Republic of Slovenia
Ministry of the Environment and Spatial Planning

7th National Communication & 3rd Biennial Report from Slovenia under the United Nations Framework Convention on Climate Change

(Required under the UNFCCC and the Kyoto Protocol)

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SEA:	Slovenian Environment Agency
JSI-EEC:	Jozef Stefan Insitute – Energy Efficiency Centre
IMAD:	Institute of Macroeconomic Analysis and Development
MESP:	Ministry of the Environment and Spatial Planning
AIS:	Agricultural Institute of Slovenia
SFI:	Slovenian Forestry Insitute

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FOREWARD

Slovenia prepared Seventh National Communication as required under Article 12 of the United Nations Framework Convention on Climate Change (UNFCCC) and Article 7 of the Kyoto Protocol, and its Third biennial report as required under Decision 2/CP.17 of the Conference of the Parties under the UNFCCC.

Slovenia is in favour of ambitious greenhouse gas emission reduction targets on national, EU and global level, which would enable to achieve the goal of limiting the growth of the global temperature below 2°C compared to preindustrial levels in accordance with commitments of Paris Agreement from 2015. In order to achieve the target it is necessary to take into account the principle of common but differentiated responsibility and respective capabilities of individual countries as well as active help of developed countries with the implementation of measures in developing countries. Slovenia is aware that this is necessary for the preservation of human and natural systems and biodiversity, and to avoid major climate imbalances.

The main document containing measures for reducing greenhouse gas emissions in Slovenia has been the Operational Programme for Reducing Greenhouse Gas Emissions until 2020 with a View to 2030 (OP TGP-2020) that was adopted by the Government in December 2014. The document follows EU position and the needs and possibilities of Slovenia in this field. The majority of measures in different sectors have been implemented in accordance with the expectations of this programme with the exception of the transport sector, where the emissions of carbon dioxide are still very high.

An important potential to reduce greenhouse gas emissions in Slovenia is an increase in efficiency of final energy consumption in all sectors. The implementation of energy efficiency measures is being promoted and facilitated by raising public awareness, informing and educating energy consumers, and encouraging investments in efficient energy consumption and renewable energy sources.

1 EXECUTIVE SUMMARY

1.1 National Circumstances

In the period 2000–2017, the population of Slovenia increased from 1,990,272 to 2,066,161, which makes 3.8%, primarily due to increasing migrations. The population density is moderate.

Geographically, Slovenia is located in Central Europe and shares border with Austria in the North, Hungary in the East, Croatia in the South and Italy in the West. The surface area of the territory is 20,273 km^2. Its landscape and biosphere are very diverse. The majority of its surface is covered by forests (58.4%[1]).

Three climate types are found in the territory of Slovenia: sub Mediterranean, Alpine and Continental. Average annual temperature in the sub Mediterranean climate type is 12 °C, in the lower regions of central Slovenia it is between 8 and 1 °C, while at the highest peaks it never exceeds 0 °C. In the majority of the country, the average temperature in the recent 30-year period increased by approximately 1.5 °C. Annual precipitation varies to a great extent; from 800 mm in the extreme north-eastern and 1000 mm in the extreme south-western part of the country, to over 3000 mm in the north-western part of the country.

Slovenia became a full member of the European Union on 1 May 2004; it joined the Euro zone on 1 January 2007.

The Ministry of Environment and Spatial Planning (MESP) is responsible for the preparation and implementation of environmental and climate policy and legislation. MESP coordinates the preparation of measures on climate policy implementation together with other relevant departments, primarily energy, traffic and agriculture. Moreover, MESP prepares reports relating to climate on EU as well as UN level, for which purpose MESP obtains input data and documents from relevant areas. Emission inventories and reports regarding these purposes are carried out by Slovenian Environment Agency (SEA), which is a body of MESP. SEA is also responsible for the Emissions Trading Registry and environmental indicators including climate change indicators.

Slovenian economy went through a variety of changes in the late 1990s caused by the transformation of political and economic systems. The economic and general crisis was intensified by the loss of common former Yugoslav market. All this resulted in a fall in GDP, a fall in the employment rate and investments, and a high inflation rate. As early as 1993, the Slovenian economy began to revive, on average exceeding an annual growth rate of 4% between 1993 and 2000.

Before the onset of the economic crisis, the Slovenian economy achieved relatively high growth rates. The average GDP growth rate was 4.3% between 1993 and 2003 and 4.9%

[1] Data for 2012 (source: Slovenia Forest Service). Forest coverage data does not include data on areas being reclaimed and therefore does not correspond to the data on forest coverage.

between 2004 and 2008. The economic crisis caused a slowdown in GDP growth even in 2008 and a dramatic decline in 2009 (-7.9%). The rapid deterioration of economic conditions in the international environment was reflected in reduced exports and investments, which had been the key factors of economic growth in previous years. After modest GDP growth in 2010 and stagnation in 2011, Slovenia entered another period of negative growth rates in 2012, which has continued into the next year and is the result of weak domestic demand, especially the decline in investments. After 2013 Slovenia resolved economic downturns which resulted in improvement of economic and other results. The GDP growth over the last years is encouraging.

According to the data of Slovenian Statistics Office, the annual GDP growth in Slovenia amounted to 3.0% in 2014, 2.3% in 2015 and 3.1% in 2016. According to data and predictions of Slovenian Institute of Macroeconomic Analysis and Development, GDP growth amounted to 4.4% in 2017 and the expected GDP growth in 2018 is 3.9%.

Slovenian GDP amounted to EUR 42.8 billion in 2017, which makes EUR 20,708 per capita. Annual inflation was 1.5% in 2017. Slovenia experienced employment growth by 2,7% in 2017. The number of unemployed reached 89,000 in 2017, which makes 9.5%, and the number is expected to decrease to 82,000 or 8.7% in 2018. Annual export growth increased by 8.8% in 2017 and it is expected to increase by 7.7% in 2018.

In the period 1992-2016, the gross inland consumption increased by 29%, whereas the primary energy intensity decreased by 34%. The highest proportion is accounted for by liquid fuels, followed by nuclear energy, solid fuels, where coal is the only domestic fossil source of energy, renewable energy sources and natural gas. Renewable sources (mainly wood and hydroelectric energy) represent a 17% share. Since 1992, the final energy consumption increased because of the increased use of electricity, natural gas and liquid fuels, whereas the final energy intensity improved similarly as the primary energy intensity. The energy consumption is growing fastest in transport sector, which is also an impact of transit transport.

The volume of road goods transport and passenger car traffic in Slovenia experienced sustained increase until the beginning of the crisis in 2009. The increase was the consequence of the growing number of vehicles (motorisation rate in 2016 was 531 cars per 1000 inhibitants) and the increased average number of vehicle-kilometres travelled. After a significant drop of passenger kilometers in public transport, slow growth has been present in the recent years. Freight transport is characterised by the geographical position of Slovenia at the crossroad of two corridors, export oriented economy and Port of Koper. These three factors contributed to high growth of freight transport, an important part of which can be attirtibuted to foreign hauliers. In the period 2008-2012, the share of foreign hauliers on Slovenian motorways increased by 15 percentage points to 86 %.

In 2015, approximately 5.2 million waste was generated in Slovenia, which makes 16% more than in 2012. One fifth of the waste was generated from households and the rest from production and service activities. Waste management has undergone great changes as only 5% of wate was disposed at landfills.

According to the data from register-based census in 2015, Slovenian housing stock comprised 845,400 housing units on 1st January 2015. Four out of five housing units were inhabited, of which every twelfth is rented. Among uninhabited housing units 20.000 are holiday housing units. The majority of housing units (60%) are in one- and two-dwelling buildings.

The trend of decrease in the share of agriculture in value added has stopped. According to economic accounts, gross value added in agriculture amounted to EUR 474 million in 2016, which represented 1.2% of GDP. Crop production has been the most important agricultural activity since 2004, which represented 56% of agriculture production value. In 2016, there were 9% of all utilised agricultural holdings included in the organic farming. According to economic accounts for forestry, gross value added amounted to EUR 300 million in 2016, which makes 0.7% of GDP.

1.2 Greenhouse Gas Inventory Information

Total emissions of GHG in 2015, sinks not considered, amounted to 16,831 kt CO_2 eq., which represents a 17.4% decrease of emissions compared to the year 1986. In the period 1986-1991, a reduction of emissions was recorded due to the economic conditions at that time and the fact that the Republic of Slovenia gained its independence. In the period 1992-1997, a strong increase of emissions was recorded, which was a consequence of increasing economic growth and revival of industrial production. In the second half of that period, the increased emissions were a consequence of "gasoline tourism" (25% of the total sale of motor fuels in the Republic of Slovenia), since the prices of motor fuels in the Republic of Slovenia were appreciably lower than in the neighbouring countries.

In the period 1998-1999, emission decreased due to the measures undertaken by the neighbouring countries to curb the "gasoline tourism" and due to the increased supply of electrical energy from the Krško Nuclear Power Plant. In the period 2000-2002, the emission kept increasing again due to the renewal of the obligatory export of electrical energy from the Krško Nuclear Power Plant to the Republic of Croatia. After joining the EU in 2004 and after acceptance of Romania and Bulgaria into EU in 2007, emissions from road transport have increased drastically and have prevailed over the decrease in other sectors which has occurred due to the policies and measures in manufacturing industry, agriculture and waste sector.

In 2009, emissions from fuel used and from industrial processes started to decrease due to the global financial crisis. In 2010 and 2011, emissions stayed almost the same as in 2009, while from 2012 to 2014 a further decrease has been observed. In 2015 emissions in all sectors slightly increased and were 1.3% higher than in 2014.

CO_2 emissions in 2015 represented 80.8% of overall emissions of greenhouse gases. CO_2 emissions excluding LULUCF followed the consumption of energy and with regard to their fraction exerted a major impact on total emissions. Compared to 1986, they decreased by 18.3% in 2015. CH_4 emissions represented 12.1% of total emissions in 2015 (12.5% in 1986) and were by 20.3% lower than in 1986. N_2O emissions represented 4.9% of total emissions and were by 11.4% lower than N_2O emissions in 1986. F-gases represent 2.2% of total

emissions and some gases (HFCs and SF_6) have shown significant increases since 1995 (base year for F-gases), while PFC decreased drastically in 2008 and has continued to decrease in 2009. Since then a slow increase of emissions has been observed.

1.3 Policies and Measures

Slovenia has committed itself to pursuing the objective of sustainable growth by way of a number of documents and decision-making processes at EU and national level.

In the period until 2020, Slovenia has set itself the objective of reducing GHG emissions within the policy and legal order of the EU. Emissions from sources that are included in the GHG emissions trading scheme should be reduced, at the EU level, by 21% as compared to 2005. Other sources are subject to the national objective that emissions will not increase by more than 4% by 2020, as compared to 2005. Annual objectives in the period 2013–2019 are also defined. Objectives for the period after 2020 are still being developed.

The Operational Programme for Reducing GHG Emissions until 2020 with a view to 2030 (OP TGP-2020) was adopted in 2014. The OP TGP-2020 Programme is based on the adopted sectoral and development programmes defining the activities for the reduction of GHG emissions and complementing them.

Environmental protection policies at the local level are important for the preparation and implementation of GHG emission reduction measures aimed particularly at the use and local supply of energy, waste management and sustainable mobility.

As an EU Member State, Slovenia has also undertaken to realize the European climate policy and implement the joint measures.

Measures and instruments for reducing GHG emissions in Slovenia are the following:

- GHG emission allowance trading (The objective of the measure is to reduce emissions where this is most cost-effective.)
- An environmental tax on the pollution of air due to CO_2 emissions (Internalisation of the external costs of air pollution due to CO_2.)
- The use of best available techniques (Reducing energy consumption by using best available techniques.)
- Taxes and charges (Achieving stimulative environment for greater use of environmentally friendly fuels by influencing the price of fossil fuels.)
- Education and training, informing, awareness and promotion (A high level of awareness, information and knowledge is necessary for the successful implementation of measures.)
- Green economy growth (Long-term GHG emission reduction by transition to economy, growth of which is based on innovations that increase energy efficiency and reduce GHG emissions.)
- Energy efficiency labelling and minimal standards for products and appliances (Improvement of products and appliances in terms of energy efficiency.)

- Obligations on energy suppliers for energy savings (Increase of energy efficiency with final consumers of energy.)
- Technological modernisation of thermal energy sector (A number of large thermal power plants are already nearing the end of their life expectancy; therefore their replacement is being planned. This will also result in a larger share of natural gas.)
- Promotion of power generation from RES and high efficiency CHP (The promotion scheme is the basic instrument in this area, which is implemented in the form of fixed feed-in tariffs of electricity and operational support.)
- Promotion of district heating based on RES and of CHP with high efficiency (Increase of energy and emission efficient generation of heat for district heating.)
- Promotion of energy efficiency in industry (Besides a reduction in production costs, the state is also promoting efficient energy use in industry by various programmes.)
- Promotion of energy efficiency and the use of RES in buildings in general (Taking into account various aspects of energy efficiency and the use of RES in spatial planning, feasibility studies of alternative systems of energy supply, pilot projects, renovation of cultural heritage, energy performance contracting, trainings of stakeholders in the area of building renovations and RES technologies, excise duty policy)
- Promotion of energy efficiency and the use of RES in households (State promotes investments in households by subsidies and soft loans; consulting network ENSVET has been established)
- Promotion of energy efficiency and the use of RES in the public sector (The public sector must set an example for the population in implementing the measures. The measures are promoted by financial incentives, while an important factor will be green public procurements.)
- Promotion of the use of public transport (The objective of this measure is to increase the number of passengers using public transport, which greatly decreased in the past.)
- Sustainable freight transport (The objective of the measure is to extend and modernise the railway network, which represents a precondition for the transition of freight transport from road to railway.)
- Vehicle efficiency improvement, promotion of efficient driving, an increase of vehicle occupancy rate and promotion of the use of low CO_2 emission fuels (Specific use of vehicles will decrease due to European legislation which sets out allowed emissions per km for new passenger cars, fiscal pressure, informing and awareness rising. Also, a non-negligible influence of green public procurement is present and financial incentives for clean vehicles are available. The shares of RES in sold quantities are prescribed until 2020 for motor fuel distributers.)
- Promotion of non-motorised traffic (Cycling and walking are two significant ways of mobility which can add to a decrease of GHG emissions. They play an important role in the integrated transport strategies for municipalities.)
- Development of integrated transport strategies for municipalities (Integrated strategies contribute to the increase in share of sustainable mobility, the improvement of infrastructure and change in behaviour.)

- Reduction of F-gas emissions from stationary equipment (Decrease in F-gas emissions by leak reduction, replacement and diligent handling with devices and introduction of quantitative cap for HFC gases on EU market.)
- Reduction of F-gas emissions from mobile air-conditioning in vehicles (The legislation lays down restrictions on the use of F-gases in air-conditioning systems in new cars.)
- An increase in the range of grazing for cattle (Grazing is promoted by subsidising measures and education; it produces lower emissions due to the avoidance of emissions generated through the storage of animal manure.)
- Rational fertilisation of agricultural land by nitrogen (Within the framework of the Rural Development Programme, numerous measures are implemented, directly contributing to a reduction in the use of mineral fertilisers.)
- A reduction in the quantity of deposited biodegradable waste (Slovenia has adopted several measures to reduce the amount of deposited biodegradable waste; for instance, separated collection of fractions, an environmental tax on waste disposal, treatment of waste before disposal, etc.)
- Waste reduction (A programme aiming to prevent waste generation was adopted.)
- Capture of landfill gas (The capture of landfill gas has been mandatory since 2005.)
- Sustainable forest management and CO_2 emission sinks (An increase in the wood supply simultaneously with an increase in CO_2 sinks are a result of the work planned by the Slovenian Forest Service based on the principles of sustainability, environmental friendliness and multi-purposeness.)

Slovenia follows the principle of sustainable development in its development policy, as shown by the new Slovenian Development Strategy 2030. Consequently, national operational programmes define sustainable development as their horizontal principle that is followed by programmes within the framework of all their priority areas. Sectoral and regional development strategies, national programmes, and other development programmes must substantively comply with the general strategic policies of Slovenia's Development Strategy.

The Emission Trading Registry started to operate in November 2005.

One of the main objectives of the Resolution on the National Forest Programme (ReNFP), which is the successor to the National Forest Development Programme, is sustainable forest development as an ecosystem within the meaning of its biodiversity and all its ecological, economic and social functions.

1.4 Projections and the Total Effect of Policies and Measures

Projections are made for a scenario with measures. Projections were prepared in 2017 on the basis of projections from 2013 taking into account the latest developments. The base year is 2015.

According to the projection with measures, emissions in 2020 amount to 18,009 kt CO_2 eq, they are reduced to 16,351 kt CO_2 eq until 2030 and until 2035 to 15,378 kt CO_2 eq. In 2020, emissions are by 7.0% higher than in 2015, in 2030 and 2035 emissions are by 2.8% and 8.6%

lower. Compared to 2005 emissions are 12.1% lower in 2020 and in 2030 they are 20.2% lower.

The main sectoral sources of emissions are energy supply (energy industries and fugitive emissions) and transport which together represent 61% of all emissions. The emissions from transport have been higher than emissions from energy supply since 2014. Emissions from both sectors will increase until 2020 and then they decrease. The emissions from energy supply are by 19% lower in 2035 compared to 2015. Decrease is slower in transport sector. Emissions from transport are by 12% lower in 2035 compared to 2015. Emissions from both sectors together represent 57% of all emissions. In industry, which includes emissions from the combustion of fuels in industry and industrial processes, emissions will increase until 2035 due to economic development, while F-gas emissions are greatly reduced. In 2035 they are by 24% higher than in 2015. Emissions due to the combustion of fuels in general use (other sectors) substantially decrease, namely for 34% in the period 2015-2035. In agriculture, emissions increase by 10% due to an increase in the number of animals, while in the waste sector, emissions decrease by 34% due to a decrease in deposited biodegradable waste.

Emissions from bunker fuels will significantly increase. Emissions from international aviation are expected to increase by 79%, emissions from navigation by 154% in the period 2015-2035.

Emissions from sources included in EU-ETS amount to 7,227 kt CO_2 eq in 2020. Until 2035 they will decrease to 5,906 kt CO_2 eq. Compared to 2005 emissions are 28.8% lower in 2030. According to the projection with measures, emissions of non-ETS sources will increase to 10,781 kt CO_2 eq until 2020 and decrease to 9,472 kt CO_2 eq until 2035. Emissions in 2020 are lower by 8.2% compared to 2005 and in 2030 they are 13.8% lower. By far, the largest share of emissions among non-ETS sources is from transport.

The total effect of all measures (implemented and adopted) amounts to 1.1 Mt CO_2 eq in 2020 and 4.5 Mt CO_2 eq in 2030. CO_2 emissions and transport sector represent the largest share in the reduction.

The largest uncertainty for Slovenia in the preparation of projections stems from the transport sector.

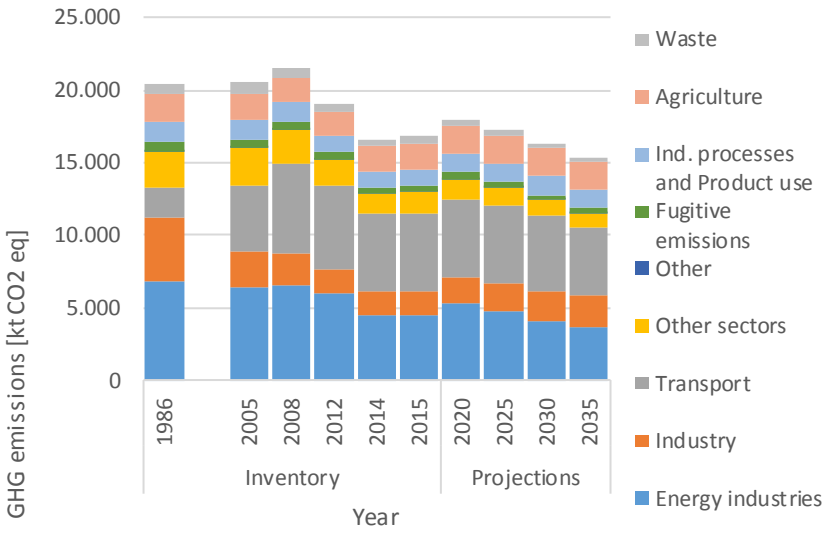


Figure 1: Actual GHG emissions in sectors for chosen years and emission projection with measures until 2035

1.5 Climate Change Impacts, Vulnerability and Adaptation

In the period since the last National Report, Slovenia has made major steps in the field of climate change impact assessment over four years, which have made possible further progress in the field of assessing vulnerability, and then the preparation and adoption of the first cross-cutting strategic document on climate change adaptation.

In December 2016, the Government of the Republic of Slovenia adopted the Strategic Framework for Climate Change Adaptation, which provides guidelines for the planning and implementation of climate change adaptation measures. An Interdepartmental Working Group on Climate Change Adaptation was established in 2016 as well the project Assessments of Climate Change Impacts in the 21st Century started at the Environmental Agency of the Republic of Slovenia. The project already offers appropriate expert groundwork and first estimates of the effects of climate change in the coming period, which will then enable the preparation of an Action Plan on Climate Change Adaptation in the future.

In the period 1961–2011, the most significant changes were seen in the average annual air temperature, which on average increased by 1.7 degrees Celsius. The climate change scenarios show that the air temperature in Slovenia will continue to rise. Compared with the period 1981-2010, it will increase on average by 1°C throughout the country in the period up to 2040, and for an additional degree C until 2070. The assessments of climate change impacts on individual sectors will continue in the future. While a comprehensive program of measures for climate change adaptation (Action Plan) will be prepared based on the results of the climate impact assessments, the need for adaptation action was addressed in the context of related topics in the 2014-2018 period.

1.6 Financial Resources and Transfer of Technology

Slovenia agreed to the commitment on helping developing countries in implementing their climate policy and measures (including transfer of technologies and enhancing their administrative capability) at 15th session of the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in 2009. Slovenia agreed on further commitment on a fair share of climate finance and assist developing countries in this field, independently as well as a EU member, at 21st session of the Conference of the Parties of UNFCCC in Paris in 2015.

The EU Member States, including Slovenia, follow the commitment of the Paris Agreement to mobilise USD 100 billion per year by 2020 for assistance and implementation of measures for reducing greenhouse gas emissions and adapting to climate change in developing countries. The assistance includes financial resources, a transfer of the "climate-friendly technologies" as well as strengthening administrative capability of developing countries in this field.

In recent years, Slovenia has been increasing its climate finances. In 2016, Slovenia contributed EUR 3 million for climate finance or assistance in developing countries, which represents an increase of 26% as compared to 2015. In 2016, Slovenia has for the first time also added resources from the "Slovenian climate change fund" (around EUR 1 million per year), where resources are gathered from the sale of allowances from the EU-ETS greenhouse gas emissions trading scheme. Slovenia estimates its climate assistance to be an amount of EUR 3.5 million in 2017. Slovenia will strive to obtain the amount of EUR 3.5 million for climate assistance by 2020.

In the draft Development Assistance Programme for developing countries, which also includes climate finance, Slovenia plans to increase the annual contribution from the Climate fund by 2030 in order for the total climate finance to reach between EUR 6 and EUR 7 million in 2030. The current share of climate finance in 2016 amounts to around 15% of the total ODA, and by 2030, it would be expected to increase at least to 30%, which is twice the increase in the share of climate finance, both in absolute amount and in the share of all ODA resources. In the field of climate finance, Slovenia will also follow joint decisions and guidelines, both at EU and UNFCCC level agreements.

1.7 Research and Systematic Observation

The key document for establishing an effective national research and innovation system for Slovenia is the Research and Innovation Strategy of Slovenia 2011–2020 (RISS) and one of its key strategic missions is to contribute to effectively tackling societal challenges. In accordance with the EU guidelines and having regard to numerous shortcomings indicated by national and international studies, the Slovenian Government adopted the Slovenian Strategy for Strengthening the European Research Area 2016–2020 in May 2016, in which it defined the Slovenian vision of the ERA as: "By 2030, Slovenia will join the group of countries, which are according to the Innovation Union Scoreboard innovation leaders." The document envisages, among other things, an increase in cooperation in EU instruments, such as:

- Activities of the current Horizon 2020 Framework Programme. In the third pillar, "Societal challenges", environmental challenges, including climate change, are especially examined in four of the seven priority areas of the pillar, and Slovenian partners are active in all of them.
- Joint Programming Initiatives (JPIs); Slovenia, among others, is participating in the JPI Climate (societal challenge of climate change).

In 2015, the Slovenian Smart Specialization Strategy (S4) identified narrower priority areas that show most potential for Slovenia's further development. S4 is a platform for concentrating development investments in areas where Slovenia has the critical mass of knowledge, capacities and competences and where there is innovation potential for placing Slovenia within global markets and thus enhancing its recognizability. Strategic objectives emphasized in the introductory part of S4 are sustainable technologies and services for a healthy life. According to the range of topics in nine areas of S4 application, it is evident that many activities will (also) contribute to a transition to a low-carbon economy. In the 2016–2017 period, each area of S4 application witnessed an establishment of its own strategic research and innovation partnership – SRIP. Financial incentives for research and innovation in the areas of smart specialization are envisaged in the Operational Programme for the Implementation of the EU Cohesion Policy 2014–2020 (OP ECP). In 2016 and 2017, several tenders have already been implemented or are under way.

The draft programme of the National Environmental Action Programme (NEAP) addresses identified weaknesses in this area, with the main objectives being:

- better understanding of the environment i.e., improving the knowledge and database for Slovenia's environmental policy and for implementing this policy through different stakeholders and at different levels;
- developing and adopting innovative technologies and non-technological innovations that will accelerate the transition to green, low-carbon and resource-efficient economy and society.

When it comes toensuring research implementation, development and innovation for protection of the environment, it will be necessary to progress towards achieving the objectives:

- of Slovenia being ranked as an innovation leader in eco-innovation indicators and technologies by 2030,
- of targeted investment in research and development which would contribute to filling the knowledge gaps,
- that in the programming period 2021–2030, 60% of research activities would contribute to a sustainable development and 35% to climate change mitigation and adaptation.

In order to attain these objectives, the draft NEAP document anticipates several measures.

Environmental Agency of the Republic of Slovenia is conducting research on climate change regarding:

- In 2013, the project "Climate Variability in Slovenia" was carried out by the SEA. The result of the project is an integrated temporal and spatial analysis of the changes and trends in climate variables in Slovenia based on homogenized series.
- In 2015, SEA initiated a project on the climate change assessment in Slovenia by the end of the 21st century that involves detailed local-scale climate projections for Slovenia. Changes of the air and soil temperatures, surface and groundwater temperatures and sea temperatures, soil water content, precipitation levels, quantity of watercourses, aquifer supply, and phenological development of selected plant species were analysed. A detailed project report will be prepared in the first half of 2018. In the next years, the impacts of climate change on individual sectors (energy, water, agriculture, health, etc.) will be prepared on the basis of pre-prepared scenarios.
- The SEA operates as a national focal point for the Drought Management Centre for South Eastern Europe (DMCSEE), which primarily helps countries in the region with establishing drought monitoring, for which operation monitoring and forecasts for all water balance elements need to be established. In order to strengthen competences and capacities in the field of monitoring and mitigation of drought, the SEA became a partner in the Interreg Project DriDanube, which closely involves countries of the Danube region.

SEA also implements systematic observation and air and water measurements. In order to monitor the state of weather, climate and water quantity, it established a network for classic and automatic measurements of meteorological and hydrological variables. On the basis of verified measurements and homogenized time series, the SEA regularly monitors the state of the climate on a monthly basis and evaluates the deviations of climate variables from long-term reference values.

Projects and studies for provision of expert bases for climate policy:

- Within the framework of the LIFE programme, the LIFE ClimatePath2050 project is under way. The goal of the project is to contribute to climate change mitigation by setting up a decision-support system to help Slovenian national authorities better shape actions by 2030, so as to achieve the 2050 targets for GHG reductions set out in the Paris Agreement.
- For a faster and more efficient planning and implementation of appropriate mitigation and adaptation measures to climate change, the Climate Change Funding Programme facilitates the preparation of expert bases, usually with shorter projects and studies.

1.8 Education, Training and Public Awareness

According to the Eurobarometer opinion poll, the awareness of Slovenians of the gravity of climate change is comparable with the EU average, but answers regarding activities for fighting the climate change are substantially above the average.

Education and communication activities in the field of climate change and related issues are, in addition to MESP, also implemented by other ministries, government agencies, education and training organisations, non-governmental sector, local communities and other institutions. They are financed from different sources, including the state budget, EU funds and various international sources.

One of the main objectives of education and training activities is defined in the Organisation and Financing of Education Act (Article 2) and involves education for sustainable development (ESD) and active participation in a democratic society, including in-depth knowledge of, and a responsible attitude to oneself, one's health, other people, one's own culture and to other cultures, natural and social environments, and to future generations. Implementation of these objectives was carried out in accordance with the Guidelines for Education for Sustainable Development from Preschool to Pre-university Education from 2007. The White Paper on Education (2011) also emphasized education for sustainable development (ESD), which requires a paradigm shift in knowledge and values, and according to the document, the principle of sustainable development should become one of the key education principles of education in Slovenia. As it turns out, these recommendations have not been sufficiently taken into account.

In the 2016–2017 period, the National Education Institute of the Republic of Slovenia performed an analysis of curricula and curriculum documents in terms of the integration of key concepts and key competences of sustainable development, compliance with the principles of ESD and didactic approaches/methods and forms of work for achieving the objectives in the field of ESD, with the resources of the Climate Change Fund (MESP). The analysis, among other things, emphasized the poor treatment of some key concepts of sustainable development, such as ecosystem services and the green economy areas. These concepts are the ones that are crucial for a paradigm shift in understanding the relationship between the environment, the economy and the society, according to which the level of ecosystem and its ability to provide ecosystem services to society, determines the framework for its development, including economic development. On the basis of the findings from the analytical part and in accordance with the wider concept of education for sustainable development, outlines (recommendations) for implementing the transition to a green economy were developed within the project of the National Education Institute.

In the field of vocational and professional education, the most important new development is the first phase of the introduction of the competence for sustainable development.

When it comes to the system for education of adults, the key strategic document from this field is the Resolution on the Master Plan for Adult Education in the Republic of Slovenia for 2013–2020.

In 2017, the preparation of the National Environmental Action Programme was under way. The draft document anticipates that in the future, more decisive progress should be made regarding objectives in the field of education for environmental protection:

- complete implementation of the sustainable development principle as one of the key education principles in Slovenia and that at the same time, education is established as a key support system for achieving the objectives of sustainable development and environmental protection,
- empowerment of the young people and adults to work and live in the green economy,
- environmental literacy as the key component of functional literacy.

In order to achieve these objectives, a systematic, professional and appropriate source-based process for carrying out the concept of training and education for sustainable development

(ESD) with an integrated approach at all education and training levels in Slovenia will have to be established. Moreover, it will be necessary to ensure that policy frameworks, plans, strategies, programmes and processes at national, regional and local level, related to the social, economic and environmental dimension of sustainable development, include ESD as a tool for implementation and that ESD becomes also a part of bilateral and multilateral frameworks for development cooperation. In order to improve the employability of an individual, the competence for sustainable development will have to be integrated into all professional standards and training at all levels. In order to attain the above enumerated objectives, the draft NEAP document anticipates also measures on an operational level, which fall within the competence of MESS.

Education and training regarding green economy is one of the key horizontal measures of the Framework Programme for Transition to a Green Economy (OPZG).

For objectives related to climate change, the amount of support in the OP ECP (Operational Programme for the Implementation of the EU Cohesion Policy in the period 2014 – 2020), priority axis 10 "Knowledge, skills and lifelong learning to enhance employability", is set to EUR 8 million.

In OP GHG 2020, education, training and climate change awareness-raising is included as a cross-sectoral domain. The measure on capacity building for the implementation of measures and coordination also specifies the following objectives:

- education and training for the transition to a competitive low-carbon society;
- strengthening human resources for establishing new green jobs;
- information on the benefits of climate change mitigation and the practical aspects of implementing the measures.

During the 2015–2017 period, many activities have been coordinated within the Climate Change Funding Programme and with cooperation between MESP and other stakeholders, but possible coordination should be strengthened further. In this period, the Climate Change Fund financed several education, training and awareness-raising projects. An important measure of the OP GHG 2020 in this field is the preparation of a detailed training plan for the transition to a competitive low-carbon society, which will determine the needs for training. OP GHG 2020 is also planning the measure on human resource development for a transition to a low-carbon society. Among other ministries, the Ministry for Infrastructure (areas of sustainable mobility, energy, energy-saving renovation and sustainable construction) and Ministry of Agriculture, Forestry and Food (training for measures on reducing GHG emissions in the field of agriculture and forestry) are especially active in this field.

There are many publications, high-profile projects and good practices regarding education, training and awareness-raising on climate change, such as: publications by Environmental Agency of the Republic of Slovenia, Eco-School programme, "Slovenia is lowering its CO2 emissions: Good Practice Examples" projects, annual European Mobility Week and the free Energy Consulting for Citizens programme – ENSVET.

LIFE Capacity Building project is primarily aimed at enhancing knowledge of the preparation and management of projects under the terms of the LIFE programme (led by MESP, 2016–2018).

NGOs have an important role to play in public information and awareness, especially those who work in the field of environment protection and nature conservation. The MESP is funding the Environmental Centre and Plan B for Slovenia, Slovenian platform of civil society for sustainable development led by NGOs, is financed by the European Social Fund. Civil society organisations also prepared a Manifesto of the civil society for development of Slovenia (January 2018).

2 NATIONAL CIRCUMSTANCES

2.1 State Organisation

Slovenia is a parliamentary democracy. The president of the country is elected in direct elections to a maximum of two five-year terms. The National Assembly, the highest legislative body, is composed of 90 members , elected to a term of four years. The Government is formed by the Prime Minister; at present it is composed of 16 ministers, two of which are without portfolio. Since 1 May 2004, Slovenia has been a Member State of the European Union.

According to Law on government, the Ministry of the Environment and Spatial Planning (MESP) is responsible for the policy and measures in the area of climate change. MESP coordinates the preparation of measures on climate policy implementation together with other relevant departments, primarily energy, traffic and agriculture. Moreover, MESP prepares reports relating to climate on EU as well as UN level and obtains input data and documents from relevant areas. Emission inventories and reports regarding these purposes are carried out by Slovenian Environment Agency (SEA), which is a body of MESP. SEA is also responsible for the Emissions Trading Registry and environmental indicators including climate change indicators.

In Slovenia there are 212 municipalities, basic local government units, of which 11 have the status of urban municipality. They have their own administrations and budgets. Municipal competencies in the field of reduction of GHG emissions are related to spatial development planning, local and public traffic regulations, preparing local energy use plans and waste collection and disposal. Urban municipalities are obliged to provide monitoring for emissions and adopt environmental protection programmes as well as action plans.

2.2 Population Profile

The population of Slovenia has been increasing very slowly in the last years. The average population increased from 1,988,925 to 2,065,042 in the period between 2000 and 2016 mainly due to relatively high migratory increase before the economic crisis.

According to population projections from 2015, the population will slowly increase until 2024 and then it will decrease to 1,954,866 until 2070. Since 2006, the natural increase rate has been positive; average annual increase rate amounted to 1.1 per 1,000 inhabitants for the period 2006-2016.

Migratory increase rate is low and has annually amounted to 0.2 per 1,000 inhabitants on average since 2010. Slovenian population is ageing. Median age of Slovenian population was 34.4 years in 1991 and 43.2 years in 2016. Life expectancy has been increasing. In 2015, life expectancy for men was 77.6 years and 83.5 years for women, which makes 6 and 7 years more, respectively, than in 1991.

2.3 Geographic Profile

Slovenia is located in central Europe with geographic coordinates of approximately 46° north latitude and 15° east longitude. The surface area of the territory is 20,273 km². It borders on Italy, Austria, Hungary and Croatia, with which it has the longest state border. Despite its small size, Slovenia is a very diverse country with three distinct types of landscape. To the north there are the mountain ranges of the Julian Alps, the Karavanke Mountains and the Kamniško-Savinjske Alps which gradually slope down to the Adriatic Sea towards the south. The hilly central part with its numerous valleys and basins, including the Ljubljana basin where the capital of Slovenia is located, is separated from the Adriatic Sea by the northernmost slopes of the Dinaric Mountain Range. In the northeast the country flattens out onto the Pannonian plain. The length of the coast is 46.6 kilometres. The variability of the terrain is illustrated by the average inclination of 25%. The average altitude is 550 m.

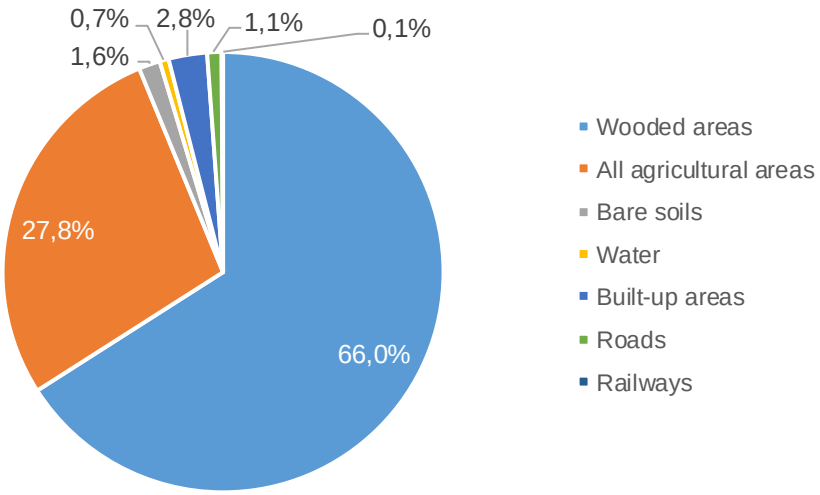


Figure 3: Shares of individual categories of ground cover (%) of the total surface, 2005 (source: SORS).

Terrain diversity, climate and pedological variety, large forests and the preservation of traditional ways of managing parts of the cultural landscape are the reasons for the high biodiversity, which is endangered due to potential climate change.

About 3000 ferns and flowers grow in Slovenia, along with 50,000 different animal species. Concern for preserving biodiversity is also evident in the increased number of protected areas. In 2008, the following areas were protected: 1 national park, 3 regional parks, 44 landscape parks, 1 integral natural reserve, 56 natural reserves and 1191 natural monuments. 256.120 hectares of land are protected, which represents 12.63% of Slovenia's territory. Since 2003, the protected areas increased by more than 1.5%.

Furthermore, 35.5% of Slovenia's territory was included in the Natura 2000 areas, of which 26.3% is already incorporated in the protected areas. Natura 2000 is a European network of Special Protection Areas declared in the Member States of the European Union with the main objective of preserving biodiversity for future generations. Special Protection Areas are intended for the preservation of animal and vegetation species and habitats which are rare or endangered on the European level due to human activities.

2.4 Climate in Slovenia

As in other parts of the world, also in Slovenia changes in climate have been observed, as well as in water balance. That's why the main characteristics of these changes are presented below. Also the role of the Slovenian Environment Agency (SEA) related to observation of climate and water conditions. Besides, SEA is responsible also for preparing forecasts and issuing warnings in case of dangerous weather events, which is an important component of the short-time adaptation measures.

2.4.1 The Role of Slovenian Environment Agency (SEA)

The main task of the SEA is observation and forecasting of natural phenomena in the environment and providing high quality public environmental data. For this purpose the SEA has an adequate observation network and laboratories. It cares for environment protection, conservation of natural resources, protection of biodiversity, and sustainable development of the country. State meteorological and hydrological services are parts of the SEA.

