total CO<sub>2</sub>-eq emission is quite small (about 2 percent). Looking at its contribution to total emission of carbon dioxide (CO<sub>2</sub>), the energy sector accounts for about 90 percent. Emissions from fossil fuel combustion comprise the majority (more than 90 percent) of energy-related emissions. The largest part (34.8 percent) of the emissions are a consequence of fuel combustion in Transport, then the combustion in Energy industries (28.5 percent in 2014) and the combustion in small stationary energy sources, such as Commercial/Institutional, Residential and Agriculture/Forestry/Fishing (17.9 percent in 2014). Manufacturing Industries and Construction contribute to total emission from Energy sector with 14.4 percent, while Fugitive Emissions from Fuels contribute with about 4.4 percent.

## Industrial processes and product use

In Industrial Processes sector, the key emission sources are Cement Production, Lime Production, Ammonia Production, Nitric Acid Production and Consumption of HFCs in Refrigeration and Air Conditioning Equipment, which all together contribute with 95.5 percent in total sectoral emission in 2014. The iron production in blast furnaces and aluminium production ended in 1992, and ferroalloys production ended in 2003. Due to constantly decreasing economic activity after 2008, emissions from Industrial processes and product use decreased in 2013 compared to 2012 by 9.1 percent, but in 2014 emissions increased by 6.1 percent compared to 2013. However, emissions were still lower by 38.0 percent compared to 1990.

## Agriculture

Emission of CH<sub>4</sub> and N<sub>2</sub>O in the Agricultural sector is conditioned by different agricultural activities. For the emission of CH<sub>4</sub>, the most important source is livestock farming (Enteric Fermentation) which makes 41.5 percent of sectoral CO<sub>2</sub>-eq emission. The number of cattle showed continuous decrease in the period from 1990 to 2000. As a consequence, this led to CH<sub>4</sub> emission reduction. In the year 2000, the number of cattle has started increasing and this trend was mostly retained until 2006. From 2007 to 2010, cattle number decreased and remained at approximately the same level in 2013 and 2014. Compared to 2013, in 2014 CH<sub>4</sub> emission from Enteric fermentation decreased by 4.2 percent. As for Manure management emissions, CH<sub>4</sub> emission decreased in 2014 compared to 2013 by 1.9 percent while N<sub>2</sub>O emission remained at approximately same levels. Emissions from Agricultural soils decreased after 1990 and during the war due to specific national circumstances and limited agricultural practice at that time. Afterwards, the emission trend is mostly influenced by the changes in the

direct soil emissions; thus, emission increase can be noticed in 1997, 2001 and 2002 due to increase in mineral fertilizer consumption and crop production, later on also due to the increase of livestock population. N<sub>2</sub>O emission from Agricultural soils decreased in 2014 compared to 2013 by 7.6 percent. Overall, in the year 2014 the GHG emission from Agriculture sector decreased by 5.4 percent in comparison with 2013.

## **LULUCF**

The Law on Forest (OG 140/05, 82/06, 129/08, 80/10, 124/10, 25/12, 68/12, 148/13, 94/14) regulates the growing, protection, usage and management of forests and forest land as a natural resource aimed to maintain biodiversity and ensure management based on principles of economic sustainability, social responsibility and ecological acceptability. Moreover, one of its most important provisions, in the context of climate protection, is that forests should be managed in conformity with the sustainable management criteria, implying the maintenance and enhancement of forest ecosystems and their contribution to the global carbon cycle.

The forests and the forest land cover 47.5 percent of the total surface area of the Republic of Croatia. By its origin, approximately 95 percent of the forests in Croatia were formed by natural regeneration (according to the national definitions applied in the sector) and the 5 percent of the forests are grown artificially. The problem of deforestation in Croatia does not exist. According to present data the total forest area has not been reduced in the last 100 years.

Removals arisen in LULUCF sector contribute with 28.5 percent to the total emissions of CO<sub>2</sub>-eq in Croatia in year 2014. The removals in 2014 were 2.0 percent lower than in 1990.

## **Waste**

Waste sector includes waste disposal, waste water management and waste incineration, whereas the waste disposal represents dominant CH<sub>4</sub> emission source from that sector. Emissions from Waste sector have been constantly increasing in the period 1990-2014. Increasing emissions are a consequence of greater quantities of waste, activities in Wastewater treatment and discharge and waste incineration. The emission from solid waste disposal on land depends on the amount and composition of municipal solid waste, management practices on-site including implementation of measures for collection and utilization of landfill gas. Although increasing of municipal solid waste amounts as a result of the growth in the living standard, amounts of municipal solid waste for disposal have slightly declined due to effects of measures undertaken to avoid/reduce, separately collect and recycle waste. Priority is given to avoiding and reducing waste generation and reducing its hazardous properties. These objectives, defined by the Waste Management Strategy (OG 130/05) and Waste Management Plan in the Republic of Croatia (OG 85/07, 126/10, 31/11, 46/15) include the assumed time-lags with respect to relevant EU legislation. CH<sub>4</sub> that is recovered and burned in a flare in the period 2004-2014 have been included in emission estimation. It should be emphasized that Solid Waste Disposal on Land contributes with 80.0 percent in total sectoral emission in 2014. Waste sector contributes to total GHG emissions with 6.5 percent in 2014. Overall, in the year 2014 the GHG emission from Waste sector increased by 127.2 percent in comparison with 1990.

