



2015

REPORT OF IMPLEMENTATION OF  
POLICIES AND MEASURES THAT REDUCE  
GREENHOUSE GAS EMISSIONS BY SOURCES  
OR ENHANCE REMOVALS BY SINKS  
-addition  
REPUBLIC OF CROATIA

June 2015



CROATIAN  
ENVIRONMENT AGENCY

REPORT ON IMPLEMENTATION OF  
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## I INTRODUCTION

'Report on implementation of policies and measures that reduce greenhouse gas emissions by sources and enhance removals by sinks' (hereinafter: the Report) is an integral part of the national system for monitoring the implementation of policies and measures for greenhouse gas emissions reduction and projections of greenhouse gas emissions related to the fulfilment of commitments under the United Nations Framework Convention on Climate Change (hereinafter: the Convention) and the Kyoto Protocol. The Republic of Croatia is required to report to the European Commission on monitoring the implementation of these policies and measures and emission projections, based on the regulations that apply to the European Union Member States.

The legal basis for preparation of the Report in the national legislation is primarily in Article 75 Paragraph 3 of the Air Protection Act (OG 130/11, 47/14).

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 280/2004/EC (hereinafter: Regulation) and Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council (hereinafter: Implementing Regulation) are applicable regulations of the European Union which prescribe obligations and way of reporting for Member States.

Article 13 of the aforementioned Regulation prescribes the content of the report. Report on the implementation of policies and measures to reduce emissions and increase removals of greenhouse gases for 2015 therefore has:

- Description of national system for reporting on policy and measures,
- Objective of the policy and measures,
- Type of policy instruments,
- Status of implementation of the policy or measure,
- Indicators for tracking of the effects of policy and measures,

- Quantitative estimates of the effect of policies and measures on emissions and removals of greenhouse gases for 2015, 2020, 2025, 2030 and 2035 (ex -ante analysis),
- Quantitative assessment of the achievements of policies and measures on emissions and removals of greenhouse gases for the period from 2008 to 2011 and from 2012 to 2013 (ex - post analysis),
- Amount of annual national emission allocation,
- Anticipated progress in meeting the emission limits to the amount of annual national quota,
- Information on planned additional measures to achieve greater emission limits of the amount of annual national quota,
- Assessment of the effect of the Clean Development Mechanism, Joint Implementation and Emissions Trading as a supplementary measure to reduce greenhouse gas emissions,
- Indicators for the projections for 2012, 2020, 2025, 2030 and 2035 in accordance with Annex III of the Regulation.

## II NATIONAL SYSTEM FOR THE DEVELOPMENT OF THE PROJECTIONS OF GHG EMISSIONS

The Ministry of Environment and Nature Protection is responsible for the overall national policy of environmental protection, including climate change and reporting on the implementation of policies and measures and on emission projections. The Environmental Protection Agency is responsible for organizing the preparation of the Inventory of greenhouse gas emissions, data collection, preparation of quality assurance and quality control plan and selection of an authorized institution for a three-year period. Update of the Report on the implementation of policies and measures to reduce emissions and enhance sinks of greenhouse gases and Report on projections of greenhouse gas emissions is organized in two-year cycles, according to Regulation (EU) No. 525/2013.

Ekoneg - Energy Research and Environmental Protection Institute is an institution that was awarded in a public tender for a three-year period to prepare reports on the inventory of greenhouse gas emissions, greenhouse gas emission projections and policies and measures to reduce emissions and enhance sinks of greenhouse gases. The current contract expires in 2015, when it will be published a new tender.

In accordance with the Air Protection Act (OG 130/11, 47/14), for monitoring and evaluation of the implementation and planning of policies and measures for mitigation and adaptation to climate change in the Republic of Croatia, the Commission for inter-sectoral coordination of policies and measures for mitigation and adaptation to climate change (OG 114/14) was established. The Committee members include representatives of relevant government bodies and other relevant organizations, agencies and non-governmental organizations. The composition of the Commission, tasks and functioning of the Commission is determined by the Croatian Government on the proposal of the ministry responsible for environmental protection. The Committee controls the process of drafting the Report on projections of greenhouse gas emissions and Report on the implementation of policies and measures to reduce emissions and enhance sinks of greenhouse gases.

## III DESCRIPTION OF POLICIES AND MEASURES

### 3.1. GENERAL INFORMATION

Policies and measures that are subject of this report are included in the "with measures" and "with additional measures" scenarios along with "without measures" scenario in the "Report on projections of greenhouse gas emissions." The above report has been prepared as a separate document.

In this report, policies and measures that belong to the so-called ETS sector are being separately observed from policies and measures in non-ETS sectors. This way of overview is selected in accordance with the European practice in which the effects of policies and measures are separated in such way. ETS (Emissions Trading System) sector includes all activities listed in Annex I of the Regulation on trading with greenhouse gas emission allowances (OG 69/12, 154/14) and for the reduction of greenhouse gas emissions from these activities alone are responsible plant operators involved in the trading system. Reduction commitments through emission allowances allocated evenly have been distributed to all Member States, thus it can be concluded that reduction of emissions of certain activities of the ETS is in fact regulated at EU level. Emissions trading system is treated as a single group of measures to reduce emissions, without dividing the activities covered by the system.

For all other activities at the state level, which are not covered by the ETS, common sectoral division is applied, while responsibility for reducing the emissions and increasing the outflow by implementing these policies and measures is on the Member States. For activities that are not covered by the ETS sector, policies and measures to reduce emissions from sources and increase sinks of greenhouse gases are shown separately for the following sectors:

- energy
- transport
- industrial processes
- waste management
- agriculture
- land use, land use change and forestry (LULUCF)

- other (cross-cutting) policies and measures.



## 3.2. EMISSIONS TRADING SYSTEM

As stated in the introductory part of the Chapter 3, emissions trading system (EU ETS) is treated as a single group of measures to reduce greenhouse gas emissions in comparison to the previous report. Besides implementation of EU ETS in Croatia from 2013 onward, there are two measures directly linked to the emission trading system. One measure refers to the use of funds from the allowances which are sold to operators at auctions and the other related to the regulation of the geological storage of carbon dioxide as one of the activities covered by the emission trading system. All three measures are described below.

### MSP-1: Inclusion of the operators and aircraft operators in the European Union Emission Trading System (EU ETS) in the full scale from 1 January 2013.

From 1 January 2013, the Republic of Croatia is fully integrated in the EU Emission Trading System (EU ETS). Operators in Croatia - the pursuants in the EU ETS have obtained Permits for greenhouse gas emissions and have established a regime for emissions monitoring and reporting to the competent authority.

The EU ETS includes activities listed in Annex I of the Regulation on the Greenhouse Gas Emission Allowances Trading (OG 69/12, 154/14). Greenhouse gases covered by EU ETS are: carbon dioxide (CO<sub>2</sub>) for all activities and additionally for certain activities, nitrous oxide (N<sub>2</sub>O) and perfluorocarbon (PFC). Additional activity included in EU ETS is aviation. Aircraft operators in Croatia are included in the EU ETS from 2012, and Croatia undertook to administer aviation operators included in the EU ETS from 2014.

All operators, except electricity producers for the third parties sales, have submitted their applications for issuance of free allowances. Operators, which will not have a sufficient number of allowances to cover their greenhouse gases emissions, have the option to purchase emission units through auctions.

### MSP-2 Adoption of the Plan for use of funds obtained from the sales of emission allowances through auctions

Of the total number of allowances designated for the allocation to operators and aircraft operators, in each year of the trading period, a part is distributed free of charge according to the prescribed method. The remaining part is distributed to the Member States of the European Union and is subject to public auctions. Revenues from the sales of emission allowances through auctions belong to the member states, of which at least 50 percent of collected funds must be earmarked for activities that are directly associated with the reduction of greenhouse gas emissions.

The Air Protection Act (OG 130/11, 47/14) stipulates that Republic of Croatia for such purposes use all funds received decreased by 5 percent, i.e. 15 percent for 2014 and 2015, which will be paid to the state budget of the Republic of Croatia to cover the costs of administering the emissions trading system, for administrative affairs, functioning of the Union Registry, auctioneers, National System for monitoring greenhouse gas emissions and other matters related to climate change. Plan for the use of funds obtained from the sales of emission allowances through auctions in the Republic of Croatia for the period from 2014 to 2016 was adopted by the Croatian Government (OG 140/14) on the proposal of the ministry responsible for environmental protection, while the funds are paid to a special account of the Environmental Protection and Energy Efficiency Fund.

### MSP-3: Preparation of National Feasibility Study with the action plan for the preparatory activities for CCS projects in Croatia

Technology for carbon capture and storage for large emission sources is not yet commercially available. The possibility of commercial application is expected in the period after 2020.

According to Directive 2009/31/EC on the geological storage of carbon dioxide, respectively Article 36 of Directive on industrial emissions 2010/75/EU, for power plants with capacity exceeding 300 MW which have obtained the construction permit after the entry into force of the Directive 2009/31/EK, it is necessary to assess whether the following requirements are satisfied:

- suitable storage locations are available,
- transport facilities are technically and economically feasible and
- upgrade of the plant for CO<sub>2</sub> capture is technically and economically feasible.

If these conditions are satisfied, the competent authority should provide adequate reserve area on the plant's location for equipment for capturing and compressing extracted CO<sub>2</sub>.

Due to described commitments for new thermal power plants, with this measure the preparation of National Feasibility Study with the action plan of the preparatory activities for CCS projects is planned. This Study will include stages of capturing on the sources of emissions, transport, injection and storage.



### 3.3. ENERGY

#### MEN-1 Promotion of energy efficiency in households and services through project activities

Increase of energy efficiency in buildings has been identified as an area with great potential for saving energy and reducing greenhouse gas emissions. Important documents that have been adopted are as follows:

- The Third National Action Plan for Energy Efficiency Croatia for the period 2014-2016 (Ministry of Economy, 2014),
- The Long-term Strategy to Stimulate Investment in the Renovation of the National Building Stock in Croatia (OG 74/14),
- The Program of Energy Renovation of Apartment Buildings for the Period from 2014 to 2020 with a Detailed Plan for the Period from 2014 to 2016 (OG 78/14),
- The Program of Energy Renovation of Family Houses for the Period from 2014 to 2020 with a Detailed Plan for the Period from 2014 to 2016 (OG 43/14),
- The Program of Energy Renovation of Commercial Non-residential Buildings for the Period from 2014 to 2020 with a Detailed Plan of Energy renovation of Commercial Non-residential Buildings for the Period from 2014 to 2016 (OG 98/14) and
- The Programme for the Energy Renovation of Public Buildings 2012 - 2013 (Ministry of Construction and Physical Planning),
- The Programme for the Energy Renovation of Public Buildings 2014 - 2015 (Ministry of Construction and Physical Planning).