On the basis of measurements and observations at meteorological stations and remote sensing ESA permanently follows the development of actual weather. By means of computer models for the simulation of the processes in the atmosphere, and experience of weather forecasters SEA strives to forecast weather as precisely as possible. The importance of the state meteorological service is particularly evident in cases of extreme weather events, when actual weather data, prognosis of near term weather development and timely warnings form the basis of measures for the protection of lives, property and environment.

Together with the Administration for Civil Protection and Disaster Relief, SEA is permanently improving early warning systems for cases of stormy weather. Warnings are being regularly sent to mass media, and are permanently refreshed on the website of the state meteorological service (www.meteo.si). All issued warnings are also forwarded to the unified European warning system MeteoAlarm (www.meteoalarm.eu). The system incorporates all important information on stormy weather, submitted by the meteorological services of European countries. Information are represented in a unified way, colour scale shows the degree of weather threat and potential consequences.

Slovenian state hydrological service is part of a large community of around 200 state organisation in the whole world, which are following their national goals and at the same time contribute to the world treasury of the knowledge on water. They all act in a coordinated way using the standards adopted by the World Meteorological Organisation (WMO). The tasks of the Slovenian hydrological service comprise the whole process from acquisition of the data, analysis of underground and surface waters, to hydrological forecast. The value of hydrological data collected by SEA and upgraded by hydrological analyses and forecasts is increasing due to ever more demanding process of water management. For the improvement of the early warning system, the hydrological service has established a modern operational system for the prognosis of fluxes of rivers Sava and Soča, and has merged it with the existing international system for the prognosis of the flux of river Mura. In case of

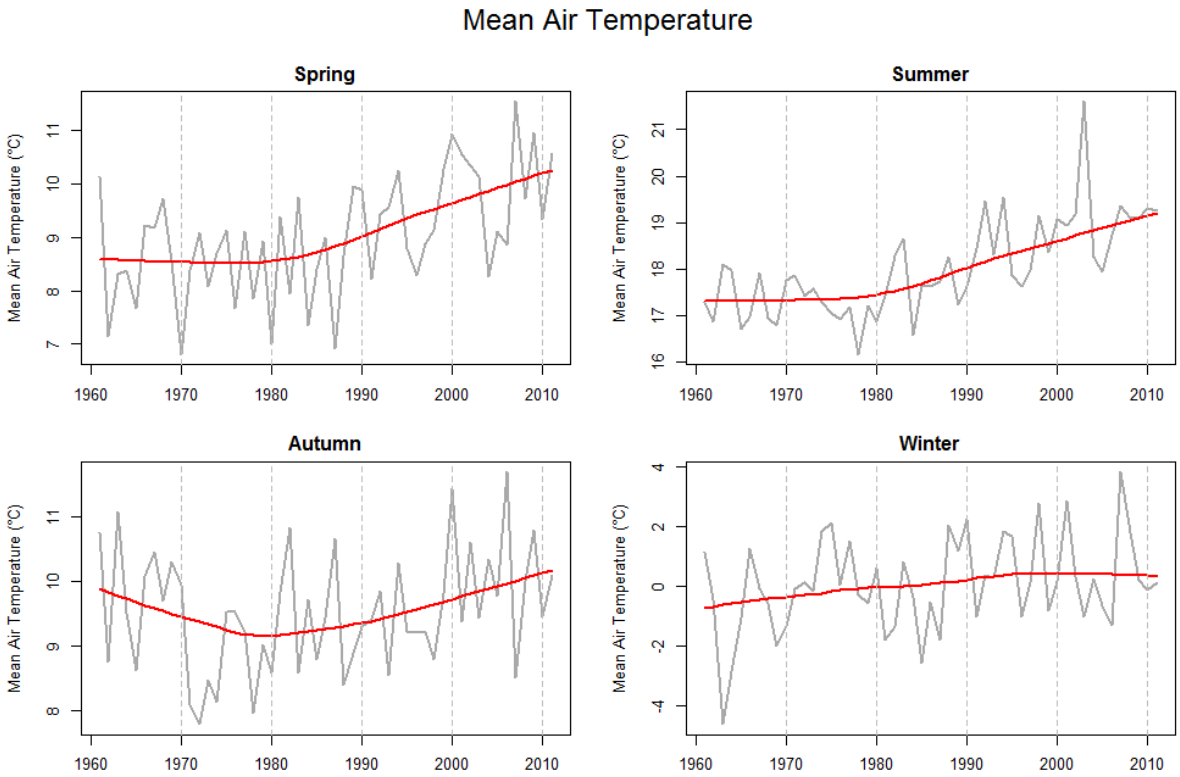
floods, early warnings prepared on the basis of meteorological and hydrological forecasts enable timely readiness and actions of the groups for civil protection and relief.

Due to more and more frequent problems with drought in Slovenia, and to the fact that SEA is also a seat of the Drought Management Centre for South-eastern Europe (DMCSEE, http://www.dmcsee.org/), one of the main focuses will be observation and forecasting of water balance on the territory of Slovenia and beyond also in the future. In accordance with the commitments deriving from the UN Convention on Combating Desertification, In 2013, SEA prepared the National Action Plan for Drought Management and Soil Degradation.

The complete overview of the activities and results of observing the environment can be found on the SEA website: http://www.arso.gov.si/. Monthly reviews of meteorological, agro-meteorological, hydrological and seismological data are published in the bulletin Naše okolje (Our Environment) also available at http://www.arso.gov.si/o%20agenciji/knji%C5%BEnica/mese%C4%8Dni%20bilten/.

2.4.2 Temperature

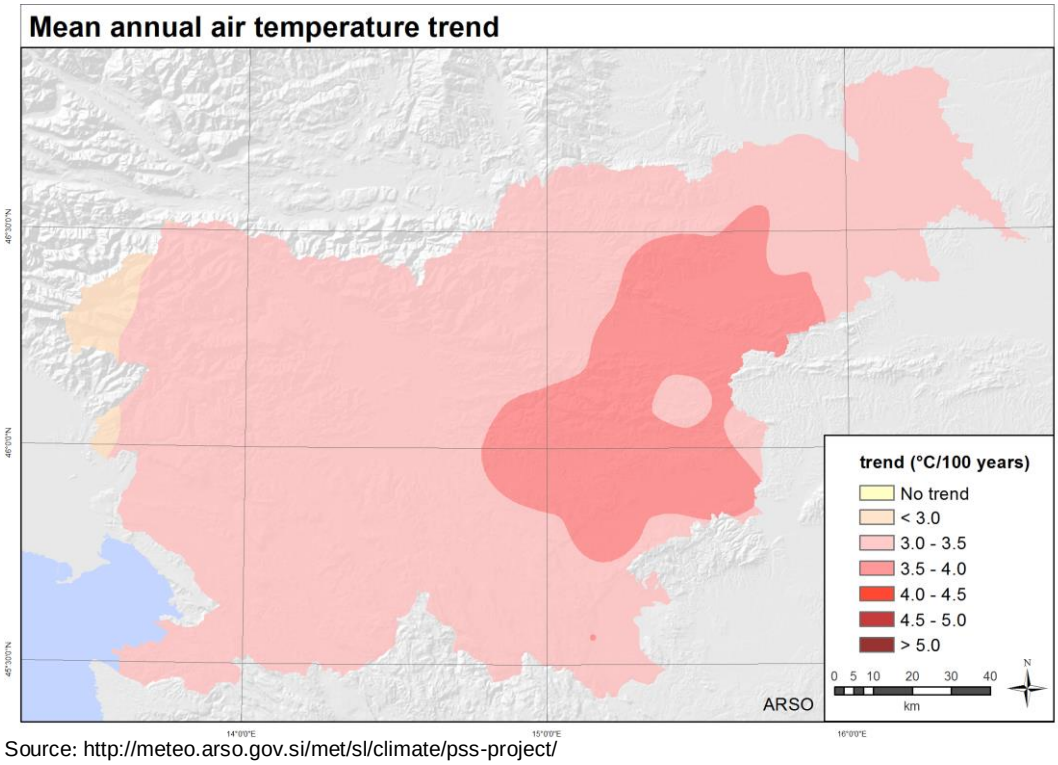
Climate change is most obvious in terms of temperature rise. Surface air temperature rise in Slovenia was in the recent decades irregular in time and space. That's why it is necessary to include in analyses, beside annual trends, also seasonal changes which can have substantially more pronounced consequences. Linear trend in the period 1961-2011, obtained by means of homogenised time series, a result of the project "Climate Variability in Slovenia", is approximately 0.34 °C per decade, which means that the average temperature in this period has risen by 1.7 °C. Similar change has been observed for daily minimum and maximum temperatures. Data and results of the project are available at http://meteo.arso.gov.si/met/sl/climate/pss-project/.



Source: http://meteo.arso.gov.si/met/sl/climate/pss-project/

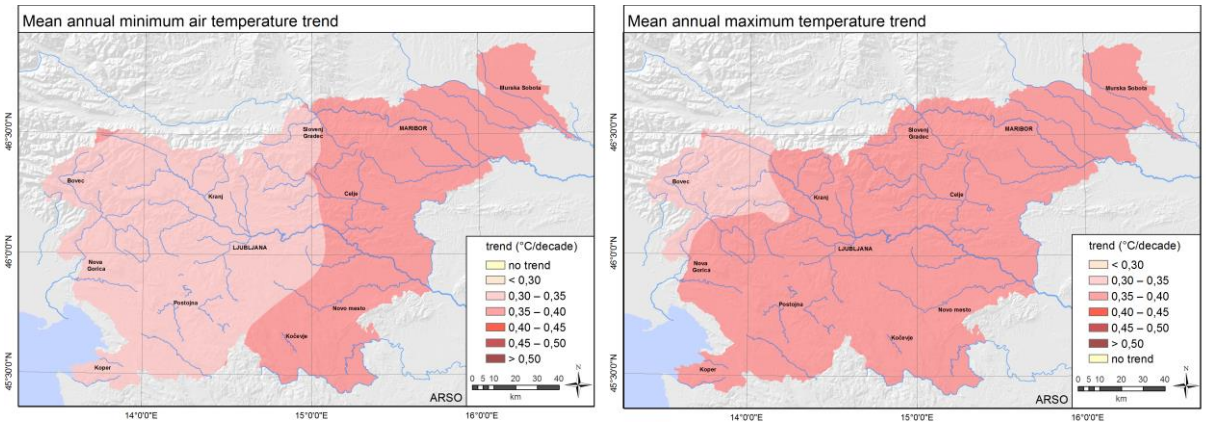
Figure 4: Seasonal mean air temperature time series in the period 1961-2011 for Slovenia (grey line) and its running mean (read line). Presented values are averages of all homogenised data sets in Slovenia.

More warming was in the east of the country that in the west. Warming was largest in spring and summer. Inter-annual temperature variability was largest in winter, that's why is warming in this season less significant. Autumn time flow of the temperature is particular for cooling at the beginning and warming from the end of the seventies on. Taking into account the whole time period, there was no notable temperature change, however, if the last three decades are excluded, there is a clear growing trend also in autumn.



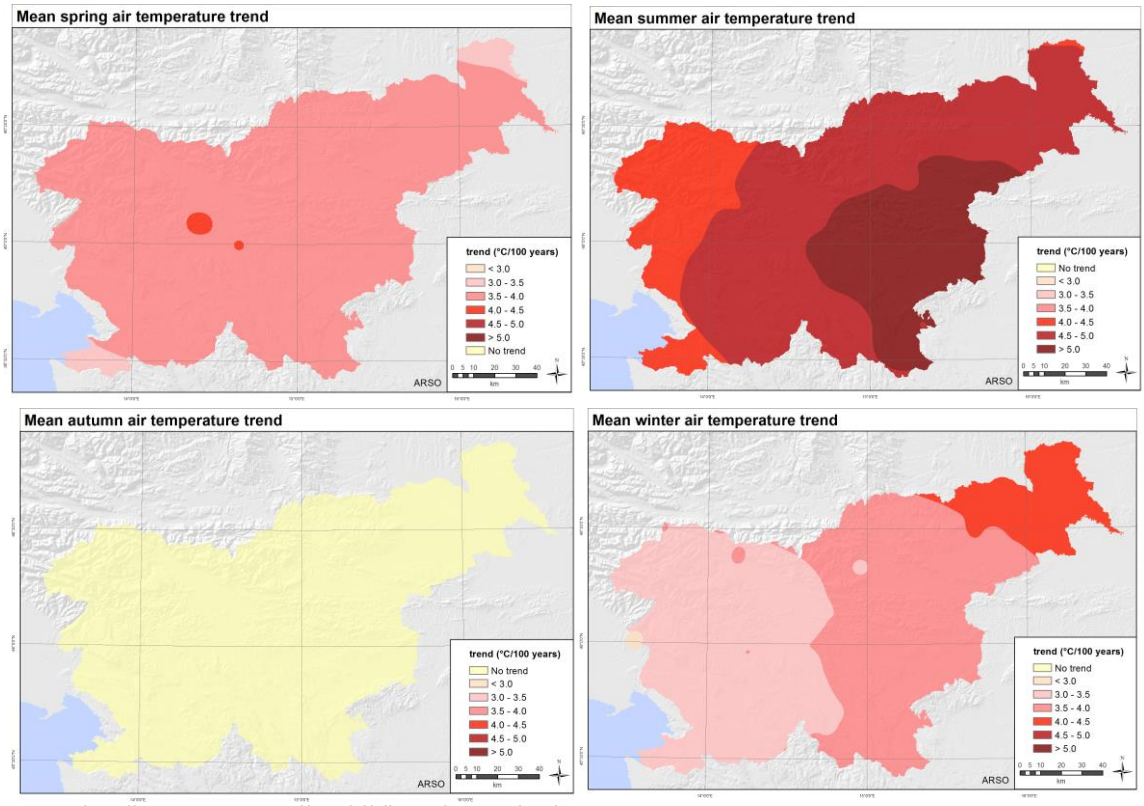
Source: http://meteo.arso.gov.si/met/sl/climate/pss-project/

Figure 5: Mean annual temperature trend in the period 1961–2011, calculated on homogenised dataset



Source: http://meteo.arso.gov.si/met/sl/climate/pss-project/

Figure 6: Mean annual minimum (left) and maximum (right) temperature trend in the period 1961–2011, calculated on homogenised dataset



Source: http://meteo.arso.gov.si/met/sl/climate/pss-project/

Figure 7: Mean seasonal temperature trend in the period 1961–2011. (Spring: upper left; Summer: upper right; Autumn: lower left; Winter: lower right). Autumn trend is not statistically significant at the 95 % confidence level.

Rise of the average temperature is reflected also in more frequent and more intense heat waves. The number of warm and hot days in summer months is increasing. In the second half of the 20th century there were less days with the temperature above 35 °C than in this century so far; this shows that heat waves are becoming more intense. During a heat wave in august 2013, all time record maximum temperatures were registered in many places, in some cases exceeding 40 °C.

RESULTS UNCERTAINTY ESTIMATION

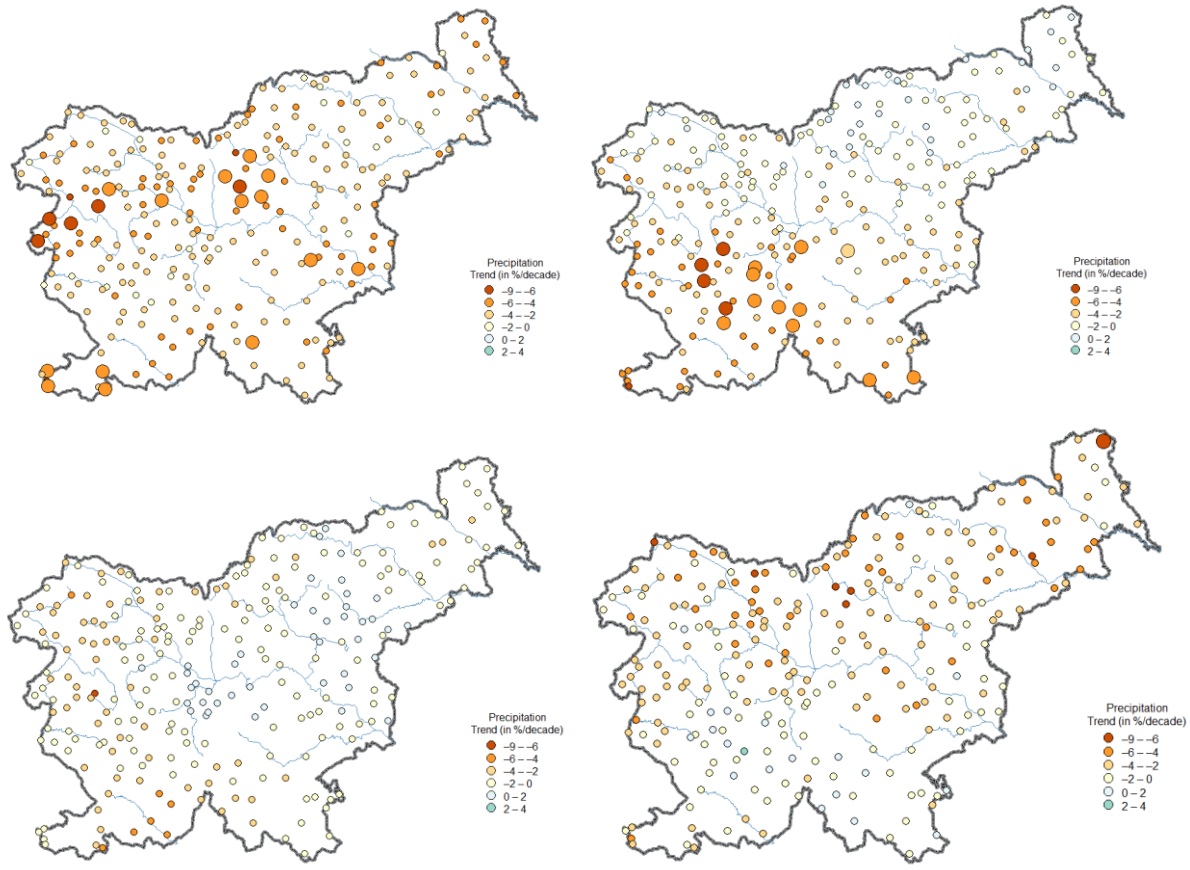
Every meteorological measurement includes measurement error. There are many factors influencing the error of measured air temperature value such as type of shelter in which thermometer is placed, type of thermometer and time of measurement. Data calculated from many measurements (such as mean annual temperature) is influenced by the type of calculation as well. With long time series a significant part of uncertainty is due to homogenisation, with which all undesired artificial signal could not be removed. All enumerated measurement error types of the time trend calculation at individual climate stations in Slovenia contribute less than 0.05°C/decade to the final uncertainty of results in the period 1961-2011. This unceratainty is not of major importance for the estimation of climate change or temperature increase rate, which is about 0.34 °C/decade for average temperature.

Much higher influence on the estimation of trends has weather variability due to month to month and year to year weather variability, therefore climate signal representing climate

change can be ascertained from measurements only to a certain degree of precision. Thus global warming signal can be ascertained from data collected from Slovenian weather stations on at least 25-year-long time series.

2.4.3 Precipitation

Yearly average precipitation for the entire Slovenia decreased in the period 1961-2011 by approximately 160 mm. The decrease was larger in western and southern Slovenia than elsewhere. About half of the decrease was in spring months, while the decrease in other seasons was substantially smaller. In contrast with temperature trends, precipitation trends are more variable, particularly in terms of spatial variability. In the same season, even opposite precipitation trends in different regions are possible. Precipitation data for Slovenia are available at http://kazalci.arso.gov.si/?data=indicator&ind_id=555.

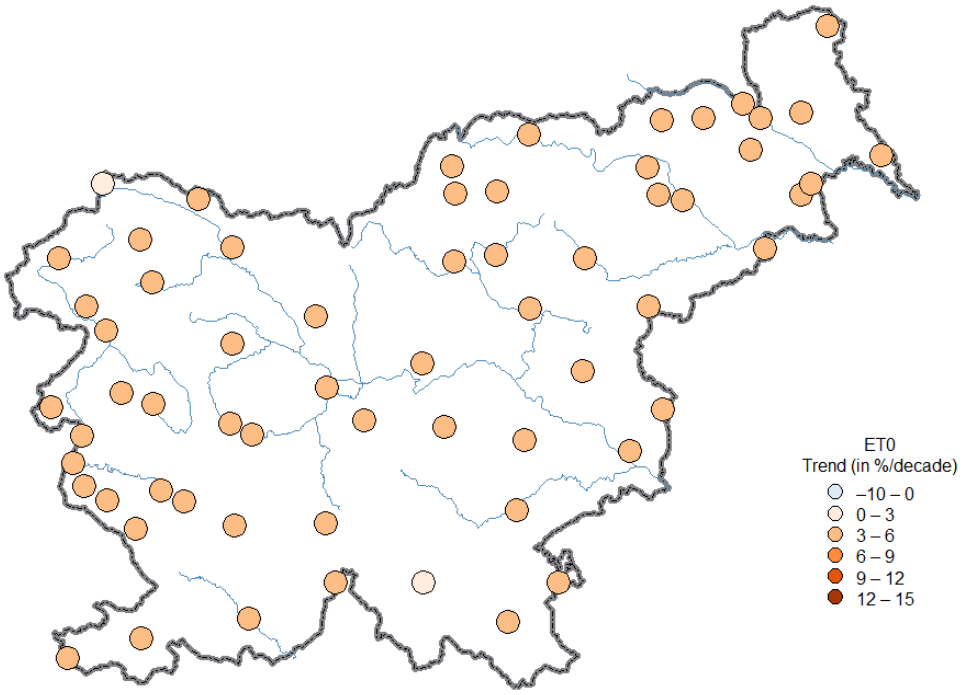


Source: http://meteo.arso.gov.si/met/sl/climate/trends/

Figure 8: Seasonal precipitation trends in the period 1961–2011: upper left - spring, upper right - summer, bottom left - autumn, and bottom right - winter. Large circles represent statistically significant trends at 95 % confidence level.

The main reason for increased evapotranspiration was the temperature rise. The combination of less precipitation in spring and summer and increased evapotranspiration increases the probability for agricultural and hydrological drought. At almost the whole territory of Slovenia, evapotranspiration has increased in the recent 40 years by more than 10%. Most critical is the increase of potential evapotranspiration on the lands with least precipitation, and where intense agriculture is being practiced (south Primorska, north-eastern Slovenia).

There, evapotranspiration has increased by more than 15% in the recent 40 years, in some parts of Primorska even by more than one fifth.

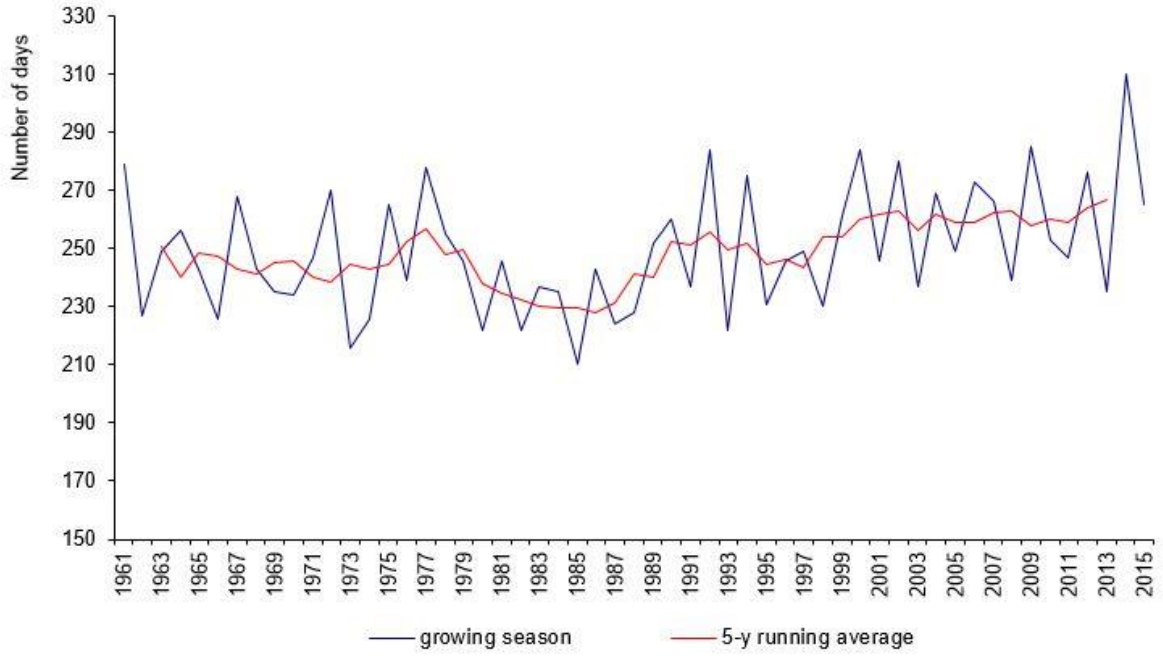


Source: http://meteo.arso.gov.si/met/sl/climate/trends/

Figure 9: Annual reference evapotranspiration trend in the period 1961–2011. Large circles represent statistically significant trends at 95 % confidence level.

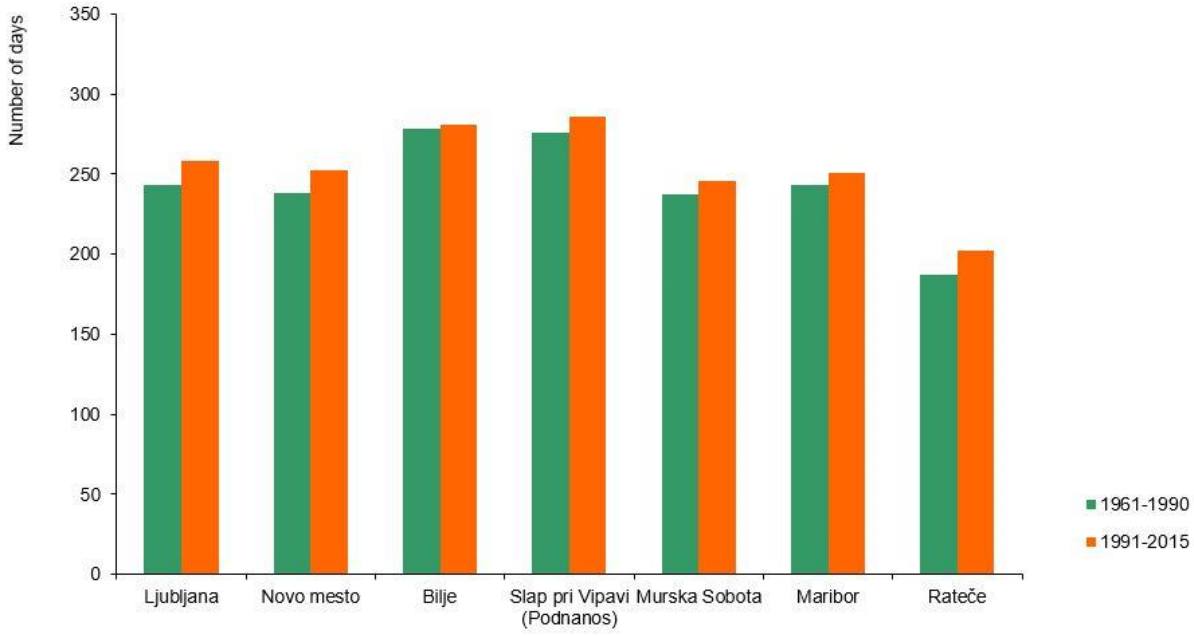
2.4.4 Change of Length of Growth Period

Increase of mean surface air temperature and higher frequency of days with temperature above vegetation threshold cause the prolongation of the yearly growth period. In the period 1961-2015, the length of the yearly growth period is inhomogeneous, with strong dissipation; more detailed analysis of running 5-year means has shown fine cyclic oscillations. The last cycle of running 5-year means indicates the extension of the yearly growth period from the nineties on, which can be seen from the comparison between the 1961-1990 and 1991-2015 means. These data have been taken from the Length of the Growth Period indicator, at http://kazalci.arso.gov.si/?data=indicator&ind_id=747.



Source: SEA, 2017

Figure 10: Changes of length of annual growing age in Ljubljana, 1961-2015.



Source: SEA, 2017

Figure 11: Average length of annual growing age at different locations, Slovenia, reference periods 1961-1990 and 1991-2015.

For the calculation of the length of the growth period in Slovenia, the number of days between spring and autumn vegetation threshold 5°C is used

2.4.5 Quantitative Situation of Water Sources

With the programme of hydrological analyses, SEA is providing yearly estimates of quantitative condition of groundwater, which are the basis for the state management of this prevailing source of drinking water.

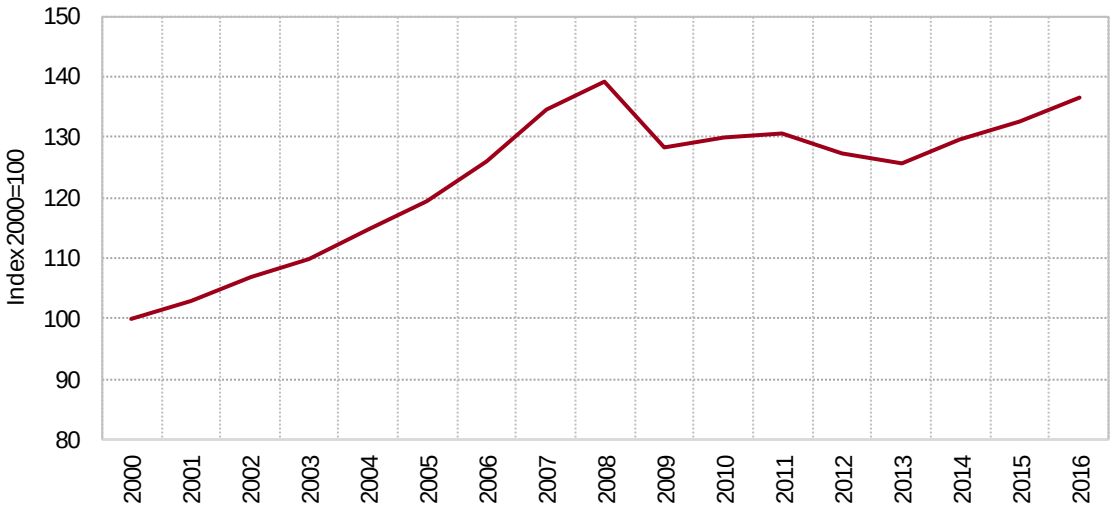
By means of hydrological monitoring of surface waters, hydrological conditions are being assessed and river flows regimes and water balance are being analysed. The impacts of climate change are reflected in increasing frequency of natural disasters, caused by too much or not enough water. In light of devastating floods and lengthy droughts in recent years, hydrologic analyses for detection of trends of long time series are extremely important. They show decreasing of water bodies in Slovenia, and prolongation of periods with small river flows. Negative trend of mean yearly flows is obvious particularly after 1980. The trend of the frequency of high water events has been observed especially in the central and eastern parts of the country. Higher temperatures of water have also been observed, particularly in summer months. More on hydrologic situation of waters and climate change can be found at http://meteo.arso.gov.si/met/sl/climate/non-periodic-publications/.

Reports on river fluxes and on unusual hydrologic events are published at http://www.arso.gov.si/vode/poročila_in_publikacije/. Data on yearly river balance are published also among the environment indicators at http://kazalci.arso.gov.si/?data=indicator&ind_id=830 and data on quantities of groundwater at http://kazalci.arso.gov.si/?data=indicator&ind_id=831.

2.5 Economic Development

Until the beginning of the economic crisis, the Slovenian economy achieved relatively high growth rates and was gradually approaching the average economic development of the EU. The average GDP growth rate was 4.3% between 1993 and 2003 and 4.9% between 2004 and 2008. The economic crisis caused a considerable slowdown in GDP growth in 2008 and a dramatic decline in 2009 (-7.9%). The rapid deterioration of economic conditions in the international environment was reflected in reduced export and investments, which had been the key factors of economic growth in previous years.

Slovenian economic recovery legged behind the average growth rates in EU in the period 2010-2013 mainly due to weak domestic demand and decrease in investments. In 2014, after five years, Slovenia began to catch up more developed countries – GDP increased for four times in a row in 2017. Despite that, according to the latest data for 2015, the economic growth of Slovenia (GDP per capita expressed in purchasing power standards) amounted to 83% of EU average and remained remarkably lower than before the crisis (90% in 2008), more precisely it was the same as in 2003.

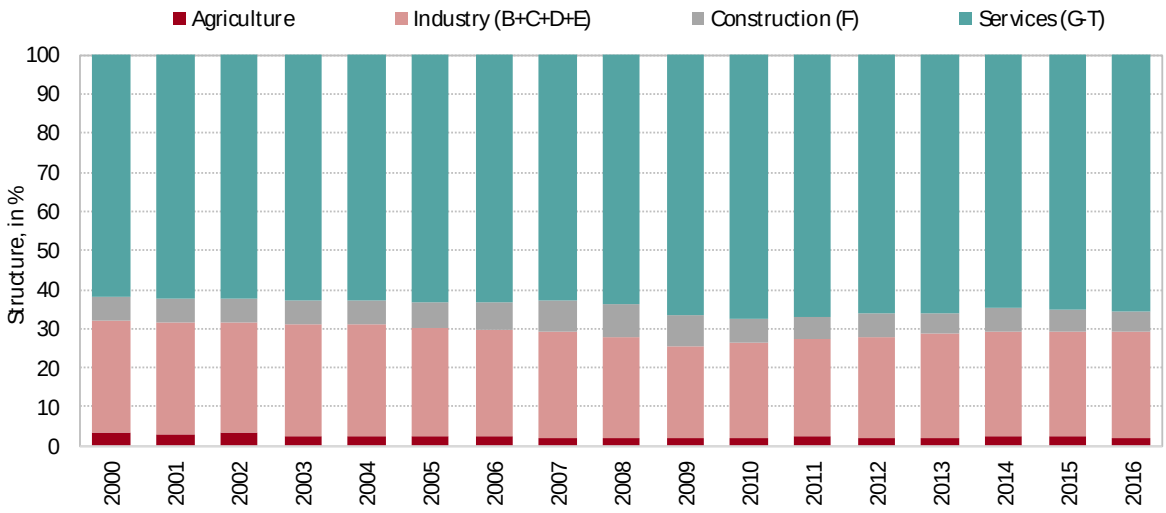


Source: Eurostat, Statistical Office of the Republic of Slovenia, December 2017

Figure 12: Gross domestic product, real growth

Achieving high economic growth rates before the crisis Slovenia was gradually approaching the EU average in terms of GDP per capita expressed in purchasing power standards; the difference to the EU average narrowed to 9 percentage points in 2008. Since the beginning of the economic crisis in 2008, Slovenia has belonged to the group of EU Member States with the biggest decline in GDP per capita expressed in purchasing power standards. In 2012, Slovenia's lag behind the EU average thus increased to 16 percentage points, which is similar to that in 2003.

The value added structure shows that the share of services has been on the increase in the last fifteen years (since 2000) and the shares of construction, industry and agriculture have decreased. After 2009, industry has begun to increase again in terms of economic structure and the share of agriculture has slightly increased too.



Source: Statistical Office of the Republic of Slovenia, December 2017

Figure 13: Shares of activity in value added, in %

The foreign trade integration rate of the Slovenian economy in terms of the share of foreign trade in GDP, which had grown faster than the EU average until 2007, declined significantly in 2008 and 2009 due to economic and financial crisis, as the reduction in world trade affected Slovenia more than the average of EU Member States. Since 2010, the average share of foreign trade relative to GDP has increased faster than in the EU (see table) as a result of a strong decline in domestic consumption.

Table 1: Average share of foreign trade (export and import)* in GDP.

	1995	2000	2005	2007	2008	2009	2010	2011	2012
Slovenia	46,7	51,8	59,9	70.4	68,2	67,1	56,3	63,6	69,5
EU 28	27,1	33,6	34,7	39.8	37,6	38,8	34,3	38,2	40,9
	2013	**2014**	**2015**	**2016**					
Slovenia	71,7	72,1	72,7	73,1					
EU 28	41,5	41,8	42,1	42,2					

Source: SI-STAT data portal - National Accounts, November 2013; Eurostat Portal Page - Economy and Finance, November 2013; calculations by IMAD

Note: * ratio between the average value of total export and import based on the statistics of national accounts and GDP by current prices.

Economic crisis had consequences on the labour market too as the number of working population decreased and the number of unemployed increased. Employment rate, which represents the share of the employed in the working age population (aged between 20 and 64), was higher than EU average before the crisis. In the period 2008-2013 the rate decreased by 5.8 percentage points to 67.2% and that is below EU average. Unemployment rate, which represents the share of the unemployed in the labour force, increased by 5.7 percentage point to 10.1% in this period and reached the highest level since data collection began in 1996. Labour market began to recover in the beginning of 2014 due to the improvement of economic activity. Employment rate again increased (to 70.1%) until 2016, while unemployment rate decreased (to 8.0%).

2.6 Energy

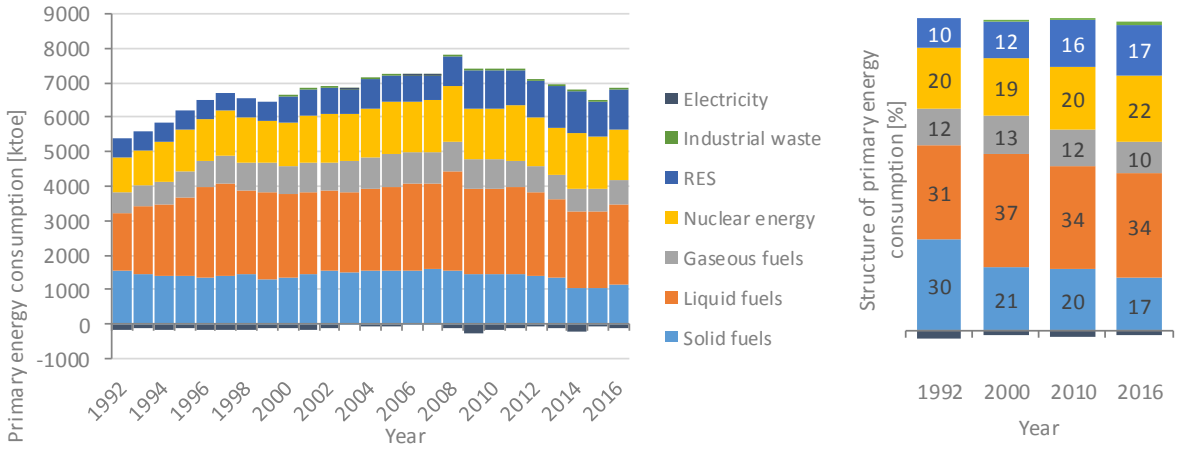
Energy consumption is the most important source of greenhouse gas emissions in Slovenia as it, including fugitive emissions, contributed 80% of the total emissions in 2015.

2.6.1 Gross inland consumption

Gross inland consumption was mostly on the increase after 1992 and reached its maximum in 2008. Compared to 1992 it was higher by 50%. Due to the crisis, energy efficiency measures and mild winters, energy consumption mainly decreased afterward and was by 15% lower in 2015. It increased noticeably again in 2016 by 3.4% to 6,727 ktoe. The increased use of petroleum products contributed the most to the growth. In 2016, liquid fuels (34%) prevailed in the structure of the energy consumption, followed by nuclear energy (22%). Renewable energy sources (RES) saw an increasing share which caught up the share of solid fuels (17%). Natural gas had the share of 10%. The net import of electricity represented 2%

of the total energy consumption (more electricity was exported than imported). With regard to fossil fuels, Slovenia produces only solid fuels.