## 2.2.2. EMISSION TRENDS BY GASES

The shares of GHG emission have not significantly changed during the entire period. In 1990, CO<sub>2</sub> emission represented 75.0 percent of overall emissions of greenhouse gases excluding LULUCF, followed by CH<sub>4</sub> with 12.1 percent, N<sub>2</sub>O with 9.0 percent and HFCs and PFCs and SF<sub>6</sub> with 4.0 percent. The largest contribution to the GHGs emission in 2014 excluding LULUCF has CO<sub>2</sub> emission with 76.7 percent, followed by CH<sub>4</sub> with 13.5 percent, N<sub>2</sub>O with 7.1 percent and HFCs, PFCs and SF<sub>6</sub> with 2.7 percent. The trend of aggregated emissions/removals, divided by gasses, is shown in the Table 2-3, Table 2-4 and the Figure 2-2.

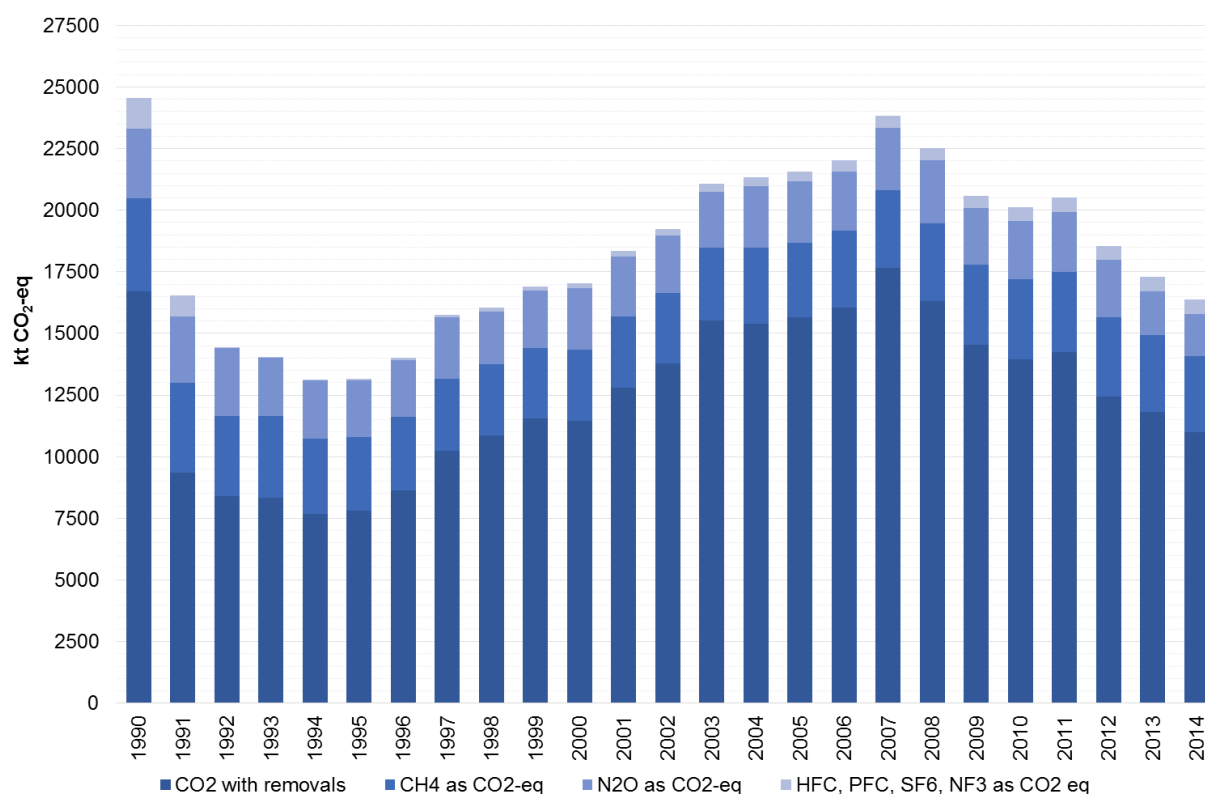


Figure 2-2: Trend of GHG emissions and removals, by gases

### Carbon dioxide (CO<sub>2</sub>)

The most significant anthropogenic greenhouse gas is carbon dioxide (CO<sub>2</sub>). In 2014, CO<sub>2</sub> emission was 24.7 percent lower than in 1990. Removals of CO<sub>2</sub> by sinks were 1.2 percent lower than removals in 1990. The largest increase in CO<sub>2</sub> emission was in Energy sector (Road Transport) and Industrial Processes. There was increase in mobility (number of road vehicles) and therefore increase in motor fuel consumption in last ten years. CO<sub>2</sub> emission from industrial processes declined from 1990 to 1995, due to the decline in industrial activities caused by the war in Croatia, while in the period 1996-2008 emissions slightly increased. A decrease of economic activities after 2008 as well as implementation of measures influenced on reduction of cement, lime, ammonia and steel productions. In 2014 CO<sub>2</sub> emissions from industrial processes increased by 7.6 percent compared with the year 2013.

## **Methane (CH<sub>4</sub>)**

The major sources of methane (CH<sub>4</sub>) emission are fugitive emission from production, processing, transportation and activities related with fuel use in Energy sector, Agriculture and Waste Disposal on Land. The emission of CH<sub>4</sub> in 2014 was 18.3 percent below the emission in 1990, largely due to decrease in emission in Agriculture sector (Enteric Fermentation and Manure Management), as a consequence of lower number of domestic animals.

## **Nitrous oxide (N<sub>2</sub>O)**

The most important sources of N<sub>2</sub>O emissions in Croatia are agricultural activities, nitric acid production, but as well, the N<sub>2</sub>O emissions occur in energy sector and waste management. The emission of N<sub>2</sub>O in 2014 was 39.6 percent lower than emission in 1990. Decrease of emission was in Energy Sector (Manufacturing Industries and Construction and Other Sectors), Industrial Processes (Nitric Acid Production) and Agriculture (N<sub>2</sub>O Emission from Manure Management; Direct Emission from Agriculture Soils; Direct N<sub>2</sub>O Emissions from Animals; Indirect N<sub>2</sub>O Emission from Nitrogen used in Agriculture).