In the above listed documents, mechanisms, dynamics and aims to achieve energy savings and reduce greenhouse gas emissions in buildings are prescribed.

In addition, incentives for energy efficiency improvements are expected under the Operative Programme Competitiveness and cohesion for the period from 2014 to 2020 where, under Priority Axis 4 - Promotion of energy efficiency and renewable energy sources, provides support for energy efficiency.

### MEN-2 Energy audits in industry

With this measure, support to assess the potential energy savings in industrial plants through co-financing the implementation of energy audits should be provided. Scheme for Energy audits in industry includes:

- mandatory energy audits for large companies (companies that meet at least two of the following criteria: total assets of at least HRK 130,000,000.00, annual income of at least HRK 260,000,000.00, an average of at least 250 employees during the financial year). The obligation is regulated by the Law on Energy Efficiency (OG 127/14),
- voluntary scheme of energy audits for small and medium companies. Energy audits on a voluntary basis are supported by the financial assistance provided by the Environmental Protection and Energy Efficiency Fund.

### MEN-3 Measurement and informative calculation of energy consumption

Law on Energy Efficiency (OG 127/14) stipulates that energy distributors ensure that, to the extent that is technically possible, financially reasonable and proportionate in view of the potential energy savings, final customers of energy and hot water in homes acquire individual meters at competitive prices that accurately reflect the actual energy consumption of end customers. Energy supplier shall free of charge on request of the end customer at least once a year provide information on the calculation of electricity, heat or gas and previous consumption of the end customer.

Legible and understandable energy bills (electricity, heat and natural gas) and individual consumption metering are obligation of distribution system operators and suppliers. This will increase consumer awareness of the way in which they consume the energy. The bills should include comparisons of consumption for the current year and for the corresponding period of the previous year, as well as information on available energy efficiency measures.

### MEN-4 Promotion of the cogeneration construction

The legislative framework which introduces a system of incentives for electricity generation from cogeneration was adopted for implementation of this measure. The largest contribution is expected from new industrial cogeneration.

Incentives (tariffs) are the main mechanism for the promotion of cogeneration. Tariffs depend on the installed plant capacity. In addition to the system of incentives for electricity generation from cogeneration plants, this measure provides adoption of appropriate regulations to promote the heat generation from cogeneration (defining the status of eligible heat producer).

#### MEN-5 Labelling the energy efficiency of household appliances

Scheme of labelling the energy efficiency of household appliances is legally prescribed in the Regulations on Energy Labelling of Household Appliances (OG 130/2007, 101/2011). It is prescribed that energy efficiency label have to be marked on all household appliances that use electricity and are placed on the Croatian market, whether they are manufactured in the Republic of Croatia or imported.

By energy labelling, customers are informed about the energy consumption of devices and selection is directed towards more efficient appliances. For the implementation of these measures, a lot has been done to raise public awareness and educate in order to increase the market share of household appliances with A, A+, A++ energy efficiency class and reduce the market share of household appliances under class C.

#### MEN-6 Eco-design of energy-using products

Ordinance on establishing Eco-design requirements for energy related products (OG 80/2013), transferred the 2009/125/EZ Directive of the European Parliament and of the Council of 21 the October 2009 about establishing a framework for determining the Eco-design requirements for energy related products to the Croatian legislation.

This Ordinance established a framework for the setting of EU Eco-design of energy-related products with the aim of ensuring the free movement of these products on the internal market. The Ordinance provides for the determination of requirements to be met by energy-related products covered by implementing measures, to be placed on the market and / or in use. It contributes to sustainable development by increasing the energy efficiency and level of environmental protection, while at the same time increasing the security of energy supply.

This Ordinance also allows the implementation of provisions related to the Directive 2009/125/EZ (air conditioners and fans, fan motor-driven, self-circulation pumps without seals,

household washing machines, electric motors, non-directional household lamps, lamps directed to the corresponding equipment LED - lamps, fluorescent lamps, external power supplies, cooling devices, simple control boxes, electric and electronic equipment in homes and offices - mode, hold and mute, televisions, household dryers, washing household dishes and pumps water). The Ordinance came into force on the date of the Republic of Croatia accession to EU.

#### MEN-7 Supporting the use of renewable energy sources in electricity generation

For the implementation of measures, legislative framework, which introduces a system of incentives electricity generation using renewable energy sources, has been adopted. The main mechanism for development of renewable energy sources are incentive prices (tariffs). The tariffs depend on the type of source, power plant size and amount of generated electricity.

In the National Action Plan for Renewable Energy Sources (Ministry of Economy, 2013), the Republic of Croatia determined the objectives and policy for increasing the share of RES in final energy consumption by 2020. The Act on Renewable Energy Sources is under development with expected adoption during 2015.

In addition, incentives for use of renewable energy sources are expected under the Operative Programme Competitiveness and cohesion for the period from 2014 to 2020 where under Priority Axis 4 - Promotion of energy efficiency and renewable energy the support of renewable energy sources is planned.

#### MEN-9 Usage of biodegradable fraction of waste in public electricity and heating plants

This is a cross-cutting measure meaning that it requires coordination of activities with "Waste management" sector. This measure is related to the measures *Use of biogas from bioreactors for electricity and heat generation* and *Thermal treatment of municipal waste and sludge from wastewater treatment*. The reduction of biodegradable waste in disposed municipal solid waste is one of the main objectives defined in the Waste Management Plan of the Republic of Croatia for the period from 2007 until 2015 (OG 85/2007, 126/2010, 31/2011) and the Law of Sustainable Waste Management (OG 94/2013). Using of biodegradable waste for production of biogas that could be used as a fuel, as well as municipal waste and sludge from wastewater treatment in thermal treatment plant also means reducing the

consumption of fossil fuels in the energy sector. One of the activities leading to the accomplishment of this objective is the utilization of waste as alternative fuel in public electricity and heating plants.

#### MEN-10 Usage of refused derived fuel in the cement industry

The same applies to this measure as to the previous one, but waste is utilized as a fuel of rotary kilns in cement industry. The Waste Management Plan defines technological processes of processing and utilization of municipal waste before final disposal within the waste management centers, whereat the procedure of mechanical-biological waste treatment is considered as method for the production of fuel from waste. Use of fuel from waste results in reduced consumption of primary energy sources. Precondition for implementation of this measure is to ensure stable quantity, composition and structure of waste.

#### MEN-11 Promotion of the use of renewable energy sources in heat/cooling energy generation

The Law on Heat Market (OG 80/13, 14/14, 102/14) stipulates that use of renewable energy as a source of heat is of interest for Croatia. The Republic of Croatia has in the National Action Plan for Renewable Energy Sources (Ministry of Economy, 2013) determined the objectives and policy for increasing the share of RES in final energy consumption by 2020 and in particular, the estimated contribution of energy sources for heating and cooling from renewable energy. The Act on Renewable Energy Sources is under development and expected adoption is during 2015.

In addition, incentives for use of renewable energy sources are expected under the Operative Programme Competitiveness and cohesion for the period from 2014 to 2020 where under Priority Axis 4 - Promotion of energy efficiency and renewable energy the support of renewable energy sources is planned.

#### MEN-12 Promotion of the use of renewable energy sources and energy efficiency by HBOR-a (Croatian Bank for Reconstruction and Development)

For the purpose of financing the environmental protection projects, HBOR extends loans through the Loan programme for the Preparation of Renewable Energy Resources and Loan Programme for the Financing of Projects of Environmental protection, Energy Efficiency and Renewable Energy Sources.

The goal of the loan program of environmental projects, energy efficiency and renewable energy sources is the realization of investment projects focused on environmental protection, improving energy efficiency and promoting renewable energy. Loans are intended for investment in land, buildings, equipment and devices. Final user may be local and territorial (regional) governments, utility companies, companies, dealers and other legal entities.

MEN-13 Promotion of the use of renewable energy sources and energy efficiency by FZOEU (The Environmental Protection and Energy Efficiency Fund) resources

The Environmental Protection and Energy Efficiency Fund provides funding for the preparation, implementation and development of programs and projects in the field of environmental protection, energy efficiency and use of renewable energy sources and climate change mitigation.

Funds for financing are provided from the revenues raised by environmental polluters, which includes fees for nitrogen oxides, sulfur dioxide and carbon dioxide emissions, fees for burdening the environment with waste, environmental user fees and special fees for the environment for motor vehicles.

Resources of the Environmental Protection and Energy Efficiency Fund are allocated to projects, which improve energy efficiency, including cogeneration, district heating systems, energy audits and demonstration activities, public lighting projects, fuel replacement and waste heat use and projects in the field of building construction and sustainable construction.

Renewable energy projects for which the Environmental Protection and Energy Efficiency Fund grants resources include solar energy, wind energy, biomass, energy from small hydro and geothermal energy.

The Environmental Protection and Energy Efficiency Fund provides grants to local and regional governments, companies, craftsmen, non-profit organizations and individuals, through loans, interest rate subsidies, financial aids and donations.

For some tenders of the Fund, operators in the EU ETS are eligible, thus this measure has effects in the EU ETS and non-EU ETS sector.

### MEN-14 Energy efficiency projects with implementation through energy services

Energy efficiency projects with implementation through energy services include modernization, reconstruction and renovation of existing plants and facilities with the aim of rational use of energy in a way to achieve the return on investment through savings in energy costs and maintenance. These projects include the development, implementation and financing to improve energy efficiency and reduce operation and maintenance. Areas of business are public and private sectors, i.e. buildings (schools and kindergartens, offices, hotels, universities, hospitals), public lighting, industry and power supply systems (cogeneration, district heating).

Center for monitoring of the energy sector and investment (CEI) was implementing the program "Energy renovation of public buildings 2012 - 2013" under an agreement with the Ministry of Construction and Physical Planning. CEI conducted the program and based on the Law on Energy Efficiency in Final Consumption (OG 55/12) and the Regulation on the Negotiation and Implementation of Energy Services (OG 69/12), by which CEI was responsible for the implementation of public procurement procedures for energy services for budgetary and extra-budgetary users (Law Art. 25(5)). The program involves contracting energy building renovation process by public tender, which results in the signing of the energy performance contract between bidder companies and the owner of the public building. Such a model has been recognized as the most effective way to achieving energy savings.