The structure of gross inland consumption significantly changed in the period 1992-2016. The share of liquid fuels was high in the period 1992-2000, with the exception of 1992, and it declined after 2000 with the exception of 2008. Nuclear energy retained the share of approximately 20% in the period 1992-2000, while in the period 2011-2016 its share increased up to 25% due to operation optimisation in 2014. The share of gaseous fuels remained around 12% in the period 1992-2010 and after 2010 it decreased to 10%. After 2000, solid fuels have been used mainly in electricity and heat generation and in industry (paper and pulp production, cement production). Its share gradually decreases. On the other hand, the share of RES has been on the increase, especially after 2009.



Source: Statistical Office of the Republic of Slovenia (SORS), Jožef Stefan Institute (JSI) - Energy Efficiency Centre (EEC)

Figure 14: Gross inland consumption by fuel in the period 1992–2016 and fuel shares for 1992, 2000, 2010 and 2016.

The CO_2 intensity of primary energy consumption changes because of the changes in the proportions of the fuels in inland energy consumption, which has an impact on the total CO_2 emissions. In the period 1992–2015, CO_2 intensity decreased by 21%. On the other hand, energy consumption increased by 25% in the same period.

In 2016, primary energy intensity of Slovenia amounted to EUR 201 toe/million 2005, which is 35% less than in 1992. In comparison to the EU-27, energy intensity was 59% higher in 2015.

2.6.2 Final Energy Consumption

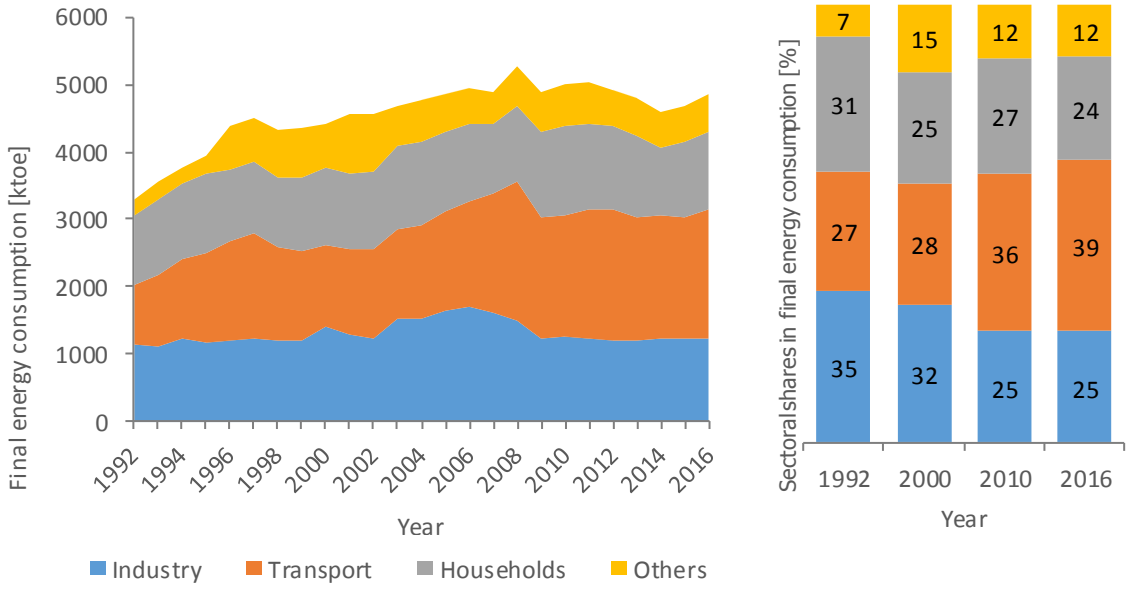
In the period 1992–2016, final energy consumption increased by 48.5%; the majority of the increase occurred before 1997.

In the period 1992–2016, the largest increase in final energy consumption was recorded in the transport sector and the other use sector. In transport, 115% (for 1,018 ktoe) more energy was consumed in 2016 than in 1992 and 55% (672 ktoe) more than in 2000. The major part of the growth occurred after 2000. In 1997, the first peak in energy consumption was reached as a

consequence of gasoline tourism. After the measures had been taken in neighbouring countries, such consumption was in decline until 2000. Energy consumption in transport increased sharply in 2007 (by 12.8%) and 2008 (by 17.1%). In 2009, consumption decreased by 13.4% due to economic crisis and the change in the ratio among fuel prices in comparison to neighbouring countries. In 2011 and 2012, consumption again increased and between 2013-2015 decreased. Along with the growth of transport, energy consumption in transport sector increased in 2016. In comparison to the previous year it increased by 5.8%. Due to the small size of Slovenia, fuel sold to vehicles in transit transport has a considerable effect on its energy balance. Fuel sold to foreigners represented the share between 30% and 28% in energy consumption in transport in the period 2008–2012, when it reached the highest levels. As many as 39% of final energy consumption was used in transport in 2016.

In the other use sector (the service sector and agriculture), energy consumption was higher by 151% in 2016 compared to 1992. The largest increase was recorded in 1996, when consumption increased by 150% due to methodological changes. consumption in this sector has changed considerably several times since 2000. In 2016, the share in total final energy consumption amounted to 12%.

Energy consumption in manufacturing industries and construction grew gradually until 2002 followed by years of faster increase until 2007. Years of decrease, with the exception of 2010, followed as a result of improved efficient energy use and particularly as a result of the economic crisis. Economy recovery has influenced the growth in energy consumption over the last years. Compared to 1992, consumption in 2016 was by 8.4% higher, while it was by 11.2% lower compared to 2000. In 2016, manufacturing industries and construction represented a 25% share in total final energy consumption, which is 10 percentage points lower than the share in 1992.



Source: JSI-EEC, SORS

Figure 15: Final energy use by sector in the period 1992–2012 and the proportion by sector of final energy use in 1992, 2000, 2005 and 2012.

Final energy consumption in households has decreased between 2004 and 2007 after a period of growth since 1998. Trend in energy consumption in households is greatly influenced by climate characteristics. If we exclude this factor, it can be noticed that energy consumption is in decline after 2009. In the observed period, energy consumption reached its highest level in 2003, namely 1,250 ktoe. Compared to 1992, consumption was by 12.4% higher in 2016, and compared to 2000, it was higher by 2.0%. The increase in energy consumption in 2009 was a result of the improved RES statistics. In 2016, households represented 24% of total final energy consumption, i.e. 7 percentage points less than in 1992 and 1 percentage point less than in 2000.

Table 2: Structure of final energy consumption per fuel in 1992, 2000, 2005 and 2016.

	1992	2000	2010	2016
Solid fuels	6%	2%	1%	1%
Petroleum products	43%	51%	49%	47%
Natural gas	15%	13%	12%	12%
Renewable energy sources	8%	10%	14%	14%
Electricity	23%	20%	21%	23%
Heat	6%	4%	4%	4%

Source: JSI-EEC, SORS

2.6.3 Electricity Production

In 2016, total electricity production amounted to 16,500 GWh. The largest share of electricity was produced from nuclear energy (35%), followed by production from RES (31%) and solid fuels (30%). Production from natural gas and liquid fuels is low. Compared to 1992, total production was higher by 37% and compared to 2000 it was higher by 21%.

In the shares of electricity production by fuel, there are oscillations as a result of variations in climate (due to river stage conditions – production by hydropower plants, river temperatures – cooling of nuclear plants), maintenance of nuclear power plants and an investment in a new unit of the thermal power plant in 2014. Long-term production trends in the period 1992–2016 show that the share of production from solid fuels decreased and the share of production from RES increased, while there was no trend in the share of production from nuclear energy.

2.7 Transport

The volume of road freight and passenger car traffic in Slovenia has been on the increase since the beginning of the economy crises in 2009. The growth is the consequence of an increasing number of vehicles and an increasing average of vehicle-kilometres travelled. The number of passenger kilometres (pkm) in public road transport was in decrease, while the share of passenger car kilometres was on an increase and exceeded 86% and remained at this level in the subsequent years. Due to its location, Slovenia is highly exposed to transit traffic, whose share has been increasing especially in freight transport. Increasing emissions from transport have substantially contributed to the increase of overall emissions.

Motorisation rate in Slovenia was increasing quickly until 2008 when the growth completely eased and has begun to increase again in the last two years. The number of registered passenger cars per 1000 inhabitants grew in the period 2001-2016 from 442 to 531.

Due to the loss of market after Slovenia's declaration of independence, low prices of motor fuels, low costs of parking and poorly developed or even cancelled lines, the number of passenger kilometres in road public transport greatly decreased in the period 1990-2005. After 2005, the trend of its decline softened and it reached its minimum volume in 2013 decreasing to 459 million pkm. In the next three years, road public transport began to gradually increase due to the introduction of integrated public transport and combined subsidised travel card and reached 519 million pkm in 2016. Rail transport, with the volume of 1429 million pkm in 1990, was also strongly impacted by the disintegration of Yugoslavia and subsequent economic recession and shrunk by almost two thirds. Its volume never reached previous levels again, however, it recovered slowly in the past decade and in 2009 reached 840 million pkm. After 2009, it began decreasing again quickly so that it fell to 680 million pkm in 2016 (19% less than in 2009). A big loss of markets after Slovenia had gained independence caused a drop also in the volume of air transport (in 1990 it was still 1554 million pkm), while due to a rapid growth afterwards, particularly in the middle of the previous decade, it reached 1349 million pkm in 2008. In the following years of economic crisis it decreased sharply, and again began to increase in the last three years until 2016 and reached 1481 million pkm.

The use of passenger cars compared to the use of public transport was approximately as frequent in Slovenia as it was in the EU. Over the years the share of the use of passenger cars increased in overall land passenger transport from about 83% to almost 87% until 2010 and decreased a little until 2016 (by 1 percentage point). Small deviations from this average are the consequance of the settlement pattern (e.g. more than 3500 towns with less than 500

inhabitants, where establishing public transport is not possible or reasonable and there are no metropolitan cities except Ljubljana) and thus also relatively unatracttive public transport.

As a consequence of the geographical position of Slovenia and export oriented economy, the high growth of goods traffic was further stimulated by the high international exchange of goods. The volume of road goods transport per person is among the highest in the EU. This is also a consequence of the favourable position of Slovenia at the crossroads of European corridorss V and X, where the traffic signifficantly increased after the last two EU enlargements. Further, with joining the EU, many administrative obstacles for driving in the EU Member States (particularly acquisition of the limited number of allowances) have been removed for Slovenian hauliers. In Slovenia, a relatively small central European county, there is, as one could expect, a larger share of international and a smaller share of internal goods transport. Rapid growth of road and rail goods transport was additionally underpinned in the last decade, up to the crisis year 2009, by high economic growth, particularly in Eastern Europe. The growth of road goods transport of Slovenian drivers was almost three times higher than economic growth in the period 2001-2008. The global crisis caused only a slight setback in road and rail goods transport and the growth has picked up especially in the last few years. In 2016, the volumes of road and rail goods traffic exceeded the volumes before the crises by 15% and 24%, respectively (GDP was a bit lower than in 2008).

The share of road goods transport in the overall land goods transport in Slovenia surpassed the average share in the EU in the middle of the last decade; it was increasing until 2009 when it reached 84% (in 2009 the volume of rail goods transport in Slovenia shrunk more than the volume of road goods transport). In the following years the share decreased a bit and is around 81%.

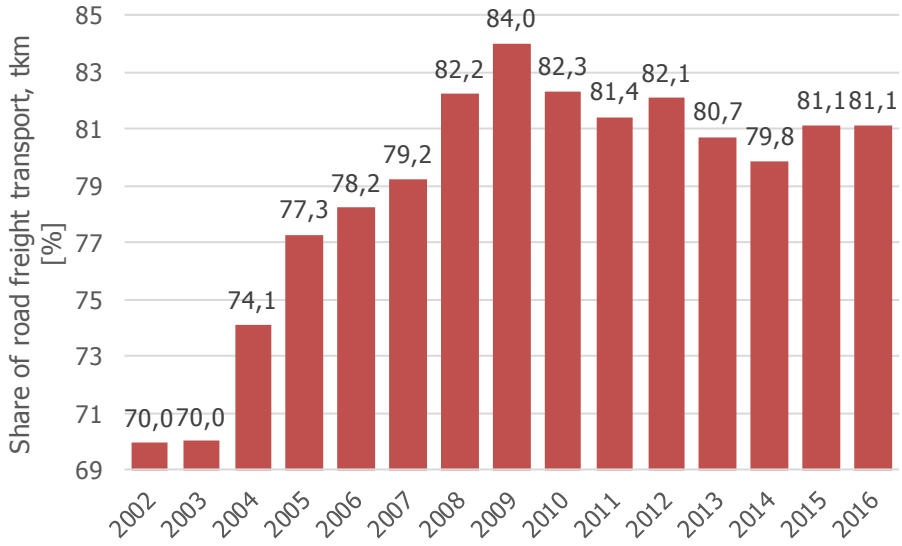


Figure 16: Share of road goods transport in the overall land goods transport, tkm (%). (Source: SORS[2])

Slovenian hauliers carry out more transports abroad, while more foreign hauliers drive in Slovenia[3]. This trend is linked to the liberalisation of transport in the EU. In 2016, the volume of transports (by domestic and foreign hauliers) in Slovenian territory after the decline during the economic crisis slightly exceeded the high level from 2008. The volume of transports carried out by Slovenian hauliers exclusively abroad increased by 52% in this period, while transports in national traffic and international transports carried out at least partially in Slovenia (when goods are loaded or unloaded in Slovenia) decreased by 14%. Thus it is assumed that transport by foreign hauliers in Slovenian territory increased, which is also proved by the data obtained from toll stations on motorways. The share of foreign hauliers on Slovenian motorways increased by 15 percentage points to 68%[4] in the period 2008-2012 and has obviously been on the increase over the last years.

Greenhouse gas emissions from transport have been increasing simultaneously with the increase of energy consumption in this sector and have contributed a fairly great share to the overall GHG emissions in Slovenia. Overall GHG emissions were on the increase in the period of economic growth and were by approximatelly 6% higher in 2008 than in the base year 1986. The crises caused overall GHG emissions to fall and in 2015 they were 15% lower than base year emissions. GHG emissions from transport substantially increased in this period. In 2008, they reached their maximum level as they were three times as high as in 1986. Emissions dropped in 2009, the crisis year, but in 2015 they were about 13% lower than

[2] The data on road goods transport relate only to the vehicles registered in Slovenia which can make a big share of volume in other countries; however, it does not include the transport of foreign vehicles in Slovenia. On the other hand, rail goods transport is dealt with on the basis of the territorial principle which includes the whole goods transport on the territory of a country, irrespective of the origin of the carrier. This different approach is a great deficiency of the indicator.

[3] As statistical data on tonne kilometres trevelled in countries are not collected, this is assumed on the basis of comparison between vehicle kilometres trevelled by domestic hauliers (source SORS) and vehicle kilometres of all goods vehicles on Slovenian roads (source SIA).

[4] Recorded goods vehicles at toll stations in Slovenian territory, MCRS 2009; Proposals of new pricing policy in the field of motorway tolls, MCRS 2013.

before the crisis and two times and a half higher than base year emissions. How serious problem transport emissions are shows their qrowing share in overall emissions. Their share has grown from on tenth in 1986 to about one third.

2.8 Waste

The total amount of waste, which decreased during the crisis, has increased in the last years. In 2015, 5.2 million ton of different types of waste were generated, which is about a tenth more than the previous year and by 16% more than in 2012 when the lowest amount of waste was recorded due to a changed methodology and the decline in recorded construction waste. The amount of the waste generated in production and service activities, representing more than 80% of all waste, has increased slowly and only in the last year a bit faster. Most of the waste was generated in the following four sectors: (i) manufacturing, (ii) construction, (iii) supply of electricity, gas and steam and (iv) water supply. The majority is construction waste as their mass is great. The fifth of generated waste is municipal waste from households and similar waste for whose mandatory municipal public services for environmental protection are responsible. Their amount increased for approximately one fourth in the period 2012-2015.

Hazardous waste, which includes chemical compounds and other chemical waste, is especially problematic. Its quantity increases and it represents a share of 3% in total waste.

Waste recovery increases faster than waste generation, while waste disposal decreases. In 2015, total waste recovery amounted to 6.9 million tonnes, which makes 13% more than a year before and almost two times more than a decade ago. The share of filling and preparation for recovery, which was at the lowest point at the beginning of the crisis, is on the increase, which results in decrease of actual waste recovery to less than a half of total waste recovery. Recycling, which is a very desirable process in waste management, has slightly increased for two consecutive years but still remains considerably lower than during the crisis. In the period after the crisis, especially in the last three years, the quantity of recycled waste has increased but its share in the total waste recovery has decreased and amounts to 42%. At the same time, waste disposal, which takes the last place in waste management hierarchy, has successfully decreased. In 2005, 28% of generated waste was disposed and in 2015 only 5%. The share of disposed waste has decreased also among municipal waste and amounts approximately to 23%, which is a bit better than the EU average. Separate waste collecting amounts to 69%, which is 57 percentage points more than ten years ago.

Table 3: Waste management in years 2005 and 2011-2015 (Source: SORS)

Waste indicators, Slovenia, per year	2005	2011	2012	2013	2014	2015
Waste generated - TOTAL (tonnes)	**6,015,149**	**6,052,094**	**4,466,441**	**4,632,783**	**4,677,335**	**5,172,377**
Hazardous waste generated - TOTAL (tonnes)	123,161	131,569	120,787	119,097	146,882	145,991
Municipal waste generated (tonnes)	**844,949**	**721,844**	**744,010**	**853,388**	**891,708**	**929,461**
Municipal waste generated (kg/inhabitant per year)	422	352	362	414	433	451
Hazardous municipal waste generated (tonnes)	1,000	4,069	5,035	5,156	6,789	8,312
Hazardous municipal waste generated (kg/inhabitant per year)	0,5	2	2,4	2,5	3,3	4,0
Collected municipal waste with public services (tonnes)	797,721	721,720	671,835	659,848	665,767	650,111
Collected municipal waste with public services (kg/inhabitant per year)	399	352	327	320	323	315
Separately collected municipal waste (tones)	93,702	234,279	382,989	535,152	576,948	637,580
Separately collected municipal waste (% of total municipal waste generated)	11	33	52	63	65	69
Waste disposal on municipal landfill sites (tonnes)	752,546	504,997	388,365	274,724	257,914	260,820
Waste disposal on municipal landfill sites (kg/inhabitant per year)	376	246	189	133	125	126
...of which municipal waste (tonnes)	658,572	419,228	314,952	224,001	207,676	209,924
... of which municipal waste (kg/inhabitant per year)	329	204	153	109	101	102
Waste generated in production and service activites (tonnes)	**5,170,200**	**5,330,250**	**3,722,431**	**3,779,395**	**3,785,627**	**4,242,916**
Hazardous waste generated in production and service activities (tonnes)	122,161	127,500	115,752	113,941	140,093	137,679
Hazardous waste generated in production and service activities (% of total waste generated in activities)	2,4	2,4	3,1	3	3,7	3,2
Internal waste recovery (tonnes)	2,022,718	-	-	-	-	-
Internal waste disposal (tonnes)	895,086	-	-	-	-	-
Total waste recovery (tonnes)	**3,526,076**	**6,044,391**	**5,256,968**	**5,168,077**	**6,098,139**	**6,899,709**
...of which actual recovery without preparation for recovery or disposal and filling (tonnes)	-	3,697,104	3,238,851	2,877,889	3,021,773	3,207,490
Total waste disposal (tone)	**1,889,601**	**1,139,660**	**763,371**	**602,058**	**584,135**	**591,442**
...of which landfill disposal (tonnes)	1,705,214	763,991	457,369	313,147	282,989	275,388
Waste export (tonnes)	337,771	315,995	419,330	603,284	671,460	629,158
Waste import (tonnes)	446,889	956,573	913,045	1,008,331	1,072,182	1,029,627

2.9 Housing Stock and Urban Structure

According to the data from register-based census in 2015, Slovenian housing stock comprised 845,400 housing units on 1st January 2015. Four out of five housing units were inhabited, of which every twelfth is rented. Among uninhabited housing units 20.000 are holiday housing units. The majority of housing units (60%) are in one- and two-dwelling buildings.

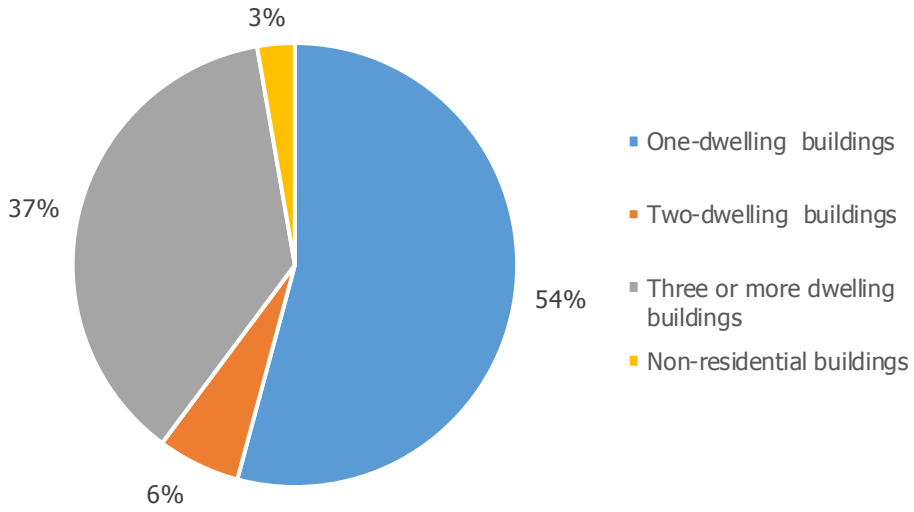


Figure 17: Inhabited housing units by types of buildings, Slovenia, Register-based census 2015 (source: SORS)

The size of the housing stock has almost not changed since the register-based census in 2011, although 14,500 housing units have been built in the last four years. Due to compiling of data on housing, stimulated by informing the owners on informative property tax calculation in 2014, 15,000 housing units[5] were excluded from the stock. Exclusion of old and inadequate housing results in the improvement of the housing stock quality as there are less housing units without bathrooms and toilets or basic infrastructure (such as water and electricity). An average size of a residential unit has risen in the last years (for about 4 m2 to 80 m2 since 2005) mainly due to a bigger size of a newly constructed residential units in the last period.

2.10 Agriculture and Forestry

2.10.1 Agriculture

According to economic accounts for agriculture, gross value added in this sector amounted to EUR 474 million in 2016, which is 2% of GDP.

The value of all income categories declined in agriculture in 2016. The value of agricultural production amounted to EUR 1,211 million, which is by 5% less than in the previous year. Production decreased by 4% whereas prices decreased by 2%.

Crop production in 2016 is estimated to EUR 665 million, which is less than in the previous year. Lower value is the consequence of the decreased crop production volume by about one tenth and slightly increased prices of crop products. In comparison to the previous year, the value of potato production decreased the most, almost for a half. The values of fruit and grapes fairly influenced the fall of the crop production value. The values of cereals and olive

[55] About 5,000 housing units in old buildings and about 10,000 housing units which were defined as »unedaquate« in the register are not included in the housing stock.

oil were lower, whereas the values of industrial crops, vegetables and fodder plants were higher.

Animal output value was estimated to EUR 528 million in 2016, which is less than in the previous year. The volume of the animal production increased while prices decreased. The value of the animal production increased with all types of stock, with pigs and poultry the most. The value of animal products amounted to EUR 219 million; the prices significantly decreased while the volume of the animal production remained the same. The main reason for the fall of animal product value lies with the lower value of milk as its price significantly decreased.

In 2016, 80,000 employees were involved in agricultural production and most of them were self-employed.

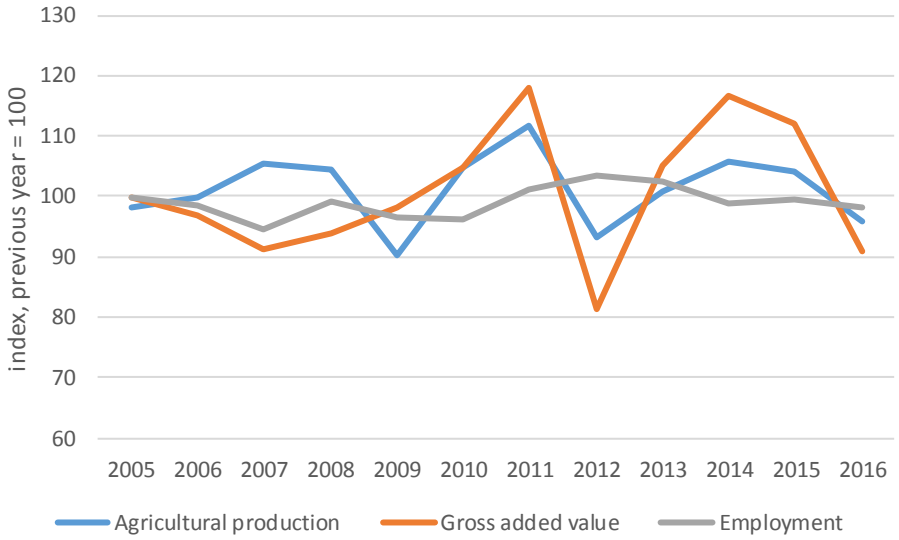


Figure 18: Agricultural production, gross value added and employment, Slovenia (source: SORS)

2.10.2 Organic Farming

The share of agricultural area included in organic control is on the increase. In 2016, there were 5% of farms with 9% of all utilised agricultural holdings included in the organic farming control system. That is much less than projected (20% of agricultural holdings), but still about 3 percentage points above the EU average. On average, organic farms are bigger, their owners are younger and have achieved higher levels of education as well as they register more secondary activities than conventional farms. Permanent pastures and grass lands represent the majority in the structure of agricultural area, but other agricultural areas increase due to an increasing demand. In the last past years, the areas of olive tree and vegetable production have increased the most. Along with greater agricultural areas, organic products and the number of livestock raised organically increased too.

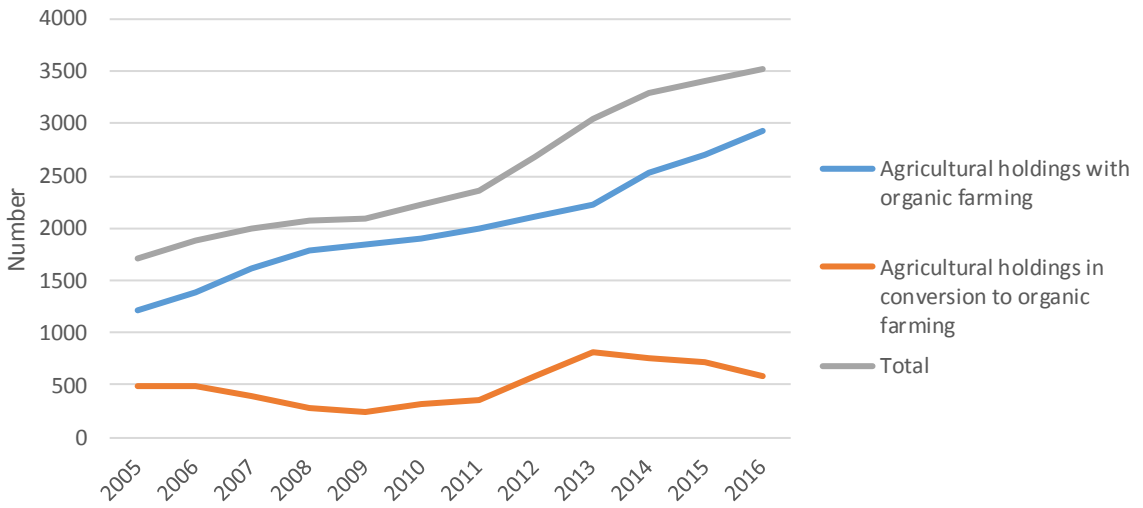


Figure 19: Agricultural holdings in the organic farming control system, Slovenia (source: MAFF, SORS)

2.10.3 Forestry

According to economic accounts for forestry, gross value added amounted to EUR 300 million in 2016, which makes 0.7% of GDP.

The value of forestry goods production represents 85% in the structure of production activities; its greatest share being natural tree growth in commercial forestland and round wood. Forestry services represent the remaining 15% share of total production.

Forestry production includes 5,500 employees, of which the majority are self-employed.

Harvest and the production of harvested wood products have increased after catastrophic sleet in 2014, yet a lot of high quality wood was exported.

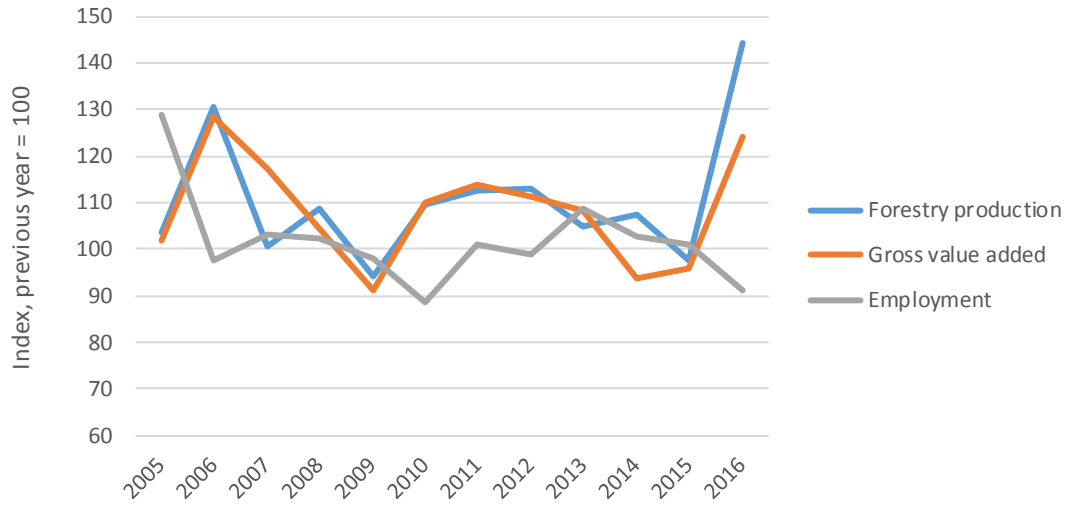


Figure 20: Forestry production, gross value added and employment, Slovenia (source: SORS)

3 GREENHOUSE GAS INVENTORY INFORMATION

3.1 Summary Tables

The complete set of CRF tables can be found at:

http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php

3.2 Descriptive Summary

Total emissions of GHG in 2015, sinks not considered, amounted to 16,831 kt CO_2 eq., which represents a 17.4% decrease of emissions compared to the year 1986. In the period 1986-1991, a reduction of emissions was recorded due to the economic conditions at that time and the fact that the Republic of Slovenia was gaining its independence. In the period 1992-1997, a strong increase of emissions was recorded, which was a consequence of increasing economic growth and revival of industrial production. In the second half of that period, the increased emissions were a consequence of "gasoline tourism" (25% of the total sale of motor fuels in the Republic of Slovenia), since the prices of motor fuels in the Republic of Slovenia were appreciably lower than in the neighbouring countries.

In the period 1998-1999, emission decreased due to the measures undertaken by the neighbouring countries to curb the "gasoline tourism" and due to the increased supply of electrical energy from the Krško Nuclear Power Plant. In the period 2000-2002, the emission kept increasing again due to the renewal of the obligatory export of electrical energy from the Krško Nuclear Power Plant to the Republic of Croatia. After joining the EU in 2004 and after acceptance of Romania and Bulgaria into EU in 2007, emissions from road transport have increased drastically and have prevailed over the decrease in other sectors which has occurred due to the policies and measures in manufacturing industry, agriculture and waste sector.

In 2009, emissions from fuel used in industry and from industrial processes started to decrease due to the global financial crisis. In 2010 and 2011, emissions stayed almost the same as in 2009, while from 2012 to 2014 a further decrease has been observed. In 2015 emissions in all sectors slightly increased and were 1.3% higher than in 2014.

GHG emissions in kt CO_2 eq. are presented in the Table 4 and on the Figure 21.

Table 4: GHG emissions and removals in Slovenia by sector and sub-sector, 1986–2015.

	1986	1990	1995	2000	2005	2010	2014	2015	Change to 1986	Change to 2014
1. Energy	16,384	14,651	15,146	15,301	16,519	16,333	13,257	13,395	-18.2	1.0
A. Fuel Combustion	15,793	14,141	14,661	14,831	15,994	15,813	12,899	13,026	-17.5	1.0
1. Energy Industries	6,841	6,375	5,725	5,594	6,448	6,340	4,448	4,562	-33.3	2.6
2. Man. Industries and Construction	4,458	3,150	2,633	2,276	2,485	1,916	1,650	1,591	-64.3	-3.6
3. Transport	2,028	2,734	3,824	3,858	4,429	5,266	5,385	5,359	164.2	-0.5
4. Other Sectors	2,424	1,851	2,478	3,100	2,629	2,289	1,413	1,510	-37.7	6.9
5. Other	41	32	1	3	3	3	4	4	-91.1	-1.4
B. Fugitive Emissions from Fuels	590	509	485	471	524	520	358	369	-37.5	3.2
1. Solid Fuels	548	459	440	423	472	472	324	334	-39.1	2.9
2. Oil and Natural Gas and other…	42	50	45	48	53	48	33	36	-16.2	6.1
2. Industrial Processes	1,391	1,376	1,068	1,150	1,417	1,001	1,143	1,172	-15.7	2.6
A. Mineral Industry	743	695	543	599	636	479	501	453	-39.1	-9.7
B. Chemical Industry	81	70	80	100	119	75	47	48	-40.3	3.6
C. Metal Industry	471	551	374	334	425	127	207	208	-55.7	0.9
D. Non-energy products	8	8	7	14	25	12	21	23	185.0	11.3
E. Electronics industry	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Product uses as ODS substitutes	NO	NO	35	47	153	260	329	346	100.0	5.3
G. Other product manufacture and use	89	52	29	56	60	47	39	93	5.6	140.5
H. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Agriculture	2,004	1,923	1,828	1,874	1,774	1,720	1,708	1,744	-13.0	2.1
A. Enteric Fermentation	982	936	903	947	913	901	906	933	-5.0	3.0
B. Manure Management	505	494	426	410	386	355	337	346	-31.5	2.5
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	465	441	458	488	450	440	444	446	-4.1	0.3
E. Prescribed Burning of Savannahs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Liming	44	44	29	17	14	13	11	11	-75.5	-2.4
H. Urea applications	9	9	12	12	12	11	9	9	-3.8	-7.2
I. Other carbon-containing fertilizers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
J. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

	1986	1990	1995	2000	2005	2010	2014	2015	Change to 1986	Change to 2014
4. Land Use, Land-Use Change and Forestry	-4,799	-4,454	-4,720	-6,116	-7,490	-6,800	-5,707	-5,629	17.3	-1.4
A. Forest Land	-4,450	-4,484	-4,808	-6,095	-7,717	-7,004	-5,987	-5,903	32.7	-1.4
B. Cropland	-76	-84	-258	-259	-225	-200	-164	-157	106.4	-4.3
C. Grassland	-266	-272	-150	-160	47	55	115	129	-148.3	12.2
D. Wetlands	0	1	0	-1	5	23	25	26	6,177.1	1.9
E. Settlements	426	429	437	467	559	427	389	379	-11.1	-2.6
F. Other Land	14	14	20	9	17	20	21	21	49.1	0.2
G. Harvested wood products	-457	-67	28	-85	-185	-129	-113	-129	-71.8	14.4
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Waste	593	645	678	768	788	549	503	521	-12.2	3.5
A. Solid Waste Disposal	372	433	483	568	594	394	330	340	-8.5	3.0
B. Biological treatment of solid waste	NO	NO	NO	NO	3	5	12	12	100.0	2.8
C. Incineration and open burning of waste	2	2	1	3	3	7	20	27	1,266.6	34.6
D. Waste water treatment and discharge	219	210	195	196	188	143	140	141	-35.8	0.4
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Memo Items.

International Bunkers	59	49	58	69	130	133	258	283	383.6	9.6
Aviation	59	49	58	69	61	73	72	75	27.7	3.6
Navigation	NO.NA	NO.NA	NO.NA	NO.NA	69	60	186	209	100.0	11.9
Multilateral Operations	NO	NO	NO	1	0	0	1	1	100.0	-5.9
CO_2 Emissions from Biomass	2,354	2,180	2,118	1,982	2,400	3,168	2,878	2,957	25.6	2.8
Long term storage of C in waste disposal sites	2,141	2,738	3,662	4,783	5,839	6,642	6,881	6,929	223.6	0.7
Total CO_2 Eq. Emissions without LULUCF	20,372	18,594	18,721	19,093	20,498	19,603	16,610	16,831	-17.4	1.3
Total CO_2 Eq. Emissions with LULUCF	15,573	14,140	14,001	12,977	13,007	12,803	10,903	11,202	-28.1	2.7

3.2.1 Description and Interpretation of Emission Trends by Gas

CO_2 emissions in 2015 represented 80.8% of overall emissions of greenhouse gases. CO_2 emissions excluding LULUCF followed the consumption of energy and with regard to their fraction exerted a major impact on total emissions. Compared to 1986, they decreased by 18.3% in 2015. CH_4 emissions represented 12.1% of total emissions in 2015 (12.5% in 1986) and were by 20.3% lower than in 1986. N2O emissions represented 4.9% of total emissions and were by 11.4% lower than N2O emissions in 1986. F-gases represent 2.2% of total emissions and some gases (HFCs and SF_6) have shown significant increases since 1995 (base year for F-gases), while PFC decreased drastically in 2008 and has continued to decrease in 2009. Since then a slow increase of emissions was observed.

3.2.2 Description and Interpretation of Emission Trends by Source

According to the UNFCCC Reporting Guidelines, emissions estimates are grouped into five IPCC categories: Energy, Industrial Processes and Product Use, Agriculture, Land Use, Land-Use Change and Forestry (LULUCF), and Waste.

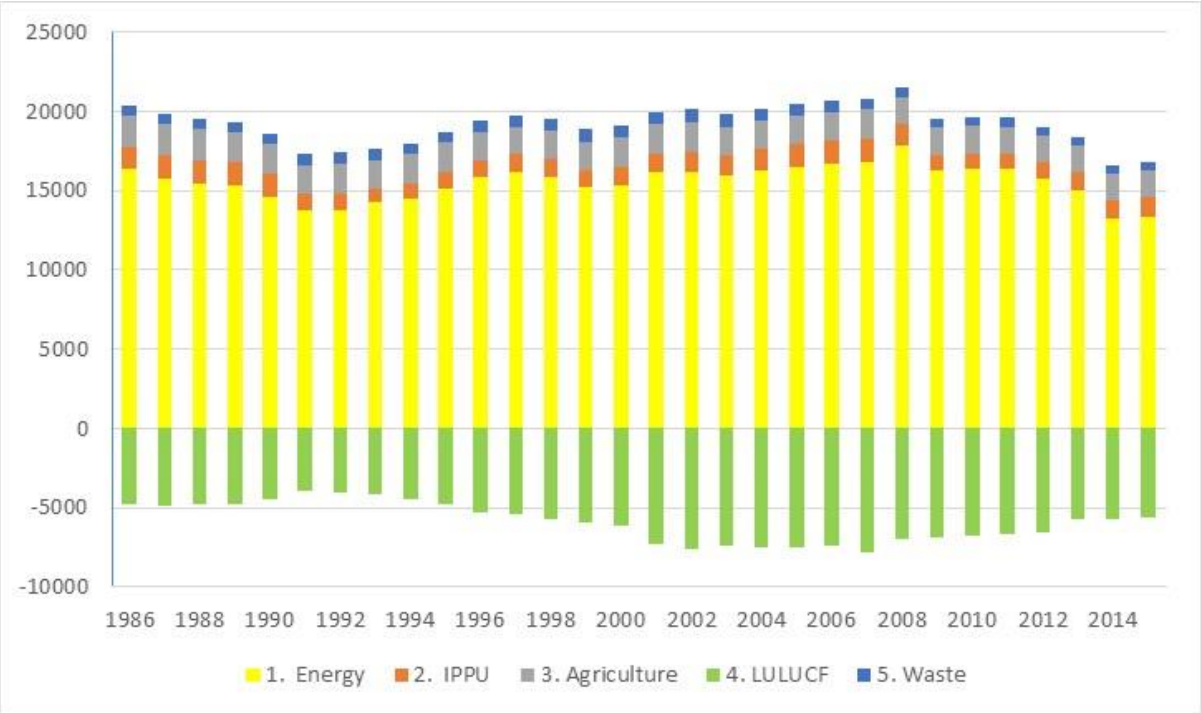


Figure 21: GHG emissions by sector in kt CO2 eq.