## **Halogenated carbons (HFCs, PFCs), SF<sub>6</sub> and NF<sub>3</sub> emissions**

Synthetic GHGs include halogenated carbons (HFCs and PFCs) and sulphur hexafluoride (SF<sub>6</sub>). Although on an absolute scale their emissions are not great, due to their high global warming potential (GWP) their contribution to global warming is considerable. Ministry of Environmental and Nature Protection (MENP) is responsible for monitoring of consumption of substitutes and mixture of substitutes for gases that deplete the ozone layer. There is no production of HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub> in Croatia; therefore, all quantities of these gases are imported. Minor quantities of some substances are exported. PFCs emissions were generated in the production of primary aluminum. The Croatian aluminum industry was still operational in 1990/1991, but production was stopped in 1992. HFCs are used as substitutes for cooling gases in refrigerating and air-conditioning systems that deplete the ozone layer. According to provided calculations, the contribution of listed gases in total national GHG emission in 2014 was 2.6 percent. The emission in 2014 was 47.1 percent below the emission in 1990.



### 3. IDENTIFICATION OF BASE YEAR FOR HFCs, PFCs, SF<sub>6</sub>, and for NF<sub>3</sub> FOR THE SECOND COMMITMENT PERIOD

In accordance with Article 3.8 of the Kyoto Protocol any Party included in Annex I may use 1990 or 1995 as its base year for hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) for the purpose of calculating its assigned amount. **Croatia has decided to use the year 1990 as its base year for HFCs, PFCs and SF<sub>6</sub>.**

- HFCs emissions have been calculated from Consumption in Refrigeration and Air Conditioning Equipment for entire time series. Emissions from Foam Blowing and Fire Extinguishers have calculated only for the period 2006-2014, because the data for the period 1990-2005 are not available.
- PFCs emissions were generated in the production of primary aluminum. The Croatian aluminum industry was still operational in 1990/1991, but production was stopped in 1992.
- SF<sub>6</sub> emissions are included in the inventory for the whole time series 1990-2014.

According to Article 3(8bis) of the Doha Amendment to the Kyoto Protocol, any Party included in Annex I may use 1995 or 2000 as its base year for nitrogen trifluoride (NF<sub>3</sub>) for the purposes of the calculation referred to in Paragraph 7 bis.

**The base year choice of Croatia for the emissions of NF<sub>3</sub> is year 2000.** However, there were no identified emissions of NF<sub>3</sub> in the period 2000-2014 in the Republic of Croatia.

The time series of HFCs and PFCs emissions, expressed in Gg CO<sub>2</sub>-eq, are presented in the Table 3-1.

*Table 3-1: Emissions of HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub> (kt CO<sub>2</sub>-eq) (1990 – 2014)*

GHG SOURCE AND SINK CATEGORIES	1990	1995	2000	2005	2010	2011	2012	2013	2014
Emissions of HFC, PFC	1,240.2	57.3	199.2	386.1	544.0	563.1	565.0	577.7	582.8
Emissions of SF <sub>6</sub>	10.5	11.1	11.6	13.0	9.0	9.4	9.2	6.2	6.8
NF <sub>3</sub> emission	NO	NO	NO	NO	NO	NO	NO	NO	NO
<b>Total</b>	<b>1,250.7</b>	<b>68.4</b>	<b>210.8</b>	<b>399.1</b>	<b>552.9</b>	<b>572.5</b>	<b>574.2</b>	<b>583.9</b>	<b>589.7</b>

## **4. JOINT FULFILMENT UNDER ARTICLE 4 OF THE KYOTO PROTOCOL FOR THE SECOND COMMITMENT PERIOD**

The Kyoto Protocol, under Article 4, provides the option for Parties to fulfil their commitments under Article 3 jointly.

The European Union and its Member States already made use of this option during the first commitment period (2008-2012), fulfilling their respective commitments under Article 3 (1) of the Kyoto Protocol jointly as a bloc of 15 countries, which were Member States of the Union at the time the Kyoto Protocol was ratified.

For the second commitment period, upon adoption of the Doha amendment to the Kyoto Protocol, the European Union, its Member States and Iceland stated that the European Union and its 28 Member States again intend to fulfil their reduction targets under the second commitment period jointly.

The ratification decision (Council Decision (EU) 2015/1339) sets out the terms of the joint fulfilment between the Union and its Member States and Iceland. The same terms are integral part of the Agreement between the European Union and its Member States, of the one part, and Iceland, of the other part, concerning Iceland's participation in the joint fulfilment of the commitments of the European Union, its Member States and Iceland in the second commitment period of the Kyoto Protocol in accordance with Council Decision (EU) 2015/1340. These terms are enclosed as Annex A.

The European Union, its Member States and the Republic of Iceland are members of this agreement (referred to as 'the members'). Therefore, the Republic of Croatia is member of the agreement to.

The joint assigned amount is calculated pursuant to the quantified emission limitation and reduction commitment listed in the third column of the table contained in Annex B to the Kyoto Protocol and in accordance with the provisions of Article 3 thereof. The assigned amounts of the members are determined in accordance with the terms of the joint fulfilment. The combined base year emissions of the members to the joint fulfilment equal the sum of emissions in the respective base years applicable to each Member State and Iceland.

If land-use change and forestry constituted a net source of greenhouse gas emissions in 1990 for any Member State or Iceland, that member shall, pursuant to Article 3(7bis) of the Kyoto Protocol, include in its emissions base year or period the aggregate anthropogenic carbon dioxide equivalent emissions by sources minus removals by sinks in the base year or period from land-use change (deforestation) for the purpose of calculating the joint assigned amount of the members determined in accordance with Article 3 (7bis), (8) and (8bis) of the Kyoto Protocol. The calculation pursuant to Article 3(7ter) of the Kyoto Protocol shall apply to the joint assigned amount of the second commitment period determined in accordance with Article 3 (7bis), (8) and (8bis) of the Protocol and the sum of the average annual emissions of the members for the first three years of the first commitment period multiplied by eight.