### 3.4. TRANSPORT

#### MTR-2: Providing information to consumers on fuel economy and CO<sub>2</sub> emission of new passenger cars

Pursuant to the Ordinance on Availability of Information on Fuel Economy and CO<sub>2</sub> Emissions from Passenger Cars (OG 120/07), which was replaced by the new Ordinance on Availability of Information on Fuel Economy and CO<sub>2</sub> Emissions from Passenger Cars (OG 7/2015) each supplier of new passenger cars intended for sale shall provide consumers with information on the fuel consumption rate and specific CO<sub>2</sub> emission of passenger cars. The Ministry of Interior which is responsible for the road traffic safety, on the basis of the Ordinance once a year, not later than 31 March of the current year, makes a Guidelines on cost-effectiveness of fuel consumption and CO<sub>2</sub> emission from new passenger cars available for purchase on the market in the Republic of Croatia. The Guidelines contains required information for each model of new passenger cars available in the domestic market.

#### MTR-3: Implementation of the pilot project and establishment of training system for drivers of road vehicles for eco-driving

The pilot projects were conducted and systematic training for drivers of road vehicles for eco-driving is implemented, as prescribed in the third National Action Plan for Energy Efficiency for the Period from 2014 to 2016 (Ministry of Economy, 2014). This saves energy and increases the level of awareness of all citizens and drivers in the Republic of Croatia on advantages of this modern, intelligent and environmentally friendly driving style. Special elements are dedicated to education on eco driving for drivers of passenger cars, buses and trucks.

#### MTR-4: Promotion of production and use of biofuels in transport

The basic regulation that regulates and promotes the usage of biofuel is Law on Biofuels for Transport (OG 65/09, 145/10, 26/11, 144/12).

Based on this law, in 2010, the National Action Plan that promotes the production and use of biofuels in transport for the period 2011 - 2020 was prepared. The Plan establishes a policy to promote

increased production and use of biofuels in transport in Croatia. The Plan contains a review and assessment of the situation on the fuel market for transport and air protection, comparative analysis, long-term goals, including the target-market of biofuels and measures to promote increased production and use of biofuels in transport. Measures prescribed by action plan include measures that promote the production of raw materials for the production of biofuels, measures that promote the production of biofuels with reference to the fee for promotion of production, measures that promote consumption of biofuels with reference to liquid petroleum distributors to place the biofuels on market, administrative measures and research and development activities. The National Action Plan for Renewable Energy Sources (Ministry of Economy, 2013) determined the goals and policies related to increasing the share of RES in final energy consumption by 2020 and in particular the estimated contribution of energy of biofuels in transport. The Act on Renewable Energy Sources is under development and the expected adoption is during 2015.

#### MTR-5: Modification of the system for special fee payment for the environment for motor vehicles

The current system of paying a special fee for the environment in motor vehicles is regulated by Environmental Protection and Energy Efficiency Law (OG 107/03, 144/12), Regulation on unit charges, corrective coefficients and detailed criteria and standards to determine the special environmental fee for motor vehicles (OG 114/14, 147/14) and Ordinance on the manner and terms of calculation and payment of the special fee for environment in motor vehicles (OG 20/04). Special fee was charged pursuant to the aforementioned Ordinance, taking into consideration the type of engine and fuel, engine operating volume and vehicle's age.

This measure proposed changes in the method of calculating the fees according to the criteria of pollutant emissions and greenhouse gas emissions to promote the purchase of vehicles with lower emissions. By the Amendments to the Regulation on unit charges, corrective coefficients and detailed criteria and benchmarks for determination of special environmental charges for motor vehicles (OG 114/14, 147/14), this measure was implemented.

#### MTR-6: Financial incentives for the purchase of hybrid and electric vehicles

Electric and hybrid vehicles are due to the cost of technological development currently still more expensive than conventional vehicles using internal combustion engines. Electric vehicles are significantly more efficient than conventional from the standpoint of primary energy consumption and are almost neutral from the standpoint of carbon dioxide emissions provided that are powered by electricity generated by using renewable sources.

In order to increase the share of electric and hybrid vehicles, subsidies for the purchase of electric and hybrid vehicles through a grant have been introduced. These payments are made from the income of the Environmental Protection and Energy Efficiency Fund achieved, inter alia, by collecting special environmental charge for motor vehicles. The Third National Action Plan for Energy Efficiency for the Period from 2014 to 2016 (Ministry of Economy, 2014) prescribed goals and a plan to support purchases of electric and hybrid vehicles.

In addition, the Law on Excise Tax on Motor Vehicles (OG 15/13, 108/13) introduced a special tax that is calculated on the basis of unit CO<sub>2</sub> emissions and is accounted for the purchase of new motor vehicles. Electric and hybrid vehicles are not covered by this law, which has further stimulated the procurement of vehicles with low greenhouse gas emissions.

#### MTR-7: Development of infrastructure for electric vehicles in urban areas

The main objective of this measure is development and establishment of infrastructure necessary for popularizing the concept of mobility in urban areas and increase the number of electric vehicles in road traffic. Development of infrastructure should be focused on building the charging stations and stations for changing electric batteries. Because of the battery capacity, the autonomy of movement and time of charging, in urban areas is necessary to provide dense network of filling stations for vehicles in relation to the distribution of filling stations for vehicles with conventional drive. According to experiences in other countries, it was found that for the same services as for conventional vehicles it is necessary to provide one charging station for every four electric vehicles. For implementation of this measure it is necessary to prepare a techno-economic analysis with optimal solution and proposed network of filling/ battery changing stations.

### MTR-8: Development of sustainable transport systems in urban areas

Traffic and need for mobility is one of the biggest pressures on the environment in urban areas. Increase in the number of passenger cars, the way they are used, intensity of traffic and unstructured expansion of urban areas largely reversed technological progress in relation to the energy efficiency of vehicles and emission intensity, including noise.

With this measure, a gradual development of sustainable transport systems in urban areas of Croatia is provided where Plans for sustainable transport development should be drawn up as basic documents. These plans would include the analysis of the current situation, defining the vision and objectives, impact analysis and the adoption of measures for all types of transportation, distribution of responsibilities, method of implementation and monitoring mechanism. These plans would be brought on the level of major cities, they should be prepared in accordance with the European Commission guidelines and funded through EU programs and funds.

In addition, incentives are expected and under the Operative Programme Competitiveness and cohesion for the period from 2014 to 2020 where under Priority Axis 7 - Connectivity and mobility, the development of public transport system with low levels of CO<sub>2</sub> is planned.

### 3.5. INDUSTRIAL PROCESSES

The Industrial Strategy of the Republic of Croatia 2014 – 2020 defines objectives of industrial development and key indicators of the Croatian industry in the period 2014 – 2020. According to the “real scenario”, in 2020 it is assumed to achieve the level of the volume of industrial production in 2008, when the highest level of development of the Croatian economy was reached.

Measures belonging to the ETS sector and included in the measure *MSP-1 Inclusion of the operators and aircraft operators in the European Union Emission Trading System (2013-2020)* are the following:

- reducing the clinker factor in cement production – the share of additives in the cement is in the range of 15-30%, depending on the composition of raw materials, availability of suitable additives on the market and market demands for certain types of cement (clinker content in cement is defined by standard HRN EN 197-1),
- N<sub>2</sub>O emission reduction in nitric acid production (catalytic decomposition) – N<sub>2</sub>O emission reduction up to 88% can be achieved by installing the catalyst.

In addition to production of cement, nitric acid and ammonia, the key source in the Industrial processes sector is the consumption of hydrofluorocarbons in refrigerating and air-conditioning equipment. Regulation on substances that deplete the ozone layer and fluorinated greenhouse gases (OG 90/14) prescribes the following measures:

MOS-1: Handling with substances that deplete the ozone layer and fluorinated greenhouse gases

Release of controlled substances and fluorinated greenhouse gases into the atmosphere during collecting, checking leakage, maintenance or servicing of devices and equipment is forbidden.

MOS-2 Technical and organizational measures for collecting, recycling, recovering and destroying of controlled substances and fluorinated greenhouse gases

This group of measures defines the way in which used controlled substances and fluorinated greenhouse gases contained in products and equipment must be recovered, recycled, reclaimed or destroyed.

MOS 2a: Capacity building and strengthening the knowledge of servicer

Education of authorized servicers responsible for collection of controlled substances and fluorinated greenhouse gases during servicing of devices and equipment and provide it to the Centre for the collection, recycling and recovery of controlled substances and fluorinated greenhouse gases.

MOS-3: Checking the leakage of controlled substances and fluorinated greenhouse gases

It is necessary to take all necessary technically feasible measures to prevent leakage, early eliminate any detected leakage and reduce emissions of controlled substances and fluorinated greenhouse gases into the atmosphere.

### 3.6. WASTE MANAGEMENT

For the purpose of effective implementation of the measures included in the waste management sector, along with the already adopted sectoral legislation that is harmonized with EU legislation, it is necessary to adopt a more significant number of by-laws. It will primarily impact on the projections after 2020 to measures MSP-9, MSP-10 and MSP-13, described below.

#### MSP-9: Prevention of and reducing the amount of municipal waste

Prevention of waste generation is the first priority in the priority order to the waste management, as outlined in the Law on Sustainable Waste Management (OG 94/13) and Waste Management Strategy of the Republic of Croatia (OG 130/05). The Waste Management Plan in the Republic of Croatia for the period 2007 – 2015 (OG 85/07, 126/10, 31/11) was adopted to meet the objectives of the Strategy. This measure should be achieved by cleaner production, education, economic instruments, implementation of regulations on integrated pollution prevention and control and investment in modern technologies. According to the Act concerning the conditions of accession of the Republic of Croatia to the European Union, quantitative targets and deadlines for reducing the total amount of waste disposed to non-compliant landfills are defined. By the end of 2015, the maximum waste disposed to non-compliant landfills amounts 1.21 million tons, by the end of 2016, 1.01 million tons and by the end of 2017, 800,000 tons. Disposal of waste to non-compliant landfills in Croatia is prohibited after 31 December 2017.

#### MSP-10 Increasing the amount of separately collected and recycled municipal waste

Beside the Waste Management Strategy in Croatia, the Waste Framework Directive also defines the quantitative targets and deadlines for increasing the amount of separately collected and recycled waste. In accordance with the requirements of the Waste Framework Directive by 2015, it is necessary to ensure separate collection of at least paper, metal, plastic and glass. By 2020, it is necessary to ensure the preparation for re-use and recycling of the following waste materials: paper, metal, plastic and glass from households and possibly from other sources if these waste streams are similar to the waste from households, in the minimum share of 50% by waste weight.

### MSP-12: Methane flaring

The Ordinance on the Methods and Conditions for the Landfill of Waste, Categories and Operational Requirements for Landfills (OG 117/07, 111/11, 17/13, 62/13) and Ordinance on the Waste Management regulate technical requirements for landfill operation, which reduces possible adverse effects of landfills on the environment. Landfills where landfill gas is generated shall have the system for collecting the gas which shall be processed and used. If the collected landfill gas cannot be used for energy generation, it must be flared at the landfill site and the emission of those gases into air has to be prevented. Methane emission into atmosphere is thereby reduced.