By far the most important sector is Energy, which in 2015 accounted for 79.6% of total GHG emissions. In this sector emissions have decreased by 18.2%, compared to the 1986. Within this sector, in the period 1986–2015, GHG emissions from the Energy Industry, as the biggest sub-sector, decreased by 33.3%. In the period 1999–2007, steep growth (+27.2%) has been recorded due to the increased consumption of electrical energy. Undoubtedly the greatest increase in GHG emissions was observed in the transport sector, by as much as 203.6% until

2008, due to the increase in road transportation, while emissions from other kinds of traffic slightly declined. In 2009 GHG emissions from transport decreased by 13.5% compared to 2008. The traffic emissions have further decreased by 1.1% in 2010, but increased again in 2011 by 8.2% and by 1.3% in 2012. Since then emissions decrease again in 2013 for 5.4%, in 2014 for 1.4%, and in 2015 for 0.5%. There was an appreciable reduction of GHGs from Manufacturing industry between 1986 and 2001 (-50.3%). After 2001, a stabilisation of emissions was observed until 2008. Due to the global financial crisis, emissions from Manufacturing industry and construction decreased in 2009 by 15.6%, in 2010 by 2.1%, in 2011 by 10.3%, in 2012 by 4.0%, in 2013 by 0.4%, and in 1015 by 3.6% compared to the previous year while in 2014 a small increase for 0.4% have been recorded. Altogether since 2008 due to the economic crises emissions from manufacturing industries and construction have decreased by 31.3%.

Fugitive emissions from fuel represent only 2.8% of emissions in the sector and have decreased by 37.5% compared to emissions in 1986.

Since 1986, GHG emissions from Industrial Processes at first fell sharply to reach their lowest value in 1993, but then started to rise again and were in 2007 6.0% above 1986 level. Due to the global financial crises and lower industrial production, emissions in 2009 were 28.2% below the 1986 emissions but in the period 2010 – 2015 slowly increase by 17.1%. The most important GHG of this sector was carbon dioxide, with 61.2% of emissions from this category, followed by HFCs with 29.5%, N_2O with 6.7%, and SF_6 and PFCs with 1.3% each. In this sector, no CH_4 emissions have occurred since 2011. The main source is Mineral industry, of which the production of cement and lime alone contributed 36.4% of the emissions in this sector.

In Agriculture as the second most important sector, emissions in 2015 amounted to 1,744 Gg CO_2 eq, which represents 10.4% of all emissions. Agriculture represents the main source of methane and N_2O emissions, namely 58.0% of all methane emissions and 66.3% of all N_2O emissions. In the agricultural sector, N_2O emissions account for 31.1% of emissions, and CH_4 emissions account for 67.7% of emissions while CO_2 emissions account 1.1%. GHG emissions from agriculture show small oscillations for individual years, but the general trend is on the decrease. In 2015, emissions were 13.0% below the base year. The most important sub-sector represents emissions from enteric fermentation, which contributes 53.5% of all emissions from agriculture, followed by emissions from agricultural soils, with 25.6%; the rest is contributed by emissions of methane and N_2O from animal manure (19.8%) while CO_2 emissions due to the liming and urea applications represent only 1.1% of emissions in this sector.

In the LULUCF sector, the CO_2 sink was estimated at 5,629 Gg CO_2 eq in 2015, which is 17.3% more than in 1986. The increase in sinks was primarily the result of an increase in timber growing stock in existing forests.

Methane emissions from the Waste sector are the second largest source of methane and represents 21.6% of all methane emissions in Slovenia in 2015. The fraction of methane emissions in this sector amounts to 84.4%, while the remaining part represent N_2O (10.4%)

and CO_2 emissions (5.2%). Solid waste handling contributes 65.4% to the total emissions from this sector, wastewater handling 27.0 %, incineration of waste 5.3% and composting 2.4%. Emissions in 2015 were 12.2% lower than in 1986 which is mainly due to the decrease in emissions from waste waters which are 35.8% lower than in the base year what is mostly due to recovery of gas in wastewater treatment plants and the decrease in industrial production. Emissions from solid waste disposal started decreasing in 2005 and since then emissions have decreased for 42.7%. In 2013 the emissions were the first time lower compared to the base year and in 2015 were lower by 8.5%.

3.3 National Inventory System

3.3.1 National Entity

In accordance with Slovenian legislation, the Environmental Agency of the Republic of Slovenia is charged with the overall coordination of activities necessary for the development of emission inventories, as well as with implementing inventories for the purpose of reporting to the UNFCCC and the European Commission.

Contact information:
Slovenian Environmental Agency (SEA)
Vojkova 1b, SI-1000 Ljubljana
phone: +386(1) 478 40 00
fax : +386(1) 478 40 51
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3.3.2 Description of Institutional Arrangements for Inventory Preparation

In Slovenia, the institution responsible for GHG inventories is the Slovenian Environment Agency (SEA). In accordance with its tasks and obligations to international institutions, the SEA is charged with making inventories of GHG emissions, as well as emissions that are defined in the Convention on Long Range Transboundary Air Pollution within the specified time limit. In making the inventories, the Environmental Agency cooperates with numerous other institutions and administrative bodies which relay the necessary activity data and other necessary data for the inventories.

A Memorandum of Understanding has been concluded with the Statistical Office of the Republic of Slovenia (SORS) to submit quality and verified data to the Environmental Agency in due time, because the time limits for inventories and the NIR have shortened with the entry of Slovenia into the EU, since inventories and part of the NIR for the year before last must be made by 15th of January, and with corrections and final submission of the NIR

by 15th of March. In view of this, an agreement has been reached with the participating institutions to shorten the time limits for submitting data. For reasons of complexity, attention was mostly focused on the Joint Questionnaires of the SORS, on the basis of which the Statistical Office produces the Energy Balance of the Republic of Slovenia, wherein the most important data on the energy sector are found. All sources of data for GHG inventory are presented on the Figure 22 and in the Table 5.

The year 2003 saw the end of the process of harmonisation of data collection among the Directorate of Energy, Ministry of Agriculture and the Environment, and the Statistical Office of the Republic of Slovenia. An end was put to previous parallel double collecting of data. The competence of collecting data has, by law, passed to the SORS, which checks the data and eliminates potential reporting errors, and submits consolidated data to the Directorate of Energy, which has been publishing data until 2005 in its Energy Yearbook of the Republic of Slovenia. In terms of content, the data were identical to those submitted in the Joint Questionnaires to the IEA.

At the beginning of 2007, the agreement between Statistical Office of the Republic of Slovenia and the Environmental Agency came into force. Accordingly, all statistical data necessary for preparing GHG inventories are available each year by October 30 at the latest. In exchange, ETS data and emission estimates are reported to the Statistical Office within a defined time frame. In 2014 the new agreement has been signed which includes more data sets and updated time lines.

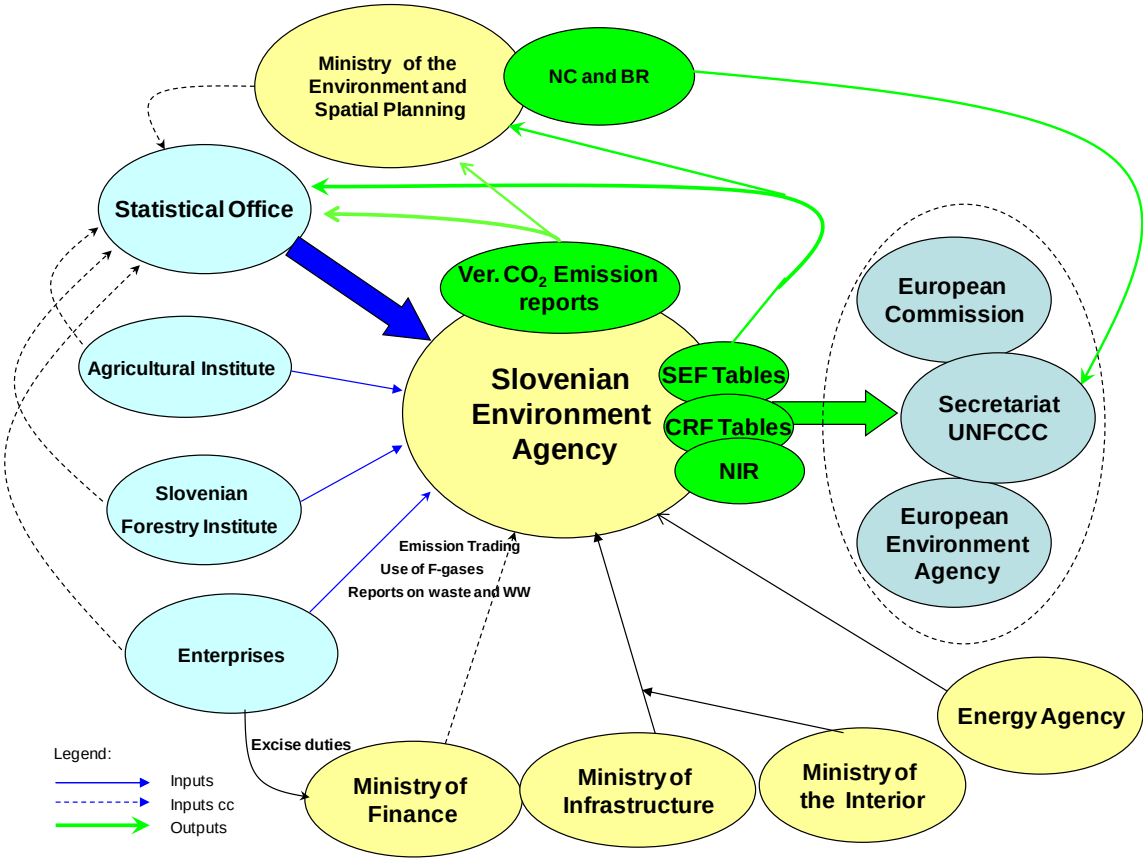


Figure 22: Data flow in the Slovenian National Inventory System

Experts from the Slovenian Forestry Institute and the Agricultural Institute of Slovenia work on GHG inventories according to the standing rules of institutes (ordinance). Financing is assured by governmental institutions according to the yearly work plan. All data from external institutions are submitted to the Slovenian Environmental Agency, where they are archived.

The detailed process from gathering data to emissions calculation and reporting is described in the Manual of Procedures, which was first prepared in 2005 and further updated in 2009. In 2014 a completely new Manual has been prepared, which follows the structure and methodology of 2006 IPCC GL and includes also the new sources of GHG.

Table 5: Inventory Institutional Arrangements and Data Sources

IPCC category	IPCC sub-category	Sources of data
1.A – Energy: Fuel Combustion	1 Energy Industry	• Statistical Office of the Republic of Slovenia: Joint Questionnaires, Energy Balances, annual energy statistics • Slovenian Environment Agency: ETS data
	2 Manufacturing Industries and Construction	• Statistical Office of the Republic of Slovenia: Joint Questionnaires, Energy Balances, annual energy statistics • Slovenian Environment Agency: ETS data
	3 Transport	• Statistical Office of the Republic of Slovenia: Joint Questionnaires, Energy balances • Ministry of Infrastructure and Spatial Planning, Directorate for National Roads (DRSC) • Ministry of the Interior (vehicle stock)
	4 Other Sectors	• Statistical Office of the Republic of Slovenia:
	5 Other	• Slovenian Army: • Police
1.B Energy: Fugitive Emissions		• Statistical Office of the Republic of Slovenia: • Slovenian Environment Agency: ETS data
CRF 2 – Industrial Processes and Product Use	CRF 2A – Mineral Products	• Statistical Office of the Republic of Slovenia: • Slovenian Environment Agency
	CRF 2B – Chemical Industry	• Statistical Office of the Republic of Slovenia:
	CRF 2C – Metal Production	• Statistical Office of the Republic of Slovenia: • Slovenian Environment Agency
	CRF 2D – Non-energy Products	• Statistical Office of the Republic of Slovenia: • Slovenian Environment Agency
	CRF 2F – ODS Substitutes	• Slovenian Environment Agency • Ministry of Finance
	CRF 2G – Other product	• Statistical Office of the Republic of Slovenia • Slovenian Environment Agency
CRF 3 – Agriculture		• Statistical Office of the Republic of Slovenia • Agricultural Institute of Slovenia
CRF 4 – Land Use, Land Use Change, and Forestry		• Slovenian Forestry Institute • Agricultural Institute of Slovenia
CRF 5 – Waste	A. Solid waste disposal	• Slovenian Environment Agency
	B. Biological treatment of solid waste	• Slovenian Environment Agency • Statistical Office of the Republic of Slovenia
	C. Incineration and open burning of waste	• Slovenian Environment Agency
	D. Waste water treatment and discharge	• Slovenian Environment Agency • Statistical Office of the Republic of Slovenia

3.3.3 Brief Description of the Process of Inventory Preparation

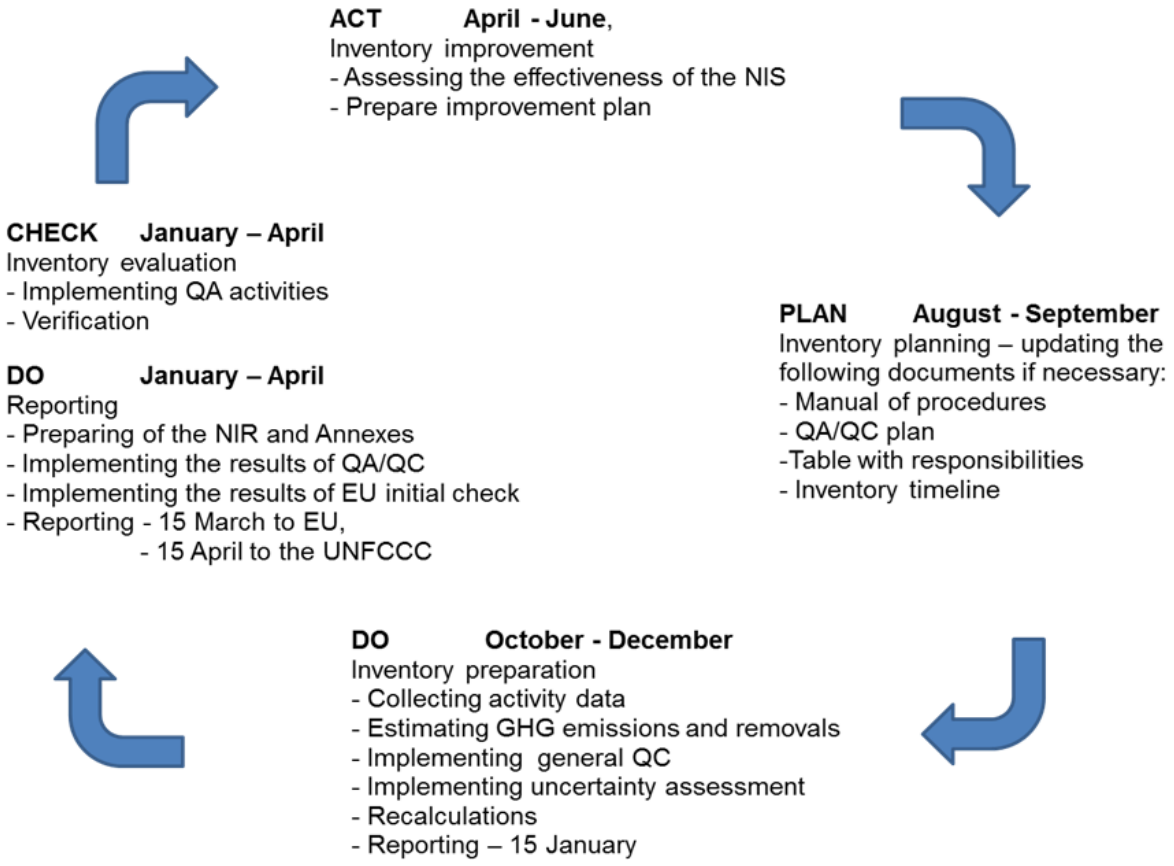
A process of inventory preparation is designed according to the PDCA-cycle (Plan – Do – Check – Act). This is a generally accepted model for pursuing a systematic quality work according to international standards, in order to ensure the maintenance and development of the quality system. This structure is in accordance with structures described in decision

19/CMP.1 and in the 2006 IPCC Guidelines. The system consists of inventory planning, inventory preparation, inventory quality checking and follow-up improvements which are integrated into the annual cycle and preparation as illustrated in the Figure 23.

Owing to the ever-increasing obligations of Slovenia with regard to reporting, the SEA has decided to implement a unified system of data collection for the purposes of making inventories, as well as secure reliable financing in accordance with the annual program of its work.

For submitting reports to different institutions, various report formats have been devised, since the same data are used to report to the UNFCCC, EEA, EC, and CLRTAP. All external reports of the SEA are prepared in accordance with ISO 9001 via the Agency's reporting service, which keeps inventories of reports. Parallel to this, emissions data are submitted to the SORS, which makes them available in its publications and submits them to EUROSTAT and the IEA

Figure 23: Data flow in the Slovenian National Inventory System



In 2006 we have started to develop a joint database for GHGs and other pollutants: ISEE – Information system for emission inventories. In broad terms the application has been completed and operational since 2011, but it is still necessary to conduct regular maintenance and improvements. The database contains activity data, emission factors and other parameters together with a description of sources from 1980 on for other pollutants,

and from 1986 on for GHG emissions. It contains equations necessary for calculation of emissions and enables a direct bulk import into the CRF Reporter. The main purpose of ISEE is:

- to enable collection and archiving of activity data, emission factors and other parameters including descriptions of sources from 1980 on for other pollutants, and from 1986 on for GHG emissions;
- to calculate GHG and other pollutant emissions;
- to automatically fill in reporting tables (CRF Reporter).

All inventory data are now stored in a joint database. Supporting data and references are stored in electronic form and/or hard copy form. Inventory submissions are stored mostly in electronic form at various locations and on various media (network server, CD-ROM, computer hard disk). Access to files is limited in accordance with the security policy. Backup copies on the server are made at regular intervals in accordance with the requirements of the information system. In 2012, all studies have been scanned, transformed to PDF files and stored on network server, CD-ROM and computer hard disk. The studies are available in hard copies and also in electronic format.

Inventories of GHG emissions were prepared on the basis of the IPCC methodology as presented in the 2006 IPCC Guidelines for all gases and sectors. Due to the importance of the source and accessible data, different approaches (tiers) from within the IPCC methodology were used (Table 6).

In the Energy sector, mainly national/plant specific CO_2 emission factors were used for assessment of emissions from solid fuels, petroleum coke and natural gas (Tier 2/3), while default IPCC emission factors were mainly used for other fuels. The quantities of fuels and consumed fuel energy values were taken from the SORS. Additional data on the energy use of some types of waste (waste tyres, oils and solvents) were acquired from the verified ETS reports. Data on fuel consumption in agriculture and forestry refer to mobile sources only, while the rest of the fuel consumption of these sub-sectors is included in the Institutional and commercial sector. GHG emissions in road transport were determined with the COPERT 4 model using default EFs from the model.

Emission factors for fugitive emissions of CO_2 and CH_4 in mining and post mining activities were determined on the basis of measurements of methane concentrations in ventilation shafts in mines and estimated quantities of released methane and, not very common, also a considerable amount of CO_2. The CH_4 emission factor that was determined in this manner was lower than the default IPCC emission factor. CO_2 emissions in post-mining activities were not assessed, as no estimation method is available. Following 2006 IPCC GL CH_4 emissions from abandoned and closed mines have been also included in the inventory using Tier 2 method and default parameters. Fugitive emissions from Oil and natural gas have been calculated using average EFs from default range from 2006 IPCC Guidance. The old method for calculating CH_4 emissions from the distribution of natural gas, which were estimated according to the length of individual types of transmission or distribution pipelines with regard to the pipe type, material and pressure, applying specific losses per unit of length has been used only for the QA purpose.

Table 6: Summary report for methods and emission factor used

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6	
	Method applied	Emission factor	Method applied	EF	Method applied	EF	Method applied	EF	Method applied	EF	Method applied	EF
1. Energy	M,T1,T2, T3	CS,D,M, PS	M,T1,T2, T3	CS,D, M,PS	M,T1	D,M						
A. Fuel combustion	M,T1,T2, T3	CS,D,M, PS	M,T1	D,M	M,T1	D,M						
1. Energy industries	T1,T2	CS,D,PS	T1	D	T1	D						
2. Manufacturing ind. and const.	T1,T2,T3	CS,DPS	T1	D	T1	D						
3. Transport	M,T1,T2	CS,D,M	M,T1	D,M	M,T1	D,M						
4. Other sectors	T1,T2	CS,D	T1	D	T1	D						
5. Other	T1	D	T1	D	T1	D						
B. Fugitive emissions from fuels	T1,T3	D,PS	T1,T2,T3	CS,D, PS	T1	D						
1. Solid fuels	T1,T3	D,PS	T2,T3	CS,D, PS	NA	NA						
2. Oil and natural gas	T1	D	T1	D	T1	D						
2. Industrial Processes	M, T1,T2, T3	CS,D,M	NA	NA	T1	D	T1,T2	CS,D	T3	CS, D	T2	CS
A. Mineral Products	T2,T3	CS,D	NA	NA	NA	NA						
B. Chemical Industry	T2	D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Metal Production	T1, T2	CS, D	NA	NA	NA	NA	NA	NA	T3	CS, D	NA	NA
D. Non-Energy Product	M, T1	D, M										
F. Substitutes for ODS							T1,T2	CS,D	NA	NA	NA	NA
G. Other product man. and use	NA	NA	NA	NA	T1	D	NA	NA	NA	NA	T2	CS, D
3. Agriculture			T1,T2	CS,D	T1, T2	CS,D						
A. Enteric Fermentation			T1,T2	CS,D								
B. Manure Management			T1,T2	CS,D	T1,T2	CS,D						
D. Agricultural Soils			NA	NA	T1	D						
G. Liming	T1	D	NA	NA	NA	NA						
H. Urea application	T1	D	NA	NA	NA	NA						
4. Land use, land use change and forestry	CS,D,T1, T2,T3	CS,D	D,T1	D	D,T1	D						
A. Forest Land	CS,D,T1, T2,T3	CS,D	D,T1	D	D,T1	D						
B. Cropland	D,T1,T2	CS,D	NA	NA	D,T1	D						
C. Grassland	D,T1,T2,T 3	CS,D	NA	NA	NA	NA						
D. Wetlands	D,T1,T2	CS, D	NA	NA	NA	NA						
E. Settlements	D,T2	CS,D	NA	NA	NA	NA						
F. Other Land	D,T2	CS,D	NA	NA	NA	NA						
G. HWP	D,T1	D	NA	NA	NA	NA						
5. Waste	D	D	T1,T2	CS,D	D,T1	D						
A. Solid Waste Disposal	NA	NA	T2	CS,D								
B. Biological Treatment			T1	D	T1	D						
C. Incineration	T1	D	T1	D	T1	D						
D. Waste-water Treatment	NA	NA	T1	CS,D	T1	D						

Until 1997 emissions from Industrial processes and Product Use were mostly determined on the basis of statistical data on production and consumption of raw materials and by applying country-specific emission factors. After 1997, the SORS partly changed the method

of collecting and presenting these data and therefore most of the data were obtained directly from individual companies. These data have also been used for preparing our National Allocation Plan for EU-ETS. Since 2005, data from verified reports have mostly been used while in some cases (aluminium and ferroalloy production) the plant data had to be obtained. In determining actual emissions caused by the use of HFCs, data were obtained from companies that have such devices and companies that maintain these devices. For SF_6 emissions, the release of this gas from gas-insulated switchgear for electricity was assessed

In Agriculture, methane emissions from enteric fermentation and manure management in bovine animals were determined using Tier 2 approach and the Tier 1 approach was used for other animals that represent a smaller fraction in methane emissions. Input data for N_2O emissions from manure handling and from direct and indirect emissions from fertilisation with animal fertilisers were obtained in the process of estimating methane emissions. For N_2O emissions, default IPCC factors were used. A default EF and Tier 1 approach has been used for calculation of CO_2 emissions from liming and application of urea.

Emissions and removals from the LULUCF sector have been calculated for all six types of land use — Forest land, Cropland, Grassland, Wetlands, Settlements and Other land - and are based on the Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC 2003) completed by country-specific methodologies. GHG emission and removal estimates in this sector are calculated from carbon stock changes in the five carbon pools (aboveground biomass, belowground biomass, deadwood, litter, and soil), direct N_2O emissions from N fertilization, N_2O emissions from drainage of soils, N_2O emissions from disturbance associated with land-use conversion to cropland, CO_2 emissions from agricultural lime application, and non-CO_2 emissions from biomass burning. Country specific emission factors and carbon stock values for forests and partially for agricultural land and grassland are derived from surveys and measurements. For other land use categories, IPCC default values or expert judgements are used.

Methane emissions from solid waste handling were determined by the first order decay model from IPCC 2006 GL, which takes into account the difference in the time dynamics of methane release from different types of waste. Emissions of CH_4 and N_2O from wastewater and composting, as well as GHG from waste incineration were calculated using the default method.

3.3.4 Brief Description of Key Source Categories

The analysis of key source categories was performed on the basis of sectoral distribution and use of the approach 1. This approach was used both for the base year and for the year 2015. A level assessment was undertaken for 1986 and 2015, and a trend assessment was performed for 2015. The analyse has been performed at a level of IPCC categories as suggested in Table 4.1 in Volume 1 of 2006 IPCC Guidelines. The results are presented in the Table 7.

Table 7: IPCC Key Categories for 2011, Tier 1 with and w/o LULUCF.

IPCC Category	Gas	w LULUCF	w/o LULUCF
1.A.1 Energy Industries, Gaseous Fuels	CO2	L	
1.A.1 Energy Industries, Liquid Fuels	CO2	T	
1.A.1 Energy Industries, Solid Fuels	CO2	L, T	
1.A.2 Manufacturing Industries and Construction, Gaseous Fuels	CO2	L, T	
1.A.2 Manufacturing Industries and Construction, Liquid Fuels	CO2	L, T	
1.A.2 Manufacturing Industries and Construction, Other Fuels	CO2	L, T	
1.A.2 Manufacturing Industries and Construction, Solid Fuels	CO2	L, T	
1.A.3.b Road Transportation, Diesel Oil	CO2	L, T	
1.A.3.b Road Transportation, Diesel Oil	N2O		T
1.A.3.b Road Transportation, Gasoline	CO2	L, T	
1.A.3.b Road Transportation, LPG	CO2	T	
1.A.4 Other Sectors, Gaseous Fuels	CO2	L, T	
1.A.4 Other Sectors, Liquid Fuels	CO2	L, T	
1.A.4 Other Sectors, Solid Fuels	CO2	T	
1.A.4 Other Sectors, Solid Fuels	CH4	T	
1.A.4 Other Sectors, Biomass	CH4	L	T
1.B.1.a Fugitive Emissions, Coal Mining and Handling	CH4	L, T	
1.B.1.a Fugitive Emissions, Coal Mining and Handling	CO2	T	
1.B.1.a Fugitive Emissions, Other	CO4	T	
2.A.1 Industrial processes, Cement Production	CO2	L, T	
2.A.1 Industrial processes, Lime Production	CO2	T	
2.C.3 Industrial processes, Aluminium Production	CO2	L	T
2.C.3 Industrial processes, Aluminium Production	PFC	T	
2.F.1 Industrial processes, Refrigeration and AC Equipment	HFC	L, T	
3.A Agriculture, Enteric Fermentation	CH4	L	T
3.B Agriculture, Manure Management	CH4	L, T	
3.B Agriculture, Manure Management	N2O	L, T	
3.D.1 Agriculture, Direct Soil Emissions	N2O	L	T
3.D.2 Agriculture, Indirect Emissions	N2O	L	
4.A.1 LULUCF, Forest Land remaining Forest Land	CO2	L, T	
4.A.2 LULUCF, Land converted to Forest Land	CO2	L, T	
4.B.2 LULUCF, Land converted to Cropland	CO2	T	
4.B.2 LULUCF, Cropland remaining Cropland	CO2	L	
4.C.2 LULUCF, Land converted to Grassland	CO2	L, T	
4.E LULUCF, Settlements	CO2	L	
4.G LULUCF, Harvested wood products	CO2	L, T	
5.A.1 Waste, Managed waste disposal sites	CH4	L	
5.D.1 Waste, Domestic and Commercial Waste Water	CH4	T	L

The analyses have been performed with and without LULUCF sector. On the basis of the KCA including LULUCF, 27 categories were selected as keys in 2015 according to the level assessment, and additional 10 were chosen as key categories according to the trend

assessment only. As many as 18 categories are key sources according to level and trend KC analysis. The most of the 37 key categories are from Energy sector: 13 categories are CO_2 emissions from fuel combustion, two are CH_4 emissions combustion in other sectors, one is CO_2 emissions from SO_2 scrubbing and two are CO_2 and CH_4 fugitive emissions from Coal mining and handling. The second most important sector is LULUCF with 7 key source categories, five KCs are in the Agriculture sector, 2 are related to methane emissions and 3 to N_2O emissions, five KCs are in the industrial processes and only two KC are in the Waste sector. On the basis of the Tier 1 analysis excluding LULUCF three categories, which were KC according to level become KC according to the trend, and one category which was trend becomes KC according to the level. In Fuel combustion sector one additional category becomes key according to trend.

In 2010 a Tier 2 key categories analyse has been done for level assessment only and as much as 27 categories have been determined as keys. Mainly due to the large uncertainty, the most KC were in Agriculture sector (9), following by LULUCF (5), Road transport (4), Waste (3), Fuel combustion in Residential sector (2), Fugitive emissions from solid fuels (2), Consumption of HFCs (1) and Electricity and heat production (1).

Following recommendation from the UNFCCC review in 2013, the qualitative approach has been also used to determine key source categories but no additional categories have been found to be keys. For determination the following criteria has been included:

- Mitigation techniques and technologies
- High expected emission growth
- High uncertainty
- Unexpected low or high emissions

The key categories have received special considerations in terms of improvements and QA/QC. On the Table 3.3.4 and 3.3.5 methodologies used to calculate emissions from key categories are presented.

According to both analyses (Tier 1 and Tier 2), the most important key categories are from LULUCF sector. For 2012 submission the LULUCF sector was highly improved using the newest data from 2012 forest inventory and with additional support from experts from JRC and from EU support project. For the present submission emissions and sinks in LULUCF have been further improved with the introduction of new land transition matrix.

The Energy and Industrial processes sectors have already largely improved with inclusion of big emitters in EU-ETS. The use of default EFs for liquid fuel, mostly fuel oil, represents the main deficiency. Due to the unavailability of resources needed to develop CS EF, the verification of default EFs have been made for the 2014 submission and will be repeated in 2018. The final results will be presented in the NIR of the April submission 2018.

The Agriculture sector has also improved in the past but the larger improvements are related to the implementation of 2006 IPCC Guidelines. We will also try to obtain additional data to improve estimates of manure allocation. Unfortunately, methodologies for calculation of emissions from agricultural soils are not planned for further improvement. It

has been assessed that resources (financial and personal) for determination of CS EFs in this category are unreasonably high for the expected results.

We are planning to improve HFC emissions from Refrigeration and AC with regular updates of the data on stock. This can be regarded as an ongoing process and will probably lead to an improvement of the inventory.

Table 8: Methodologies used for key categories according to the level in 2015

IPCC Category	Gas	Methodology	EF and other parameters
1.A.1 Energy Industries, Gaseous Fuels	CO_2	Tier 2	CS
1.A.1 Energy Industries, Solid Fuels	CO_2	Tier 3	PS
1.A.2 Manufacturing Industries and Construction, Gaseous Fuels	CO_2	Tier 2	CS
1.A.2 Manufacturing Industries and Construction, Liquid Fuels	CO_2	Tier 1	D
1.A.2 Manufacturing Industries and Construction, Solid Fuels	CO_2	Tier 3	PS
1.A.2 Manufacturing Industries and Construction, Other Fuels	CO_2	Tier 1, Tier 3	D, PS
1.A.3.b Road Transportation, Diesel Oil	CO_2	Model	Model
1.A.3.b Road Transportation, Gasoline	CO_2	Model	Model
1.A.4 Other Sectors, Gaseous Fuels	CO_2	Tier 2	CS
1.A.4 Other Sectors, Liquid Fuels	CO_2	Tier 1	D
1.A.4 Other Sectors, Biomass	CH_4	Tier 1	D
1.B.1.a Fugitive Emissions, Coal Mining and Handling	CH_4	Tier 3	PS
2.A.1 Industrial processes, Cement Production	CO_2	Tier 3	PS
2.C.3 Industrial processes, Aluminium Production	CO_2	Tier 3	PS
2.F.1 Industrial processes, Refrigeration and AC Equipment	HFC	Tier 2	CS, D
3.A Agriculture, Enteric Fermentation	CH_4	Tier 1, Tier 2	CS, D
3.B Agriculture, Manure Management	CH_4	Tier 1, Tier 2	CS, D
3.B Agriculture, Manure Management	N_2O	Tier 1, Tier 2	CS, D
3.D.1 Agriculture, Direct Soil Emissions	N_2O	Tier 1	D
3.D.1 Agriculture, Indirect Soil Emissions	N_2O	Tier 1	D
4.A.1 LULUCF, Forest Land remaining Forest Land	CO_2	CS, D, Tier 1-3	CS, D
4.A.2 LULUCF, Land converted to Forest Land	CO_2	D, Tier 1-3	CS, D
4.B.2 LULUCF, Cropland remaining Cropland	CO_2	D, Tier 1 - 2	CS, D
4.C.2 LULUCF, Land converted to Grassland	CO_2	D, Tier 1-3	CS, D
4.E LULUCF, Settlements	CO_2	D, Tier 2	CS, D
4.G LULUCF, Harvested wood products	CO_2	D	D
5.A.1 Waste, Managed waste disposal sites	CH_4	Tier 2	CS, D
5.D.1 Waste, Domestic and commercial Waste Waters	CH4	Tier 1	CS, D

Table 9: Methodologies used for key categories according to the trend only in 2015

IPCC Category	Gas	Methodology	EF and other parameters
1.A.1 Energy Industries, Liquid Fuels	CO_2	Tier 1	D
1.A.3.b Road Transportation, LPG	CO_2	Model	Model
1.A.3.b Road Transportation, Diesel	N_2O	Model	Model
1.A.4 Other Sectors, Solid Fuels	CO_2	Tier 1	D
1.A.4 Other Sectors, Solid Fuels	CH_4	Tier 1	D
1.B.1.a Fugitive Emissions, Coal Mining and Handling	CO_2	Tier 3	PS
1.B.1.a Fugitive Emissions, Other	CO_2	Tier 3	PS
2.A.1 Industrial processes, Lime Production	CO_2	Tier 3	PS
2.C.3 Industrial processes, Aluminium Production	PFC	Tier 3	PS
4.B.2 LULUCF, Land converted to Cropland	CO2	D, Tier 1 - 2	CS, D

3.3.5 Main Reasons for Recalculating GHG Estimates

In the submission 2017 almost all off recalculations were due to the recommendations from the EU and the UNFCCC review. The impact of the recalculations on the total GHG emissions is presented in the Table 3.3.6.

Table 10: The total changes in kt CO2 eq. due to the recalculation with a respect to the previous submission.

	1986	1990	1995	2000	2005	2010	2014
1. Energy	0.3	0.3	0.3	0.3	1.3	2.2	2.7
2. IPPU	-14.1	-14.8	-19.0	-18.5	-8.7	-17.8	7.7
3. Agriculture	-9.1	-8.3	-22.1	-16.5	-7.7	4.9	8.6
4. LULUCF	-174.3	-230.3	161.5	1,868.7	1,676.0	423.2	1,199.3
6. Waste	0.7	0.7	0.2	1.0	-10.0	-5.0	9.1
Total w/o LULUCF	-22.2	-22.2	-40.5	-33.7	-25.1	-15.7	28.0
Total with LULUCF	-196.5	-252.5	121.0	1,835.0	1,650.9	407.5	1,227.4
Total in % w/o LULUCF	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1	0.2
Total in % with LULUCF	-1.3	-1.8	0.9	14.1	12.7	3.2	11.3

ENERGY

1.A.2 Manufacturing industry and construction, Other fuels

CO_2 EF for waste solvents combusted in 1A2gii Other manufacturing industries have been corrected and corresponding CO_2 emissions have been recalculated for the entire period.

1.A.3.a Domestic aviation

According to the Eurocontrol data a small amount of jet kerosene has been used since 2005 in domestic aviation. After investigation it was found that, this fuel has been used for reallocation of airplanes between the two largest airports. The corresponding GHG emissions have been reallocated from international aviation to domestic aviation accordingly.

1.A.3.b Road Transportation

The emissions of CO_2 have been recalculated for the period 1986-2014 due to the EU review recommendation. The emissions of CO_2 from lubricant use in two-stroke engines were added to the Road transportation sector. The emissions were reported under 1.A.3.b.iv Motorcycles/ Other Liquid Fuels

1.A.4.b Fuel combustion: Other sectors

Very minor recalculations occurred in the commercial and residential sector due to a change in the AD on biomass. Following the recommendation from ERT and in line with the IPCC 2006 GL the emissions from landfill gas which was flared was excluded from the commercial sector. In the residential sector a small correction of biomass used in the period 2011-2014 have been done and CH_4 and N_2O emissions have been recalculated accordingly.

INDUSTRIAL PROCESSES

2.A.1 Cement Production

The emissions of CO_2 have been recalculated for the period 1986-2011 due to a correction of emission factors used. The emission factors were revised for one of the cement plants due to a change in the correction factor for CaO and MgO content in the raw material.

2.D.1 Lubricant Use

The emissions of CO_2 have been recalculated for the period 1986-2014 due to an EU review recommendation. Tier 1 method was applied for the emissions calculation according to the 2006 IPCC Guidelines.

2.F.1 Product uses as ODS substitutes / Refrigeration and AC

The emissions of F-gasses have been recalculated for the period 1995-2014 due to the improved data on transport refrigerators and some other updated values from the database.

2.G.1 Other product manufacture and use / Electrical equipment

The emissions of SF_6 have been recalculated for the period 2007-2014 due to the use of updated values from the database.

AGRICULTURE

For the submission 2017 the GHG emissions have been imported in the CRF Reporter with all digits and for this reason all emissions for all years have been slightly changed when compared with the previous submission. This effect for each gas is visible on the sixth digit but become more important when multiplying with GWP. Besides this some mistakes in N Model have been also eliminated. Major specific changes in the methodology are given below

3.A Enteric Fermentation

The CH_4 emissions from enteric fermentation have been recalculated for the entire period 1986-2014. For the period 1986-2012 the population data of goats has been corrected by excluding young goats, while for years 2013 and 2014 the horse population data were replaced by new values which were published by SORS.

3.B Manure management, CH_4

The CH_4 emissions from manure management have been changed for the entire period 1986-2014. For the period 1986-2012 the population data of goats has been corrected by excluding young goats, while for years 2013 and 2014 the horse population data were replaced by new values which were published by SORS.