The joint quantified emission limitation and reduction commitment for the members listed in the third column of Annex B of the Kyoto Protocol for the European Union, its 28 Member States

and Iceland is 80%. The joint assigned amount of the Members is determined pursuant to Article 3(7bis), (8) and (8bis) of the Kyoto Protocol on the basis of the combined base year.

The respective emission levels of the members to the joint fulfilment are as follows:

- The emission level and assigned amount for the European Union is the difference between the joint assigned amount of the members, and the sum of the emission levels of the Member States and Iceland.
- The assigned amount of the European Union is counted against the emissions of greenhouse gases listed in Annex A to the Kyoto Protocol that are also covered by the EU Emissions Trading System (EU ETS) pursuant to Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community. The sectors covered by the EU Emissions Trading System are those specified in Annex I of the EU ETS Directive and taking into account the application of its Articles 24 and 27.
- The emission levels of the Member States and Iceland cover the emissions from sectors and gases listed in Annex A to the Kyoto Protocol not covered by Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community. This includes all emissions from sources and removals by sinks covered by Article 3(3) and (4) of the Protocol as well as all emissions of nitrogen trifluoride (NF<sub>3</sub>) under the Kyoto Protocol. These emission levels are no longer derived as a reduction percentage compared to base year emissions as in the first commitment period, but as an absolute figure, expressed in tonnes of carbon dioxide equivalents listed for each Member State and Iceland. The figure for individual Member States is equal to the sum of each Member State's Annual Emissions Allocation under Decision 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (Effort Sharing Decision) for the years 2013 to 2020 before the application of Article 3(7bis). The respective emission level of the Republic of Croatia in accordance with Article 4(1) and (5) of the Protocol and before application of Article 3(7bis) is 162,271,086 tCO<sub>2</sub>eq.

The terms of the joint fulfilment determine that the assigned amounts of the members shall be equal to their respective emission levels, adjusted for Article 3(7bis) of the Kyoto Protocol.

According to Article 3(7ter) of the Doha Amendment of the Kyoto Protocol, any positive difference between the assigned amount of the second commitment period and the average annual emissions for the first three years of the preceding commitment period multiplied by eight shall be transferred to the cancellation account.

In line with the terms of the joint fulfilment of the European Union, its Member States and Iceland under Article 3 of the Kyoto Protocol, Article 3(7ter) is applied to the joint assigned amount of the second commitment period.

The assessment of compliance of the joint fulfilment at the end of the second commitment period does not require changes to the annual inventory reporting. The European Union, the 28 Member States and Iceland shall continue to report individually on emissions by sources and removals by sinks, submitting full greenhouse gas inventories covering all anthropogenic

emissions by sources and removals by sinks for gases listed on Annex A to the Kyoto Protocol and all source categories covered by the UNFCCC reporting guidelines occurring on their territories under the Kyoto Protocol. They will also report annually in the national inventory reports on their verified emissions falling under the scope of the Emissions Trading System and the share of those emissions in the total emissions, allowing for the transparent annual monitoring of the respective emission levels.

The European Union shall report in its national inventory report on the combined emissions of the 28 Member States and Iceland as well as the emissions for sources and sinks falling under the scope of the Emissions Trading System.

## 5. CALCULATION OF ASSIGNED AMOUNT PURSUANT TO ARTICLE 3, PARAGRAPH 7 AND 8

Pursuant to Article 3(7bis), (8) and (8bis) of the Kyoto Protocol and paragraph 2 of Annex I to document FCCC/SBSTA/2015/L.13, the assigned amount for the second commitment period is equal to the percentage inscribed in the third column of Annex B of the Annex to the Doha amendment of the aggregate anthropogenic carbon dioxide equivalent emissions of greenhouse gases in the base year multiplied by eight, taking into account Article 3(7bis) of the Kyoto Protocol and Paragraph 2 of the Annex to document FCCC/SBSTA/2015/L.13.

According to Commission Decision 2013/162/EC of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision 406/2009/EC Annual Emission Allocation for Croatia for the period from 2013 to 2020 are presented in Table 5-1.

According to Commission implementing Decision 2013/634/EC of 31 October 2013 on the adjustments to Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision 406/2009/EC of the European Parliament and of the Council Adjustment to Annual Emissions Allocation for Croatia for the period from 2013 to 2020 are presented in Table 5-1.

*Table 5-1: Annual Emission Allocation and its Adjustment for the period 2013 - 2020*

<b>t CO<sub>2</sub>-eq</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
Annual Emission Allocation	21,196,005	21,358,410	21,520,815	21,683,221
Adjustment	1,582,200	1,553,154	1,524,107	1,495,060
Total	19,613,805	19,805,256	19,996,708	20,188,161

<b>t CO<sub>2</sub>-eq</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Annual Emission Allocation	21,845,626	22,008,031	22,170,436	22,332,841
Adjustment	1,466,014	1,436,968	1,407,921	1,378,875
Total	20,379,612	20,571,063	20,762,515	20,953,966

Cumulative of Annual Emission Allocations with accounted Adjustment in the period 2013 – 2020 equals Assigned Amount Units for Croatia for the period 2013 – 2020. The calculated Assigned amount of units for the Republic of Croatia is shown in the Table 5-2.