4,802 tons of methane is processed at Croatian landfills in 2012, whether it is burned in a flare or used for electricity generation.

### MSP-13: Reducing the amount of landfilled biodegradable municipal waste

The aim of this measure is to reduce the amount of biodegradable fraction of waste disposed at landfills, thus reducing methane emissions resulting from anaerobic decomposition of waste.

Pursuant to the Law on Sustainable Waste Management, quantitative targets related to the reduction of biodegradable municipal waste disposed to landfills are established. By the end of 2016, the share of biodegradable municipal waste disposed to landfills must be reduced to 50% weight of biodegradable municipal waste produced in 1997, until the end of 2020 the share of biodegradable municipal waste disposed to landfills must be reduced to 35% weight of biodegradable municipal waste generated in 1997.

Reducing the biodegradable fraction of waste disposed to the landfills results in reduced emissions of methane, which would otherwise occur during the process of anaerobic decomposition of waste in landfills.

### MSP-14: Production of fuel from waste and processing of waste for use in the cement industry

The measure is related to the measures in Energy sector means of which the fossil fuels to generate electricity and heat as well as for the cement production in rotary kilns is replaced by the fuel from waste. Production of fuels from waste by mechanical-biological treatment of municipal waste in regional and county waste management centres is planned. Using biodegradable fraction of waste as fuel to generate electricity and heat as well as in the cement industry is important from the

standpoint of reducing the greenhouse gas emissions, conservation of primary energy sources and reducing the amount of waste disposed to landfills. Biodegradable fraction of waste is considered to be neutral with respect to carbon dioxide. Reduction of methane emissions will be achieved by reducing the amount of disposed biodegradable waste.

#### MSP-15: Use of biogas for electricity and heat generation

The measure is associated with measures *Promoting the use of renewable sources in electricity generation* and *Promoting the construction of cogeneration plants* in the Energy sector. The main mechanism for promoting the implementation of biogas for electricity generation and to promote the construction of biogas cogeneration plants are incentive prices (tariffs) that depend of the installed plant capacity. Looking at the waste management sector, the potential reduction in greenhouse gas emissions of these measures is the potential to reduce methane emissions (resulting from the anaerobic decomposition of the biodegradable fraction of waste), which is used for electricity and heat generation.

In Croatia, so far, thirteen biogas plants (total installed power of 13.935 MW) and two power plants on landfill gas and gas from wastewater treatment plants (total installed power of 4.536 MW) are connected to the power grid, within the system of eligible power producers. Additionally, thirteen biogas plants (total installed power of 11.531 MW) have signed power purchase agreements with the Croatian Energy Market Operator, but plants have not yet been put into operation (<http://www.hrte.hr/default.aspx?id=82>, as at 13/03/2015).

#### MSP-16: Thermal treatment of municipal waste and sludge from wastewater treatment plants

Construction of a facility for thermal processing of municipal waste in the city of Zagreb is planned, in which about 300,000 tonnes of municipal waste and about 70,000 tonnes of dried sludge from the "Central waste water treatment plant" would be treated annually at the facility by 2020. Thermal treatment of municipal waste and sludge from wastewater treatment plant is important from the standpoint of conservation of primary energy sources, reducing the amount of waste disposed to landfills and reducing greenhouse gas emissions.

### 3.7. AGRICULTURE

#### MSP-4: Development of the assessment of implementation of GHG emission reduction measures in the agriculture sector

Development of this assessment is recommended with the goal of valorization of middle-term period of acceptability of potential emission reduction measures that imply various social and economic risks for farmers. Possible measures to be analyzed are:

- improvement of cattle feeding regime and improvement of cattle meal (balanced ratio of energy and protein) in order to reduce methane emissions from the storage of manure and enteric fermentation
- anaerobic decomposition and biogas manufacturing
- improvement of nitrogen use efficiency with the goal of reducing the N<sub>2</sub>O emissions from synthetic and organic fertilizer use
- carbon capture in agricultural soil.

#### MSP-4a: Rural Development Programme of the Republic of Croatia for the Period 2014-2020

One of the principal areas of institutional work of the European Union is the Common Agricultural Policy (CAP). Rural development, as the second CAP tier, is financed through the Agricultural Fund for Rural Development (EAFRD). Development of the Rural Development Programme of the Republic of Croatia is a prerequisite for the EAFRD eligibility in the next period. Goals set by the Europe 2020 Strategy are also evident within three CAP goals: agriculture competitiveness, sustainable resource management and balanced development of rural areas. The Rural Development Programme should achieve the goals set by CAP through measures given in six priorities:

- Promotion of knowledge and innovation transfers in agriculture, forestry and rural areas
- Improvements in sustainability and competitiveness in agriculture, forestry and rural areas

- Promotion of food provision chain, including processing and market placement of agricultural products, animal welfare and risk management
- Revitalization, protection and improvement of agriculture and forestry related ecosystems
- Promotion of resource efficiency and encouraging the shift to low-carbon farming, resilient to climate changes in the agriculture, food and forestry sectors
- Promotion of social involvement, combating poverty through economic development of rural areas.



### 3.8. LULUCF

#### MSP-5: Improving the reporting from LULUCF sector

The Annex I countries of the United Nations Framework Convention on Climate Change, including Croatia as well, are obligated in accordance with Annex I to Decision 15/CP.17 continuously review the quality of the relevant technical elements of GHG inventory. Because of this commitment and because of the fact that additional improvements to the procedure for determining the changes in carbon stocks in LULUCF sector need to be done for each store separately, as well as the procedure for more detailed matrix of land, the implementation of these measures is still considered necessary.

For the implementation of this measure, during 2014, the Ministry of Environmental and Nature Protection launched two projects from the LULUCF sector that are currently in the final stages of implementation. These are: 'Improving the reporting in the sector Land use, land-use change and forestry during the first commitment period of the Kyoto Protocol' (abbreviated as LULUCF 1) and 'Upgrade of the National System for reporting on greenhouse gas emissions for the implementation of the Decision of the European Parliament and of the Council No. 529/2013 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' (abbreviated as LULUCF 2). Since the land matrix represents the basis for the calculation of sinks/emissions of greenhouse gases in the LULUCF sector, the LULUCF 2 project includes defining the proposal of national system for determining the land cover, use and land use change, as well as the development of the new project proposal that would put the newly defined system into operation.

#### MSP-6: Preparation of cost-benefit analysis of afforestation on new areas and natural regeneration of forests as a measure of increasing the sinks in LULUCF sector

Changes in the sinks of greenhouse gases as a result of direct land use change caused by human activity and forestry activities are allowed to be calculated in the national balance of emissions and sinks of greenhouse gases and used to fulfill obligations under the Kyoto Protocol. The

aforementioned is stipulated by Article 3 paragraph 3 of Kyoto Protocol for parties included by Annex I to the Kyoto Protocol.

By analyzing the costs and benefits of afforestation on the new areas, possibility of increasing greenhouse gas sinks using reforestation activities on the barren productive forest floor will be investigated. Thus would justify introduction of possible incentive measures, such as the afforestation of fast-growing species and natural regeneration of forests, equivalent to measures for greenhouse gas emissions reduction. The implementation of this activity was determined in the Plan for Air Protection, Ozone Layer Protection and Climate Change Mitigation for the period 2013-2017 (OG 139/13), and its implementation is planned for 2015.

#### MSP-7: Revision of Forest Management Reference Level (FMRL) under Article 3.4 of the Kyoto Protocol for the second commitment period

For the second commitment period of the Kyoto Protocol, new rules for the calculation of sinks generated from forest management under which the outflow is calculated relative to the Forest Management Reference Level (FMRL) were adopted. In addition, obligation of revision of reference levels for forest management activities in accordance with the correction in the national inventory is introduced and it is necessary to determine the new value of the reference level for Croatia. For the purpose of implementing this measure, as part of the launched project LULUCF 1, a review of the established value for FMRL is planned and the first technical correction of FMRL for the Republic of Croatia will be performed and later presented in NIR 2015. According to currently available information, by the end of the Second commitment period it will be necessary to perform another technical correction of FMRL considering that further improvements of the LULUCF sector calculation are planned for this period.

#### MSP-8: Development of Action plan for LULUCF sector

According to the Decision 529/2013/EU<sup>1</sup>, as a member of the European Union, Croatia is obliged to prepare and submit information from the forestry sector to the Commission in accordance with

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<sup>1</sup> 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

Article 10 of Decision 529/2013/EU. The plan was drafted and submitted to the EC on 9 January 2015, and will form an integral part of the national strategy for low carbon development.

As part of the action plan, measures for maintaining/reducing emissions and maintaining/increasing sinks of greenhouse gases that occur as a result of implementation of activities of forest management, cropland management, grazing land management, and implementation of afforestation and deforestation have been defined. The basis for the preparation of the aforementioned document was the draft of Rural Development Programme of the Republic of Croatia for the period 2014-2020 (the document is in the process of harmonization with the European Commission) to define the measures in the forestry sector as well as to define the measures associated with agricultural land use categories. During the document preparation, data and information available in the National Inventory Report on Greenhouse Gas Emissions for the Republic of Croatia (NIR 2014) were used, as well as data and information available in a number of different strategic documents, national regulations (e.g. Ordinance on cross-compliance OG 27/14) and the European Commission Guidance<sup>2</sup>, which was created in order to assist Member States in fulfilling the obligations defined under Article 10 of the Decision 529/2013/EU. In order to address future activities within the low-carbon development strategy it should be noted that the Air Protection Act (OG 130/11, 47/14) stipulates the obligation of adopting the Low-Carbon Development Strategy of the Republic of Croatia, which ensures a long-term economic and social development towards a low-GHG emission society. The Low-Carbon Development Strategy defines the guidelines for long-term actions by defining objectives in accordance with Article 4, paragraph 1 of the Regulation (EU) No. 525/2013 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 accession to the European Union, and that they e.g. National Environmental Strategy (OG 46/02) do not contain provisions related to maintaining/increasing the carbon pools in forest ecosystems and wood products, it will be necessary to revise them in the coming period and to align them with provisions of the legislative acts which were adopted after the Croatia accession to the European Union. Additionally, upon the adoption of the Low-Carbon Development Strategy, certain modifications of some strategic documents that are of particular

<sup>2</sup> Guidance on Member State reports providing: 'Information on LULUCF actions' in accordance with Article 10 of EU Decision 529/2013/EU

importance to the horizontal level will be required, e.g. Sustainable Development Strategy of the Republic of Croatia (OG 30/09).