3.B Manure management, N_2O

The N_2O emissions from manure management have been recalculated for the entire period 1986-2014 due to the following reasons:

- EMEP/CORINAIR 2002 N excretion rates for sheep, goats and horses were replaced by EMEP/EEA 2013 values

- an error in calculation of nitrous oxide emissions from farmyard manure storage for the non-dairy cattle category was discovered for the period before the year 2000. By mistake, it was not taken into account that a part of total ammonia N is immobilised due to the addition of bedding material. An error was corrected. It resulted in lower emission factors for the period up to year 2000.

- for years 2013 and 2014 the horse population data were replaced by new values which were published by SORS.

3.D Agricultural soils

The N_2O emissions from agriculture soils have been recalculated for the entire period 1986-2014 due to the following reasons:

- EMEP/CORINAIR 2002 N excretion rates for sheep, goats and horses were replaced by EMEP/EEA 2013 values

- for years 2013 and 2014 the horse population data were replaced by new values which were published by SORS.

- the methodology for estimation of nitrous oxide emissions due to N mineralization/immobilization associated with loss/gain of soil organic matter was corrected in line with recommendations of reviewers. As a result, the emissions which were previously estimated to be null became positive. Recalculation have been performed for entire period.

- indirect emissions of N_2O which result from mineralization of soil organic matter and consequential N loss into waters were added to emissions for the entire period.

3.G Liming

Activity data, i.e. amounts of limestone for the period 1995 onwards were recalculated as follows; data on limestone production for the year 2015 (24,500 tons in total) were obtained from the major three limestone producers, which presumably produce over 90% of limestone in Slovenia. Since no other data on limestone are available, we obtain data on land use areas of agricultural holdings and GDP in agriculture. GDP per area unit was then used to calculate the missing values considering the surrogate method.

LULUCF

Forest Land, CO_2

Emissions was recalculated due to consideration of relatively high variation in EF for some periods recognized during the 2016 revision. As it was explained, jumps in emissions trends are results of the methodology. In recalculation, only data from FECS 2007 and 2012 were considered, which are in good correlation with SFS forest data, which have smoother trend. But rather than growing stock acquired from the SFS inventory, data on gain and loss were incorporated in the overlap method. Following the recommendation given by the ERT and in line with the IPCC 2006 guidelines update of EF from Table 2.5 was made, which result in recalculations. Moreover, new activity data on burnt area for the years 1993 and 1994 were obtained from Slovenia Forest Service.

Cropland, CO_2

The carbon stock value in orchards and vineyards was reconsidered, which resulted in updated EF and recalculations. In consistence with the methodology provided in the 2006 Guidelines, gains occurred after 2 years onward were also estimated and reported in Land converted to perennial Cropland.

Grassland, CO_2

Emissions were recalculated due to inclusion of new data on biomass growth obtained from SORS as well as biomass growth after conversion to perennial grassland, which improved EFs.

Wetlands, Settlements and Other land, CO_2

The main recalculations were provided due to updated emission factors.

Harvested wood products, CO_2

Recalculations of carbon stock changes in HWP according to each type were performed due to new data acquired from domestic producers and the SORS.

LULUCF, Indirect emissions of N_2O

Direct and indirect N_2O emissions from N mineralization associated with loss of soil organic matter resulting from change of land use have been reported for the first time.

WASTE

5.A Solid waste disposal

The emissions of CH_4 in for the period 2003-2014 have been recalculated due to improved data on biodegradable waste:

Inclusion of bulky waste (20.03.03), mixed construction waste (17.09.04) and other municipal waste (20.03.03)

improved results of the screening analyses for mixed MSW for 2011-2014.

5.C Waste incineration

All GHG emissions from this category have been recalculated for the entire period 1986-2014 due to the replacement of EFs used: default EFs from IPCC GPG have been replaced with the default EFs from IPCC 2006 Guidelines.

3.3.6 Information on the QA/QC Plan and Verification

In 2014, Slovenia developed and implemented a new Quality Assurance and Quality Control Plan as recommended by the IPCC Guidelines (IPCC 2000 and 2006). The QA/QC plan is part of the Manual of Procedures, elaborated in 2005 and updated in 2014. This update was necessary due to the new methodology guidance (IPCC, 2006), which become official guidance for GHG reporting since 2015. The manual is improved and updated regularly.

QUALITY CONTROL (QC)

Quality Control is a system of routine technical activities to measure and control the quality of the inventory as it is being developed. The QC system is designed to:

- provide routine and consistent checks to ensure data integrity, correctness and completeness;
- identify and address errors and omissions;
- document and archive inventory material and record all QC activities.

The final part of this system is incorporated in an Oracle database (ISEE – "Emission inventory" information system). ISEE enables and ensures that all necessary built-in QA/QC checks have been performed before data and emission estimates are entered in the reporting format tables. It also keeps a record of all changes made to data in the database.

As all calculations are performed in the database with software generated for this purpose, no human errors are expected. But for QA/QC purpose all emissions are also calculated in the old way in Excel spreadsheets. Both estimates were then compared and all differences were carefully investigated and corrected.

DURING DEVELOPMENT OF THE DATABASE, THE FOLLOWING QC WAS PERFORMED:

CHECK OF METHODOLOGICAL AND DATA CHANGES RESULTING IN RECALCULATIONS

- Check for temporal consistency in time series input data for each source category.
- Check for consistency in the algorithm/method used for calculations throughout the time series.

COMPLETENESS CHECKS

- Confirm that estimates are reported for all source categories and for all years from the appropriate base year to the period of the current inventory.
- Check that known data gaps resulting in incomplete source category emissions estimates are documented.
- Compare estimates to previous estimates: for each source category, current inventory estimates should be compared to previous estimates. If there are significant changes or deviations from expected trends, recheck estimates and explain any differences.

CHECK OF ACTIVITY DATA, EMISSION FACTORS AND OTHER PARAMETERS

- Cross-check all input data from each source category for transcription errors.
- Check that units are properly labelled in calculation sheets.
- Check that units are correctly carried through from beginning to end in calculations.
- Check that conversion factors are correct.
- Check that temporal and spatial adjustment factors are used correctly.

In 2006, an additional quality control checking point was introduced by forwarding the assessment of verified emission reports from installations included in the National Allocation Plan to the SORS. The role of SORS is to compare data from installations included in EU-ETS with data from their reporting system and to propose corrective measures if necessary. The outcome of data consistency checks is used as preliminary information for the Ministry of Agriculture and the Environment for performing on-site inspections. The use of (EU) ETS data is described in detail in the relevant chapter on Energy and Industrial Processes sectors.

CHECK OF EMISSIONS ESTIMATES

Every year emissions are also calculated in the old way using Excel spreadsheets and using built-in formulas in the database. Both estimates were compared and all differences carefully investigated. All errors were corrected and the accuracy of emissions calculations on all levels is assured.

QA/QC CHECKS NOT PERFORMED IN THE DATABASE:

UNCERTAINTY

According to the QA/QC plan checks of uncertainty were performed in 2015. The checks consisted of the following:

- Check that the qualifications of individuals providing expert judgement for uncertainty estimates are appropriate.
- Check that qualifications, assumptions and expert judgements are recorded.
- Check that calculated uncertainties are complete and calculated correctly.
- Check that there is detailed internal documentation to support the uncertainty estimates.

While first two QC have been performed, the last QC shows that detailed documentation is not available for the most of uncertainty estimates. So we decided to use expert judgements except for categories for which uncertainty estimates are available in 2006 IPCC GL.

PREPARATION OF NIR

- Check that all chapters from annotated NIR are included in the NIR
- Check that AD, EF and other numerical information mentioned in the text is correct
- Check all AD data is presented in the tables in the NIR
- Check all EF and other parameters used in the tables in the NIR
- Check all graphs for accuracy and presence in the whole period
- Check all titles for tables and pictures
- Check that all Annexes to the NIR are included and updated

DOCUMENTATION AND ARCHIVING

QA/QC checks of documentation and archiving procedures:

- Check that inventory data, supporting data and inventory records are archived and stored to facilitate detailed review.
- Check that all supporting documentation on QA/QC procedures is archived
- Check that results of QC analysis and uncertainty estimates are archived
- Check that there is detailed internal documentation to support the estimates and enable duplication of emissions estimates.
- Check that documentation of the database is adequate and archived.
- Check that bibliographical data references are properly cited in the internal documentation and archived.
- Check that inventory improvements plan is updated ad archived.

Following recommendation from 2013 in country review an instruction have been prepared to determine the form and the names of archived documents.

QUALITY ASSURANCE (QA)

QA generally consists of independent third-party review activities to ensure that the inventory represents the best possible estimates of emissions and removals and to support the effectiveness of the QC program. In the past we performed only one peer review. In 2006, we received many useful comments from the team preparing our fourth National

Communication Report. Although the comments were not presented as an official report, we accepted many of the suggestions and corrected a number of errors. We are planning a sectoral review of our inventory on a yearly basis – one sector per year.

In May 2009, a peer review of the Slovenian inventory was performed for the Energy sector. Since then the Energy sector and Industrial processes sector is regularly checked by experts from Energy efficiency centre (JSI-EEC).

In 2011, the peer review for the Waste sector was performed, no important errors were found.

For Agriculture and LULUCF sector it is very hard to perform a peer review as the main institutions (Slovenian Forestry Institute and Agricultural Institute of Slovenia) are already involved in the inventory preparation. Due to the lack of relevant independent expert for LULUCF sector in Slovenia, this sector has been reviewed during the two-day visit in JRC Ispra, which took place in April 2012. In the years 2013 and 2014, Slovenia has also been included in EU support project for improving LULUCF inventory.

QA/QC procedures performed by other institutions (Slovenian Forestry Institute and Agricultural Institute of Slovenia) are described in the relevant chapters in the NIR (LULUCF, Agriculture). Data based on forest statistics are produced by the Slovenian Forestry Institute and SORS. Data based on agricultural statistics are mainly from SORS and the Agricultural Institute. All data have been checked.

The Statistical Office of Slovenia (SORS) is our main data provider. In 2005, the European Statistics Code of Practice was adopted, bringing considerable changes to the SORS QA/QC system. The main pillars (factors) of quality are defined and thoroughly described in the Medium-term Programme of Statistical Surveys 2013-2017 (http://www.stat.si/doc/drzstat/MediumTerm_2013-2017.pdf)

The strategic directions of Quality in National Statistics are presented in detail at http://www.stat.si/eng/drz_stat_kakovost.asp .

EU EXPERT REVIEW OF GHG EMISSIONS

According to the Regulation (EU) 525/2015 (MMR) the member states' GHG inventories are subject to the annual review. During this review the European commission carry out checks to verify the transparency, accuracy, consistency, comparability and completeness of submitted inventories. In addition the comprehensive review is performed if needed. More details are available in the Commission implementing regulation (EU) 749/2014 in the Chapter III.

3.3.7 Official Consideration and Approval of the Inventory

Before the inventory is reported to the EU, EEA or UNFCCC Secretariat, it goes through an approval process. The institution designated for approval is the Ministry of the Environment and Spatial Planning. The inventory is sent to the Ministry according the following plan:

- draft CRF tables on 3 January
- final CRF tables and draft NIR on 1 March
- final report on 1 April

3.3.8 Public Availability of the Inventory

The inventories are publicly available on the web. Every submission is accompanied with a short description in Slovene language. The estimates are presented in more simple way with the table similar to Table 4 in the NIR. GHG emissions are also presented as indicator. It is very common that yearly submission of GHG inventory is followed by press conference, where our last estimates are presented in connection with our Kyoto goal.

Web page address:

http://www.arso.gov.si/podnebne%20spremembe/emisije%20toplogrednih%20plinov/

3.4 National Registry

Directive 2009/29/EC adopted in 2009, provides for the centralization of the EU ETS operations into a single European Union registry operated by the European Commission as well as for the inclusion of the aviation sector. At the same time, and with a view to increasing efficiency in the operations of their respective national registries, the EU Member States who are also Parties to the Kyoto Protocol (26) plus Iceland, Liechtenstein and Norway decided to operate their registries in a consolidated manner in accordance with all relevant decisions applicable to the establishment of Party registries - in particular Decision 13/CMP.1 and Decision 24/CP.8.

The consolidated platform which implements the national registries in a consolidated manner (including the registry of the EU) is called the Union registry and was developed together with the new EU registry on the basis the following modalities:

Each Party retains its organization designated as its registry administrator to maintain the national registry of that Party and remains responsible for all the obligations of Parties that are to be fulfilled through registries;

Each Kyoto unit issued by the Parties in such a consolidated system is issued by one of the constituent Parties and continues to carry the Party of origin identifier in its unique serial number;

Each Party retains its own set of national accounts as required by paragraph 21 of the Annex to Decision 15/CMP.1. Each account within a national registry keeps a unique account number comprising the identifier of the Party and a unique number within the Party where the account is maintained;

Kyoto transactions continue to be forwarded to and checked by the UNFCCC Independent Transaction Log (ITL), which remains responsible for verifying the accuracy and validity of those transactions;

The transaction log and registries continue to reconcile their data with each other in order to ensure data consistency and facilitate the automated checks of the ITL;

The requirements of paragraphs 44 to 48 of the Annex to Decision 13/CMP.1 concerning making non-confidential information accessible to the public is fulfilled by each Party through a publically available web page hosted by the Union registry;

All registries reside on a consolidated IT platform sharing the same infrastructure technologies. The chosen architecture implements modalities to ensure that the consolidated national registries are uniquely identifiable, protected and distinguishable from each other, notably:

With regards to the data exchange, each national registry connects to the ITL directly and establishes a secure communication link through a consolidated communication channel (VPN tunnel);

The ITL remains responsible for authenticating the national registries and takes the full and final record of all transactions involving Kyoto units and other administrative processes such that those actions cannot be disputed or repudiated;

With regards to the data storage, the consolidated platform continues to guarantee that data is kept confidential and protected against unauthorized manipulation;

The data storage architecture also ensures that the data pertaining to a national registry are distinguishable and uniquely identifiable from the data pertaining to other consolidated national registries;

In addition, each consolidated national registry keeps a distinct user access entry point (URL) and a distinct set of authorisation and configuration rules.

Following the successful implementation of the Union registry, the 28 national registries concerned were re-certified in June 2012 and switched over to their new national registry on 20 June 2012. Croatia was migrated and consolidated as of 1 March 2013. During the go-live process, all relevant transaction and holdings data were migrated to the Union registry platform and the individual connections to and from the ITL were re-established for each Party.

The following changes to the national registry have occurred since the last National Communication report (

Table 11)

Table 11: Changes to the Union registry, including changes to the Slovenian national registry

Reporting Item	Description
15/CMP.1 Annex II.E paragraph 32.(a) Change of name or contact	No change in the name or contact information of the administrator occurred since the last National Communication report. The administrator designated by Slovenia to maintain the national registry is: Slovenian Environment Agency Address: Vojkova 1b, SI-1000 Ljubljana Phone: +386 1 478 40 00 Contact for registry - email: registerCO2.arso@gov.si
15/CMP.1 Annex II.E paragraph 32.(b) Change regarding cooperation arrangement	No change of cooperation arrangement occurred during the reported period.
15/CMP.1 Annex II.E paragraph 32.(c) Change to database structure or the capacity of national registry	In 2016 new tables were added to the database for the implementation of the CP2 functionality. Versions of the Union registry released after 6.1.6 (the production version at the time of the last NC submission) introduced other minor changes in the structure of the database. These changes were limited and only affected EU ETS functionality. No change was required to the database and application backup plan or to the disaster recovery plan. No change to the capacity of the national registry occurred during the reported period.
15/CMP.1 Annex II.E paragraph 32.(d) Change regarding conformance to technical standards	Each release of the registry is subject to both regression testing and tests related to new functionality. These tests also include thorough testing against the DES and were successfully carried out prior to each release of a new version in Production. Annex H testing is carried out every year. No other change in the registry's conformance to the technical standards occurred for the reported period.

Reporting Item	Description
15/CMP.1 Annex II.E paragraph 32.(e) Change to discrepancies procedures	No change of discrepancies procedures occurred during the reported period.
15/CMP.1 Annex II.E paragraph 32.(f) Change regarding security	The mandatory use of hardware tokens for authentication and signature was introduced for registry administrators.
15/CMP.1 Annex II.E paragraph 32.(g) Change to list of publicly available information	Publicly available information is provided via the Union registry homepage for the Slovenian registry (https://ets-registry.webgate.ec.europa.eu/euregistry/SI/public/reports/publicReports.xhtml) and via the web page of Slovenian Environment Agency (http://www.arso.gov.si/) over icon ”Register emisijskih kuponov” (http://www.arso.gov.si/podnebne%20spremembe/Register%20emisijskih%20kuponov/) . Publicly available information of the Parties to the Kyoto Protocol pursuant to the decision 13/CMP.1 are available under title “Javno dostopna poročila” (http://www.arso.gov.si/podnebne%20spremembe/Register%20emisijskih%20kuponov/Javno%20dostopna%20poro%C4%8Dila/).
15/CMP.1 Annex II.E paragraph 32.(h) Change of Internet address	No change of the registry internet address occurred during the reporting period. The Slovenian registry can be accessed at the following URL: https://ets-registry.webgate.ec.europa.eu/euregistry/SI/index.xhtml. Direct link to the registry is also published on the Slovenian Environment Agency web page (http://www.arso.gov.si/podnebne%20spremembe/Register%20emisijskih%20kuponov/) under “Prijave v register Unije”.

Reporting Item	Description
15/CMP.1 Annex II.E paragraph 32.(i) Change regarding data integrity measures	No change of data integrity measures occurred during the reporting period.
15/CMP.1 Annex II.E paragraph 32.(j) Change regarding test results	Both regression testing and tests on the new functionality are carried out prior to release of the new versions in Production. The site acceptance tests are carried out by quality assurance consultants on behalf of and assisted by the European Commission. Annex H testing is carried out on an annual basis.

4 POLICIES AND MEASURES

4.1 Policy Making Procedures

As an EU Member State, Slovenia actively participates in the formulation and implementation of common EU policies and measures. Under these processes, it develops its targets for reducing GHG emissions.

4.1.1 Development Strategies and Policies

At the end of 2017, Slovenia adopted the Slovenian Development Strategy 2030, the new umbrella national document. One of the Strategy's objectives is a low-carbon circular economy and a sustainable natural resource management. Slovenia is heading towards a period of adopting and preparing various strategies and plans, which will specify objectives for the period to 2030 and 2050. One of these is Slovenia's energy concept (ECS), which will identify orientations and plans regarding different areas of energy policy to 2030 and 2050. Two headline targets of Slovenia's energy concept are to reduce greenhouse gas emissions arising from energy consumption by at least 40% until 2030 as compared to 1990, and to reduce greenhouse gas emissions arising from energy consumption by a minimum of 80% by 2050 as compared to 1990. The aim is to ensure a sustainable energy use and that is why the concept will deal with three aspects of sustainability: climate variability, reliability of the energy supply and power supply competitiveness.

Preparations are also underway for a National Energy and Climate Plan (NECP), which will include national objectives by 2030 regarding following areas: decarbonisation (including targets for reducing greenhouse gas emissions and promoting further use of renewable energy sources), energy efficiency, energy security, internal energy market research, innovation and competitiveness. Its due date of preparation is end of 2019.

With numerous documents and decision-making processes at the EU level, and in particular with the EU 2020 Strategy, Slovenia has committed itself to pursuing the objective of sustainable growth. The EUROPE 2020[6] strategy for smart, sustainable and inclusive growth creates a vision of Europe's social market economy for the 21st century, including three priority elements that connect, complement and reinforce each other:

- smart growth: developing an economy based on knowledge and innovation;
- sustainable growth: promoting a more resource efficient, greener and low carbon economy;
- inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

The strategy supports the transition to an economy that is efficient in the use of all materials, completely decouples economic growth from the use of sources and energy and their

[1] COM (2010) 2020 final

environmental impacts, reduces greenhouse gas emissions, improves competitiveness with effectiveness and innovation, and provides greater security of the energy supply. Slovenia implements its vision referred to in the Europe 2020 strategy in its national policies. Therefore, Slovenia's preparation of the Operational Programme for Reducing GHG Emissions by 2020 is one of the priority tasks of the state in the National Reform Programme as a measure for reducing GHG emissions and boosting economic growth.

4.1.2 Objectives for Reducing GHG Emissions

In 2002, the Republic of Slovenia ratified the Kyoto Protocol, and committed itself to emitting on an average yearly basis 8% less greenhouse gases (GHG) in the period 2008–2012 than in the base year, which were determined as the sum of CO_2, CH_4 and N_2O emissions in 1986 and F-gases in 1995. This results in average annual target emissions of 18,726 Gg CO_2 eq, which was Slovenia's target in the period 2008–2012. In the Accession Treaty, Slovenia also adopted the same objectives as EU Member States.

In the period until 2020, Slovenia has set itself the objective of reducing GHG emissions within the policy and legal order of the EU. Within the climate and energy legislation package adopted in 2009, Slovenia adopted new legally binding objectives for reducing greenhouse gas emissions by 2020. The EU objective until 2020 was to reduce GHG emissions by 20% compared to 2005. Within this objective, Slovenia is reducing GHG emissions. A part of the reduction will be attained within installations which are not included in the emissions trading scheme; the objective is determined at the EU level, i.e. to decrease GHG emissions by 21% by 2020 compared to 2005 emissions. The objective for the sectors outside the EU Emissions Trading Scheme is a 10% decrease in the amount of emissions by 2020 compared to 2005 emissions for the EU as a whole.

The national objective of Slovenia is defined in sectors outside the EU ETS. According to Decision 406/2009/EC[7], the reduction of greenhouse gas emissions refers only to emissions from sectors which are not included in the European emission trading scheme with greenhouse gas emission allowances in accordance with Directive 2009/29/EC[8], and thus including emissions from fuel burning in households and in the service, transport, industry and energy sectors (only plants not included in the EU ETS), fugitive emissions from the energy industry, process emissions from industrial processes (without EU ETS), solvents and other product use, agriculture, and waste management. The objective of Slovenia until 2020 is to not increase greenhouse gas emissions by more than 4% compared to 2005. In the above legal act, Slovenia defined legally binding annual objectives, as the greenhouse gas emissions in the period 2013–2020 should not exceed the target annual emissions determined by a linear trajectory to the target in 2020. Since 2015, emissions calculations of GHG have been taking into account potential value of global warming referred to in the

[7] Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

8 Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.

Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which means that absolute annual commitments to reduce GHG emissions must be suitably adjusted. With this aim in mind and these measures in the EU-ETS sectors, Slovenia will contribute to a decrease in GHG emissions at the EU level by 20% by 2020 compared to the 1990 level.

Operational Programme for Reducing GHG Emissions until 2020 with a View to 2030 (OP GHG-2020) also defines indicative sectoral objectives for reducing sources of GHG emissions not included in the ETS, by 2020 and framework objectives by 2030. Framework objectives by 2030:

- to curb the rising emissions in the transport sector, so they do not increase by more than 18% by 2030 as compared to 2005 (which means a reduction of 15% by 2030 as compared to 2008);
- to reduce emissions in general use by 66% by 2030 as compared to 2005;
- in agriculture, the goal is to maintain GHG emissions up to a maximum of +6% by 2030 as compared to 2005, while simultaneously increase Slovenia's food self-sufficiency and food safety provision;
- to reduce emissions in industry by 32% by 2030 as compared to 2005;
- to reduce emissions in waste treatment by 57% by 2030 as compared to 2005;
- to reduce emissions in energy sector (predominant are fugitive emissions) by 16% until 2030.

Within the climate and energy legislation package, Slovenia undertook to achieve a 25% share of renewable energy sources of gross final energy use, a 10% of renewable energy sources in transport, and a 20% improvement in energy efficiency, all by 2020.

Policies and objectives are still being formulated for the period after 2020. Slovenia provides active support in developing a joint vision in order to prevent the dangerous consequences of climate change and to keep the growth of global temperature under 2 °C and its realisation within the framework of EU climate policy and agreements under the UNFCCC (in 2016, Slovenia also ratified the Paris Agreement) and with national climate policy and measures. Under the EU Plan for achieving a low-carbon economy by 2050, there are debates on sectoral objectives at the EU level until 2050 and on necessary intermediate objectives until 2030 and until 2040.

To support the preparation of the long-term low emissions strategy, which Slovenia needs to draw up by 2020, the LIFE ClimatePath2050 project has been initiated (2017–2021) for creation of GHG emissions projections by 2050 and the impact assessment.

4.1.3 National Programme Documents Regarding the Reduction of Greenhouse Gas Emissions

The Operational Programme for Reducing GHG Emissions until 2020 with a View to 2030 (OP GHG-2020) is an implementing plan for measures for achieving Slovenia's legally binding objectives for reducing GHG emissions by 2020 under the energy and climate

package in accordance with Decision 2009/406/EC and as such it is of key importance for changing Slovenia to a resource-efficient, green and competitive low-carbon economy and for attaining the objectives for reducing GHG emissions. The Government of Slovenia adopted it in December 2014.

OP GHG-2020 in is based to a large extent on the established instruments from the previous operational programme. Government of the Republic of Slovenia assigns the implementation of measures to the ministries responsible for individual areas. The programme provides clearer responsibilities for the implementation of activities by individual ministries, with time limits and defined sources of funding.

Most of the measures are implemented by pursuing several objectives at the same time and in this respect, the costs of implementing measures decrease significantly and they maximise the benefits due to synergy and multiplicative effects. For example, the EEU and RES are measures that at the same time reduce air pollution due to the pollutants SO_2, NO_x and dust particles and decrease GHG emissions. This orientation will additionally be strengthened in the implementation of climate policy after 2020. Therefore, the reduction of GHG emissions will mainly depend on the implementation of the adopted sectoral policies with integrated climate objectives and on the further integration of climate objectives and measures to mitigate climate change into the new sectoral programmes that are in the process of preparation.

Sectoral and development programmes defining the activities for reduction of GHG emissions are discussed even in more detail in the OP GHG-2020 than in the previous OP GHG-1. These documents include particularly programme documents regarding energy efficiency, renewable sources of energy, municipal waste management, implementation of European cohesion policy and rural development. The table below shows detailed information on the new or updated programme documents that are important for mitigation of climate change and were adopted after preparation of Slovenia's Sixth National Communication for UNFCCC.

In comparison to previous reporting, important progress has been achieved in regard to providing for the financing of measures by way of adopting the Operational Programme for Implementing European Cohesion Policy for 2014–2020 (OP ECP) and the Rural Development Programme of the Republic of Slovenia for the period 2014–2020 (PRP). In addition, revenues from the European GHG emission allowance trading scheme are now fully deposited into the Climate Change Fund, and not partially as in the period before 2015.

Table 12: Strategic documents of the Republic of Slovenia relevant to the mitigation of climate change.

Document title	Adoption	Implementation management	Monitoring and reports on implementation	Energy supply	Transport	General use	Industry	Agriculture	LULUCF	Waste
Climate changes										
Operational Programme for Reducing GHG Emissions until 2020 (OP GHG-2020).	2014, Government of the Republic of Slovenia	Ministry responsible for environmental protection	Annually (2017)	✓	✓	✓	✓	✓	✓	✓
Programme of the use of funds for Climate Change Fund in 2015 and 2016	2015, Government of the Republic of Slovenia		Annually		✓	✓				
Programme of the use of funds for Climate Change Fund in 2017 and 2018	2016, Government of the Republic of Slovenia	Ministry responsible for environmental protection	Annually		✓	✓	✓			✓
National Environmental Action Programme until 2030 (NEAP)	In preparation	Ministry responsible for environmental protection								
Waste										
Waste Management Plan and Waste Prevention Programme of the Republic of Slovenia	2016, Government of the Republic of Slovenia	Ministry responsible for environmental protection	Every three years							✓
Energy										
Energy Efficiency Action Plan for the period 2014−2020, (AN URE 2020).	2015, Government of the Republic of Slovenia	Ministry responsible for energy	Annually	✓	✓	✓	✓			

Document title	Adoption	Implementation management	Monitoring and reports on implementation	Energy supply	Transport	General use	Industry	Agriculture	LULUCF	Waste
Energy Efficiency Action Plan for the period 2017−2020, (AN URE 2020).	2017, Government of the Republic of Slovenia	Ministry responsible for energy	Annually	✓	✓	✓	✓			
National Action Plan for Nearly Zero-Energy Buildings Up to 2020, (AN sNES).	2015, Government of the Republic of Slovenia	Ministry responsible for energy			✓					
Long-term Strategy for Promoting Investments in the Energy Renovation of Buildings, (LTSERB).	2015, Government of the Republic of Slovenia	Ministry responsible for energy				✓				
National Renewable Energy Action Plan (AN OVE 2010–2020)	2010, Government of the Republic of Slovenia	Ministry responsible for energy	Biennially	✓	✓	✓	✓			
National Renewable Energy Action Plan – update 2017 (AN OVE 2010–2020)	In the process Government of the Republic of Slovenia	Ministry responsible for energy	Biennially	✓	✓	✓	✓			
Energy Concept of Slovenia (ECS)	In preparation	Ministry responsible for energy		✓		✓	✓			
National Energy and Climate plan (NECP)	In preparation	Ministry responsible for energy		✓	✓	✓	✓	✓	✓	
Transport										
Transport Development Strategy of the Republic of Slovenia (TDS).	2015, Government of the Republic of Slovenia	Ministry responsible for energy			✓					

4.1.4 Programmes at the Local Level

Administratively, Slovenia is divided into 212 municipalities, 11 of which have the status of urban municipality. There is no regional level of governance in Slovenia. This is why the majority of programmes and measures are implemented at the national level and all subsidies dedicated for the reduction of GHG emissions are allocated at the national level. However, municipalities have several obligations related to the planning of measures for the reduction of GHG emissions and an important role in the preparation of projects and monitoring their impacts.

A local energy concept is mandatory for all municipalities in accordance with the Energy Act (EZ-1). On the basis of the local energy concepts (LECs), the use of RES is planned in the territory of a local community. Objectives and measures for achieving these objectives are defined in LECs and they must be compliant with action plans in the area of EEU and RES and the national umbrella energy policy. An LEC is an important basis for development planning at the level of a local community as it presents the mandatory expert basis for the preparation of spatial plans of the local community. Bodies of a local community and providers of energy-related activities in the area covered by an individual LEC are obliged to align the respective development programmes and related activities with objectives and measures envisaged in the LEC. The local energy concept is a mandatory document which must be prepared by a local community (possibly in cooperation with other communities) at least every ten years. The methodology for the preparation of LEC is regulated, and in accordance with EZ-1, a revised methodology is being prepared. Practically all municipalities have adopted an LEC. Important decisions for reducing GHG emission are also adopted by municipalities within the scope of municipal spatial plans.

The environment protection programmes have been adopted by all Slovenian city municipalities; these programmes also include objectives for reducing emissions of substances in the air, for the improvement of the air quality, for reducing GHG emissions and the long-distance transfer of hazardous substances. They also include EE measures for achieving objectives set in the regard to light pollution. Air quality plans have been adopted by all municipalities with excessive particle pollution (PM10 particles), which include EEU measures, simultaneously also being measures for reducing GHG emissions. The implementation of measures is promoted by the State by providing additional subsidies financed from the Climate Change Fund.

Within the framework of Operational Programme for Implementing European Cohesion Policy for 2014–2020 under investment priority no. 4, the municipalities were able to: Sustainable consumption and production of energy and smart grids, investment priority no. 4.4: Promoting low-carbon strategies for all types of geographical area, in particular for urban areas, including the promotion of sustainable multi-modal urban mobility and adequate mitigation and adaptation measures apply for funding of Comprehensive Transport Strategy (CPS). The specific objective of the co-financing of operations was development of urban mobility and improvement of the air quality in the cities. Integrated transport strategies enable the establishment of a sustainable transport system, among others by reducing greenhouse gas emissions, energy consumption and pollution. When

planning the CPS, municipalities also include reducing GHG emissions in the transport sector.

On a voluntary basis, municipalities have joined various international initiatives, such as, for example the "Covenant of Mayors Committed to Local Sustainable Energy". These municipalities have set the target of reducing GHG emissions by more than 20% by 2020, which has been defined in their Sustainable Energy Action Plans. In 2015, the Covenant of Mayors set new objectives for 2030, which are reducing CO_2 emissions of greenhouse gases by at least 40% and a merger of climate change mitigation and adaptation under a common framework. The newly initiated "Covenant of Mayors for Climate and Energy" was presented by the European Commission on 15 October 2015 during an event at the European Parliament in Brussels. The signatories also support the joint vision for 2050: promoting the decarbonisation of territories, strengthening the ability to adapt to the inevitable effects of climate change, and ensuring access to safe, sustainable and affordable energy for citizens. The signatories are committed to submit an action plan for sustainable energy and climate change within two years from the date of the local council's decision adoption. The plan will outline the key measures the signatories intend to take. In 2017, the said Convention included 29 Slovenian municipalities with the total of 34% of all inhabitants of Slovenia. All of the municipalities have already submitted the Sustainable Energy Action Plans.

Seven local energy agencies, created by municipalities with the support of the state and European programmes in 2006, are highly active in the preparation of local energy concepts, the implementation of efficient energy use measures and use of renewable resources in municipalities. Every agency connects the municipalities that have established it, with the wider geographical area, and acts as a promoter of projects and supports local communities in preparing their projects. With their assistance, municipalities also get united with applications for international tenders regarding technical assistance for the implementation of EEU and RES measures. They play an important role in the implementation of new instruments in practice, such as energy contracting, energy management, etc. They are an important element in the cross-border and cross-regional cooperation of municipalities in the field of sustainable energy and mitigation of climate change.

Municipalities are also uniting when it comes to the implementation of climate change mitigation measures, especially in the construction of waste management infrastructure and sustainable mobility, including infrastructure for the development of public passenger transport, non-motorised forms of transport and the introduction of alternative fuels into transport.

4.1.5 Monitoring of Climate Change Implementation

In addition to measures, the OP GHG-2020 programme also includes plans for monitoring implementation. Two reports on implementation of the OP GHG-2020 were prepared and adopted by the Government. The reports consisted of two parts: an analysis of the indicator movement to monitor the impact of the measures, and analysis of the implementation of the measures according per responsible entity. Within the LIFE ClimatePath2050 project, the monitoring system of the programme implementation will be updated and extended, so that

it will meet the needs of monitoring the implementation of the National Energy and Climate plan. Implementation of previous greenhouse gas emission reduction programmes has been monitored since 2008, including the preparation of annual reports approved by the Government of the Republic of Slovenia. All relevant sectoral programmes: Renewable Energy Action Plan 2010–2020, Energy Efficiency Action Plan 2014–2020 are also monitored with reports.

Slovenia as an EU Member State has also undertaken to monitor the implementation of its climate policy within the mechanism for monitoring Community greenhouse gas emissions in accordance with Regulation No. 525/2013, on the basis of which Member States are obliged to annually submit recorded data, and every two years, prepare reports on measures and projections, while the Commission must annually prepare a report on the progress of the EU and individual Member States.

4.1.6 Policy Making Coordination

Guidance and harmonisation of activities for the implementation and possible changes and amendments were carried out by the ministry responsible for environmental protection, and in the period from June 2009 to March 2012 by a special government body: the Government Office for Climate Change. In 2012, this service re-joined the ministry responsible for protecting the environment due to a reduction in the number of ministries and government services with a view to reducing the costs of public administration.

The ministry responsible for environment (since 2014 known as the Ministry of the Environment and Spatial Planning), guides sectoral and inter-sectoral policy-making in the areas of mitigation, adaptation and technological-developmental transition to a low-carbon society; guides the development of policy-making in order to achieve the objectives of mitigation and adaptation to climate change and the formation of the priorities of sectoral and inter-sectoral programmes for the mitigation of climate change and adaptation; participates in the preparation of the technological-development policy and the promotion of a low-carbon platform; on the basis of a Government decision, it helps prepare draft acts and other acts referring to the area of climate change; participates in the preparation of the positions of line ministries for the preparation of regulations and other EU documents referring to the area of climate change; cooperates with the public and private sectors in the implementation of programmes and measures; promotes and participates in the preparation of awareness, training and education programmes on climate change and monitors the implementation of policies, programmes and measures in the area of climate change.

4.2 GHG Emission Reduction Measures

4.2.1 Multi-sectoral Measures

(M-1) GHG EMISSION ALLOWANCE TRADING (EU-ETS)

Sectors influenced by the implementation of the measure: *electricity and heat generation, energy consumption in industry and construction, industrial processes*

The objectives of EU Emissions Trading System are the following: to support the commitments to reduce emissions; to enable lower costs for corporate entities by enabling a decrease in emissions where this is the cheapest; to equalise the costs of the reduction of GHG emissions in the entire EU area by permitting international trading – this will minimise the restriction of competition and discrimination of the position of corporate entities (operators of plants responsible for GHG emissions) in the common internal EU market, and facilitate the reduction of GHG emissions in the future by upgrading innovation regarding the reduction of GHG emissions.

A decision was made at EU level on reaching the objective of the EU ETS sector by 2030 with the market stability reserve mechanism defined by Decision (EU) 2015/1814, which will be put into practice at the beginning of 2019. In 2015, a proposal for a legal revision of phase 4 of the EU ETS system was presented, which would apply for the period from 2021 to 2030 with the following changes: the volume of emission allowances on the market will decrease by 2.2% per year after 2021. Promotion through revenue from EU ETS auctions will increase, this will also facilitate the modernisation of the energy system and improvement of the energy efficiency in the Member States.

After 2013, 73 plants in Slovenia were included in the GHG emission allowance trading scheme in phase three and these represented 36.3% of total GHG emissions. Operators are distributed in the following IPCC sectors: energy industries, where most of the operators are included in the EU ETS; manufacturing industries and construction, where 63% of GHG emissions of this sector are included in the EU ETS; and industrial processes, where 54% of GHG emissions are included in the EU ETS. Since 2012, the EU ETS also includes aviation.

Emissions of the EU ETS sector reduced by 26% in the 2005–2016 period, in the transformation sector by 24.1% and industrial emission from fuel consumption and processes by 31.0%.

At the EU level, the legally binding objective of reducing GHG emissions from this sector by 21% by 2020 compared to the 2005 level has been adopted and is the common goal for the EU-28 and is not further differentiated according to each Member State. For the period until 2030, the objective of reducing emissions by 43% was set. For the period 2013–2020, the impact of the EU ETS scheme on reduction of emissions in Slovenian installations has been assessed as the difference between the projection of actual emissions and the indicative average annual quantity of emission allowances. The indicative amount was assessed in

such a way that the amount of emission allowances for the period 2008–2012 decreased linearly by 1.74% annually from 2010.

The Ministry of the Environment and Spatial Planning (MESP) is responsible for its implementation, while the tasks encompass implementation of the provisions of the Environmental Protection Act referring to trading with emission allowances. The establishment of the system falls within the competence of the EU.

(M-2) ENVIRONMENTAL TAX ON CO_2 EMISSIONS

Sectors influenced by the implementation of the measure: *energy consumption in industry and construction, energy consumption in households, services, transport and agriculture*

In Slovenia, the environmental tax on CO_2 emissions (the CO_2 environmental tax) was introduced in 1997, the current legal basis for the tax is provided in the Decree on environmental tax on carbon dioxide emissions[9] and the Environmental Protection Act[10]. The environmental tax is paid for the use of fuels and, since 2008, for the use of fluorinated greenhouse gases. With the new Decree, the F-gases tax was abolished in 2016. The exemption of tax payment for the combustion of fuels for liquefied petroleum gas and natural gas as a propellant was also abolished.

The basis for the calculation of the environmental tax on CO_2 emissions is the sum of the units of pollution of the purchased amount of fuels. The price per unit of pollution is determined by the Government of the Republic of Slovenia and has amounted to €17.3/t CO_2 [9] since 1 April 2016 and has not changed since the last decision was adopted. Prior to that, it amounted to €14.40/t CO_2.