*Table 5-2: Assigned Amount Units for the Republic of Croatia for the period 2013 - 2020*

<b>t CO<sub>2</sub>-eq</b>	<b>2013 - 2020</b>
Assigned Amount Units	<b>162,271,086.0</b>

## 6. CALCULATION OF COMMITMENT PERIOD RESERVE (CPR) IN ACCORDANCE WITH DECISION 11/CMP.1

Parties are required by Decision 11/CMP.1 under the Kyoto Protocol and Paragraph 18 of Decision 1/CMP.8 to establish and maintain a commitment period reserve as part of their responsibility to manage and account for their assigned amount. The commitment period reserve equals the lower of either 90% of a Party's assigned amount pursuant to Article 3(7bis), (8) and (8bis) or 100% of its most recently reviewed inventory, multiplied by 8. Table 6-1 provides a calculation using both methods to calculate the commitment period reserve. The last column presents the commitment period reserve applicable for the second commitment period for the Croatia.

*Table 6-1: Commitment period reserve*

	t CO <sub>2</sub> -eq
Assigned amount for second commitment period	162,271,086
90 % of assigned amount	146,043,977
Emission from last submitted inventory	22,898,878
100% of most recently reviewed* inventory multiplied by 8	183,191,025
Commitment period reserve	146,043,977

\*data from last submitted inventory (NIR2016) is used in calculation. Because last reviewed inventory was NIR 2014, data from last submitted inventory (NIR 2016, last inventory year was 2014) was used to calculate CPR.

## 7. APPLICATION OF PARAGRAPHS 23 – 26 OF DECISION 1/CMP.8

According to Decision 1/CMP.8, Paragraph 23, each Party included in Annex I with a commitment inscribed in the third column of Annex B as contained in Annex I to Decision 1/CMP.8 shall establish a previous period surplus reserve (PPSR) account in its national registry. Based on this provision, the European Union, each Member State and Iceland will establish previous period surplus reserve accounts in their respective registries.

According to Decision 1/CMP.8, Paragraph 24, where the emissions of a Party referred to in Paragraph 23 above in a commitment period are less than its assigned amount under Article 3, the difference shall, on request of that Party, be carried over to the subsequent commitment period, as follows:

- Any ERUs or CERs held in that Party's national registry that have not been retired for that commitment period or cancelled may be carried over to the subsequent commitment period, up to a maximum for each unit type of 2.5 per cent of the assigned amount calculated pursuant to Article 3(7) and (8)
- Any AAUs held in that Party's national registry that have not been retired for that commitment period or cancelled shall be added to the assigned amount for that Party for the second commitment period. That part of a Party's assigned amount consisting of AAUs held in that Party's national registry that has not been retired for that commitment period or cancelled shall be transferred to its previous period surplus reserve account for the subsequent commitment period, to be established in its national registry.

Based on this provision, the European Union, each Member State and Iceland will carry over any remaining ERUs, CERs or AAUs that have not been retired or cancelled for the first commitment period in their respective registries to their respective previous period surplus reserve accounts. The 2.5 per cent limit in Paragraph 24 (a) of Decision 1/CMP.8 will be calculated based on the assigned amounts of the Member States, Iceland and the European Union calculated pursuant to Article 3(7) and (8) for the first commitment period.

According to Decision 1/CMP.8, Paragraph 25, units in a Party's previous period surplus reserve account may be used for retirement during the additional period for fulfilling commitments of the second commitment period up to the extent by which emissions during the second commitment period exceed the assigned amount for that commitment period, as defined in Article 3(7 bis), (8) and (8 bis), of the Kyoto Protocol. This provision will be applied to the European Union, its Member States and Iceland individually due to the fact that the previous period surplus reserve accounts will be established in the Kyoto registries of the European Union, its Member States and Iceland. Units in a member's Previous Period Surplus Reserve account may be used for retirement during the additional period for fulfilling commitments of the second commitment period, up to the extent by which that member's emissions during the second commitment period exceed its respective assigned amount for that commitment period.

According to Decision 1/CMP.8, Paragraph 26, units may be transferred and acquired between previous period surplus reserve accounts. This provision will be applied to the European Union, its Member States and Iceland individually due to the fact that the previous period surplus reserve accounts will be established in the Kyoto registries of the European Union, its Member States and Iceland.

In December 2015 Croatia submitted its Report upon expiration of the additional period for fulfilling commitments for the first commitment period of the Kyoto Protocol (True-up period report). In this report Croatia requested to carry over Kyoto Protocol units from first to the second commitment period. In Table 7-1 the total quantity of emission reduction units (ERUs),

certified emission reductions (CERs) and assigned amount units (AAUs) that Croatia requests to be carried over to the second commitment period, in accordance with Paragraph 49(c) of the Annex to Decision 13/CMP.1 are presented.

*Table 7-1: Total quantity of Kyoto Protocol units requested to be carried over from the first to the second commitment period*

<b>AAUs</b>	<b>ERUs</b>	<b>CERs</b>
9,048,519	0	0



## **8. INFORMATION RELATED TO LULUCF ACTIVITIES UNDER ARTICLE 3, PARAGRAPHS 3 AND 4 OF THE KYOTO PROTOCOL**

### **8.1. IDENTIFICATION OF THE SELECTION OF SINGLE MINIMUM VALUES FOR TREE CROWN COVER, LAND AREA AND TREE HEIGHT FOR USE IN ACCOUNTING UNDER ARTICLE 3(3) AND (4)**

Croatia has identified the following values for definition of forest for reporting under the Kyoto Protocol, Article 3, Paragraphs 3 and 4:

- Minimum value for tree crown cover: 10%
- Minimum land area: 0.1 ha
- Minimum tree height: 2 m

According to Croatian regulation forest is land overgrown with forest trees in a form of a stand with a surface area larger than 0.1 ha (Forestry Act, OG 140/05, 82/06).

According to the Food and Agricultural Organization (FAO) of the United Nations forest is defined as "Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ" (*Global Forests Resources Assessment 2006*). Croatia uses different single minimum values compared to those of FAO in order to ensure consistency with national legislation.