With the Plan of usage of financial resources received from the sale of emission allowances through auctions in the Republic of Croatia for the period from 2014 to 2016 (OG 140/14), Croatia plans to allocate the significant financial resources for emission reductions and adaptation to climate change, in accordance with the provisions of Article 100 of the Air Protection Act (OG 130/11, 47/14). Activities that are planned to be financed by the plan are determined in accordance with the LULUCF sector activities included in the Decision No. 529/2013/EU, Low-Carbon Development Strategy of the Republic of Croatia, which is in preparation, and Regulation 525/2013/EU.



### 3.9. OTHER (CROSS-CUTTING) POLICIES AND MEASURES

#### MSP-17: Establishment of monitoring, reporting and verification of greenhouse gas emissions in the lifetime of liquid fuels

In accordance with the Air Protection Act (OG 130/11, 47/14), supplier that places the fuel on domestic market shall monitor greenhouse gas emissions per energy unit in the life of the fuel. Suppliers have to draw up a report that has to be verified and submitted to the Environmental Protection Agency.

Pursuant to the Act, the Croatian Government's Decree on the quality of liquid petroleum fuels (OG 33/11, 113/13, 76/14) stipulates limit values for components and quality characteristics of liquid petroleum fuels, the method of determining and monitoring the quality of liquid petroleum fuels, method of conformity, the conditions for the operation of laboratories for sampling and laboratory analysis of quality liquid petroleum fuels, product labelling and the method and deadline for the submission of reports on the quality of liquid petroleum fuels to the Environmental Protection Agency.

#### MSP-18: CO<sub>2</sub> emission tax

The Regulation on Unit Charges, Corrective Coefficients and Detailed Criteria and Benchmarks for Determination of the Charge for Emissions into Environment of Carbon Dioxide (OG 73/07, 48/09) stipulates the obligation to pay charges on CO<sub>2</sub> emission for all stationary sources emitting more than 30 tonnes of CO<sub>2</sub> per year. Fee payers who invest in energy efficiency, renewable energy and other measures to reduce emissions of CO<sub>2</sub> and other greenhouse gas emissions are charged by lower fee.

The Environmental Protection and Energy Efficiency Fund is authorized for accounting and collecting charges. The unit fee for 2013 is HRK 14 for emitting one tonne of CO<sub>2</sub>. The Law on Amendments to the Law on Environmental Protection and Energy Efficiency Fund (OG 142/12) stipulates that from 1 January 2013, legal or natural persons who own or use a single source of CO<sub>2</sub> emissions, for which permits for greenhouse gas emissions have been obtained, do not have to pay fee. This means that from 2013 onwards measures apply only to sources that are not covered by the ETS.

The amount of compensation paid by the operators of installations excluded from the EU ETS is defined by the Decision on the amount of the unit charge on greenhouse gas emissions for operators of installations excluded from emissions trading system for 2013 (OG 105/14).

MSP-19: Establishment of the Committee for cross-sectoral coordination of policies and measures for mitigation and adaptation to climate change

In accordance with the Air Protection Act (OG 130/11, 47/14), for monitoring and evaluation of the implementation and planning of policies and measures for mitigation and adaptation to climate change in the Republic of Croatia, the Commission for inter-sectoral coordination of policies and measures for mitigation and adaptation to climate change (OG 114/14) was established. The Committee members include representatives of relevant government bodies and other relevant organizations, agencies and non-governmental organizations. The Committee members, activities and functioning of the Commission are determined by the Croatian Government on the proposal of the ministry responsible for environmental protection.

MSP-20 Intensifying the use of innovative information and communication technologies (ICT) to reduce greenhouse gas emissions

Innovative information and communication technologies have an increasingly important role in reducing greenhouse gas emissions and increasing energy efficiency. Intensifying their use in public administration, services and manufacturing processes, will boost productivity and work efficiency and at the same time will reduce energy consumption and consequent greenhouse gas emissions. The measure is expected to intensify the use of innovative ICT and monitoring of actual energy savings and reductions of greenhouse gas emissions.

Among others, examples of the implementation of this measure are:

- System for the Measurement and Verification of Energy Savings (SMIV, 2014), which will monitor the energy savings and resultant reduction of greenhouse gas emissions, was presented by the Ministry of Economy,
- Energy Management Information System (ISGE), which is supported and established by the UNDP, GEF, the Fund and the Croatian Government, is used as a national tool for systematic energy and water management in public buildings. ISGE is under the

competence of the Ministry of Construction and Physical Planning and Agency for Transactions and Mediation in Immovable Properties (APN).



## IV OVERVIEW OF POLICIES AND MEASURES BY SECTORS

Overview tables of policies and measures in each sector contain the code and title of the policy or measure, objective of implementation, identification of greenhouse gas affected by the policy or measure, type of policy instrument, status of implementation and implementing body. Measures were taken from the Plan for the Protection of Air, Ozone Layer and Climate Change Mitigation in the Republic of Croatia for the Period 2013-2017, but the names of individual measures were changed for better definition of the scope and content of measures and aligned with the new sectoral legislative framework. Also, descriptions of measures have been updated with the situation by the end of January 2015.

The type of instrument was determined according to recommendations laid down in the Guidelines for the preparation of National Communications by parties included in Annex I to the Convention. The guidelines make a distinction between economic, fiscal, agreement, regulatory, information, research and other instruments.

The status of implementation that can be assigned to a policy or measure is: implemented, adopted or planned. Status "implemented" is assigned if national legislation is in force, voluntary agreements have been established, financial resources have been allocated or human resources have been mobilized. Status "adopted" is assigned to policies and measures for which an official government decision has been made and there is a clear commitment to proceed with implementation. For those policies and measures that are still under discussion and have a realistic chance of being adopted and implemented, status "planned" is chosen.

**EMISSIONS TRADING SYSTEM****Table 4-1: Overview of policies and measures in Emissions Trading System**

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MSP-1 Inclusion of operators and aircraft operators in the European Union Emission Trading System (EU ETS) in the full scale from 1 January 2013	reduction of greenhouse gas emissions from the industrial sector and the aviation	CO <sub>2</sub> , N <sub>2</sub> O	economic, regulatory	implemented	Ministry of Environmental and Nature Protection, Croatian Environment Agency
MSP-2 Adoption of the Plan for use of funds obtained from the sales of emission allowances through auctions	distribution of funds raised at the auction in projects to mitigate and adapt to climate change	all GHG	economic	implemented	Ministry of Environmental and Nature Protection, Government of the Republic of Croatia
MSP-3: Preparation of the National Feasibility Study with the action plan for the preparatory activities for CCS projects in Croatia	preparation of CCS projects in the Republic of Croatia	CO <sub>2</sub>	research	planned	Ministry of Economy

**ENERGY****Table 4-2: Overview of policies and measures in Energy**

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MEN-1 Promotion of energy efficiency in households and services through project activities	encourage the use of cost effective, energy efficient (EE) technologies, materials and services, households and the public sector	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory, information	implemented	Ministry of Economy, Ministry of Construction and Physical Planning
MEN-2 Energy audits in industry	primary energy savings in energy generation	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory	implemented	Ministry of Economy, Ministry of Environmental and Nature Protection
MEN-3 Measurement and informative calculation of energy consumption	primary energy savings in energy generation	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	information	implemented	Ministry of Economy, distributing companies
MEN-4, MEN-8 Promotion of cogeneration construction	primary energy savings in electricity generation	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory	implemented	Ministry of Economy
MEN-5 Labelling the energy efficiency of household appliances	informing consumers on the energy efficiency of household appliances	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	regulatory, information	implemented	Ministry of Economy
MEN-6 Eco-design of energy-using products	determine the requirements to be met by products associated with energy covered by implementing measures, to be placed on the market and / or put into service	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	regulatory, information	implemented	Ministry of Economy
MEN-7 Supporting the use of renewable sources in electricity generation	increasing the share of renewable energy in gross final energy	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory	implemented	Ministry of Economy

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
	consumption				
MEN-9 Usage of biodegradable fraction of municipal waste in public electricity and heating plants	reducing the consumption of fossil fuels in the energy sector	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory	implemented	Ministry of Environmental and Nature Protection
MEN-10 Use of refused derived fuel in cement industry	primary energy savings in cement production	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory	implemented	Ministry of Environmental and Nature Protection
MEN-11 Promotion of the use of renewable energy sources in heat/cooling energy generation	increasing the share of renewable energy in gross final energy consumption	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic, regulatory	planned	Ministry of Economy
MEN-12 Promotion of the use of renewable energy sources and energy efficiency by HBOR-a (Croatian Bank for Reconstruction and Development)	increasing the share of renewable energy in gross final energy consumption, primary energy savings	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic	implemented	HBOR
MEN-13 Promotion of the use of renewable energy sources and energy efficiency by FZOEU (The Environmental Protection and Energy Efficiency Fund) resources	increasing the share of renewable energy in gross final energy consumption, primary energy savings	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic	implemented	Environmental Protection and Energy Efficiency Fund
MEN-14 Energy efficiency projects with implementation through energy services	development of energy efficiency projects	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	economic	implemented	ESCO companies

TRANSPORT

Table 4-3: Overview of policies and measures in Transport

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MTR-2: Providing information to consumers on fuel economy and CO <sub>2</sub> emission of new passenger cars	consumer information on fuel economy and CO <sub>2</sub> emissions of new passenger cars	CO <sub>2</sub>	information	implemented	Ministry of Environmental and Nature Protection
MTR-3: Implementation of the pilot project and establishment of training system for drivers of road vehicles for eco-driving	reducing CO <sub>2</sub> emissions from road vehicles	CO <sub>2</sub>	educational	implemented	Ministry of Interior Affairs, Ministry of Environmental and Nature Protection
MTR-4: Promotion of the production and use of biofuels in transport	increasing the share of biofuels in transport	CO <sub>2</sub>	regulatory, economic, fiscal	partially adopted	Ministry of Economy
MTR-5: Modification of the system for special fee payment for environment for the motor vehicles	reducing CO <sub>2</sub> emissions from road vehicles	CO <sub>2</sub>	fiscal	implemented	Ministry of Environmental and Nature Protection, Environmental Protection and Energy Efficiency Fund
MTR-6: Financial incentives for the purchase of hybrid and electric vehicles	reducing CO <sub>2</sub> emissions from road vehicles	CO <sub>2</sub>	economic	adopted	Ministry of Environmental and Nature Protection, Ministry of Economy

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MTR-7: Development of infrastructure for electric vehicles in urban areas	reducing CO <sub>2</sub> emissions from road vehicles	CO <sub>2</sub>	economic	planned, partly adopted	Ministry of Economy, Ministry of Maritime Affairs, Transport and Infrastructure
MTR-8: Development of sustainable transport systems in urban areas	reducing CO <sub>2</sub> emissions from road vehicles	CO <sub>2</sub>	research	partly planned, partly adopted	Ministry of Environmental and Nature Protection, Units of regional and local self-government