The use of gaseous fuels, liqueied petrol gas (LPG) and kerosene used as a propellant is exempt from the payment of the environmental tax which, however, does not apply for private flights. The exemption also applies to companies that are included in the EU ETS system (holders of permits for the emissions of greenhouse gases) and the de minimis decision. In the past, the environmental tax was supplemented with an exemption scheme on the basis of voluntary agreements which expired in 2010.

The above-mentioned instrument has been introduced in order to internalise the external costs of air pollution due to CO_2 emissions and, being an economic instrument, was aimed at reducing CO_2 emission through the fuel price and therefore aimed at reducing environmental pollution. The CO_2 tax improves the competitiveness of renewable energy sources and of other energy products with lower specific emissions and the competitiveness

[9] Decree on environmental tax on carbon dioxide emissions (Official Gazette of the Republic of Slovenia, No. 22/2016).

[10] The Environmental Protection Act/ZVO-1 (Official Gazette of the Republic of Slovenia 41/2004, 17/2006, 20/2006, 28/2006 Constitutional Court Decision, 39/2006-UPB1, 49/2006-ZMetD, 66/2006 Constitutional Court Decision, 112/2006 Constitutional Court Decision, 33/2007-ZPNačrt, 57/2008-ZFO-1A, 70/2008, 108/2009, 108/2009-ZPNačrt-A, 48/2012, 57/2012, 97/2012 Constitutional Court Decision, 92/2013, 56/2015,102/2015, 30/2016 and 61/2017 – GZ).

of energy efficiency measures. The measure has effects simultaneously with other measures for promoting improvements in energy efficiency and fuel substitution in transport and in buildings.

(M-3) USE OF BEST AVAILABLE TECHNIQUES

Sectors affected by the implementation of the measure: *electricity and heat generation, energy consumption in industry and construction, industrial processes, waste management, agriculture*

The Directive 2010/75/EU on industrial emissions is the key instrument regulating the emissions of harmful substances, while the most important instrument in regard to emissions from fuel use or for the promotion of energy efficiency and substitution of fuels in industry is the emissions trading, EU ETS (measure M-1), with the Directive 2010/75/EU merely complementing it. The aim of the directive is the introduction and the promotion of the best available technologies (BAT) through environmental permits for installations and devices and their control. In this manner, the selection of new equipment is influenced and the replacement of existing equipment is encouraged so that the equipment must meet the conditions and provisions from the directive or standards from referential documents. The Directive also specifies the emission limit values for large combustion installations. The Directive is of key importance for emission reduction (CH_4, N_2O, F-gases) in the following sectors: industry, energy supply, agriculture and waste management. The Directive is also complemented with other EU measures, such as Directive on the reduction of national emissions of certain atmospheric pollutants ("NEC Directive").

In Slovenia, this instrument contributed to the key reduction of GHG gases emissions in industrial processes, when the old electrolysis unit was stopped since it failed to meet the standards of the best available technologies. Consequently, the PFC emissions were reduced by approximately 85%.

(M-4) TAXES AND CHARGES

Sectors influenced by the implementation of the measure: *energy consumption in industry and construction, energy consumption in households, services, agriculture and transport*

The reason for the taxation of energy primarily stems from the nature of the budget. The main goal of the tax system is providing a stable source of fiscal revenue. This goal also takes into account other goals of government policies (social, economic, energy and environmental) but these goals are subordinated to the above-mentioned primary goal. As regards the energy taxation, the Government is partially limited with requirements for minimal energy products taxation as set in Directive restructuring the Community framework for the taxation of energy products and electricity11. Energy taxation is one of the most important instruments available for the Government for influencing the final price of individual energy products, influencing the price relations among energy products and

[11] Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity

thus assisting in the fulfilment of the objectives of the environmental and energy policy. In addition to excise duties, the price of energy products is significantly affected by world market prices, the environmental tax on CO_2 emissions, RES and EEU contributions.

In 2016, the new Excise Duty Act (ZTro)[12] was adopted, bringing updates on charging excise duties for installations with self-sufficient electricity supply, which is only charged for the net amount of electricity used; the amendment therefore encourages the use of renewable energy resources. Under the new arrangement, excise duty on electricity is calculated according to the size of the supply – bigger clients pay less – which does not support climate and energy objectives.

A new system of excise duty exemption was introduced, which is regulated in detail by the Rules on the Conditions and Procedures for Excise Duty Exemptions For Energy Intensive Companies (Official Gazette of the Republic of Slovenia, No. 83/16). The amendment is contrary to the objectives of reducing GHG emissions.

A more detailed presentation of the excise duty for fuels and energy products in the Republic of Slovenia is presented in the Slovenia's Sixth National Communication and First Biennial Report under the UNFCCC (SI-NC6/BR1). In 2014, the transitional period for the taxation of natural gas as vehicle fuel lapsed; it had been negotiated by Slovenia since the immediate introduction of a minimum excise duty in the prescribed amount could endanger the implementation of the set objective (increased use of natural gas) and the fulfilment of commitments undertaken by Slovenia with the ratification of the Kyoto Protocol. The amount of excise duties for liquid fuels is determined by the Government of the Republic of Slovenia by the harmonisation of the prices[13] of oil derivatives with the movements of crude oil prices and the American dollar exchange rate. The results of the excise duty policy for liquid fuels are indicated in the change of the excise duty and the difference between the price of motor petrol and gas oil and the approximation of the retail prices of motor fuels to the European average. The prices in the neighbouring countries have a significant impact on the sales of the transit transport fuel in Slovenia, which is a volatile category and results in uncertainties in the energy balance and GHG emissions and is particularly noticeable due to the smallness of Slovenia.

The excise duty on motor fuels has increased in the period since 2000, with excise duty for diesel fuel increasing by 39% and for petrol by 41% in 2008–2016 period. The highest petrol excise duty was in 2013, and up to 2016, excise duty for this type of fuel has been slightly falling. In 2011, the excise duty for diesel fuel reached its lowest point. After 2011, this excise duty has been gradually increasing. Throughout the 2008–2016 period, the excise duties for extra light fuel oil increased significantly, specifically, by 587%. The use of this type of fuel for heating has decreased significantly with simultaneous application of other measures

[12] Excise Duty Act – ZTro (Official Gazette of the Republic of Slovenia, No. 47/2016)

[13] On 1 November 2017, a new updated methodology for determining prices of oil derivatives entered into force, which is defined in the Decree on Setting Prices for Certain Petroleum Products (Official Gazette of the Republic of Slovenia, No. 60/2017). The price level is determined on the basis of the Platts European Marketscan, which is then converted into EUR/litre units. The purchase price of mineral fuels also includes the additive for bio-component, which is also expressed in EUR/litre units.

(subsidies for RES, calculation of heat consumption in multi-apartment buildings according to the actual use, etc.).

The Slovenian excise duty policy allows certain suspensions from payment, partial reimbursements and exemption of excise duty. In accordance with European legislation (i.e. Directive No. 2003/96/EC on taxation of energy products58), the exemptions of the excise duties identical in all EU Member States have been enforced in Slovenia, specifically, for energy products used for electricity generation, co-generation of thermal and electric power, and for fuel use in diplomatic vehicles.

Some other exemptions have also been enforced which are optional at the EU level, and the reimbursement is calculated as a difference to the regulated minimum excise duty applicable in the EU. The possibility for a partial reimbursement of excise duty paid for gas oil has been in place since April 2009, if it is demonstrated that it is applied for powering commercial vehicles. A partial reimbursement of excise duty is envisaged for the use of energy products in industrial commercial applications (static working machinery, construction machinery, motor vehicles on rails, cable ways and ski lifts) and in the use of energy products applied in agricultural and forestry machinery. In 2014, a new measure was adopted within the scope of the OP GHG 2020 for progressive reduction of subsidies, which is contrary to the objectives of reducing GHG emissions. This should not jeopardise the competitiveness of the Agriculture sector and the achievement of the objectives of the agricultural and food policy. The report on the implementation of the OP GHG 2020 notes that these subsidies have been increasing over the years and that the value of the indicator moves away from the intended target.

A new working group for the green budget reform was formed in 2016, which is run by the Ministry of Finance. The working group was established within the scope of the Framework Programme for Transition to a Green Economy. The purpose of the group is the making of policies, instruments and measures aimed at promoting a simultaneous development of a sustainable and competitive economy. The group examined the situation regarding environmentally harmful subsidies and developed proposals for their elimination and reduction; it also analysed the suitability of other taxes on environment pollution and exemptions, reimbursements and tax credits in case of conducts with adverse effects on the environment. For this purpose, the Project Start-up Plan of the Government Strategic Development Project P3: Green Budget Reform was prepared.

(M-5) EDUCATION, TRAINING, AWARENESS-RAISING, COMMUNICATION AND PROMOTION

Sectors affected by the implementation of the measure: *all sectors*

Various players in Slovenia (government and non-government sector, media, business sector, professional institutions etc.) have been carrying out activities for education, training, communication and awareness-raising in regard to mitigating climate change. The activities are financed from different sources, including the state budget, EU funds and various international sources. Currently, the activities are carried out individually and there is no

coordination between them. In accordance with the OP GHG-2020, the targets for the period up to 2020 have been oriented towards education and training for the transition to a competitive low-carbon society, the strengthening of human resources for opening new green jobs and for communicating about the benefits of mitigating climate change and practical aspects of implementing measures.

AWARENESS RAISING, COMMUNICATION AND PROMOTION

Articles 351, 352 and 353 of EZ-1 refer to the programmes for communication, awareness-raising and training of the subject mater. The main change in the established practice is the transfer of the development and implementation regarding communication, training and awareness raising programmes for various target groups (households, SMEs, public sector) to the Centre for RES/CHP Support (Borzen company). The Borzen company is promoting awareness-raising, communication and training activities on renewable energy sources and efficient energy use under its own trademark "Trajnostna energija" (in English: "Sustainable Energy"). A web portal under the same name was established, which was revamped in 2016.

In addition to the portal, Borzen also organised the "Sustainable Energy – Locally" conference in 2016 (also in 2015); company's activities also included organisation of a competition for university students, demonstration of building renovations in terms of savings, establishment of an information portal on wood biomass, a geographical presentation of potentials and realisation of RES and EEU measures (in 2015 and 2016), production of DVDs with 15 popular educational TV shows on sustainable energy ("Eko utrinki"; in English: "Eco Moments"), which they donated to Slovene elementary and secondary schools for educational purposes. The shows were also broadcast on Slovenian national television in 2016. Together with the Informa Echo agency, the Borzen company carried out the REUS research on energy efficiency in 2015.

In 2017, Borzen produced the cartoon series "Lepši svet" (in English: "Better World") on efficient use of energy for children, which was broadcast on RTV SLO national television, and in 2018, new episodes of "Eko utrinki" will be broadcast on national television.

The provision of information to households continues to be conducted through the network of Energy Consulting Network for Citizens (ENSVET), which has been active since 1993. In 2016, there were 70 qualified independent energy consultants operating in 49 offices of the ENSVET network. Altogether, they participated in 7,530 activities (providing advice in the form of written reports, online advising, articles, broadcasts on the national television, lectures, schools, etc.). In 2015, 5230 activities were carried out within the ENSVET network, including recommendations regarding energy (articles, broadcasts on national television, lectures, providing advice in written reports). Energy consultants also visited 41 project sites, which were funded by the Eco Fund grants, and graded the quality of their construction. In 2015, there were 4,321 cases where advice was provided in a written report, in 2016 there were 5,746 such cases. Target objectives lag behind the annual work programme, which planned 8,000 pieces of advice given during face-to-face interviews. In 2017 and 2018, the annual work programme anticipates 8,000 pieces of advice given during face-to-face interviews. This norm will increase yearly and its aim is to increase the annual number of pieces of advice to 10,000 in 2020.

Information on EEU measures and exploitation of RES continue to be submitted to consumers by other players in the energy service market, such as energy companies, Eco Fund, local energy agencies, NGOs and others. In the 2013–2014 period, the above-mentioned activities were pursued within the scope of achieving savings in energy sold to final customers. The Decree on Energy Savings for Final Customers expired on 1 January 2015.

From March 2014 to the beginning of 2017, the REACH project was being implemented, and one of its partners was the Focus organisation, which offered energy consultations in 410 low-income households of Zasavje and Pomurje region. Project REACH was based on the ACHIEVE project, which taught households on how to implement suitable steps to reduce energy consumption and unnecessary costs.

One of the supplementary measures for increasing the efficiency of energy use in public sector and in households is the support provided for education and awareness-raising on energy efficiency envisaged within the scope of the priority axis "Sustainable consumption and production of energy and smart grids" within the OP ECP.

One of the major non-governmental projects in the area of climate change mitigation was the "Slovenia is lowering its CO_2 emissions" project; its implementation in 2015 and 2016 was continued by the Umanotera foundation. The project identified good practices in Slovenia, which aim to significantly reduce CO_2 emissions and contribute to promoting the principles of sustainable development. 20 good practice examples were compiled and presented in a catalogue.

The LIFE ClimatePath 2050 project, which began in 2017 and will last until 2021, will (partially) contribute to a greater awareness of climate change mitigation. The project will organise a photography contest (for young people) on the subject of climate change action, and a climate scoreboard will be established for local communities.

Awareness-raising campaigns in the field of transit are also not being monitored. Promotional activities have been implemented in the framework of the IJPP project and other projects, which is also planned for the future.

In agriculture, during the 2015–2016 period, five public procurements were carried out for drawing-up the animal welfare programmes, the development of plans for organic farming and the development of farm activity programmes for farms undergoing measures of organic farming and agricultural and environmental climate payments. 1990 participants used the consultation services.

EDUCATION

By way of the Energy Efficiency Action Plan 2020 (AN URE 2020) and OP GHG-2020, the measure regarding the inclusion of climate contents into a broader education process for sustainable development in Slovenia at all educational levels continues. The content related to the EEU and use of RES are included in various educational programmes (for example, the Energy Technology study programme pursued by the University of Maribor, the Eco-

School programme for kindergartens, elementary and secondary schools, optional subjects regarding the environmental protection in general upper secondary schools and elementary schools). The Framework Programme for the Transition to a Green Economy foresees the establishment of an Expert Working Group for education and training on climate change and sustainable development which will also address the needs for an integrated review of the situation and the planning of the development of the area. Within the measure of education and training on climate change and sustainable development the Partnership for a Green Economy, a working group of the Ministry of Education, Science and Sport, was established in 2016. The task of developing a set of knowledge and competences important for achieving the objectives of the green economy has also been fulfilled. The task will be fully implemented by 2021 with the completion of all the projects.

The measure for the preparation and implementation of a targeted education and training for implementing projects related to EEU, use of RES, green energy technologies and other areas for mitigating climate change will be further executed. Introducing the non-formal and formal education of providers of energy-saving renovation of buildings and energy managers and training of SMEs and providers in construction implementing renovation and new construction will be upgraded with the education organised for the staff from the public sector in regard to the implementation of Green Public Procurement and Energy Contracting.

Some funds have also been allocated for the non-formal and formal training of providers of energy-saving renovation of buildings within the scope of the priority axe "Sustainable consumption and production of energy and smart grids" within the OP ECP.

TRAINING

Article 341 of EZ-1 regulates the implementation of training programmes for independent experts carrying out inspections of air-conditioning and heating systems, and for independent experts providing energy performance certificates. Training for independent experts carrying out inspections of heating systems is not implemented. Training for regular inspections of air-conditioning systems is implemented by the Laboratory for Heating, Sanitary, Solar and Air-Conditioning Engineering of the Slovenian Faculty of Mechanical Engineering since 2014. It takes place several times a year. In 2015 and 2016, 14 individuals have successfully completed the training. Currently, training of RES technology installers as stipulated by the Article 359 of the EZ-1, is not carried out. On the other hand, training for experts providing energy performance certificates, which is composed of four days of lectures and an individual production and presentation of two energy efficiency certificates (calculation and measurement reports), has been in place since 2012. By the 2 February 2018, 388 licences had been issued by the ministry responsible for energy to independent experts providing energy efficiency certificates.

Education activities and training programmes are also conducted within the scope of various projects and programmes, for example, the education for European Energy Manager – EUREM (annually), training programmes for engineers and architects on sustainable construction, energy efficiency, and green public procurement are held by the Slovenian Chamber of Engineers and Slovenian Chamber of Architecture and Spatial Planning and the

Green Building Council Slovenia – GBC, training programmes financed by the Climate Change Fund (training programmes for elementary school teachers, chimney sweepers, energy advisers operating within the ENSVET network etc.) and other training programmes. In agriculture, within the Rural Development Programme, which also includes the transfer of knowledge and information activities in the field of agri-environment-climate content, seven public procurements were carried out for training in the field of Agri-Environment-Climate Payments (AECP), ecological farming and animal welfare in 2015 and 2016. 25,350 participants attended these training sessions. In 2017 and 2018, more public procurements will follow.

The finances of the Climate Change Fund have been planned to be used for the implementation of various future training programmes (for example, training programmes for multi-apartment building managers, training programmes for companies providing building structures cleaning services, for companies participating in the planning, installation and maintenance of small heating boilers, training programmes for public servants on climate change and sustainable development, training programmes for various target groups on energy efficiency etc.). Within the OP ECP, the "Sustainable consumption and production of energy and smart grids" priority axis, plans have been made to organise training programmes for providers of nearly zero-energy construction and for micro enterprises and SMEs in construction industry, and within the "Investing in education, training and lifelong learning" priority axis, activities have been envisaged for enhancing knowledge and skills enabling faster adjustment to changes in the labour market and transfer to low-carbon society (LCS).

In 2015, seven programmes were available but there was not enough interest in educating the MESS professional staff on how to strengthen the competences of students in higher quality education regarding sustainable development. Only one programme was fully implemented. In 2016, 39 public school teachers were selected for the project "Liven Up the School 2016–2021", which aims to educate professional staff on how to strengthen competences of their students.

(M-6) GREEN ECONOMIC GROWTH

Sectors influenced by the implementation of the measure: *energy consumption in industry and construction, energy consumption in households, services, agriculture and transport*

One of the objectives of the OP GHG-2020 is also to support a transition to an economy with a growth, which is not based on an increased use of natural resources and energy but on economy which is reducing GHG emissions by way of efficiency and innovation, improving competitiveness and promoting higher security of the energy supply. It thus includes measures for increasing domestic demand for green solutions and represents a great opportunity for green economic growth, being oriented towards the sectors of buildings, transport, agriculture, waste and industry and supported by incentives for research and technological development and eco-innovation. The OP GHG-2020 is mainly focused on issues related to sustainable consumption and production, supporting innovation and research, reducing environmentally harmful subsidies and providing suitable prices.

There were several development incentives available in Slovenia in the past which, however, were not area-focused; this has changed in the past two years, mainly as a result of the thematic focus of the European Cohesion Policy. The transition to a low-carbon economy in all sectors is a high priority objective in the 2014–2020 period, together with the strengthening of research, technological development and innovation. The financial framework for a successful implementation of OP GHG-2020 measures is provided for in the OP ECP and the planned measures will be predominantly financed from the European investment and structural funds. For financial research and innovation incentives that are used for achieving climate change objectives, EUR 68.2 million is planned within the OP ECP to promote the development of entrepreneurship, and EUR 86.4 million is planned for climate objectives.

The Slovenian Smart Specialisation Strategy (S4) which represents the basis for the drawing of funds from the OP ECP within the first priority axis (International competitiveness of research, innovation and technological development) was adopted by the Government and the European Commission at the end of 2015. The comprehensive vision regarding S4 supports the green economy and practically all priority areas and areas of the use of S4; especially priority areas such as smart cities and communities, smart buildings and homes, including wood chain, networks for the transition to a circular economy, sustainable food production, mobility, development of materials, are important for the transition to a green economy with low GHG emissions.

In 2016, the S4 was financed from the EU funds and was launched through RDI activities in chains and value networks for industrial research and experimental development and for products and services (TRL 6-9).

In October 2015, the Government of the Republic of Slovenia also adopted the Framework Programme for the Transition to Green Economy. The programme aims at providing an active support of responsible players in a transition to a green economy and integration of measures and activities pursued by sectoral policies. The main objective of the said programme is to establish an active and permanent dialogue between key players, the integration of existing policies and activities and their improvement; the acceleration of the transfer of knowledge for a faster transition to green entrepreneurial practices and the development of green job posts, products and knowledge, together with the development of indicators and monitoring the progress of the green economy.

At the same time that the Framework Programme for the Transition to Green Economy was adopted, the Inter sectoral Working Group – "Partnership for Green Economy" was established, which has been assigned the task of monitoring and improving measures from the said programme.

The evaluation of efficiency of individual instruments on the part of the management body will be important for OP GHG-2020, in order to monitor effects of funds allocated for research and innovation for reducing GHG emissions and, on a broader scale, for green economy.

(M-7) ENERGY LABELLING AND MINIMUM STANDARDS FOR PRODUCTS AND APPLIANCES

Sectors influenced by the implementation of the measure: *energy use in the public sector, service sector and households, energy use in transport*

Eco-design requirements for energy related products are defined in Article 327, while requirements for energy labelling of products in Article 328 of EZ-1; they come from Directive No. 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products[14], including smaller changes compliant with the EED, and Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products[15], which was repealed by Regulation (EU) 2017/1369 setting a framework for energy labelling[16]. This regulation introduces a gradual transition to the labelling of products with a simpler scale from A to G, as the lowest categories from the previous scale (from A+++ to G) will no longer be necessary due to the development of more energy efficient products.

Eco-design requirements for energy related products are transposed into Slovenian legal order directly with Commission Regulations. In the 2015–2016 period, a range of these products was expanded with professional refrigerated storage cabinets, local space heaters and solid fuel local space heaters, solid fuel boilers and air heating products, cooling products, high temperature process chillers and fan coil units. For professional refrigerated storage cabinets, local space heaters, solid fuel boilers and solid fuel boiler sets with other devices, the requirements for energy labelling were set down in the 2015–2016 period. These requirements are also directly transposed to the Slovenian legislation by means of delegated Commission regulations. The Commission will continue to include new product groups.

In 2016, all regulations with regard to eco-design requirements for energy-related products, with the aim of improving product testing and reducing the possibility for fraud, were amended by the Commission Regulation with regard to the use of allowed tolerances in verification procedures.

In Slovenia, favourable loans granted by the Eco Fund are available to purchase large energy efficient household appliances, specifically, for stoves, refrigerators, freezers or their combinations, for washing machines, drying machines and dishwashers classified into A+ energy class or higher in terms of energy consumption. The purchase of energy-efficient household appliances is also one of the measures by which the obligated parties can achieve savings under the energy efficiency obligation scheme, which is in more detail presented in the instrument (M-8).

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[14] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of eco-design requirements for energy-related products (recast), OJ L 285, 31. 10. 2009.

[15] Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (recast), OJ L 153, 18. 6. 2010.

[16] Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU, OJ L 198, 28. 7. 2017.

(M-8) OBLIGATIONS OF ENERGY SUPPLIERS TO ACHIEVE ENERGY SAVINGS IN ENERGY SOLD TO FINAL CUSTOMERS

Sectors influenced by the implementation of the measure: *energy consumption in the public sector, service sector and households, energy consumption in industry and construction, energy consumption in transport*

In 2015, in accordance with Article 7 of the Energy Efficiency Directive (EED)[17] and Article 318 of the EZ-1, a new scheme of mandatory end-use energy savings for retail energy sales companies was established. In the scheme, which is more accurately defined by the Decree on Energy Savings Requirements[18], all suppliers of electricity, gas, liquid and solid fuels are obliged to ensure the achievement of energy savings among final customers, while the amount of savings that the obligated parties have to achieve, varies from 0.25% of the energy sold in the previous year in 2015, up to 0.75% in 2018 and from 2018 onwards. The Decree does not define the financing of measures by which companies ensure savings.

According to the Slovenian Energy Agency, which is responsible for monitoring the implementation of the new scheme of mandatory end-use energy savings target, in 2015, 163 obligated parties were included in the scheme and they achieved 502.2 GWh of energy savings, of which 57% were achieved by implementing measures in economy[19], and 39% by implementing measures in transport. In 2016, 167 obligated parties reduced energy consumption at final customers by 327.3 GWh, of which 56% of all savings were achieved by measures in industry, 31% by measures in transport, and 7.5% by measures in households. There is no information available on the achieved CO_2 reduction for 2015, but for 2016, it was estimated at 89 kt.

According to the proposal for amending the Energy Efficiency Directive in the "Clean Energy for All Europeans" energy package, implementation of the instrument is expected to continue at least until 2030.

[17] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/08/EC and 2006/32/EC, OJ L 315, 14. 11. 2012.

[18] Official Gazette of the Republic of Slovenia, No. 96/14

[19] Separate effects for the industry and the private service sector are not known.

Table 13: Summary of the description of multi-sectoral measures.

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-1)	EU EMISSIONS TRADING SYSTEM (EU ETS)	To reduce GHG emissions where this is most cost efficient	CO_2, PFC	Economic, Regulatory	Implemented	MESP	515	859	M-1 GHG EMISSIONS ALLOWANCE TRADING (EU ETS)
(M-2)	ENVIRONMENTAL TAX ON CO_2 EMISSIONS	To internalise the external costs of air pollution due to CO_2 emissions	CO_2	Fiscal	Implemented	MESP	IE	IE	M-2 ENVIRONMENTAL TAX ON AIR POLLUTION DUE TO CO_2 EMISSIONS
(M-3)	USE OF BEST AVAILABLE TECHNIQUES	Reduction of energy use by using the best available techniques	CO_2	Regulatory	Implemented	MESP	IE	IE	
(M-4)	ENERGY TAXES AND CHARGES	To influence the price of fossil fuels to create an environment that encourages higher use of environmentally friendly fuels	CO_2	Fiscal	Implemented	MF	IE	IE	M-4 TAXES AND CHARGES
(M-5)	EDUCATION, TRAINING, AWARENESS-RAISING, COMMUNICATION AND PROMOTION	To create an environment favourable to the implementation of GHG emission reduction measures	CO_2, N_2O, CH_4	Information, Education	Implemented	Various ministries	IE	IE	M-5 EDUCATION, TRAINING, AWARENESS RAISING, COMMUNICATION AND PROMOTION
(M-6)	GREEN ECONOMIC GROWTH	Long-term Reduction of GHG Emissions	CO_2	Economic, Research	Implemented	SVRK, MEDT	NE	NE	
(M-7)	ENERGY LABELLING AND MINIMUM STANDARDS FOR PRODUCTS AND APPLIANCES	Improvement of energy efficiency of devices	CO_2	Regulatory, Information	Implemented	MI	NE	NE	M-12 ENERGY LABELLING AND MINIMUM STANDARDS FOR PRODUCTS AND DEVICES
(M-8)	ENERGY EFFICIENCY OBLIGATION SCHEME FOR ENERGY SUPPLIERS	Increased efficiency of energy use at final customers	CO_2	Regulatory	Implemented	MI	IE	IE	

4.2.2 Energy Supply

(M-9) TECHNOLOGICAL MODERNISATION OF THE THERMAL POWER SECTOR

Sectors influenced by the implementation of the measure: *electricity and heat generation*

Due to the expiry of the lifetime and the requirements of the Directive on industrial emissions (integrated pollution prevention and control) (2010/75/EC) or directives prior to this one, the majority of the large power generating units in Slovenia should be replaced by modern and environmentally acceptable units with substantially higher efficiency, the power generation from CHP with high efficiency should be increased and where necessary, a partial change in fuel should be carried out – primarily a partial transition to natural gas[20] and higher use of wood biomass in co-firing. For reducing GHG emissions, the following implemented and planned measures are important:

- Šoštanj Thermal Power Plant (TEŠ): in 2014, the TEŠ Unit 3 was permanently closed down, and in 2015, the new TEŠ Unit 6 started its trial operation to gradually replace the operation of all other existing units of this power plant. The Contract on the Arrangement of Mutual Relations between the Government of Republic of Slovenia and Šoštanj Thermal Power Plant defines a gradual reduction of GHG emissions, stating an emissions ceiling of annual CO_2 emissions from the existing units and unit 6 for the period 2016–2054. The upper ceiling will be reduced, considering the initial value; it will be 28% lower by 2030, 40% lower by 2035 and 52% lower by 2040.
- In 2014, Trbovlje Thermal Power Plant (TET) stopped generating electricity by burning brown coal for economic reasons. In 2012, the commercial production of coal was stopped in Trbovlje Hrastnik Mine which used to be the main coal supplier.
- Ljubljana Heat and Power Plant: the investment in the wood biomass co-incineration in unit 3 was realised in 2008 (20% of coal was replaced by wood biomass in this unit). A gradual transition to natural gas is planned.
- Brestanica Thermal Power Plant: units in this power plant are intended for reserve capacities; the replacement of old 1–3 units with a new unit is under way.

The main mechanisms for achieving the implementation of the measures are the same as described under SI-NC6/BR1. The abovementioned contract concluded by and between the Government of the Republic of Slovenia and the Šoštanj Thermal Power Plant represents an additional mechanism. There is a modification in regard to the **support scheme for electricity generated by co-generation of heat and electricity with high efficiency and support scheme for electricity generated from renewable energy sources which,** since the modification has not been relevant for the electricity generation in larger units, as it only applies for RES installations not exceeding 10MW of rated capacity and for installations for heat and power co-generation with high efficiency not exceeding 20MW of rated capacity. More about the modifications of the support scheme is presented in the next two chapters.

[20] Data source: Indicative Development Plan for the energy sector, data from investors.

(M-10) PROMOTION OF CO-GENERATION OF ELECTRICITY AND HEAT WITH HIGH EFFICIENCY

Sectors influenced by the implementation of the measure: *electricity and heat generation, energy consumption in industry and construction, energy consumption in service sector, public sector, agriculture and households*

The promotion scheme for production of electrcity from high efficiency co-generation of electricity and heat (CHP) and renewable energy sources was introduced by Slovenia in 2002. In 2009, some important modifications were introduced in the scheme in order to promote a too slow development in CHP. As it was shown over time that the majority of all new entrants into the scheme is represented by the most expensive technologies, the amended Energy Act (EZ-1)[21] in 2014 has introduced a full renewal of the support scheme with the goal of managing its costs. Amendments to the 2009[22] support scheme and support for energy-intensive companies in the form of reduced contributions to the support scheme were notified to the European Commission as State aid in May 2015. Until October 2016, when the Republic of Slovenia waited for the decision of the European Commission on notification of the State aid, no support was provided for electrical power from the new RES generation unit and CHP generation unit, and consequently there were no investments in such devices[23]. On 10 October 2016, the European Commission authorised Slovenia to provide State aid to electricity producers from RES and CHP generation units[24].

Since the entry into force of the EZ-1, the support has been limited to installations with lower thresholds of the nominal capacity (10 MW for RES generation units, with the exception of generation units utilising wind power (50 MW) and 20 MW for CHP generation units). So far, support for installations below 1MW could have been applied as a guaranteed purchase of electricity at a determined fixed price or as a financial aid for current operations (hereinafter referred to as "operational support") whereas the renewal of the scheme provides for a fixed purchase only from installations of up to 500 kW of power, and bigger installations may only be granted an operational support. The duration of support for electricity from RES generation units is further limited to 15 years and support for electricity from CHP generation units to 10 years. A modification is that for the installation to enter the scheme, an installation must be selected on the basis of an open public call by the Energy Agency (Article 373), as compared to previous operator's entrance into the scheme on the basis of an application and satisfaction of requirements. The Centre for RES/CHP Support is responsible for implementing the scheme; the said centre operates within the organisation of

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[21] Official Gazette of the Republic of Slovenia, Nos. 17/2014 and 81/2015, prior Energy Act, Official Gazette of the Republic of Slovenia Nos. 27/07–Official Consolidated Text, 70/08, 22/10, 37/11–Constitutional Court Decision, 10/12 and 94/12–ZDoh-2L.

[22] Commission decision SA.28799 Support for production of electricity from renewable energy sources and in co-generation installations, OJ C 285, 26.11.2009.

[23] The last entry of the generation units into the "old support scheme" was realised with the conclusion of a contract on the use of the system between the electricity producer and the electricity system operator prior to 22 September 2014, which, according to the provisions of the EZ-1, was a requirement for listing in the old support scheme.

[24] Decision State aid SA.41998 (2015/N) – Slovenia, 10/10/2016 No. C(2016) 6592 final.

the market organiser, Borzen. The Energy Agency, which, in the 2010–2014 period, was responsible for issuing decisions on certificates for generation units, issuing decisions on allocation of support and issuing certificates on the origin of electricity will select projects and decide on approving them or refusing their application for entering the scheme, in accordance with the EZ-1.

The co-generation is also promoted by the EZ-1 by introducing the mandatory use of RES, CHP and waste heat in the district heating systems (Article 322); specifically, by the end of 2020, heat distributors must ensure that heat is delivered from at least one of the following sources on an annual basis: (i) at least 50% of heat is generated from RES, (ii) at least 50% from residual heat, (iii) at least 75% of heat from high efficiency CHP or (iv) at least 75% of heat combination generated from the sources referred to in the first three indents. The high efficiency co-generation represents one of potential alternative systems for energy supply for which a feasibility study must be produced when constructing a new building and during greater renovation of a building or its individual part (Article 332). An additional support for
co-generation is also found in certificates of the origin of energy which are supposed to make the trading of electricity generated from RES and CHP easier; they are defined in detail in Articles 366 and 367 of the EZ-1. In addition, energy products for electricity and heat co-generation are exempt from the payment of excise duty, in accordance to the Excise Duty Act (ZTro-1)[25].

The installation of high efficiency CHP units is also promoted by the Rules on Efficient Use of Energy in Buildings with a Technical Guideline[26], which defines that the energy performance of a building is met if at least 50% of end-use energy for the heating and cooling of the building and for providing hot water is obtained from such systems. Efficient co-generation of electricity on RES installations is being promoted by certificates of the origin and Rules on Efficient Use of Energy in Buildings with a Technical Guideline, which requires a mandatory 25% share of RES in the total use of final energy in buildings. Other measures associated the utilisation of RES are mainly oriented towards the heat generation from RES.

In 2015, the CHP support scheme system included installations with the total of 87.7 MW of electric power installed, which generate the total of 342 GWh of electricity. Compared to the previous year, the installed power has increased by 22.7%, especially on the account of smaller units in the service sector. In 2016, the installed power of the installations has slightly reduced to 84.9 MW and they generated 325GWh of electricity. The reduction of GHG emissions due to the operation of CHP systems using fossil fuels is estimated to 96.9 kt CO_2 eq in 2015; in 2016, the reduction of GHG emissions amounted to 92.4 kt CO_2 eq.

In 2015, the RES support scheme system included RES installations with the total of 341 MW of electric power, which generate the total of 639 GWh of electricity, or only 1% more than a year before. In 2016, electric power of installations amounted to 343 MW, which generated 678.5 GWh of electricity or 6.2% more than in 2015. These installations include by far the

[25] *Official Gazette of the Republic of Slovenia, No. 47/16.*
[26] *Official Gazette of the Republic of Slovenia, Nos. 52/2010 and 61/17-GZ.*

most solar power plants, with its number having increased dramatically in the 2011–2013 period. In total, in 2015, the installations on RES included in the support scheme contributed to the reduction of GHG emissions by 415.5, and by 443.1kt CO_2 eq in 2016. Like in the case of co-generation the volume of entrances into the system is expected to lower in the future as a result of ensuring the financial sustainability of the said scheme.

According to the EZ-1 (Article 373), the Energy Agency shall, each year before 1 October, issue a public call inviting investors to submit projects for RES or CHP generation units that are applying to enter the support scheme. Within the public call framework, the projects will be chosen according to the allowed increase in funds providing support over the next year, compliance of the project with the plan for the operation of the support scheme with a view to achieving the targets, and the price offered for the production of electricity.

In addition to funds from the support scheme, in the 2012–2014 period, investment incentives for installation of co-generation units were provided by public calls of energy distributors and some funds were also available from the Cohesion Fund within the scope of the Operational Programme of Environmental and Transport Infrastructure Development[27] 2007–2013 (OP ROPI). The installation of CHP units continues to be promoted by Eco Fund, the Slovenian environmental public fund, by providing loans for investments with favourable interest rates. When it comes to obligations of energy suppliers, the Decree on Energy Savings Requirements[28] continues to support the installation of units for efficient co-generation, and within the OP ECP, it will be possible to obtain the finances for improving the energy efficiency of the SMEs or energy renovation of public and multi-apartment buildings.

Investment subsidies are also planned to encourage the construction of new smaller facilities for the production of electricity from RES (wind and solar energy, biomass and small hydroelectric power plants up to 10MW of power) within the framework of the Operational Programme for the Implementation of the European Cohesion Policy 2014–2020 (OP ECP). EUR 10.1 million will be available; construction of the additional capacities up to 50MW of installed power is expected.

In order to increase the RES-generated heat and electricity, in the 2015–2020 period, there will be funds available within the scope of the Rural Development Programme 2014–2020 (PRP) (13/2/2015), specifically, within the scope of the support instruments for investments in agricultural holdings, support for investments in processing, marketing and/or development of agricultural products and support for investments in the establishment and development of non-agricultural activities. Support instruments will be partially dedicated to the production of electricity and heat from RES for the purpose of production, processing or marketing of agricultural products, and the other part will be used for the production of electricity and heat from RES for the purpose of sale.

Furthermore, in Slovenia, the construction of hydroelectric power plants (HPP) is being continued on the lower branch of the Sava River; construction of HPP Brežice, with the

[27] *Operational Programme of Environmental and Transport Infrastructure Development*
[28] *Official Gazette of the Republic of Slovenia, No. 96/2014.*

estimated annual production of 161 GWh, was completed in 2017 and began its operation in the same year. The construction of HPP Mokrice is also envisaged. Procedure for the preparation of the National Spatial Plan (NSP) for three hydroelectric power plants on the middle branch of the Sava River: HPP Suhadol, HPP Trbovlje and HPP Renke are under way. Their construction is also being dealt with in the draft new version of the Renewable Energy Action Plan for the 2010–2020 period, which also includes projections regarding the utilisation of RES by 2030. The anticipated average annual production of electricity generated by the abovementioned three HPPs amounts to 383 GWh; the proposals aim at their construction in the period of up to 2030. An initiative for the preparation of the National Spatial Plan for the area which has been designated for energy use in the Litija and Ljubljana branch of the middle Sava River has also been launched. The draft new version of the Renewable Energy Action Plan focuses primarily on the construction of HPPs in areas that are not protected by the Natura instrument; for the implementation of other projects, the principle of overriding public interest for protection of the climate or the public interest will be necessary in the forthcoming decision-making processes. However, the outcome of these procedures is rather precarious and it is therefore possible that the energy potential in this area may only be utilised in a limited scale or the project will not even be implemented at all.

Decree on Self-supply of Electricity from the Renewable Energy Sources[29] entered into force on 15 January 2016. For household and small business consumers, it enables self-supply of electricity from RES for the entire or partial coverage of their own electricity consumption with a self-supply device based on net-metering. The maximum nominal power of the self-supply device is 11 kW. Electricity consumption of the owners of self-supply devices will be charged at the end of the calendar year: the difference between the received and the delivered electrical active power (kWh) will be read at the same measuring point at the end of the accounting period.

According to data, 135 self-supply devices were installed altogether in 2016. 130 of those were solar power plants and 5 hydroelectric power plants. The total nominal power of the installations is less than 1.1 MW.

(M-11) PROMOTING THE PRODUCTION OF DISTRICT HEAT FROM RENEWABLE ENERGY SOURCES AND HIGH EFFICIENCY CHP

Sectors affected by the implementation of the measure: *electricity and heat generation, energy use in industry and construction, energy use in private service sector, public sector and households*

Promoting the production of district heat from renewable energy sources (RES) and high-efficiency co-generation of heat and electricity (CHP) involves the implementation of two instruments, namely efficient district heating systems and the promotion of the development of district heating systems on RES under the Operational Programme for the

[29] Official Gazette of the of the Republic of Slovenia, No. 97/2015

Implementation of the European Cohesion Policy (OP ECP)[30] and the Rural Development Programme (PRP)[31].