Forests defined under the Kyoto Protocol and reported to the UNFCCC are consistent with forests defined by Forestry Act and reported to FAO.

### **8.2. THE IDENTIFICATION OF ELECTION OF ADDITIONAL ACTIVITIES UNDER ARTICLE 3(4) OF THE KYOTO PROTOCOL FOR INCLUSION IN THE ACCOUNTING FOR THE SECOND COMMITMENT PERIOD**

No additional activities have been elected by Croatia for the inclusion in the accounting for the Second commitment period to the previously elected activity of Forest management under the Article 3(4).

### **8.3. IDENTIFICATION OF THE FREQUENCY OF ACCOUNTING FOR ACTIVITY UNDER ARTICLE 3, PARAGRAPH 3 AND 4 OF THE KYOTO PROTOCOL**

The chosen frequency of accounting for the activity under Article 3, Paragraph 3 and 4 of the Kyoto Protocol is the same as for the first commitment period - at the end of the commitment period.

### **8.4. INFORMATION ON FOREST MANAGEMENT REFERENCE LEVELS AS INSCRIBED IN THE APPENDIX TO THE ANNEX TO DECISION 2/CMP.7**

In the last three years Croatian Ministry for Environmental and Nature Protection initiated different activities on national level in order to improve and upgrade Croatian reporting in LULUCF sector. Under the scope of one of the implemented LULUCF projects in period 2014-2015, the first technical correction of FMRL was performed.

Croatia recognized this was needed since the first FMRL was set out without data and information about emissions/removals in case of maquis and shrub forests and without taking into consideration the role of Harvested wood products.

Croatia submitted the first technical correction of the FMRL as part of the NIR 2016 Resubmission. The FMRL as defined in Annex to Decision 2/CMP.7 equals to – 4906.20178 Gg CO<sub>2</sub> net removals without HWP (instantaneous oxidation) and to **FMRLcorr. – 5384.16933 Gg CO<sub>2</sub> net removals with the HWP Mt CO<sub>2</sub>eq/year.**

## **8.5. INFORMATION ON HARVESTED WOOD PRODUCTS**

Croatia performed estimation of emissions/removals in case of Harvested wood products. For these purposes officially delivered data by the Croatian Ministry of Agriculture to the UNECE/FAO database were used. Estimation was performed using the first order decay function in case of HWP originating from the areas under the forest management and calculating emissions due to harvest as the instantaneous oxidation in case of HWP originating from the deforested areas.

Half-life values for the saw wood, wood panels and paper and paperboard and corresponding conversion factors recommended by the Kyoto Protocol Supplement were used in the estimation and application of the first order decay function.

Data and information are presented in Croatian NIR 2016, LULUCF and Kyoto Protocol Chapters and CRF tables 4Gs1 and 4Gs2.

## **8.6. INFORMATION ON EXCLUSION OF EMISSION FROM NATURAL DISTURBANCES**

With respect to the treatment of natural disturbances emissions, and as it was reported by Croatia in NIR 2015 and NIR 2016, Croatia intends to use option of excluding emissions from the Natural disturbances from the accounting.

Data related to the different types of disturbances that are recorded in Croatia (i.e. snow breaks, windbreaks and pests diseases) and that are needed for the purpose of this estimation are not available at the moment since the existing data and information on natural disturbances are not in line with the requirements of the Kyoto Protocol Supplement.

In order to prepare accurate estimation of emissions due to natural disturbances and define background level and margin level for the activities under the article 3(3) and 3(4) of the Kyoto protocol, separate project was defined by the Ministry of Environmental and Nature protection in 2015.

It is planned to execute this project during this year, and submit values for margin and background levels in NIR 2017 for the activities under the article 3(3) and 3(4) of the Kyoto protocol.

## **9. DESCRIPTION OF NATIONAL SYSTEM IN ACCORDANCE WITH ARTICLE 5, PARAGRAPH 1 OF THE KYOTO PROTOCOL**

Institutional arrangement for inventory preparation in Croatia is regulated in Chapter II of the Regulation on the Monitoring of Greenhouse Gas Emissions, Policies and Mitigation Measures in the Republic of Croatia (OG 87/12) entitled National system for the estimation and reporting of anthropogenic greenhouse gas emissions by sources and removals by sinks. Institutional arrangements for inventory management and preparation in Croatia could be characterized as decentralized and out-sourced with clear tasks breakdown between participating institutions including Ministry of Environmental and Nature Protection (MENP), Croatian Agency for the Environment and Nature (CAEN) and competent governmental bodies responsible for providing of activity data. The preparation of inventory itself is entrusted to Authorised Institution which is elected for three-year period by public tendering. Committee for inter-sectorial coordination for national system for monitoring of GHG emission (National System Committee) is included in the approval process; its members provide their opinion on certain parts of the Inventory within the frame of their speciality. Members of the National System Committee are nominated by the authorized Ministries upon the request of the MENP.

MENP is a national focal point for the UNFCCC, with overall responsibility for functioning of the National system in a sustainable manner, including:

- mediation and exchange of data on greenhouse gas emissions and removals with international organisations and Parties to the Convention;
- mediation and exchange of data with competent bodies and organisations of the European Union in a manner and within the time limits laid down by legal acts of the European Union;
- control of methodology for calculation of greenhouse gas emissions and removals in line with good practices and national circumstances;
- consideration and approval of the National Inventory Report prior to its formal submission to the Convention Secretariat.