INDUSTRIAL PROCESSES

Table 4-4: Overview of policies and measures in Industrial processes

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MOS-1: Handling with substances that deplete the ozone layer and fluorinated greenhouse gases	ban of the release of controlled substances and fluorinated greenhouse gases into the atmosphere	SF <sub>6</sub> , HFC, PFC	regulatory	implemented	Ministry of Environmental and Nature Protection
MOS-2: Technical and organizational measures for collecting, recycling, recovering and destroying of controlled substances and fluorinated greenhouse gases	collecting, recycling and recovery of controlled substances and fluorinated greenhouse gases	SF <sub>6</sub> , HFC, PFC	regulatory	implemented	Centers for collecting, recycling and recovering of controlled substances and fluorinated greenhouse gases
MOS-2a: Capacity building and strengthening the knowledge of servicer	education of authorized servicers responsible for collection and handling of controlled substances and fluorinated greenhouse gases	SF <sub>6</sub> , HFC, PFC	regulatory, educational	implemented	Ministry of Environmental and Nature Protection
MOS-3: Checking the leakage of controlled substances and fluorinated greenhouse gases	prevention of leakage and reduction of emissions of controlled substances and fluorinated greenhouse gases into the atmosphere	SF <sub>6</sub> , HFC, PFC	regulatory	implemented	Ministry of Environmental and Nature Protection, operators

**WASTE MANAGEMENT****Table 4-5: Overview of policies and measures in Waste management**

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MSP-9: Prevention of and reducing the amount of municipal waste	reducing the amount of waste for disposal	CH <sub>4</sub>	regulatory, economic, educational	implemented	Regional and local self-government units
MSP-10 Increasing the amount of separately collected and recycled municipal waste	reducing the amount of waste for disposal	CH <sub>4</sub>	regulatory, economic	implemented	Regional and local self-government units
MSP-12: Methane flaring	reduce methane emissions into the atmosphere	CH <sub>4</sub>	regulatory, economic	implemented	Regional and local self-government units
MSP-13: Reducing the amount of disposed biodegradable municipal waste	increasing the share of municipal waste treated by mechanical - biological treatment	CH <sub>4</sub>	regulatory	adopted	Regional and local self-government units
MSP-14: Production of fuel from waste and processing of waste for the use in the cement industry	reduce methane emissions into the atmosphere, primary energy savings in energy generation	CO <sub>2</sub> , CH <sub>4</sub>	regulatory, economic	adopted	Regional and local self-government units
MSP-15: Use of biogas for electricity and heat generation	reduce methane emissions into the atmosphere, primary energy savings in energy generation	CO <sub>2</sub> , CH <sub>4</sub>	regulatory, economic	implemented	Regional and local self-government units
MSP-16: Thermal treatment of municipal waste and sludge from wastewater treatment plants	reduce methane emissions into the atmosphere, primary energy savings in energy generation	CO <sub>2</sub> , CH <sub>4</sub>	economic	planned	City of Zagreb

AGRICULTURE

Table 4-6: Overview of policies and measures in Agriculture

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MSP-4: Development of the assessment of implementation of potential GHG emission reduction measures in the agriculture sector	Assessment of potential emission reduction measures in the agriculture sector	CH <sub>4</sub> , N <sub>2</sub> O	research	planned	Ministry of agriculture, Ministry of Environmental and Nature Protection
MSP-4a: Rural Development Programme of the Republic of Croatia for the Period 2014-2020	Agriculture competitiveness, sustainable resource management and balanced development of rural areas: promotion of knowledge and innovation, improvements in sustainability and competitiveness, promotion of resource efficiency and encouraging of the shift to low-carbon farming, resilient to climate changes in the agriculture, food and forestry sectors	CH <sub>4</sub> , N <sub>2</sub> O	regulatory, economic	adopted	Ministry of Agriculture

LULUCF

Table 4-7: Overview of policies and measures in LULUCF sector

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MSP-5: Improving the reporting from LULUCF sector	improving the quality of data in the LULUCF sector	CO <sub>2</sub>	regulatory	Partially implemented Continuing until 2020	Ministry of Environmental and Nature Protection, Ministry of Agriculture
MSP-6: Preparation of cost-benefit analysis of afforestation on new areas and natural regeneration of forests as a measure of increasing sinks in LULUCF sector	examining the justification of new measures to increase the outflow	CO <sub>2</sub>	research	planned	Ministry of Environmental and Nature Protection, Ministry of Agriculture
MSP-7: Revision of the Forest Management Reference Level (FMRL) under Article 3.4 of the Kyoto Protocol for the second commitment period	calculation of sinks of greenhouse gases	CO <sub>2</sub>	regulatory	in progress. Second technical correction of FMRL planned by the end of 2020	Ministry of Environmental and Nature Protection, Ministry of Agriculture
MSP-8: Development of Action plan for LULUCF sector	fulfillment of the obligations of submitting data on LULUCF sector to the European Commission	CO <sub>2</sub>	regulatory	implemented	Ministry of Environmental and Nature Protection, Ministry of Agriculture

CROSS-CUTTING POLICIES AND MEASURES

Table 4-8: Overview of cross-cutting policies and measures

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
MSP-17: Establishment of monitoring, reporting and verification of greenhouse gas emissions in the lifetime of liquid fuels	Greenhouse Gas Emissions Monitoring of liquid petroleum fuels	CO <sub>2</sub>	regulatory	adopted	Ministry of Environmental and Nature Protection, Ministry of Economy, Croatian Environment Agency
MSP-18: CO <sub>2</sub> emission tax	reduce CO <sub>2</sub> emissions from stationary sources with annual emissions greater than 30 tons of CO <sub>2</sub> , excluding EU ETS operators	CO <sub>2</sub>	regulatory, fiscal	implemented	Environmental protection and energy efficiency fund
MSP-19: Establishment of the Committee for cross-sectoral coordination of policies and measures for mitigation and adaptation to climate change	monitoring the implementation of policies and measures for mitigation and adaptation to climate change	all GHG	regulatory	implemented	Ministry of Environmental and Nature Protection, competent ministries
MSP-20: Intensifying the use of innovative information and communication technologies (ICT) to reduce greenhouse gas emissions	increasing productivity and work efficiency while reducing energy consumption and consequent greenhouse gas emissions. Improve monitoring of GHG emissions	CO <sub>2</sub>	information	adopted	Ministry of Environmental and Nature Protection, Ministry of Economy, Ministry of

Name of PAM	Objective	Greenhouse gas	Type of instrument	Status	Implementing body
					Construction and Physical Planning, Croatian Environment Agency

## V INDICATORS FOR THE PROJECTIONS IN YEARS 2012, 2020, 2025, 2030 AND 2035

Table 4-1: Indicators for the projections with aim to assessment of policies and measures implementation, 'with existing measures' scenario

NO.	SECTOR BY EUROSTAT	INDICATOR	2012	2020	2025	2030	2035
1	MACRO	Total CO <sub>2</sub> intensity of GDP [t/mil. EUR]	635.2	573.7	557.2	540.3	516.6
		Total CO <sub>2</sub> emissions [kt CO <sub>2</sub> ]	27,038	26,271	28,034	29,687	30,888
		GDP [bill. EUR] (EC10)	42.6	45.8	50.3	55.0	59.8
2	MACRO B0	CO <sub>2</sub> intensity from energy consumption of GDP [t/mil. EUR]	450.6	418.2	411.4	402.3	387.0
		CO <sub>2</sub> emissions from energy consumption [kt CO <sub>2</sub> ]	19,180	19,148	20,670	22,106	23,138
		GDP [bill. EUR] (EC10)	42.6	45.8	50.3	55.0	59.8
3	TRANSPORT C0	CO <sub>2</sub> emissions from passenger cars [kt]	3,187	3,015	3,352	3,701	4,023
		Number of kilometers from passenger cars [Mkm]	26.2	27.6	27.0	31.8	33.5
4	TRANSPORT D0	CO <sub>2</sub> emissions from freight transport (all kinds) [kt]	2,204	2,123	2,238	2,338	2,445
		Number of kilometers from freight transport (all kinds) [Mkm]	136.7	140.3	145.2	150.2	155.4
5	INDUSTRY A1	Energy related CO <sub>2</sub> intensity of industry [t/mil. EUR]	289.9	251.1	232.0	214.8	200.6
		CO <sub>2</sub> emissions from industry which use fossil fuels [kt]	2,802	2,778	2,825	2,848	2,858
		Gross value-added total industry [bill. EUR] (EC10)	9.7	11.1	12.2	13.3	14.2
6	HOUSEHOLDS A1	Specific CO <sub>2</sub> emissions of households [t/dwelling]	1.1	1.1	1.1	1.2	1.2
		CO <sub>2</sub> from households using fossil fuels [kt]	1,869	1,754	1,858	1,963	2,064
		Stock of permanently occupied dwellings [1,000]	1,643	1,645	1,659	1,671	1,683
7	SERVICES A0	CO <sub>2</sub> intensity of the commercial and institutional sector [t/mil. EUR]	21.9	18.7	17.8	16.9	16.1
		CO <sub>2</sub> emissions from fossil fuel consumption in commercial and institutional sector [kt]	542	501	521	539	560
		Gross value-added services [bill. EUR] (EC10)	24.8	26.7	29.3	32.0	34.8
8	TRANSFORMATION B0	Specific CO <sub>2</sub> emissions of public and autoproducer power plants [t/GJ]	NE	NE	NE	NE	NE
		CO <sub>2</sub> emissions from all fossil fuel combustion for gross electricity and heat production by public and autoproducer thermal power and combined heat and power plants. Without heat only plants. [kt]	NE	NE	NE	NE	NE
		All products – output by public and autoproducer thermal power stations [TJ]	NE	NE	NE	NE	NE
9	AGRICULTURE	Specific N <sub>2</sub> O emissions of fertiliser and manure use [kg/kg]	NE	NE	NE	NE	NE
		N <sub>2</sub> O emissions from synthetic fertiliser and manure use [kt]	2.9	3.0	3.1	3.1	3.1
		Use of synthetic fertiliser and manure [kt nitrogen]	184	170	176	179	182

NO.	SECTOR BY EUROSTAT	INDICATOR	2012	2020	2025	2030	2035
10	AGRICULTURE	SpecificCH <sub>4</sub> emissions of cattle production [kg/head]	69.4	76.7	75.6	76.8	77.9
		CH <sub>4</sub> emissions from cattle [kt]	32	32	36	38	39
		Cattle population [1.000 heads]	461.7	410.0	475.0	490.0	505.0
11	WASTE	Specific CH <sub>4</sub> emissions from landfills[kt/kt]	0.03	0.03	0.04	0.03	0.03
		CH <sub>4</sub> emissions from landfills [kt]	37.8	35.1	29.5	24.8	20.8
		Municipal solid waste going to landfills [kt]	1,382	1,004	815	798	771

\*NE – not estimated

## VI QUANTITATIVE ESTIMATES OF THE EFFECTS OF POLICIES AND MEASURES ON EMISSIONS BY SOURCES AND REMOVALS BY SINKS OF GREENHOUSE GASES

### 6.1. QUANTITATIVE ESTIMATES OF THE EFFECTS OF POLICIES AND MEASURES ON EMISSIONS BY SOURCES AND REMOVALS BY SINKS OF GREENHOUSE GASES FOR 2015, 2020, 2025 AND 2030 (EX ANTE ASSESSMENT)

Quantitative estimates of the effects of policies and measures on emissions by sources and removals by sinks of greenhouse gases for years 2015, 2020, 2025, 2030 and 2035 (ex-ante assessment) for three scenarios are given in table 6-1 below.