EFFICIENT DISTRICT HEATING SYSTEMS – MANDATORY SHARE OF RES, CHP AND WASTE HEAT IN DISTRICT HEATING SYSTEMS

Mandatory heat share values from RES, which all district heating systems must achieve, are defined in Article 322 of the EZ-1. Heat distributors must ensure that heat is provided from at least one of the following sources on an annual basis: (i) at least 50% of heat is generated from RES, (ii) at least 50% from waste heat, (iii) at least 75% of heat from high efficiency CHP or (iv) at least 75% of heat combination generated from the sources referred to in the first three indents. Distributors must meet this obligation no later than by 31 December 2020.

In 2017, the Energy Agency published for the first time a list of energy efficient district heating and cooling systems, which, in 2016, met at least one of the criteria from the Article 322 (EZ-1) with regard to the mandatory use of RES, CHP and waste heat[32]. 60% i.e. 54 of all systems were energy efficient, but there is no official information on the share of heat produced in these systems. According to Energy Agency, in 2016, almost 2.4 TWh of heat was produced for the needs of customers connected to district heating distribution systems, and the previous year, 2.3 TWh were produced.

PROMOTING DEVELOPMENT OF THE DISTRICT HEATING SYSTEM ON RES WITHIN THE SCOPE OF OP ECP AND RDP

Grants for district heating systems on RES are planned in the scope of the OP ECP, the "Sustainable consumption and production of energy and smart grids" priority axis, for the construction of new and reconstruction of existing heating systems; grants for connecting new users to pre-existing capacities are also planned. The first open call for grants for investments in RES district heating systems (up to 10 MW of power) and micro-systems of RES district heating (up to 1 MW of power) was published in 2016 and the second in 2017. 8 beneficiaries received funds within the scope of the first public call, and the second public call will be open until mid-2018. In both cases, EUR 8 million was available from the Cohesion Fund for the financing of operations.

In the Rural Development Programme (PRP), investments are planned for the establishment and development of non-agricultural activities. Financial resources are intended for agricultural holdings and micro and small businesses in settlements of up to 5,000 inhabitants, including for investments in the production of electricity and heat from renewable energy sources such as wood mass, biomass, manure and liquid manure, water, wind, sun (sub-measure M06.4). This measure has not yet been implemented.

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30 Operational Programme for the Implementation of the European Cohesion Policy 2014–2020, Government of the Republic of Slovenia, December 2014, http://www.eu-skladi.si/sl/dokumenti/kljucni-dokumenti/op_slo_web.pdf

31 Rural Development Programme, https://www.program-podezelja.si/sl/kaj-je-program-razvoja-podezelja-2014-2020

32 https://www.agen-rs.si/documents/10926/86946/Agencija-za-energijo---Energetsko-u%C4%8Dinkoviti-distribucijski-sistemi-2016/e63f8236-cbc6-4f70-b290-06e450659086

4.2.3 Energy Consumption

(M-12) PROMOTION OF EFFICIENT ENERGY USE IN INDUSTRY

Sectors influenced by the implementation of the measure: *energy consumption in industry and construction*

In the 2015–2016 period, EEU and RES utilisation in industry were promoted mostly through three framework financial mechanisms, Cohesion Fund (estimated savings of 55 GWh[33] for 2015), scheme for mandatory final energy savings for companies selling electricity (estimated savings 29 GWh[33] for 2015) and Eco Fund loans (estimated savings of 11 GWh[33] for 2015). In 2015, the total amount of end-use energy savings of the above mentioned incentives has been estimated to amount to 95 GWh[33].

Measures for reducing the use of electricity (e.g. energy-efficient lighting, energy-efficient household appliances, installation of energy-efficient electric motors and frequency converters etc.) were carried out under the scheme for mandatory final energy savings ("persons liable"). The savings made under the scheme for mandatory final energy savings are estimated at 39 GWh in 2016.

In the scope of the measure *Financial incentives to raise energy efficiency in industry and the services sector and significantly increase the scope of environmentally friendly electricity generation from RES and CHP systems (Measure I.2*) envisaged in AN URE 2020, another few projects were implemented in 2015, which were supported by the Cohesion Fund[34]. 1.1 GWh of energy savings were achieved this year with these projects. There are no financial incentives for the introduction of energy management systems in the industry *(Measure I.3)*, but the measure is implemented under the scheme for mandatory final energy savings. In 2016, these savings amounted to 131.5 GWh.

In 2017, the Eco Fund provided EUR 4.0[35] million for grants to companies and other legal entities to promote measures for the efficient use of energy in buildings (e.g. installation of a solar heating system, installation of a biomass combustion plant for central heating of the buildings, installation of thermal heat pumps for central heating of the building, connection of the building to the district heating, installation of energy-efficient wooden outdoor furniture, thermal insulation of the outside thermal building envelope, installation of ventilation by returning the heat of waste air, replacement of heating stations, etc.) and use of renewable energy sources, promotion of measures of efficient electricity use for the installation of energy efficient lighting systems, installation of energy efficient electric motors, and for the enhancement of the efficiency of compressed air preparation systems; installation of advanced measurement systems and charging of energy; the introduction of

[33] Action Plan for Energy Efficiency until 2020 (AN URE 2020), Ministry for infrastructure, December 2017

[34] Open calls for the co-financing of individual wood biomass heating systems (KNLB) and the co-financing of district heating using wood biomass (DOLB).

[35] Business and Financial Plan by the Eco Fund, Slovenian environmental public fund, for 2017, Eco Fund, February 2017

energy management systems, as well as for the efficient energy use for waste heat recovery systems. It is expected that 60 investments will be realised, which will contribute to lower energy use by almost 35 GWh[35] a year and to reduction of 19,000 tonnes of CO_2 emissions annually.

The Eco Fund also provides financial assistance for energy audits in small and medium-sized enterprises in the industry and in the service sector. Financial assistance for carrying out an energy audit will be targeted at small and medium-sized enterprises in the industry and in the service sector. The energy audit represents the basis for the design of energy policy and the basis for decisions on investments according to the priority in terms of risk, repayment period and complexity. Financial assistance of up to 50% of the eligible costs of an energy audit will be granted for the energy audit of a building, processes and transport in an establishment, if an audit is implemented in accordance with the Regulation on energy audits[37] and with the provisions of SIST ISO 50002 or a series of standards SIST EN 16 247-1, SIST EN 16 247-2, SIST EN 16 247-3 and SIST EN 16 247-4. To encourage energy audits, SMEs in the industry and service sectors will receive EUR 0.3[35] million of grants. There will be 125 realised investments, which will contribute to a lower energy consumption by almost 7.0[35] GWh per year and to a reduction of 1,900[35] tons of CO_2 emissions annually. For large companies, according to Article 354 of the EZ-1 transposing Directive 2012/28/EC, energy audits are mandatory every 4 years.

In the context of the mandatory final energy savings for companies selling electricity, in accordance with the AN URE 2020, companies are also provided with incentives for carrying out energy audits and the introduction of energy management systems, and implementation of energy audits for large companies is, according to Article 354 EZ-1, mandatory every four years. At the end of 2017, the deadline for the implementation of the energy audit, which had to be carried out by large[36] companies in accordance with the EZ-1 and the Regulation on energy audits, expired[37].

Even in the period up to 2020, the investments for EEU and RES utilisation will be made available to the industry in the scope of the mandatory final energy savings for companies selling energy, programmes of the ERDF and favourable Eco Fund loans. With the OP ECP, the funds are targeted to improve the energy and material efficiency of small and medium-sized enterprises (SMEs) within the priority axis "Dynamic and competitive entrepreneurship for green economic growth" and, in general, within the priority axis "Sustainable consumption and production of energy and smart grids" to increase the share of RES in the use of final energy. It is planned that incentives will be granted in the form of loans from the European Cohesion Fund to promote the installation of wood biomass boilers. There are no plans for financial incentives for EEU and RES measures in the industry, with the exception of incentives for SMEs. Within the scope of the European Cohesion Fund and the investment priority *promoting the production and distribution of energy*

[36] According to the ZGD-1, large companies meet two of the following criteria: they have more than 250 employees, the amount of annual revenues exceeds EUR 40 million or the value of the balance sheet total exceeds EUR 20 million.

[37] Regulation on energy audits (Official Gazette of the Republic of Slovenia, No. 41/16)

derived from renewable sources a decision was made to support the *open call for co-financing the construction of new small electricity generation facilities from wind farms and small hydroelectric power plants* (published in March 2017), where the EU will contribute EUR 4,000,000[38], and a new open call for the co-financing of district heating with renewable energy sources, where the European Cohesion Fund will contribute EUR 8 million[38], is being prepared.

An important area for the industry is also the development and production of new sustainable products and services in the field of EEU and the use of RES; the funds from the OP ECP are planned within the priority axis "International competitiveness of research, innovation and technological development in line with smart specialisation for enhanced competitiveness and greening of the economy". This area also relies strongly on the Smart Specialisation Strategy (S4)[39], which served as one of the bases for the absorption of the European funds from the new financial perspective, which was confirmed in September 2015 and is strategically oriented towards sustainable technologies and services for a healthy life. In every field of the S4 application, a Strategic Research and Innovation Partnership (SRIP[40]) was formed at the end of 2016, due to a spontaneous bottom-up decision to cooperate and integrate key players in the field of application. Over 400 companies and more than 100 education institutions have joined in, and it is worth mentioning that the partnerships are open-ended. This means that in the future, the key players will continue to collaborate in these partnerships. This will be particularly important for involving small and medium-sized enterprises. The cooperation between stakeholders in SRIPs is built on: coordination of R&D activities, sharing of capacities, development of human resources, exchange of knowledge and experience, networking and collective representation of interests abroad. Some of these SRIP partnerships, which will have a long-term impact on the industry development, are: *Smart cities and communities, Smart buildings and homes, including wood chain, Networks for the transition to a circular economy, Factories of the future, Development of materials as products, and Mobility*.

Preparation of expert bases for deciding on whether voluntary agreements with industry, that would commit to achieving energy savings, should be used is also planned. Support is also planned for targeted training for the preparation and implementation of projects in the areas of EEU, RES and green energy technologies. All the measures mentioned in the chapter on multi-sectoral instruments are also important for the industry.

[38] Report on the Implementation of the 2014–2020 European Cohesion Policy for the January 2014–March 2017 period, Government Office for Development and European Cohesion Policy of the Republic of Slovenia, May 2017

[39] Slovenia's Smart Specialisation Strategy (S4), Government of the Republic of Slovenia, September 2015

[40] http://www.svrk.gov.si/si/delovna_podrocja/strategija_pametne_specializacije/strateska_razvojno_inovacijska_partnerstva_srip/

(M-13) PROMOTION OF ENERGY PERFORMANCE AND USE OF RENEWABLE ENERGY SOURCES IN BUILDINGS IN GENERAL

Sectors affected by the implementation of the measure: *energy consumption in public sector, service sector and households*

Two important documents were adopted in 2015 for the promotion of energy efficiency and use of renewable energy resources in buildings: Action Plan for Nearly Zero-Energy Buildings Up to 2020 (AN sNES)[41] that includes targets in regard to nearly-zero construction of new buildings, renovation and programmes and measures for achieving these targets, and the Long-term Strategy for Promoting Investments in the Energy Renovation of Buildings (LTSERB)[42] by way of which Slovenia has set a goal to significantly improve the energy efficiency of buildings. In June 2017, the Annex to the LTSERB (Annex to the LTSERB)[43] was presented to the public for identification of areas that were already discussed in the existing LTSERB, but proved to be in need of a more detailed consideration and upgrading during the strategy's implementation. The areas of quality management, financial instruments design and the issue of a moderately developed energy contracting market were exposed as critical. The Annex to the LTSERB will be adopted in the first half of 2018.

In May 2015, the Energy Efficiency Action Plan 2014–2020 (AN URE 2020)[44] was adopted in which measures for more efficient use of energy in residential and public buildings are defined. In accordance with the implementation of the activities in the interim period, the plan was additionally updated and supplemented with new measures in 2017. The amended document was adopted in December 2017 and is valid for 2017–2020 period (AN URE 2020)[45]. A renewal of the Rules on Efficient Use of Energy in Buildings with a Technical Guideline (PURES) is planned for the future, together with the accompanying technical guidelines.

In addition to the above-mentioned statutory measures and programme documents supporting EEU and RES, the following measures are also important for buildings in general. At least partially, these measures are already being implemented:

- taking into account energy efficiency and exploitation of RES in integrated planning of buildings, residential quarters and settlements within the scope of spatial planning;
- mandatory preparation of feasibility study regarding alternative energy supply systems (decentralised systems on the basis of RES, high efficiency co-generation, district or collective heating and cooling, heat pumps) when constructing a new building and a larger renovation of an old building or its individual part;

[41] Action Plan for Nearly Zero-Energy Buildings Up to 2020 (AN sNES), Government of the Republic of Slovenia, April 2015

[42] Long-term Strategy for Promoting Investments in the Energy Renovation of Buildings, Government of the Republic of Slovenia, October 2015

[43] Annex to the Long-term Strategy for Promoting Investments in the Energy Renovation of Buildings, Government of the Republic of Slovenia, June 2017

[44] Energy Efficiency Action Plan 2014–2020, Government of the Republic of Slovenia, May 2015

[45] Energy Efficiency Action Plan 2017–2020, Government of the Republic of Slovenia, December 2017

- implementation of pilot projects for comprehensive energy renovation of different building types in the public and residential sector according to the criteria of nearly zero-energy renovation under the OP ECP (buildings of central government, cultural heritage buildings, multi-apartment buildings). In 2016, three pilot projects for energy renovation of buildings were approved according to the model of energy contracting; a pilot project for energy renovation of a cultural heritage building is also being prepared;
- a support scheme for the renovation of the cultural heritage buildings and other specific building groups, including the preparation of criteria for the renovation and implementation of pilot projects;
- promotion of energy contracting for the implementation of comprehensive energy-saving renovation projects for public as well as multi-apartment buildings (details under the measure (M-15));
- coordinated awareness-raising, information and promotion in the field of EEU, use of RES and energy services (details under the measure (M-5));
- informal and formal education and training of various players in the field of energy renovation of buildings, nearly-zero energy new buildings and renovations and energy contracting projects (details under the measure (M-5));
- an excise duty policy that ensures the competitiveness of biomass and biofuels compared to fossil fuel heating products.

Measures specific to the promotion of EEU and the use of RES in households or public sector are described in the instruments under (M-14) and (M-15).

(M-14) PROMOTION ENERGY EFFICIENCY AND RENEWABLE ENERGY USE IN HOUSEHOLDS

Sectors affected by the implementation of the measure: *energy consumption in households*

The main measure for promoting energy efficiency and renewable energy use in households continue to remain financial grants allocated by the Eco Fund, the Slovenian Public Environmental Fund, for such investments in one-apartment and two-apartment buildings since 2008, and since 2009 for multi-apartment buildings. Set of measures funded by grants differ in regard to the invitation to tender and in regard to the amount of the received grant. Funds for grants are collected by means of a contribution paid per energy use in order to increase energy efficiency, and from 2014 onwards, funds from the Climate Fund are also made available by the Eco Fund in the said tenders. In 2015, the first open call exclusively for citizens with a low socio-economic status was also published, which financed the replacement of old solid fuel combustion installations from the above mentioned Climate Fund. A similar open call was made in 2017. In total, EUR 38.8 million of Eco Fund grants in the 2015–2016 period funded investments in households with a value of EUR 224.9 million, which resulted in an annual reduction in final energy consumption by 231 GWh, and CO_2 emissions by 27 kt.

Moreover, favourable Eco Fund loans can also be obtained for the implementation of the EEU measures and the use of RES, while household measures are also implemented under

the scheme for mandatory final energy savings for persons liable (details under the measure (M-8)). Grants for investments in RES are also available for households under the Rural Development Programme, where funds are drawn from the European Agricultural Fund for Rural Development (EAFRD).

All the mentioned measures will continue to implement in the future. In order to implement EEU and RES measures in residential buildings, up to EUR 33 million (EUR 27 million from the contribution and up to 6 from the Climate Change Fund) are planned for 2017, and up to EUR 44 million in 2018 (EUR 28 million from the contribution and up to 16 from the Climate Change Fund). In addition, some of the sources to increase the efficient energy use in households are also envisaged in the framework of the OP ECP. In order to co-finance the energy renovation of residential buildings within the framework of Integrated Territorial Investments (ITI), EUR 11.8 million is reserved for this, and EUR 5 million for the implementation of measures in 500 households facing the issue of energy poverty. The implementation of the pilot projects for comprehensive energy renovation of multi-dwelling buildings is also planned according to criteria of nearly zero-energy renovation (details under the measure (M-13)). Annual energy savings are projected to increase by more than 100 GWh by 2023 due to the implementation of these measures.

Other important measures for promoting EEU and RES in residential buildings which are already being implemented include the energy consulting network for citizens (ENSVET; see details under measure (M-5)) and a scheme for energy renovation projects for vulnerable groups of population. Within the scope of this scheme, the Eco Fund, in order to advise on EEU measures and the purchase of goods for socially vulnerable households to tackle energy poverty with the help of ENSVET in the 2016–2020 period, has an annual budget of EUR 100,000[46] confirmed by the Climate Change Fund, with the aim to enable 500 consultations annually. As already mentioned, the funds for this target group have already been projected in the scope of the OP ECP.

In addition to the AN-URE 2020 and LTSERB, further legislative measures are planned that should facilitate the implementation of energy renovations in buildings with multiple owners and/or tenants, and provide for the credit insurance, obtained in the scope of the reserve fund of a certain multi-apartment building.

(M-15) PROMOTION OF ENERGY EFFICIENCY AND USE OF RENEWABLE SOURCES OF ENERGY IN PUBLIC SECTOR

Sectors affected by the implementation of the measure: *energy consumption in public sector*

In the 2013–2014 period, EEU and RES use in public sector was promoted mostly by grants for energy renovation of buildings provided from the Cohesion Fund within the scope of the OP ROPI 2007−2013. In the period of two years, the total of EUR 114 million of grants were allocated within the scope of various calls to tender to 244 projects achieving the reduction

[46] Business Policy of the Eco Fund, the Slovenian Environmental Public Fund from 2016 to 2020, Eco Fund, 2016

of final energy consumption by poor 112 GWh per annum, and in regard to CO_2 emissions reduction, a solid amount of 31 kt was reached. In 2013, funds from OP ROPI contributed to the implementation of the majority of projects promoted within the scope of the public call for financing operations for energy efficient renovation of public lighting system for the 2011–2013 period, as a matter of fact, 20 projects received EUR 2.5 million of grants, thus reaching the reduction of electricity consumption by 10.7 GWh, and CO_2 emissions by 5.3 kt. In 2015, the final projects regarding energy renovation of public buildings financed under the OP ROPI were completed. In 2016, the Ministry of Infrastructure offered grants from the Cohesion Fund for comprehensive energy renovation of buildings owned by municipalities in total of EUR 10.6 million. The first co-financing contracts were concluded in 2017 and the deadline for the disbursement of funds is planned for the second half of 2018. Once again, in 2017, the Ministry of Infrastructure offered grants from the Cohesion Fund for comprehensive energy renovation of buildings owned by municipalities in total of EUR 17.6 million. As in 2016, the deadline for the disbursement of funds is set in the second half of 2018. Private funding may be provided by beneficiaries themselves or in combination with a private partner in the event of energy contracting.

In 2017, the Ministry of Infrastructure also held an open call for co-financing the energy renovation of public sector buildings owned by the state in the total amount of EUR 14.1 million, and for public sector buildings in the amount of EUR 7.6 million, both within the framework of the OP EPC and financed by the Cohesion Fund. The projects must be completed by the end of September 2019.

Some grants for low-energy or passive construction or the renovation of municipality owned buildings, in which educational activities are carried out, were allocated from the Eco Fund within the scope of its 2012 invitation to tender. In the 2013–2014 period, EUR 3.2 million was allocated to support eight projects, saving 2.6 GWh of final energy, and 0.6 kt of CO_2 emissions per year. In total, the 2013–2014 period saw the public sector reaching a reduction of 125 GWh/a in final energy consumption, and 37 kt/a of savings in CO_2 emissions. Favourable loans granted by the Eco Fund could have been obtained by the public sector for investments in energy efficiency and RES; within large energy suppliers obligation scheme programmes and the programmes provided by the European Regional Development Fund (ERDF); no data on the effects of these programmes are available. Grants for the public sector were available again in 2016 and were given out by the Eco Fund, with half a million euros for energy renovation of buildings managed by the Ministry of Defence; projects must be completed within three years of signing the contract, EUR 6 million is reserved for municipalities to invest in the construction of nearly zero-energy buildings of general social importance – in this case, the projects must be completed within two years of signing the contract. In both cases grants are provided from a contribution to the use of energy for increasing energy efficiency.

In the period up to 2020, the Eco Fund and ERDF programmes will continue to provide the public sector with subsidised loans and grants in the scope of mandatory final energy savings for energy sales companies. Increasing energy efficiency in the public sector is also envisaged within the scope of the OP ECP, specifically, funds intended for energy-saving renovation of public buildings owned and used by direct and indirect budget users and local

communities, funds for projects regarding energy renovation of public buildings, which will be implemented within the scope of energy performance contracting, and the implementation of demonstration projects for integrated energy renovation of various types of public buildings following the criteria of nearly-zero energy renovation. As a result of the measures envisaged in the OP ECP and owing to the renovation of 1.8 million m^2 of surface area, the annual energy consumption on the part of the public sector is expected to reduce by 240 GWh by 2023. In order to achieve this goal, in the 2016–2023 period, the annual volume of investment activities amounting to EUR from 51 to 53 million will have to be provided for, totalling EUR 415 million of funds for the said period. As a result of an increase of RES in the final energy consumption, funds from the OP ECP have been planned to be granted for wood-biomass-fuelled boilers in the public sector, service sector and industry.

For achieving greater effect of public funds invested in energy renovation of public buildings, in the period leading to 2020, an important measure will be promoting energy performance contracting, ensuring the distribution of risks and a suitable leverage in the financing of such projects. As mentioned, the scheme will be based on a combination of grants from the OP ECP, with up to EUR 50 million of funds being invested into the scheme from this fund, and other public and private funds. LTSERB complements these support instruments and plans to establish a broader supporting environment for the development of energy contracting which, in the long-term, will ensure a stable and foreseeable flow of projects suitable for energy contracting. For assuring the quality of public sector projects, financial support is expected to be made available for the preparation of investment projects; the Project Office will play an important role in the preparation and implementation of projects related to the energy renovation of governmental buildings. In December 2014, the Guidelines for Implementing Measures Aiming at Energy Efficiency of Public Sector Buildings Following the Principle of Energy Performance Contracting were published by the Ministry of Infrastructure[47].

In accordance with the EED and AN URE 2020, it is mandatory to renovate 3% of total floor surface of buildings owned and used by the core Government Offices. The potential for energy renovation at the level of nearly-zero energy building in case of public buildings was assessed to 6.857 million m^2 in 2015, representing 66% of total surface area of public buildings.

Two important measures for reducing energy consumption in the public sector are energy management and green public procurement. The energy management system in public buildings is defined by Article 324 of EZ-1; a decree, where the Government would define energy suppliers and minimal content of the energy management system, has not yet been adopted. Green contracting is governed by the Decree on green procurement[48], which was supplemented by environmental requirements for the public procurement of drying

[47] Guidelines for Implementing Measures Aiming at Energy Efficiency of Public Sector Buildings Following the Principle of Energy Performance Contracting, Ministry of Infrastructure, December 2013.

[48] Official Gazette of the Republic of Slovenia, Nos. 102/11, 18/12, 24/12, 64/12, 2/13 and 89/14

machines, vacuum cleaners and electricity lamps in the 2013–2014 period; its renewal is currently being envisaged. In 2016, the Decree on energy management in the public sector was adopted (Official Gazette of the Republic of Slovenia, No. 52/16). The energy management system is obligatory for buildings with a useful floor area of more than 250 m^2, which is used by the Government, self-governing local communities or government bodies founded by the Republic of Slovenia or the local community. The decree also lays down minimum requirements regarding the energy efficiency of buildings that were newly acquired by purchasing or hiring by the Government administration. In 2016, the Ministry of Infrastructure started building a register, and in the first phase, in the 2017–2018 period, it will establish a system of energy accounting for public sector buildings, where energy suppliers will be able to send reports.

Table 14: Summary of the description of measures in energy consumption sectors

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-9)	TECHNOLOGICAL MODERNISATION OF THERMAL POWER SECTOR	Reduction of CO_2 and other emissions (air pollutants) in electricity generation	CO_2	Regulatory	Implemented	MI	NE	NE	M-6 INCREASE IN THE ENVIRONMENTAL EFFICIENCY OF ELECTRICITY AND HEAT GENERATION IN LARGE COMBUSTION PLANTS
(M-10)	PROMOTION OF CO-GENERATION OF ELECTRICITY AND HEAT FROM RES AND CHP WITH HIGH EFFICIENCY	Increasing electricity and heat production from RES and in CHP units	CO_2	Economic, Regulatory, Planning	Implemented	MI, Borzen, AGEN-RS	NE	NE	M-7 PROMOTION OF CO-GENERATION OF ELECTRICITY AND HEAT WITH HIGH EFFICIENCY M-8 PROMOTION OF ELECTRICITY GENERATION FROM RENEWABLE ENERGY SOURCES
(M-11)	PROMOTION OF DISTRICT HEAT GENERATION FROM RES AND CHP WITH HIGH EFFICIENCY	Increasing energy and emission-efficient generation of district heat	CO_2	Economic, Regulatory, Information	Implemented	MI, SVRK, MAFF	NE	NE	
(M-12)	PROMOTION OF EFFICIENT ENERGY USE IN INDUSTRY	Efficient energy use in industry	CO_2	Economic, Regulatory, Information	Implemented	MEDT, MI	18	127	M-9 PROMOTION OF EFFICIENT ENERGY USE IN INDUSTRY
(M-13)	PROMOTION OF EE AND RES IN BUILDINGS IN GENERAL	Increasing the EEU and use of RES as a heat source	CO_2	Economic, Regulatory, Information,	Implemented, adopted	MESP, MI, MC, MF	159	380	M-10 PROMOTION OF THE USE OF RENEWABLE ENERGY SOURCES AS A HEAT SOURCE M-13 PROMOTION OF THE ENERGY EFFICIENCY OF BUILDINGS IN THE HOUSEHOLD AND SERVICE SECTORS
(M-14)	PROMOTION OF EE AND RES IN THE HOUSEHOLDS	Increasing the energy efficiency and use of RES in households	CO_2	Economic, Regulatory, Information,	Implemented	MI, Eco Fund	IE	IE	M-13 PROMOTION OF THE ENERGY EFFICIENCY OF BUILDINGS IN THE HOUSEHOLD AND SERVICE SECTORS M-10 PROMOTION OF THE USE OF RENEWABLE ENERGY SOURCES AS A HEAT SOURCE

Table 14: Summary of the description of measures in energy consumption sectors - continued

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-15)	PROMOTION OF EE AND RES IN THE PUBLIC SECTOR	Increasing the energy efficiency and use of RES in the public sector	CO_2	Economic, Regulatory, Education, Research	Implemented	MI, MESP	IE	IE	M-11 PROMOTION OF THE ENERGY EFFICIENCY IN THE PUBLIC SECTOR

4.2.4 Transport

(M-16) PROMOTION OF PUBLIC PASSENGER TRANSPORT

Sectors affected by the implementation of the measure: *transport*

In 2010, passenger kilometres in public passenger transport were estimated to amount to 1,620 million and, by 2014, the volume decreased to 1,430 million, and, by 2016, it slightly increased to 1,479 million. In 2014, rail transport amounted to 49%, and 46% in 2016. In the field of public transport, the OP GHG-2020 has set indicative target for increasing passenger kilometres.

Policies and measures for the promotion of public passenger transport are included in the following documents: Transport Development Strategy and Programme for the Development of Transport of the Republic of Slovenia, Operational Programme for Reducing GHG Emissions until 2020, Energy Efficiency Action Plan.

Public passenger transport in Slovenia is governed by the Road Transport Act[49] and Railway Transport Act[50]. In 2016, a proposal for amendments to the Road Transport Act was drafted with the aim of improving the supply of public passenger transport, increasing the connection between bus and rail transport, increasing the economic acceptability of public passenger transport and facilitating new types of passenger transport.

The ministry covering the area of transport finished the project of establishing an Integrated Public Passenger Transport (IPPT) with a goal to connect different modes of public transport. In the scope of the project, a single electronic ticket was introduced, timetables were adjusted and Public Passenger Transport (PPT) services were improved. The uniform electronic ticket enables the use of one electronic card, which will have pre-loaded tickets for different types of public transport and various carriers. Key to combining these services was the coordination of timetables between different carriers and modes of transport. The system is currently used by high school and university students only, but in 2018, the service should be available to all passengers.

Encouraging municipalities to establish an efficient public passenger transport system and promoting its use are the objectives of open calls for the construction of P+R ("park and ride") carparks at the personal vehicle-public transport transfer points in the framework of the Operational Programme for the Implementation of the European Cohesion Policy for the period 2014–2020 (OP ECP). The main purpose is to reduce the need to use a personal vehicle in cities and to accelerate the development of public passenger transport.

[49] Official Gazette of the Republic of Slovenia, Nos. 131/06, 5/07 – correction, 123/08, 28/10, 49/11, 40/12 – ZUJF, 57/12, 39/13, 92/15, 6/16

[50] Railway Transport Act (Official Gazette of the Republic of Slovenia, Nos. 92/1999, 11/2001, 33/2001, 110/2002, 56/2003, 86/2004, 29/2005, 15/2007, 58/2009, 106/2010, 63/2013, 84/2015, 99/2015– official consolidated text)

Improvement of public passenger transport will also be influenced by the measure of improving public railway infrastructure, for which EUR 153 million is available within the OP ECP programme, in particular by reducing the travel time. The OP ECP document also explicitly points out that, in the area of measures for sustainable mobility, the document will follow the commitments of the OP GHG-2020. In addition to the abovementioned measures, the OP GHG-2020 also plans to promote a sustainable choice of transport in regard to the calculation of travel costs. The Programme for the Development of Transport in the railway transport segment also includes the preparation of a study and project documentation for the increased role of the railway in public passenger transport and the connection of the railway system with, for example, the P+R or with the cycling network.

To be able to perform public transport services, carriers have a concession for the operation of public passenger transport services. The transport prices are regulated and part of the costs for performing the service is reimbursed from the state budget. The State also subsidises tickets for high school and university students.

Within the ministry responsible for transport, a service for sustainable mobility and transport policy was established with the aim of carrying out professional and administrative tasks in the field of public passenger transport, subsidising tickets for high school and university students, sustainable mobility and transport policy.

(M-17) SUSTAINABLE FREIGHT TRANSPORT

Sectors affected by the implementation of the measure: *transport*

The proportion of railway transport in total freight transport increased to 25% by 2013, thus reaching the indicative target value as referred to in OP GHG-2020. By 2016, it additionally increased by a percentage point. This, in fact, is the only indicator in the transport sector that shows impacts compliant with set goals. The number of tonne-kilometres travelled in road transport decreased from 2011 to 2014, but from 2015 to 2016, the number of tonne-kilometres was higher. In 2016, the volume was 4% higher than in 2011. In railway transport, the volume increased by 16 %. It is necessary to provide for the continuation of these positive trends along with an increased economic activity, which will have an impact on larger volume of freight transport. These data only include journeys carried out by domestic road haulage operators whereas a large proportion of freight transport is of transitional nature.

In regard to sustainable freight transport, the emphasis is placed on co-modality, for which the construction and modernisation of the existing transport infrastructure (especially, the railway) is of essential importance. The measure is additionally supported by the Transport Development Strategy and Programme for the Development of Transport in the Republic of Slovenia. The strategy has the following objectives: to establish an efficient railway transport (the electrification of the whole Slovene railway network, modernisation, upgrades and newly-built facilities) and efficient road freight transport (the introduction of electronic tolling for cargo vehicles, the introduction of IT for higher capacity utilisation of existing roads). The following measures for shifting the transit cargo from roads to railway were

accepted by the Transport Development Strategy in RS: the inclusion of external costs into tolls and other taxes for freight transport, the promotion of the use of intermodal transport units, the modernisation of intermodal terminals, the modernisation of the railway network and elimination of bottlenecks.

The following priority activities on railway infrastructure were included in the Programme for the Development of Transport:

- Elimination of bottlenecks in all railway subsystems. A study for increasing the permeability of the infrastructure and the provision of TEN-T standards on the Slovenian corridor network is a priority.
- Implementation of the key upgrade projects on the railway network (upgrade of the Maribor–Šentilj line, Zidani Most–Celje line, Pragersko railway node, etc.).
- Additional track construction (Divača–Koper).
- Introduction of the ETCS/ERTMS system, system of railway network voltage, electrification of regional lines, optimisation of the structure of the railway system, etc.
- Providing documentation for medium-term solutions to relieve the burden on the Ljubljana railway node

For the implementation of activities in the first period (2016–2022), EUR 1,326 million is planned, while in the second period EUR 829 million. Part of the funds will be provided from the budget by Slovenia, some will be obtained from the Cohesion Fund (OP ECP), the Connecting Europe Facility (CEF), and from the private sector.

By 2030, all sections of the TEN-T network will be modernised, upgraded and constructed by way of measures for the electrification of the whole Slovenian railway network, by way of the introduction of ERTMS (ETCS Level 2) on the entire TEN-T network, by way of the modernisations, upgrade and newly built facilities on the regional network. After the electrification of the Pragersko–Hodoš track, a total of 50% of all railway tracks in Slovenia will be electrified, and of these, all railways lines on the Trans-European Transport (TEN-T) Network.

For an efficient road freight transport, in addition to the rail network, improvement of the road infrastructure and the efficiency of the infrastructure's use is needed. The following measures for the improvement of road transport efficiency have been envisaged in the AN URE
2020: the introduction of electronic tolling for cargo vehicles, the introduction of intelligent transport systems for better use of existing roads, and the development of traffic telematics and a dynamic traffic signal control system. Electronic tolling for cargo vehicles will be implemented in the first half of the 2018.

Slovenia is highly exposed to transit transport due to its position at the crossroads of V. and X. European corridor which, for the main part, represents a section of the TEN-T core network and corridors of the core network. Since Slovenia is also small, with an attractive price offer for oil derivatives in Slovenia as compared to neighbouring countries, the increase in transit transport has a significant impact on the sale of liquid motor fuels in the

country and, thus, on GHG emissions. A long-term solution to the problem is possible only by redirecting goods transport from road to railways; however, a precondition for this is a modern and reliable railway, the construction of which has commenced. In 2008, when energy use in transport reached its peak, the portion of fuels sold to transit transport amounted to 30% of the total volume of fuels sold in the country. This was followed by a decrease in the portion due to economic crisis and changes in price ratios. In the last few years, the share has amounted to around 20%.

(M-18) INCREASE IN THE EFFICIENCY OF VEHICLES, PROMOTION OF ENERGY-EFFICIENT DRIVING, HIGHER VEHICLES OCCUPANCY AND PROMOTION OF THE USE OF FUELS WITH LOW CO_2 EMISSIONS

Sectors affected by the implementation of the measure: *transport*

INCREASE IN THE EFFICIENCY OF VEHICLES

The measure is based on three pillars:

- the obligation of the automotive industry to improve fuel consumption efficiency,
- awareness raising regarding fuel consumption and vehicle emissions and
- promotion of the fuel consumption efficiency of vehicles through tax measures.

In 2009, the European Commission adopted obligatory goals regarding emissions from new cars. In accordance with Regulation 443/2009[51], the average emissions of new passenger vehicles after 2015 will not be allowed to exceed 130 g CO_2/km, and after 2021, the emissions will not be allowed to exceed 95 g/km. In 2015, average emissions from new vehicles in Slovenia amounted to 120 g CO_2/km. Due to a large difference between factory data regarding emissions and fuel consumption and actual emissions values, the EU is increasing. In 2015, the average difference amounted to 40%. In 2017, in order to reduce the difference, the EU introduced a new standard for measuring vehicle emissions, which, on the basis of laboratory measurements, better imitates real driving conditions, and also includes measurements of emissions when driving on roads. In September 2018, the new standard will completely replace the old one. In November 2017, the European Commission prepared a proposal, according to which CO_2 emissions of new cars and light-duty vehicles in 2025 should be by 30% lower than in 2021.

CO_2 emissions from light-duty vehicles are defined in the Regulation No. 510/2011. In 2017, the average emissions value for new vehicles should not exceed 175 g CO_2/km and 147 g/km in 2020.

For heavy-duty vehicles, the EU currently does not define CO_2 emissions per kilometre. In the future, this could affect the higher growth of emissions from this segment due to the fact that heavy-duty vehicle transport is rapidly growing. That is why the EU in 2014 presented its strategy for reducing the emissions from heavy-duty vehicles. On the basis of the

[51] Regulation (EC) No. 443/2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles.

strategy, two proposals for regulations were presented in 2017, which regulate monitoring, reporting and the determining of the CO_2 emissions for heavy-duty vehicles. In the case of heavy-duty vehicles, due to a large number of different vehicle types, the determination of CO_2 emissions limits is more complex. The CO_2 emissions limit value for heavy-duty vehicles will be determined in future periods.

Informing and awareness raising is mostly carried out through labelling the fuel consumption of passenger vehicles. Slovenia transposed Directive 1999/94/EC[52] relating to the availability of consumer information on efficient fuel consumption and CO_2 emissions into the Slovenian legal order through the Decree on consumer information on fuel economy and CO_2 emissions in respect of new passenger cars (Official Gazette of the Republic of Slovenia, No. 81/2010), which replaced the rules previously in force. In accordance with the Decree, the suppliers of passenger vehicles must provide data on fuel consumption and vehicle emissions at the point of sale and in promotional leaflets. In addition to the above-mentioned, they must also prepare a manual on efficient fuel consumption and CO_2 emissions.

The Decree on Green Public Procurement (Official Gazette of the Republic of Slovenia, No. 51/2017) transposed the provisions of Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles into the Slovenian legal order. According to the Decree, in public procurements, the costs of CO_2 emissions will be taken into account in the mandatory vehicle life-cycle cost estimate. As a recommendation, the Decree lays down the minimal EURO emission standards. The Decree also defines environmental criteria for public procurement of tyres.

The third pillar concerns tax measures. In 2010, the Act Amending the Motor Vehicles Tax Act (Official Gazette of the Republic of Slovenia, No. 9/2010) was put into effect, and it introduced progressive tax rates for motor vehicles linked to CO_2[53] emissions[54]. The annual duty for the use of road vehicles is determined by the vehicle's engine capacity.

PROMOTION OF ENERGY-EFFICIENT DRIVING AND VEHICLE OCCUPANCY RATE

Training of drivers and managers of the vehicle fleet is carried out in accordance with Directive 2003/59/EC (driver training) and Regulation 1071/2009/EC (education of transport managers), including in terms of energy-efficient driving and logistics, by authorised transport operators.

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[52] DIRECTIVE 1999/94/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 1999 relating to the availability of consumer information on fuel economy and CO_2 emissions in respect of the marketing of new passenger cars.

[53] After the adoption of the Act, new tax rates entered into force, except for passenger motor vehicles with CO_2 emissions between 150 and 210 grams per kilometre, for which a transitional period was valid until 1/1/2011. Additional taxation has also been imposed on diesel vehicles with a particulate matter emissions of more than 0.005g/km and motor vehicles with a lower emission rate than Euro 4 and, since 1/1/2010, lower than Euro 5.

[54] Taxation applies to vehicles designed primarily for the transport of people (up to 10 people).