CAEN is responsible for the following tasks:

- organisation of greenhouse gas inventory preparation with the aim of meeting the due deadlines referred to in Article 12 of above mentioned Regulation;
- collection of activity data referred to in Article 11 of above mentioned Regulation;
- development of quality assurance and quality control plan (QA/QC plan) related to the greenhouse gas inventory in line with the guidelines on good practices of the Intergovernmental Panel on Climate Change;
- implementation of the quality assurance procedure with regard to the greenhouse gas inventory in line with the quality assurance and quality control plan;
- archiving of activity data on calculation of emissions, emission factors, and of documents used for inventory planning, preparation, quality control and quality assurance;
- maintaining of records and reporting on authorised legal persons participating in the Kyoto Protocol flexible mechanisms;
- selection of Authorised Institution (in Croatian: *Ovlaštenik*) for preparation of the greenhouse gas inventory.
- provide insight into data and documents for the purpose of technical reviews.

Authorised Institution is responsible for preparation of inventory, which include:

- emission calculation of all anthropogenic emissions from sources and removals by greenhouse gas sinks, and calculation of indirect greenhouse gas emissions, in line with the methodology stipulated by the effective guidelines of the Convention, guidelines of the Intergovernmental Panel on Climate Change, Instructions for reporting on greenhouse gas emissions as published on the Ministry's website, and on the basis of the activities data referred to in Article 11 of this Regulation;
- quantitative estimate of the calculation uncertainty referred to in indent 1 of this Article for each category of source and removal of greenhouse gas emissions, as well as for the inventory as a whole, in line with the guidelines of the Intergovernmental Panel on Climate Change;
- identification of key categories of greenhouse gas emission sources and removals;
- recalculation of greenhouse gas emissions and removals in cases of improvement of methodology, emission factors or activity data, inclusion of new categories of sources and sinks, or application of coordination/adjustment methods;
- calculation of greenhouse gas emissions or removal from mandatory and selected activities in the sector of land use, land-use change and forestry;
- reporting on issuance, holding, transfer, acquisition, cancellation and retirement of emission reduction units, certified emission reduction units, assigned amount units and removal units, and carry-over, into the next commitment period, of emission reduction units, certified emission reduction units and assigned amount units, from the Registry in line with the effective decisions and guidelines of the Convention and supporting international treaties;
- implementation of and reporting on quality control procedures in line with the quality control and quality assurance plan;
- preparation of the greenhouse gas inventory report, including also all additional requirements in line with the Convention and supporting international treaties and decisions;
- cooperation with the Secretariat's ERTs for the purpose of technical review and assessment/evaluation of the inventory submissions.

EKONERG – Energy and Environmental Protection Institute was selected as Authorised Institution for preparation of inventory submission until 2018.

## **10. DESCRIPTION OF THE NATIONAL REGISTRY**

### **European Union**

For the purpose of meeting their obligations as Parties to the Kyoto Protocol and under Article 10 of Regulation (EU) No 525/2013 ("Monitoring Mechanism Regulation"), each Member State and the European Union operate a Kyoto Protocol national registry. In accordance with Decision 13/CMP.1 and Decision 24/CP.8 the Member States and the Union operate their national registries in a consolidated manner.

A description of the national registry is required pursuant to the Annex to Decision 2/CMP.8 if the Party did not have a quantified emission limitation and reduction target in the first commitment period. The European Union already had a quantified emission limitation and reduction target in the first commitment period and provided a description of the national registry in the report to calculate the assigned amount of the first commitment period. Subsequently changes that occurred related to the national registry were reported as part of the annual supplementary information under Article 7 of the Kyoto Protocol included in the national inventory report.

### **Republic of Croatia**

The competent authority for the management of the emission trading scheme in Croatia is the Ministry of Environment and Nature Protection. In accordance with Article 102. of the Air Protection Act (OG 130/11, 47/14), the Ministry on behalf of the Croatia manages Croatian account in the Registry and orders the CAEN regarding the management of this account.

In accordance with Article 101, Paragraph 3 of Air Protection Act (OG 130/11, 47/14):

- (1) Croatian Agency for Environment and Nature is national administrator for administering the Registry.
- (2) Registry administering activities are:
  - Maintenance of the accuracy and security of Registry data,
  - Creation and maintenance of user accounts,
  - Managing the party account,
  - Preparing the reports in accordance with the Convention and regulations of the European Commission,
  - Publishing information in accordance with the Convention and regulations of the European Commission.

### **Registry administrator**

Table 10-1 contains the name and contact information of the registry administrator designated to maintain Croatian registry.

*Table 10-1: Information of the registry administrator*

Title	Registry Administrator
Name	Tomislav Glušac
Organization	Hrvatska agencija za okoliš i prirodu / Croatian Agency for Environment and Nature (CAEN)
Address	Radnička cesta 80 - 10 000 Zagreb, Croatia
E-mail	ghgregistry.admin@azo.hr
Phone	+385 1 5581 660
Fax	+385 1 4886 850
Website	<a href="http://www.azo.hr">www.azo.hr</a>

## **ANNEX A. NOTIFICATION OF THE TERMS OF THE AGREEMENT TO FULFILL JOINTLY THE COMMITMENTS OF THE EUROPEAN UNION, ITS MEMBER STATES AND ICELAND UNDER ARTICLE 3 OF THE KYOTO PROTOCOL FOR THE SECOND COMMITMENT PERIOD OF THE KYOTO PROTOCOL**

### **1. Members of the agreement**

The European Union, its Member States and the Republic of Iceland, each being Parties to the Kyoto Protocol, are the members of this agreement ("the members"). The following are at present Member States of the European Union:

the Kingdom of Belgium, the Republic of Bulgaria, the Czech Republic, the Kingdom of Denmark, the Federal Republic of Germany, the Republic of Estonia, Ireland, the Hellenic Republic, the Kingdom of Spain, the French Republic, the Republic of Croatia, the Italian Republic, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Grand Duchy of Luxembourg, Hungary, the Republic of Malta, the Kingdom of the Netherlands, the Republic of Austria, the Republic of Poland, the Portuguese Republic, Romania, the Republic of Slovenia, the Slovak Republic, the Republic of Finland, the Kingdom of Sweden, and the United Kingdom of Great Britain and Northern Ireland.