**Table 6-1: Quantitative estimates of policies and measures for 2015, 2020, 2025, 2030 and 2035**

'Without measures' scenario	2015	2020	2025	2030	2035
Energy	14,523	18,769	20,205	21,811	22,324
Transport	5,563	5,933	6,390	6,845	7,283
Industrial process	3,092	3,385	3,665	3,922	4,124
Waste management	1,605	1,854	2,098	2,314	2,498
Agriculture	3,101	3,423	3,589	3,783	3,916
<b>TOTAL</b>	<b>27,885</b>	<b>33,365</b>	<b>35,948</b>	<b>38,675</b>	<b>40,145</b>

'With measures' scenario	2015	2020	2025	2030	2035
Energy	12,436	13,673	14,759	15,703	16,292
Transport	5,403	5,475	5,940	6,403	6,846
Industrial process	2,377	2,523	2,717	2,896	3,040
Waste management	1,353	1,245	1,103	981	876
Agriculture	3,044	3,355	3,515	3,704	3,833
<b>TOTAL</b>	<b>24,614</b>	<b>26,271</b>	<b>28,034</b>	<b>29,687</b>	<b>30,888</b>

'With additional measures' scenario	2015	2020	2025	2030	2035
Energy	12,436	11,450	11,227	11,009	11,202
Transport	5,403	5,145	5,518	5,879	6,250
Industrial process	2,377	2,523	2,717	2,896	3,040
Waste management	1,353	1,245	1,103	981	876
Agriculture	3,044	3,355	3,515	3,704	3,833
<b>TOTAL</b>	<b>24,614</b>	<b>23,719</b>	<b>24,079</b>	<b>24,469</b>	<b>25,202</b>

## 6.2. QUANTITATIVE ESTIMATES OF THE EFFECTS OF POLICIES AND MEASURES ON EMISSIONS BY SOURCES AND REMOVALS BY SINKS OF GREENHOUSE GASES FOR THE PERIOD 2008-2011 (EX POST ASSESSMENT)

Quantitative estimates of the effects of policies and measures on emissions and removals of greenhouse gases is presented in this report for the period from 2008 to 2011 and for the period from 2012 to 2013.

### 6.2.1. PERIOD FROM 2008 TO 2011

Quantitative estimates of the effects of policies and measures on emissions by sources and removals by sinks of greenhouse gases are presented in this report for the period 2008-2011. This period correlates with the period covered by Air protection and air quality improvement plan in the Republic of Croatia for the period 2008-2011.

In the Report on Air Quality State in the Republic of Croatia in the period 2008-2011 (OG 95/2013), policies and measures for greenhouse gas emission reduction, increase of energy efficiency and promotion of renewable energy sources were qualitatively assessed in regard to their effectiveness of implementation with three statuses: implemented, not implemented and partially implemented.

Of 33 policies and measures in total, 22 were implemented, 6 were not implemented and 5 were partially implemented. It should be emphasized that at this moment monitoring mechanisms do not allow consistent quantification of effectiveness of implementation of policies and measures. Therefore, this chapter presents the assessment of measures which were implemented and for which analytical background documents are available.

#### MCI-1 Supporting the use of renewable sources in electricity generation

According to information from annual energy reports „Energy in Croatia 2008“, „Energy in Croatia 2011“ and „National renewable energy action plan“ (Ministry of Economy, October 2013) electricity generation from renewable energy sources increased from 155.86 GWh in 2008 to 322.24 GWh in 2011 (factor of 2).

The largest increase was realized in wind energy generation (39.9 GWh in 2008, 201.0 GWh in 2011). Supporting fees for eligible RES producers amounted to total of 142.98 million HRK in 2008 and 77.9 million HRK in 2011, while unit supporting fee was reduced from 0.0089 HRK/kWh to 0.005 HRK/kWh.

Eligible RES producers received feed-in tariffs amounted to 26.2 million HRK in 2008, 182.2 million HRK in 2011 and 331.7 million HRK in 2012.

#### MCA-5: Crediting program of CBRD for preparation of renewable energy projects

The Croatian Bank for Reconstruction and Development (CBRD) grants loans for the preparation of renewable energy projects including biomass facilities, small hydro plants (up to 10 MW), geothermal and solar power plants. Wind power projects are a special group of projects. Loans are intended for financing of the project documentation in the public and private sector. In the framework of this program, project documentation for 15 projects was contracted to generate electricity from renewable power of approximately 140 MW.

#### MCA-7: Promotion of energy efficiency through project "Removing Barriers to Efficient Use of Energy in Households and Services Sector"

The project commenced in 2005 aiming at raising the public awareness, implementing the energy efficiency measures to public facilities and supporting for capacity building of sustainable energy management at local level. In the period from 2010 to 2012, financial monitoring and active participation in implementation of national programmes and projects carried out jointly by the Ministry of Economy, Labour and Entrepreneurship, UNDP and FZOPEU was continued. These projects are: 'Systematic Energy Management (SGE) in cities and counties' and Programme for efficient usage of energy in buildings owned by the Republic of Croatia 'House in Order'. The basic activities of the aforementioned projects are related to the establishment of training system for employees in state administration and local and regional self-government units, informing of general public in the Republic of Croatia and establishment of registry of properties and places for energy consumption control. Realization of other activities includes energy audits of buildings owned by state administration, local and regional self-government units, preparation of investment studies,

realization of pilot projects related to reconstruction of individual buildings, presentation of certificates on energy properties of buildings in public and establishment of building certification information system.

#### MCA-8: Energy efficiency programme of HEP ESCO company

HEP ESCO is a company of HEP Group for providing services in energy sector which develops, executes and finances energy efficiency projects on commercial bases (using ESCO principles). HEP ESCO is also the implementing agency for energy efficiency project in Croatia indicated in the description of the previous measure. The company's fields of activity include: public lighting, buildings (schools and kindergartens, offices, hotels, universities, hospitals), industry and energy supply systems. Projects completed so far result in annual savings in CO<sub>2</sub> emission of approximately 6,000 tonnes. The market potential for energy efficiency projects in Croatia is estimated to more than 2.4 billion HRK. The potential is increasing, primarily due to increased energy prices, but also because of the demand arising from legislation and awareness raising on sustainable development.

#### MCI-9: Increase of energy efficiency in buildings

Measure to increase the energy efficiency in buildings has been carried out by adopting appropriate laws, by-laws, technical regulations and action plans. The Physical Planning and Construction Act (OG 76/07, 38/09) is the base regulation governing the activities in building construction and set of rulebooks and technical regulations transposing Directive 2002/91/EC on the energy performance of buildings into national law are essential for energy efficiency improvement of buildings. The objective of projects implemented by the technical and financial support of the Environmental Protection and Energy Efficiency Fund, the Croatian Bank for Reconstruction and Development and HEP ESCO company is to reduce the intensity of energy consumption of schools, kindergartens, hospitals, hotels, commercial buildings and other non-residential buildings from 200-300 kWh/m<sup>2</sup> to 60-80 kWh/m<sup>2</sup>. In the period from 2008 to 2011, the Fund has invested funds in the amount of 34.1 million for measures to increase the energy efficiency in buildings.

### MCA-20: Establishment of EU ETS

From 1 January 2013, the Republic of Croatia is fully integrated in the EU Emission Trading System (EU ETS). EU ETS was developed as market mechanism for emission reduction and started in 2005. It includes 28 EU Member States and states within the European economic area, which are not the EU members. Since the beginning of the EU ETS third commitment period is the same as the beginning of calendar year, the Republic of Croatia was included into EU ETS even before the formal accession to the European Union on 1 July 2013.

As preparation for EU ETS, the monitoring and reporting system on greenhouse gas emissions was implemented in the Republic of Croatia on 1 January 2010 for persons obliged to obtain the permit for greenhouse gas emissions based on applied Air Protection Act and Regulation on Emission Quotas of Greenhouse Gases and Method of Emission Allowances Trading. The monitoring and reporting system was established for the period from 2010 to 2012 and was complied with EU ETS regarding the scope as it includes the same energy and industrial sectors and same greenhouse gases as the European system. At that time, the EU ETS was practically partially implemented in the Republic of Croatia, as monitoring and reporting on emissions is its integral, quite important and demanding component. Operators in Croatia - the pursuants in the EU ETS have obtained Permits for greenhouse gas emissions and have established a regime for emissions monitoring and reporting to the competent authority. The main difference of the system established in the Republic of Croatia in relation to EU ETS is that plant operators were not in the EU ETS, ie. they were not obliged to limit the emissions and to use the financial instrument of trading of emission allowances as were plant operators in the EU Member States.

Since 2013, every plant in the Republic of Croatia included by EU ETS will be stimulated to reduce the emission from the plant due to purchase costs of emission allowances. The year in which plants in the Republic of Croatia are being included into the EU ETS is the same as for the beginning of the third trading period that lasts until 2020. According to significant European regulations, the emission trading system will be continued after 2020 as well.

## 6.2.2. PERIOD FROM 2012 TO 2013

In the period from 2012 to 2013, the first commitment period of the Kyoto Protocol (2008 to 2012) was completed and the Plan of protection of air, ozone layer and climate change mitigation in the Republic of Croatia for the period from 2013 to 2017 (OG 139/13) was adopted. Below is an overview of the achievements of policies and measures implemented in this period, for which there are quantified estimates of the effect.