Iceland is a member of this agreement pursuant to the Agreement between the European Union and its Member States and Iceland concerning Iceland's participation in the joint fulfilment of the commitments of the European Union, its Member States and Iceland for the second commitment period of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

### **2. Joint fulfilment of the commitments under Article 3 of the Kyoto Protocol for the second commitment period of the Kyoto Protocol**

In accordance with Article 4(1) of the Kyoto Protocol, the members will fulfil their commitments under Article 3 thereof as follows:

- the members will ensure that, in accordance with Article 4(5) and (6) of the Kyoto Protocol, in the Member States and Iceland the combined sum of the aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A to the Kyoto Protocol does not exceed their joint assigned amount;
- the application of Article 3(1) of the Kyoto Protocol to greenhouse gas emissions from aviation and shipping for the Member States and Iceland is based on the Convention's approach of only including emissions from domestic flights and domestic shipping in Parties' targets. The European Union approach under the second commitment of the Kyoto Protocol will remain the same as that of the first commitment period, given the lack of progress since Decision 2/CP.3 in attributing those emissions to Parties' targets. This is without prejudice to the stringency of the European Union's commitments under the climate and energy package, which remain unchanged. It is also without prejudice to the need to take measures concerning emissions of such gases from aviation and marine bunker fuels;
- each member may increase its ambition level by transferring assigned amount units, emission reduction units or certified emission reduction units to a cancellation account established in its national registry. The members will jointly submit the information required by

paragraph 9 of Decision 1/CMP.8, and will jointly make any proposals for the purpose of Article 3(1ter) and (1quater) of the Kyoto Protocol;

- the members will continue to apply Article 3(3) and (4) of the Kyoto Protocol and decisions agreed thereunder individually;
- the combined base year emissions of the members will equal the sum of emissions in the respective base years applicable to each Member State and Iceland;
- if land use, land-use change and forestry constituted a net source of greenhouse gas emissions in 1990 for any Member State or Iceland, the relevant member shall, pursuant to Article 3(7bis) of the Kyoto Protocol, include in its emissions base year or period the aggregate anthropogenic carbon dioxide equivalent emissions by sources minus removals by sinks in the base year or period from land use, land-use change and forestry for the purpose of calculating the joint assigned amount of the members determined in accordance with Article 3 (7bis), (8) and (8bis) of the Kyoto Protocol;
- the calculation pursuant to Article 3(7ter) of the Kyoto Protocol shall apply to the joint assigned amount of the second commitment period for the members determined in accordance with Article 3 (7bis), (8) and (8bis) of the Kyoto Protocol and the sum of the average annual emissions of the members for the first three years of the first commitment period multiplied by eight;
- in accordance with Decision 1/CMP.8, units in a member's Previous Period Surplus Reserve account may be used for retirement during the additional period for fulfilling commitments of the second commitment period, up to the extent by which that member's emissions during the second commitment period exceed its respective assigned amount for that commitment period, as defined in this notification.

### 3. Respective emission levels allocated to the members to the agreement

The quantified emission limitation and reduction commitments for the members listed in the third column of Annex B to the Kyoto Protocol are 80 %. The joint assigned amount of the members for the second commitment period will be determined pursuant to Article 3(7 bis), (8) and (8 bis) of the Kyoto Protocol, and its calculation will be facilitated by the report submitted by the European Union pursuant to paragraph 2 of Decision 2/CMP.8.

The respective emission levels of the members are as follows:

- The emission level for the European Union is the difference between the joint assigned amount of the members, and the sum of the emission levels of the Member States and Iceland. Its calculation will be facilitated by the report submitted pursuant to paragraph 2 of Decision 2/CMP.8.
- The respective emission levels of the Member States and Iceland in accordance with Article 4(1) and (5) of the Kyoto Protocol are the sum of their respective amounts listed in Table 1 below and any results of the application of the second sentence of Article 3(7bis) of the Kyoto Protocol for that Member State or Iceland.  
The assigned amounts of the members shall be equal to their respective emission levels.

The assigned amount of the European Union will be counted against the emissions of greenhouse gases from sources under the European Union Emissions Trading Scheme, in which its Member States and Iceland participate, to the extent that those emissions are covered under the Kyoto Protocol. The respective assigned amounts of the Member States and Iceland cover the greenhouse gas emissions by sources and removals by sinks in each Member State



or Iceland from sources and sinks not covered by Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community. This includes all emissions by sources and removals by sinks covered by Article 3(3) and (4) of the Kyoto Protocol as well as all emissions of nitrogen trifluoride (NF<sub>3</sub>) under the Kyoto Protocol.

Members of this agreement shall report separately on the emissions by sources and removals by sinks covered by their respective assigned amounts.

Table 1: Emission levels of the Member States and Iceland (before application of Article 3(7bis)) in terms of tonnes of carbon dioxide equivalent for the second commitment period of the Kyoto Protocol

Belgium	584,228,513
Bulgaria	222,945,983
Czech Republic	520,515,203
Denmark	269,321,526
Germany	3,592,699,888
Estonia	51,056,976
Ireland	343,467,221
Greece	480,791,166
Spain	1,766,877,232
France	3,014,714,832
Croatia	162,271,086
Italy	2,410,291,421
Cyprus	47,450,128
Latvia	76,633,439
Lithuania	113,600,821
Luxembourg	70,736,832
Hungary	434,486,280
Malta	9,299,769
Netherlands	919,963,374
Austria	405,712,317
Poland	1,583,938,824
Portugal	402,210,711
Romania	656,059,490
Slovenia	99,425,782
Slovakia	202,268,939
Finland	240,544,599
Sweden	315,554,578
United Kingdom	2,743,362,625
Iceland	15,327,217