### MEN-1 Promotion of energy efficiency in households and services through project activities

National programs of energy renovation of buildings are regulated by mechanisms, dynamics and aims to achieve energy savings and reduce greenhouse gas emissions in buildings. Implementation of these measures is associated with the measure MEN-13 as an important part of the program is planned to be carried out with the support of funding from the Fund for Energy Efficiency and Environmental Protection. In conducting energy audits and other measures, among others, civil society organizations have participated.

It is estimated that in 2012 and 2013, through the promotion of sustainable construction and renovation, 16.48 TJ of energy and 1114.3 t CO<sub>2</sub> emissions were saved.

The Program for the Energy Renovation of Public Buildings 2012 – 2013 applies the model for the development of markets for energy services companies (ESCO), with an emphasis on the leading role of the public sector in the launch markets for energy services and exploit business opportunities in the field of energy efficiency. By the Program in 2013, 5 schools were renovated, whose proven savings by projects and energy certificate, amount to 1,952,839 kWh or 0,007 PJ per year.

### MEN-7 Supporting the use of renewable energy sources in electricity generation

According to the annual energy review "Energy in Croatia in 2012" and "Energy in Croatia in 2013", the electricity generation from renewable sources (excluding large hydro) increased from 510.8 GWh in 2008 to 775.9 GWh in 2011 or by 52%. The largest increase was recorded in the wind power generation (328.8 GWh in 2012, 517.3 GWh in 2013). Funds paid to eligible producers amounted to HRK 331.7 million in 2012 and HRK 553.3 million in 2013.

MEN-11 Promotion of the use of renewable energy sources in heat/cooling energy generation

According to the annual energy review "Energy in Croatia in 2012" and "Energy in Croatia in 2013", the heat generation from renewable sources in Croatia in 2012 amounted to 21.89 PJ, and 20.91 PJ in 2013. It shows that no additional progress has been made in the heat generation from renewable sources.

MEN-13 Promotion of the use of renewable energy sources and energy efficiency by FZOEU (The Environmental Protection and Energy Efficiency Fund) resources

Overview of savings in the period from 2011 to 2013 from the Report on energy savings from programs and projects of the Environmental Protection and Energy Efficiency Fund by the end of 2013 are shown in Table 6-2.

**Table 6-2: Savings from the evaluated projects of the Fund from 2011 to 2013**

Activity	Number of projects	Savings [TJ]	Savings [HRK]	Savings [t CO <sub>2</sub> ]	Subventions [HRK]
1. National energy programmes	160	194.09	30,437,598.52	17,987.80	60,020,206
2. Energy audits and education	64	1.98	283,765.23	202.04	593,358.26
3. Renewable energy sources	15	7.29	873,175.31	506.99	6,155,819.90
4. Sustainable building	66	20.96	2,957,134.72	1,428.25	23,500,276.00
5. Clean transport	0	0	0	0	0
Total:	305	224.33	34,551,673.79	20,125.07	90,269,660.53

With the support of the Fund, 305 projects were carried out, 224.33 PJ of energy saved, reduced costs were HRK 34.55 mil. and achieved CO<sub>2</sub> savings were 20.16 kt CO<sub>2</sub>. In order to support the projects, HRK 90.27 mil. were distributed.

Analysed period from 2011 to 2013 is based on the second Action Plan for Energy Efficiency for the period from 2011 to 2013. It isn't done for equal periods as the Air Protection Plan and therefore analyzed period is not equal to the period of implementation of the Air Protection Plan.

## VII ANNUAL NATIONAL EMISSION ALLOCATIONS

### 7.1. AMOUNT OF ANNUAL EMISSION ALLOCATION

Outside the EU ETS, aims to reduce or increase the permitted emissions are determined on the basis of GDP per capita in the framework of the Decision on joint efforts of the division. For the Republic of Croatia is allowed to increase greenhouse gas emissions outside the EU ETS by 11% by 2020 compared to 2005. The Commission Decision 2013/162/EC of 26 March 2013 determined the quotas expressed in absolute terms for Croatia from 2013 to 2020. The Commission Decision 2013/634/EC of 31 October 2013 adjusted the quotas due to an increase in the scope of the EU ETS, which has decreased the quotas for emissions outside the EU ETS. In both documents, quota is expressed using the value of global warming potential (GWP) of the second and fourth report of the Intergovernmental Panel on Climate Change (IPCC).

Table 7-1 shows the limitation of greenhouse gas emissions outside the EU ETS (national annual quota) in the period 2013-2020 using GWP values from the second and fourth assessment report of the IPCC.

**Table 7-1: Annual emission allocations for the Republic of Croatia for the period 2013-2020 [t CO<sub>2</sub>eq]**

	2013	2014	2015	2016	2017	2018	2019	2020
GWP from second report	18,990,152	19,185,523	19,380,894	19,576,265	19,771,635	19,967,007	20,162,378	20,357,748
GWP from fourth report	19,613,805	19,805,256	19,996,708	20,188,161	20,379,612	20,571,063	20,762,515	20,953,966

## 7.2. PROJECTED PROGRESS IN MEETING THE EMISSION LIMITATIONS TO THE AMOUNT OF ANNUAL NATIONAL QUOTA

**Table 7-2: Projected development in relation to the national annual quota in period 2013 – 2020 [t CO<sub>2</sub>eq]**

	2013	2014	2015	2016	2017	2018	2019	2020
Quota	19,613,805	19,805,256	19,996,708	20,188,161	20,379,612	20,571,063	20,762,515	20,953,966
Difference								
'Without measures' scenario	6,936,834	5,316,630	3,150,800	2,299,354	1,983,528	1,606,259	1,175,338	1,544,446
'With measures' scenario	8,021,259	5,943,443	4,100,200	3,715,363	3,687,033	3,597,320	3,377,201	3,754,412
'With additional measures' scenario	8,021,259	5,943,443	4,100,200	3,750,071	3,669,284	3,665,884	4,454,544	4,881,559

Table 7-2 shows the estimates of the amount of greenhouse gases in period 2013-2020 and differences realized in relation to the national annual quota. Differences were calculated by subtracting the amount of the annual national and estimated annual emissions of non-ETS sectors. Emission projections were made using GWP values from the second assessment report of the IPCC, but in this update report, projections were recalculated using GWP values of the fourth assessment report and the comparison was made in relation to the quota given by the use the same GWP.

It is evident that the expected projections are below the annual national quota laid down for all three scenarios.

## 7.3. INFORMATION ON PLANNED ADDITIONAL MEASURES FOR ACHIEVING LARGER EMISSION LIMITATIONS THAN THE AMOUNT OF NATIONAL ANNUAL QUOTA

The Plan for Air and Ozone Layer Protection, and Climate Change Mitigation in the Republic of Croatia for the period 2013 - 2017 as one of the goals defines "further reduction and limitation of greenhouse gas emissions in accordance with the decisions and strategic documents of EU's path towards a low carbon economy and in accordance with the development of green economy in the Republic of Croatia". This goal is in addition to the single goal of "reducing and limiting emissions of greenhouse gases and substances that deplete the ozone layer in the period 2013 - 2017 in accordance with obligations assumed from the Croatian international treaties, in particular the Kyoto Protocol and its amendments and the *acquis communautaire*." A set of measures arising from the general and specific objectives in the area of climate change mitigation includes further reduction. There were not specifically defined measures that would pertain solely to further limit emissions. It is expected that

the envisaged measures to achieve emission constraints result in a higher limit and will ultimately achieve the limitation of the amount of annual national quota until 2020.



## VIII ASSESSMENT OF IMPACT OF APPLICATION OF CLEAN DEVELOPMENT MECHANISM, JOINT IMPLEMENTATION AND EMISSIONS TRADING AS COMPLEMENTARY MEASURES TO REDUCE GHG EMISSIONS

The current impact of application of the Kyoto Protocol is still inestimable since in Croatia this mechanism has not yet been used. Domestic measures were the only measures applied to reduce emissions and increase sinks of greenhouse gases. The Regulation on Implementation of the Flexible Mechanisms (OG 142/08) from 2008 remains in force, which is the standard way of flexible mechanisms. From 2013, the system of emissions trading (EU ETS) the plants in Croatia were included, which means that the application of the emissions trading mechanism at the level of industrial plants has started. Croatia made no plans for the implementation of project mechanisms, i.e. for investment in clean development mechanism and joint implementation by which Croatia would acquire units of CERs and ERUs.

Since 2013, the system of emissions trading (EU ETS) includes the plants in Croatia as well, which means that there is application of emission trading mechanism at the level of industrial plants.

In Croatia, implementation of the auction is regulated by the Air Protection Act (OG 130/11, 47/14), Decision on the Auctioneer for conducting the auction of allowances and the choice of auction system (OG 84/14) and the Regulation on auction of greenhouse gas emission (OG 19/13) .

In accordance with Article 100 of the Air Protection Act, the funds obtained from the sale of emission allowances through the auctions shall be paid to a special account of the Environmental Protection and Energy Efficiency Fund. The aforementioned law also prescribes the activities financed from the sale of emission allowances through auctions, thus the Plan on using financial funds obtained from the sale of emission allowances through the auctions in the Republic of Croatia for the period from 2014 to 2016 (OG 140/14) was adopted for that purpose.

Sales of emission allowances at auction, which are relevant to participants in the ETS from Croatia, began in early 2015.

## REFERENCES

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2. Guidelines for the preparation of information under Article 7 of the Kyoto Protocol (FCCC/KP/CMP/2005/8, Annex 2)
3. Air Protection Act (OG 130/11, 47/14)
4. 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
5. Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council
6. Air and Ozone Layer Protection Plan and Climate Change Mitigation in the Republic of Croatia for the period 2013-2017 (OG 139/13)
7. Sixth Croatian National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), the Ministry of Environmental Protection, Physical Planning and Construction, 2014.
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9. The National Action Plan for Renewable Energy Sources, Ministry of Economy, 2013.
10. The Third National Action Plan for Energy Efficiency Croatia for the period 2014-2016, Ministry of Economy, 2014.
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13. The Program of Energy Renovation of Family Houses for the Period from 2014 to 2020 with a Detailed Plan for the Period from 2014 to 2016 (OG 43/14)
14. The Program of Energy Renovation of Commercial Non-residential Buildings for the Period from 2014 to 2020 with a Detailed Plan of Energy renovation of Commercial Non-residential Buildings for the Period from 2014 to 2016 (OG 98/14)
15. The Programme for the Energy Renovation of Public Buildings, Ministry of Construction and Physical Planning, 2013.
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17. Waste Management Strategy of the Republic of Croatia (OG 130/05)
18. Waste Management Plan in the Republic of Croatia 2007th-2015th (OG 85/ 07, 126/10, 31/11)
19. The Law on Sustainable Waste Management (OG 94/13)
20. Decision No 529/2013 / EC 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, the European Parliament and European Council, 2013.

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