In the OP GHG-2020, a measure for promoting energy-efficient driving for all drivers is proposed. Courses are already available and are being implemented, but it would be appropriate to use at least some of the content in other courses that are more frequently implemented, for example, in beginners course or driver safety course.

In comprehensive transport strategies, municipalities have also identified measures to encourage greater occupancy of passenger cars. In bigger cities, commuters represent a major problem, since most of them use their own car to drive to work. The following measures were identified: management of the parking policy in order to reduce car traffic in the cities, introducing new car mobile services for optimisation of the passenger transport ("carsharing", "carpooling"), and introducing entry fees for cities.

PROMOTION OF FUELS WITH LOW CO2 EMISSIONS

In 2017, the Government of the Republic of Slovenia adopted a strategy regarding market development for the establishment of adequate infrastructure related to alternative fuels in the country's transport sector. The strategy proposes groups of measures for each alternative fuel (electricity, liquefied petroleum gas, liquefied natural gas, compressed natural gas, biofuels and hydrogen), for which a detailed action plan for 2018–2020 will be prepared. Measures are envisaged to provide the appropriate charging infrastructure for electric vehicles, compressed or liquefied natural gas vehicles, which will facilitate the increase in alternative fuel vehicles. The measures will be implemented in various areas: in the field of financial incentives and co-financing the construction of adequate infrastructure for alternative fuels, changes in regulations, promotion of innovative solutions and elimination of administrative barriers. One of the key measures will be financial incentives for purchasing electric and plug-in hybrid vehicles, exemptions from certain charges for electric vehicles, free parking and other similar measures. The key objectives of the strategy are: from 2025, first registration of passenger vehicles and light-duty vehicles (M1, MG1 and N1 categories) with a total carbon footprint greater than 100 g CO_2/km according to the manufacturer's declaration, will be limited, and after 2030, the first registration of cars with internal combustion using petrol or diesel with a total carbon footprint of more than 50 g CO_2/km will not be allowed anymore.

The purchase of electric or hybrid vehicles is facilitated by the Eco Fund, which is a public fund offering favourable loans to legal entities, sole proprietors and citizens. The Eco Fund also subsidises the purchase of battery electric vehicles and plug-in hybrid vehicles to citizens and legal entities according to the Decree on amendments and supplements to the Regulation on the provision of energy savings to final customers (Official Gazette of RS, No. 57/2011).

In 2017, EUR 1.7 million of grants were provided for this purpose – EUR 0.7 million for citizens and EUR 1.0 million for legal entities. Also encouraged is the purchasing of vehicles with CO_2 emissions of maximum 50g/km.

The Eco Fund also encourages the purchase of buses that run on alternative fuels. In 2017, the Eco Fund opened a tender on grants for the purchase of electric and hybrid buses and buses on compressed or liquefied natural gas in the amount of EUR 2.8 million per year.

In 2017, the Eco Fund also opened a tender for the purchase of new public works vehicles that run on electricity or use a combination of diesel and electricity (plug-in hybrid) and liquefied or compressed natural gas in the amount of EUR 1.0 million.

In addition, the Eco Fund also encourages the installation of charging stations for alternative fuels. In 2017, funds for charging stations for electric vehicles in protected nature areas and Natura 2000 areas were announced. Co-financing of smart charging stations is also planned in the scope of the OP ECP (EUR 2 million). Co-financing of 630 public smart charging stations and 3,150 private smart charging stations is planned. Funds will be announced in the 2017–2020 period.

The Decree on green public procurement also defines the criteria used in public procurement for the purchase of buses and hiring bus transport services. In accordance with Directive 2009/33/EC, the vehicle life-cycle cost estimate must take into account the costs of the emissions of carbon dioxide, nitrogen oxides, non-methane hydrocarbons and solid particles.

Decree on renewable energy sources in transport (Official Gazette of the Republic of Slovenia, No. 64/16) is currently in force since 2016. The Decree defines the obligations of fuel suppliers who have to achieve an energy share of renewable energy in a calendar year – at least 6.2% in 2017, at least 7.0% in 2018, minimum 8.4% in 2019, and a minimum of 10% in 2020. A portion of renewable energy sources is obtained by the energy supplier through the sale of biofuels compatible with criteria of sustainability, electricity from renewable energy sources, hydrogen from renewable energy sources and a combination of these fuels. The Decree, in accordance with the EU Directive, limits the maximum contribution of biofuels, which are produced from cereals and other field crops with a high content of starch, plants for the production of sugar, oilseeds and crops, which are grown on agricultural land as main crops specifically for energy purposes, in 2020 to 7% of final transport energy consumption in the country.

(M-19) PROMOTION OF NON-MOTORISED MODES OF TRANSPORT

Sectors affected by the implementation of the measure: *transport*

The Programme for the Development of Transport envisages measures for promotion of greater inter-modality, where cycling is considered an important means of mobility (bike & ride), and an improvement of the cycling network is foreseen (establishment of the national cycling network and local cycling networks. Its priority is to connect the already constructed bicycle sections to larger sections.)

Technical designs for implementing the national cycle connections have been implemented within the framework of the budgetary funds allocated by the Republic of Slovenia to the Slovenian Roads Agency. Funds earmarked for carrying out cycling projects have been continually increasing since 2008. Projects concerning the construction of the national cycle network were co-financed from the EU funds (OP ECP). Measures that encourage cycling have also been defined in comprehensive transport strategies.

AN URE 2020 provides financial incentives for the construction of bicycle lanes and support facilities, removal of barriers for boarding the bicycles on the train/bus and financing promotional and educational activities.

In 2011, the bicycle rental system called BicikeLJ was introduced in Ljubljana, the capital of Slovenia. It is possible to rent 510 bicycles from 51 bicycle stations. 4 million rides have been made with the bikes so far. Smaller bicycle rental systems also operate in towns such as Velenje, Šoštanj, Ravne na Koroškem, Jesenice, Kranj, Piran and Ptuj.

The Programme for the Development of Transport also promotes walking; a national strategy for promotion of walking and pedestrian standards will also be developed.

(M-20) DEVELOPMENT OF COMPREHENSIVE TRANSPORT STRATEGIES IN MUNICIPALITIES

Sectors affected by the implementation of the measure: *transport*

A Comprehensive Transport Strategy is a strategic document, in which the municipality develops effective sequence of transport actions that, during its implementation, help to achieve comprehensive changes and consequently a higher quality of life.

In the scope of OP ECP, funds were allocated for planning Comprehensive Transport Strategies, which were prepared by 62 municipalities. In 2017, additional funds were offered in an open call by Eco Fund; the funds will be used for developing Comprehensive Transport Strategies in municipalities that were not yet able to develop a strategy. Funding will also be available in 2018. The ministry responsible for transport will also co-finance projects from Comprehensive Transport Strategies with the OP ECP funds: safe access to PPT bus stations and stops, benches and sheltering roofs for bicycle parking, PPT stops, pavements, bicycle lanes, as well as measures in the field of education, awareness-raising and preventive measures (e.g. measures of sustainable parking policy, restriction of transport in urban centres etc.). In addition, these funds will also finance development of mobility plans for institutions, measures to limit transport in urban centres for passenger transport, the use of modern technologies for effective mobility management, green urban logistics and education and awareness-raising activities.

Table 15: Summary of the description of transport measures

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-16)	PROMOTION OF PUBLIC PASSENGER TRANSPORT	Increase in the share of public passenger transport	CO_2	Economic, Legislative, Informative	Implemented, adopted	MI, Slovenian Railways, local communities	66	118	M-16 PROMOTION OF THE USE OF PUBLIC TRANSPORT
(M-17)	SUSTAINABLE FREIGHT TRANSPORT	Increase in the share of railways in goods transport and thereby an increase in efficiency of the goods transport	CO_2	Economic, Planning	Implemented, adopted	MI	42	97	M-17 SUSTAINABLE GOODS TRANSPORT M-18 GHG EMISSIONS FROM TRANSIT TRANSPORT
(M-18)	INCREASE IN THE EFFICIENCY OF VEHICLES, PROMOTION OF ENERGY-EFFICIENT DRIVING AND PROMOTION OF THE USE OF FUELS WITH LOW CO_2 EMISSIONS	Reducing CO_2 emissions per kilometre by improving vehicle performance and changing behaviour, and increasing the share of RES in transport	CO_2	Fiscal, Information, Regulatory, Education, Economic	Implemented, adopted	MI, MESP, MF, Eco Fund	494	1494	M-14 REDUCTION IN EMISSIONS FROM PASSENGER MOTOR VEHICLES M-15 PROMOTION OF THE USE OF BIOFUELS
(M-19)	PROMOTION OF NON-MOTORISED MODES OF TRANSPORT	Increasing level of cycling and walking	CO_2	Economic, Planning	Implemented	MI, SVRK	NE	NE	
(M-20)	DEVELOPING COMPREHENSIVE TRANSPORT STRATEGIES IN MUNICIPALITIES	Increasing the share of sustainable mobility modes, Improving infrastructure, Changing behaviour	CO_2	Planning	Implemented	MI	IE	IE	

4.2.5 Industrial Processes

(M-21) REDUCTION OF F-GASES EMISSIONS FROM STATIONARY EQUIPMENT

Sectors affected by the implementation of the measure: *industrial processes*

The implementation of the provisions of the Regulation (EU) No. 517/2014 relating to fluorinated greenhouse gases from 2014 affects the reduction of F-gases emissions from the stationary equipment. The Regulation's impact will mainly be achieved through limiting the placement of F-gases onto the EU market by means of a quantity cap and by limiting the use of F-gases with high greenhouse potential. The Regulation and implementing regulations also regulate the handling of the devices containing F-gases for reducing leakage and safe handling of F-gases. Further detailed information about the regulation is presented in Chapter 3.5.1 EU-BR2.

In Slovenia, the implementation is regulated by way of the Decree on the use of fluorinated greenhouse gases and ozone-depleting substances (Official Gazette of the Republic of Slovenia, No. 60/2016).

Implementation of this measure will contribute to substantially lower emissions. The effect of measures in 2020 amounts to 61 kt CO_2 eq., and to 258 kt CO_2 eq. in 2030.

(M-22) REDUCTION OF F-GASES EMISSIONS FROM MOBILE AIR-CONDITIONING SYSTEMS

Sectors affected by the implementation of the measure: *industrial processes*

Directive 2006/40/EC of the European Parliament and of the Council relating to emissions from air-conditioning systems in motor vehicles and amending Council Directive 70/156/EEC (OJ L No. 161 of 14 June 2006) was transposed into the Slovenian legal order by the technical specification TSV – 161 (issue 01) on air-conditioning systems in motor vehicles regulating the area of emissions from air-conditioning systems in vehicles of category M1 and N1 (passenger motor vehicles and goods vehicles up to a total mass of 3.5 t). The Directive was implemented in three phases. The last phase entered into force on 1 January 2017, by prohibiting the registration of all vehicles with a built-in air conditioning system containing fluorinated greenhouse gases with a global warming potential above 150.

Because of this measure, the emissions will be lower by 37 kt CO_2 eq. in 2020, and by 94 kt CO_2 eq. in 2030.

Table 16: Summary of the description of measures in industrial process

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-21)	REDUCTION OF F-GASES EMISSIONS FROM STATIONARY EQUIPMENT	Reduction in the emission of F-gases through a reduction in leakage and replacement, and diligent operation of equipment and implementation of the quantity cap in the EU market for HFC gases	F-gases	Regulatory, Education	Implemented	MESP	61	258	M-19 REDUCTION IN THE EMISSION OF F-GASES FROM STATIONARY EQUIPMENT
(M-22)	REDUCTION OF F-GASES EMISSIONS FROM MOBILE AIR-CONDITIONING SYSTEMS	Reduction in the emission of F-gases from mobile air-conditioning systems	F-gases	Regulatory	Implemented	MI, Car manufacturers	37	94	M-20 REDUCTION IN THE EMISSION OF F-GASES FROM MOBILE AIR-CONDITIONING SYSTEMS

4.2.6 Agriculture

In 2011, the National Assembly adopted the Resolution on the Slovenian Agriculture and Food Industry Strategic Guidelines until 2020 – "Let's secure food for tomorrow", which among the strategic goals places food security, ensured through stable food production and the provision of quality and affordable food to consumers, sustainable use of production potentials and the provision of public goods related to agriculture. Activities from the Operational Programme for Reducing GHG Emissions by 2020 were aligned with these guidelines. The objective of the programme is to control and manage GHG emissions while simultaneously increase food self-supply in Slovenia. This means reduction in emissions per unit of produced food. The attainment of this objective is primarily based on the more efficient transfer of knowledge into practice and on faster implementation of modern farming procedures generating low GHG emissions.

(M-23) INCREASING EFFICIENCY IN ANIMAL PRODUCTION

Sectors affected by the implementation of the measure: *agriculture*

An improvement in the efficiency of animal production can significantly contribute to a reduction in the amount of released methane and released nitrogen per unit of milk and meat produced. Since methane and nitrous oxide emissions represent a loss of energy and nitrogen, animal producers have a direct economic interest in the reduction of emissions. There is still quite a large potential for improvement in this sector, and these possibilities can only be used by training breeders about the ways for improving the efficiency of animal production. Due to the specific structure of Slovenian agriculture (high number of small farms), this is a special challenge for agricultural policy. The agricultural policy contributes to the reduction of emissions in this regard through measures provided for by the Rural Development Programme (mostly through investments in physical assets), by financing breeding programmes for breeds of cattle and small ruminants, by financing public advisory services for farmers in regard to forage production, animal nutrition and general cattle production. The maintenance of the existing "Govedo" (Cattle) Information System is ensured within the scope of breeding programmes; the said system provides support to dairy cow breeders in making decisions that lead to a reduction in GHG emissions, and it provides information on emissions status at their farms.

(M-24) INCREASE OF THE PROPORTION OF GRAZED ANIMALS

Sectors affected by the implementation of the measure: *agriculture*

By pasture grazing, emissions of methane generated by the storage of cattle manure are avoided. Pasture grazing also contributes to a reduction in emissions due to the use of fossil fuels in the harvesting and transport of foodstuffs for animals in stable animal production. Due to the dispersion of agricultural plots of land, due to traditional siting of farms in closely-settled villages and due to the indoor housing tradition, animal grazing is very rarely used in Slovenia. The Ministry of Agriculture, Forestry and Food has contributed to an

increase in grazing management by financing the public agricultural advisory service. The Ministry also encourages use of pasture grazing through the Animal Welfare Programme of the Rural Development Programme, which, with financial assistance, encourages farmers to exceed the standard farming methods, including grazing. In the framework of the Agri-Environment-Climate Payment the "Planina paša" project is being carried out, which directly stimulates above-standard forms of summer pasture on the mountains. In terms of reducing GHG emissions, it is also important to adequately address the problem of spreading large carnivores to areas that are suitable for grazing, and in the framework of the AECP, the operation of "Taking care of domestic animals" in the area of large carnivores is also being implemented.

The goals of increasing the proportion of grazing animals at the expense of reducing animals in farmland are very ambitious. With the proposal of the first amendment to the Rural Development Programme 2014–2020, the Ministry of Agriculture, Forestry and Food decided to promote pasture of cattle and sheep through the entire pasture season as part of the "Dobrobit živali" measure (Wellbeing of animals).

(M-25) RATIONAL USE OF N FERTILIZERS

Sectors affected by the implementation of the measure: *agriculture*

Efforts in this area are directed into more efficient use of mineral and animal fertilisers. In this manner, with reduced use of nitrogen, the quantity of agricultural production is maintained or even increased, and the direct nitrous oxide emissions from agricultural land and indirect nitrous oxide emissions are reduced. The agricultural policy contributes to reducing emissions in this area through measures provided by the Rural Development Programme (Investments in Physical Assets, Agri-Environment-Climate Payments (AECP), Organic Farming etc.) and through financing public advisory services for farmers. All farms entering the AECP must have a programme of activities, which includes record-keeping on the use of mineral and animal fertilisers. If mineral fertilisers are used, they must make fertilisation plans based on soil analyses. In addition to general conditions, specific requirements which are implemented within the scope of individual AECP operations contribute to the more efficient use of fertilisers. These are requirements about crop rotation, fertilisation based on analysis of mineral nitrogen in the soil, low-emission fertilisation, greening of arable land and other similar requirements.

Climate change mitigation and adaptation to climate change represents a significant horizontal objective of the Rural Development Programme (PRP 2014–2020), as the process of adaptation to climate change and mitigation of these associated with structural changes in rural areas and agriculture, precisely because of this reason this content (in addition to already mentioned measures) are also involved in measure Cooperation and LEADER.

Table 17: Summary of the description of measures in agriculture

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-23)	INCREASING EFFICIENCY IN ANIMAL PRODUCTION	Increase in the efficiency of cattle production to reduce GHG emissions per unit of milk and meat produced	CH_4, N_2O	Education, information	Implemented	MAFF	2	47	M-22 INCREASE IN THE EFFICIENCY OF DOMESTIC ANIMAL PRODUCTION
(M-24)	INCREASE OF THE PROPORTION OF GRAZED ANIMALS	Reduction in methane emissions from animal manure and live-stock feed preparation	CH_4, N_2O	Economic, Research	Implemented	MAFF	1	1	M-24 INCREASE IN CATTLE PASTURE GRAZING
(M-25)	RATIONAL USE OF N FERTILIZERS	Improvement in the effectiveness of the nitrogen cycle on farms and thereby a reduction in the need for nitrogen from mineral fertilisers	N_2O	Information, Research	Implemented	MAFF	20	20	M-25 RATIONAL FERTILISATION OF AGRICULTURAL PLANTS WITH NITROGEN

4.2.7 Waste

(M-26) REDUCTION OF LANDFILLED BIODEGRADABLE WASTE

Sectors affected by the implementation of the measure: *waste management*

In 2015, the quantity of deposited biodegradable waste in Slovenia was 75% smaller than in 2005 and was a bit higher compared to the linear path towards the indicative target of the OP GHG-2020 set for 2020. By 2020, the amount of deposited biodegradable waste will have to be reduced by additional 66%. The objective of the OP GHG-2020 is more ambitious than the EU 2020 objective.

In December 2015, the European Commission presented an ambitious package of measures aimed at achieving a transition to a circular and thus more competitive economy with a more sustainable use of resources. The package also includes amended legislative proposals on waste with ambitious targets: the EU's common goal by 2030 is 65% of municipal waste recycling, 75% of packaging waste recycling, and a binding target of reducing the amount of waste that ends up at landfills to a maximum of 10% of municipal waste.

Main measures, which in the past contributed to reducing the quantities of deposited biodegradable waste, are waste separation at source and mechanical biological treatment of mixed municipal waste. The share of separately collected waste increased from 18% to 69% in 2009–2015 period. In most municipalities, door-to-door collection systems are used for waste packaging, bio-waste, and in some cases also for paper. However, the differences in the proportion of separately collected waste between municipalities are enormous (in 2015, the municipalities with worst result managed to achieve a share of separately collected waste of only around 20%, but a lot of others managed to separately collect more than 90% of waste); that is why the aim here would be to transfer the good practices of public services in municipalities with good results to less successful municipalities. Since 2016, the mechanical biological treatment of mixed municipal waste prior to disposal in municipal waste management centres has been mandatory. That is why facilities for mechanical and biological treatment of mixed municipal waste in Slovenia had to be upgraded in order to meet the country's needs.

In 2016, Slovenia adopted the Waste Management Plan as well as the Waste Prevention Programme, which serve as a basis for achieving ambitious objectives by 2030. In addition to the separate collection of waste and the mechanical biological treatment of mixed waste, the following measures of the waste management programme will contribute to further reduction of the quantity of deposited biodegradable waste:

- raising tax for the landfilling of waste and other changes to the environmental tax for the final establishment of the waste hierarchy (prevention, preparation for reuse, recycling, other recovery operations, waste disposal);
- improving the collection and management system for waste packaging by promoting packaging reuse systems;

- introduction of payment for a public service according to the "Pay as you throw" system in order to encourage users to reduce waste generation;
- harmonisation of the prescribed limit values for compost used in agriculture, with limit values in other EU countries in order to promote the use of compost for agricultural purposes.

It is estimated that due to the GHG emission reduction measure, the emissions will decrease by 74 kt CO_2 eq by 2020 and by 168 kt CO_2 eq by 2030 as compared to 2015.

(M-27) WASTE PREVENTION

Sectors affected by the implementation of the measure: *waste management*

The Waste Prevention Programme, adopted in 2016, addresses eight content sets, namely, waste prevention in enterprises, households and the public sector, and the following waste streams: construction waste, light plastic waste bags, bulk waste, food waste, textile and clothing waste. The main objective of the programme is to reduce the volume of waste and to minimise its negative effect on the environment. By reducing the need to produce new materials and products, the measure indirectly influences the reduction of GHG emissions. Special instruments were prepared for each set. The programme includes 34 instruments. The instruments that appear for most of the content sets, are awareness-raising, information and educational activities, while other instruments include: green public procurement, recording of generated waste in the public sector, increasing the number of companies involved in environmental management systems, launching identification and implementation programmes for potential waste prevention in companies, introduction of techniques and technologies that extend the life of buildings, etc.

The effect of this measure is taken into account in the effect of the measure to reduce the amount of landfilled biodegradable waste (M-26)(M-26).

(M-28) COLLECTION OF LANDFILL GAS

Sectors affected by the implementation of the measure: *waste management*

All landfill operators were obliged to build landfill gas capture facilities by the end of 2005. In 2015, 6.5 kt of methane was captured, which is 30% of the methane generated on landfills. Landfill gas is mostly used for production of electricity.

The landfill gas capture in 2020 amounts to emissions reduction by 105 kt CO_2 eq., and by 75 kt CO_2 eq. in 2030. The effect of the measure is decreasing since the volume of deposited biodegradable waste decreases and consequently, the amount of the resulting landfill gas decreases too.

4.2.8 Forestry

(M-29) SUSTAINABLE FOREST MANAGEMENT AND CO2 EMISSION SINKS

Sectors influenced by the implementation of the measure: *sinks/forestry*

Slovenia is pursuing an active policy in the area of sustainable forest management according to the principles of sustainability, environmental friendliness and multi-functionality. Forests **provide sinks of carbon dioxide emissions and also other important ecosystem services.** The accumulation of wood stock in the past period is the result of low logging intensity, which has gradually been increasing since 2000. Storage of CO_2 in recovered wood products (HWP) also contributes to the reduction of emissions. energy through t.i. substitution effect.

In 2017, the Government adopted a five-year Operational Programme for the Implementation of the National Forest Programme 2017-2021 (OP NGP), which is the implementation document adopted in 2007 by the Resolution on the National Forest Program (ReNFP). One of the ReNFP's main objectives is sustainable development as an eco-system in the sense of its biodiversity and all its ecologic, economic and social functions.

In 2012, the Action plan to increase competitiveness of forest-wood chain in Slovenia by the year 2020[55] was adopted, which plans measures to promote the felling of trees in accordance with the forest management plans in force.

The Slovenian Forest Service also plays an important role in the management and restriction of the felling of trees in forests; namely, it prepares forest management plans, and issues decisions on the felling of trees and authorisations for other interventions in forests. The Slovenian Forest Service directs the management of all forests in Slovenia – irrespective of ownership. The largest permitted felling of trees in Slovenia is defined in the Forest Management Plans for Forest Management Areas, with a validity of 10 years (the recent plans are valid for the period 2011–2020[56]). According to these plans and in order to follow sustainable and environment-friendly forest management, which has been carried out in Slovenia for more than 50 years, 7.5 million m^3 of wood may be felled (75% forest growth per year), without endangering the stability of the forests and their habitats.

Most forests in Slovenia are privately owned (around 76%), which in terms of their management represents a great challenge. Private owners receive subsidies from the State for the implementation of forestry and conservation works and for the maintenance of the environment of wild animals, in accordance with forestry plans prepared by the Forest Service.

[55] Action plan to increase competitiveness of forest-wood chain in Slovenia by the year 2020, adopted by the Government of the Republic of Slovenia, July 2012.

[56] Forest-management and game-management plans for the period 2011–2020, Summary for Slovenia prepared by the Slovenian Forest Service, adopted by the Government of the Republic of Slovenia, August 2012.

The Slovenian Forest Service is also responsible for the education and training of forest owners and for advising them in the scope of the public forestry service. Individual counselling is done through personal contact and through various communication channels, while group training covers a variety of topics (for example, workshops on forest protection). Implementation of the measures is based on the Act on Forests and the Resolution on National Forest Programme (Official Gazette of the Republic of Slovenia, No. 111/07).

One of the OP GHG-2020 planned measures is the development and testing of the methodology for monitoring and accounting of sinks and emissions sources in the sector, the establishment of an information system, demonstration sampling and the preparation of bases for the integration of climate goals and measures regarding land use policies, forest agricultural land management.

Table 18: Summary of the description of measures in the agricultural sector.

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-26)	REDUCTION OF LANDFILLED BIODEGRADABLE WASTE	Reducing waste disposal, Increasing recycling rates and improved waste management	CH_4	Regulatory, Fiscal, Information	Implemented, adopted	MESP, MAFF	74	168	M-26 REDUCTION IN EMISSIONS FROM WASTE TREATMENT
(M-27)	WASTE PREVENTION	Reduction of the generated waste volume	CH_4	Regulatory, Fiscal, information	Adopted	MESP, MESS, companies, MEDT	IE	IE	-
(M-28)	COLLECTION OF LANDFILL GAS	Landfill gas capture and its use	CH_4	Regulatory	Implemented	MESP	105	75	M-26 REDUCTION IN EMISSIONS FROM WASTE TREATMENT

Table 19: Summary of the description of measures in the forestry sector.

Label	Measure and/or policy	Objective	Gas influenced by the measure	Type of measure	Status of Implementation	Implementing Entity	Effect of the measure [kt CO_2 eq]		Reference to the measure from the previous National Report
							2020	2030	
(M-29)	SUSTAINABLE FOREST MANAGEMENT AND CO_2 EMISSION SINKS	Ensuring the permanent accumulation of wood supply	CO_2	Regulatory, planned	Implemented	MAFF, SFS	NE	NE	M-27 SUSTAINABLE FOREST MANAGEMENT AND CO_2 EMISSION SINKS

4.3 How Measures and Policies Influence the Long-term Trends of GHG Emissions

The majority of the measures presented in this chapter are long-term measures, which means that their results and implementation are not planned to end by 2030. On the contrary, in accordance with the national and EU policies, the implementation of measures will even strengthen in this area.

The total effect of the measures in 2020, 2025, 2030 and 2035 is indicated in the following chapter. A series of measures are long-term measures and will have an impact on reducing emissions even after 2035; among others, they include the construction of hydropower plants, energy retrofitting of buildings, the development of district heating systems using renewable sources of energy, waste treatment systems, and, in particular, measures in the areas of technological development, innovation, providing information, raising awareness, and education.

4.4 Measures no Longer Applicable

The majority of measures was planned to be implemented over a long-term period and the necessary changes were introduced over the years, as presented in chapter on individual measures.

In accordance with the requirements of the rules regulating environmental state support, a scheme of exemptions from taxes for pollution due to CO_2 emissions implemented on the basis of contracts concluded for the period 2005–2010 between the facility operators and the ministry responsible for the protection of the environment, has expired. Moreover, the environmental tax for the use of F-gases is not being paid anymore.

4.5 Implementation of Mechanisms Defined in Articles 6, 12 and 17 of the Kyoto Protocol

Slovenia has reduced its GHG emissions exclusively through domestic measures, which also include the EU measures. Among the OP GHG-01 measures, Slovenia envisaged the possibility of implementing the Kyoto Protocol mechanisms to achieve GHG emissions reduction objectives. This was not envisaged in the OP GHG-2020 from 2014. Slovenia currently does not plan to implement Kyoto Protocol mechanisms and intends to fulfil its obligations by 2020 with implementation of domestic measures. The latest projection of GHG emissions shows that Slovenia will meet its objectives in accordance with Decision 2009/406/EC without using the Kyoto Protocol mechanisms.

4.6 Measures and Policies under Article 2 of the Kyoto Protocol

4.6.1 Promotion of Sustainable Development

As an EU Member State, Slovenia actively participates in the formulation and implementation of common EU policies and measures in this area. With numerous documents and decision-making processes at the EU level, and in particular with the EU 2020 Strategy, Slovenia has committed itself to pursuing the objective of sustainable growth.

The EU also adopted a strategy of sustainable development; both strategies contribute to the attainment of the objective of sustainable development and are mutually complementary.

In its Development Strategy 2030, Slovenia also incorporated the UN objectives for sustainable development. This shows that Slovenia is one of the countries that recognizes the meaning of global responsibility for environment and society. One of the country's strategic orientations are especially a well-preserved natural environment and a highly productive economy that creates added value for everyone. Two of the Strategy's objectives are also a low-carbon circular economy and a sustainable natural resource management.

The partial, sectoral and regional development strategies, national programmes, and other development programmes must be, in terms of substance, in line with the general strategic guidelines of Slovenia's Development Strategy. In accordance with the Slovenian Development Strategy, the sectoral programmes such as Energy Efficiency Action Plan, Renewable Energy Action Plan, Resolution on the Transport Policy and Resolution on National Environmental Action Plan are also oriented towards environmental sustainability.

4.6.2 Reduction of International GHG Emissions in Aviation and Shipping

In the area of international GHG emissions in aviation and shipping transport, the Resolution on Traffic Policy defines the policy of the Republic of Slovenia and directs it towards the objective in order to ensure development of the area following the principles of sustainable and balanced regional development.

As an EU Member State, Slovenia has achieved a reduction in international emissions in aviation through the inclusion of aircraft operators in the GHG emissions allowance trading scheme. The measure entered into force on 1 January 2012 for all flights.

Slovenia supports EU efforts to reduce GHG emissions from international shipping transport. The EU adopted a strategy for gradual inclusion of GHG emissions from shipping transport and, as the first step, proposed legislation which is in the process

of being decided on, for monitoring, reporting and verification of emissions from large vessels.

4.6.3 Minimising Harmful Effects

Slovenia acts in accordance with the provisions of the Kyoto Protocol and implements measures regarding climate change so that the negative impacts of climate change as well as the results of the measures for reducing GHG emissions would be as low as possible for all countries, in particular, for the most vulnerable developing countries.

The Kyoto Protocol considers all these factors; namely, its objective is to reduce emissions, the result of which is a direct reduction in the harmful influences of climate change. Furthermore, activities for the reduction of emissions are not restricted to one gas or sector, but include six gases an/or groups of gases and various sectors, which is why the burden can be transferred between them. The Kyoto Protocol additionally introduces flexible mechanisms that also additionally allocate the burden outside individual countries. The Protocol also promotes technology and knowledge transfer.

As an EU Member State, Slovenia performs additional activities in this area. The EU adopted an action plan regarding climate change and development, the objective of which is to provide aid to developing countries to achieve economic progress.

4.7 State Programmes and/or Legislative or Administrative Measures

First subchapter of chapter Policies and Measures presents the Operational Programme for Reducing GHG Emissions and the monitoring system for the implementation of the operational programme, through which Slovenia ensured achievement of the Kyoto objective and will ensure implementation of the objective of reduced GHG emissions by 2020.

The Environmental Protection Act plays an important legislative role in achieving the climate objectives. The Environmental Protection Act provides a legal basis for all other legislation in the area of environmental protection that indirectly or directly influences GHG emissions; for instance, in the areas of waste, environmental certificates, comprehensive assessment of environmental influences, ecolabels, environmental management of organisations, economic and financial environmental instruments (e.g. the environmental tax on environmental pollution, GHG emissions allowance trading), etc.

The environmental inspection service is responsible for supervision of the implementation of the Environmental Protection Act and all relevant implementing regulations; the competences of the environmental inspection service also include authorisation to prohibit the operation of plants or equipment, the revocation of

environmental certificates, etc. In case of infringement, the Act stipulates the payment of fines.

Other important legislative frameworks for the implementation of the measures for the reduction of GHG emissions include the Construction Act, the Energy Act and the Agriculture Act; the latter two Acts provide the basis for the preparation, adoption and implementation of sectoral policies for the two above-mentioned areas. The area of transport is regulated by many Acts.

4.7.1 Procedures for Public Participation

The Environmental Protection Act (ZVO) provides for the participation of the public in the preparation of all programmes regarding environmental protection. In compliance with the international conventions (Espoo and Aarhus), the participation of the public in the decision-making process regarding plans (within the framework of a comprehensive environmental impact assessment) is provided for all plans and projects with known environmental impacts, among others, for spatial planning, water management, forest management, agriculture, energy, industry, transport, waste treatment and wastewater treatment. Owing to their size, extent, location or other characteristics that may have an impact on the environment, the environmental impact assessment is obligatory for projects which include certain types of spatial planning.

Implementation of the principle of partnership with social and regional partners and civil society and the inclusion of the expert public in document preparation procedures are mandatory for the preparation of all planning documents.

The Environmental Protection Act (ZVO) provides for access to environmental information by all interested persons. In accordance with the Environmental Protection Act, the Ministry will prepare a report on the state of the environment every four years. Environmental data are available on the websites of the Environmental Agency of the Republic of Slovenia and the programmes and legislation are available on the websites of the competent ministries.

4.7.2 Participation in Kyoto Flexible Mechanisms

The national coordination point for mechanisms of joint investments (JI and CDM) is the Ministry of the Environment and Spatial Planning.

For additional information, see the chapter Implementation of Mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol.

4.7.3 Description of the National Registry

The Slovenian Environmental Agency is stipulated as the operator of the emissions trading registry, which started to operate in November 2005 for the needs of the Kyoto Protocol and the EU Directive relating to the CO_2 emissions trading scheme,

on the basis of the Environmental Protection Act, the Rules on the general terms and conditions for the operation of the emissions coupon registry, and the Decree on detailed criteria and conditions for establishing and operating the emissions allowance registry.

The registry was developed for the needs of the EU-ETS, while the transition to ITL was carried out in October 2008. A review was carried out in October 2007 by ITL trustees.

The registry is accessible on the website http://arso.gov.si/.

Detailed information on the registry can be found in chapter on emissions inventory.

4.7.4 Procedures in Connection with the Implementation of Articles 3.3 and 3.4 of the Kyoto Protocol Preserving Biodiversity

In 2007, the Resolution on the National Forest Programme, Forests for the Future, (ReNFP) was adopted, where one of the fundamental objectives was sustainable forest development as an ecosystem within the meaning of its biodiversity and all its ecological, economic and social functions.

The tag line of the ReNFP – Forest for the Future – shows the efforts on the basis of which forests will permanently ensure the preservation of the health of Slovenia's inhabitants and enable economic development and employment in line with the sustainable management and consumption of wood and the preservation of the environment and biodiversity. ReNFP is the successor to the National Forest Development Programme (NFDP) of 1996. The National Forest Programme also presents the implementation of the Environmental Action Plan at the national level, defining four priority tasks: climate change, nature and biodiversity, the environment, and health, as well as living quality, natural resources and waste.

The Slovenian Forest Service also plays an important role in the management and restriction of the felling of trees in forests; namely, it prepares forest management plans, and issues decisions on felling and authorisations for other interventions in forests. The Slovenian Forest Service directs the management of all forests in Slovenia – irrespective of ownership. The largest permitted felling in Slovenia is defined in forest management plans for forest management areas with a validity of 10 years (according to the ReNFP, the most recent are valid for the period 2011–2020). According to these plans, sustainable and environmentally friendly forest management, which has been carried out in Slovenia for more than 50 years, is followed in order to not endanger the stability of forests and their habitats[57]. In 2012, the Action Plan to increase the competitiveness of the forest-wood chain in Slovenia

[57] Forest-management and game-management plans for the period 2011–2020, the Summary for Slovenia prepared by the Slovenian Forest Service, adopted by the Government of the Republic of Slovenia, August 2012.

by 2020[58] was adopted, stipulating measures to promote felling in accordance with the forest management plans in force.

[58] Action plan to increase competitiveness of forest-wood chain in Slovenia by 2020, adopted by the Government of the Republic of Slovenia, July 2012.

5 PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

Emissions projections have been made in 2017, taking 2015 as a base year, and take the utmost account of the recent development of projections made in 2013. Projections were made for 2020, 2025, 2030 and 2035.

5.1 Definition of Scenarios

Projections were calculated for a scenario with measures. The table below presents sectoral strategic documents used as a basis to develop emissions projections and which quantitative basis was used in the activity projections. The reason for calculating only the projection with measures is a major project that began in 2017 and is intended to prepare quantitative basis of a strategy for the reduction of GHG emissions by 2050. Attaining the target for 2020 has already been achieved for Slovenia in projection with measures, which shows that for attaining the 2020 targets, the continuing implementation of the existing measures will suffice.

Table 20: Number of scenarios by sectors and the source of sector projections which have been applied

Sector	Sectoral projections that are foundation for projections	Strategic or programme documents
Energy Use	TRANSFORMATIONS, GENERAL USE Reference (REF) projection of energy use in long-term energy balances from 2013, trends in energy consumption until 2030 extrapolated until 2035. Calibration of projections with statistics in 2015. INDUSTRY A new projection of the energy use, which took into account the recent projections of the GDP trends and value added. TRANSPORT Distribution of energy use by type of vehicle and an estimate of the fuel purchase by foreign vehicles in Slovenia. Projection of the transport activity for a transport development strategy. The structure of the vehicle fleet according to the expert groundwork for the strategy for alternative fuels	Long-term energy balances of Slovenia until 2030 and expert bases for setting national energy targets, Energy Efficiency Action Plan for the period 2014–2020, Operational Programme for the Implementation of the EU Cohesion Policy in the period 2014–2020, Operational Programme for Reducing GHG Emissions until 2020, Transport Development Strategy, Alternative Fuels Strategy
Industrial Processes	Projection of economic development until 2030 from long-term energy balances from 2013 extrapolated until 2035.	Operational Programme for Reducing GHG Emissions until 2020
Agriculture	Projection of the Agricultural Institute with consideration of the directions of the Strategy for Implementation of the Resolution on Strategic Directions of the Slovenian Agriculture and Food Industry until 2040	Rural Development Programme 2014–2020, Strategy for Implementation of the Resolution on Strategic Directions of Slovenian Agriculture and Food Industry until 2020
Waste	Projections of waste flows in the Programme for waste management and waste prevention programme from 2016	Programme for waste management and waste prevention programme of the Republic of Slovenia from 2016

5.2 Results of the Projections

5.2.1 Carbon Dioxide

CO_2 emissions have been decreasing from 2008 to 2015. In 2015 they amounted to 13,598 kt. According to the projection with measures, emissions will increase by 8.0% until 2020 compared to 2015, but they will be decreasing after 2020. Compared to 2015, emissions are 1.7% lower in 2030. By 2035, emissions are further reduced to 12,514 kt, so emissions are 8.0% lower than in 2015. Compared to 2005, emissions are 13.3% lower in 2020 and 21.0% lower in 2030.

CO_2 emissions in the projections with measures for 2020 and 2030 represent 82% of all emissions, and 81% in 2035.

The main source of CO_2 emissions is the combustion of fuels, reaching 92% in 2020 and 91% in 2030 respectively; the most important source of emissions within this sector is transport reaching 36% of total emissions in 2020 and 39% in 2030. The second most important source is transformation, holding 37% and 29%, combustion of fuels in the industry contributes 17% in 2030, and other sectors 7%. The remaining CO_2 emissions are mostly the result of industrial processes (8% in 2030), and 1% is contributed for by fugitive emissions. By 2030, emissions will mostly be reduced in transformations by 0.5 Mt CO_2 compared to 2015, due to the reduction in coal consumption, and in other sectors by 0.4 Mt CO_2 due to higher energy efficiency of buildings and the reduction in the use of fossil fuels. Emissions are also reduced in transport i.e., by 0.1 Mt CO_2, while they increase in industry (0.5 Mt) and industrial processes (0.3 Mt).

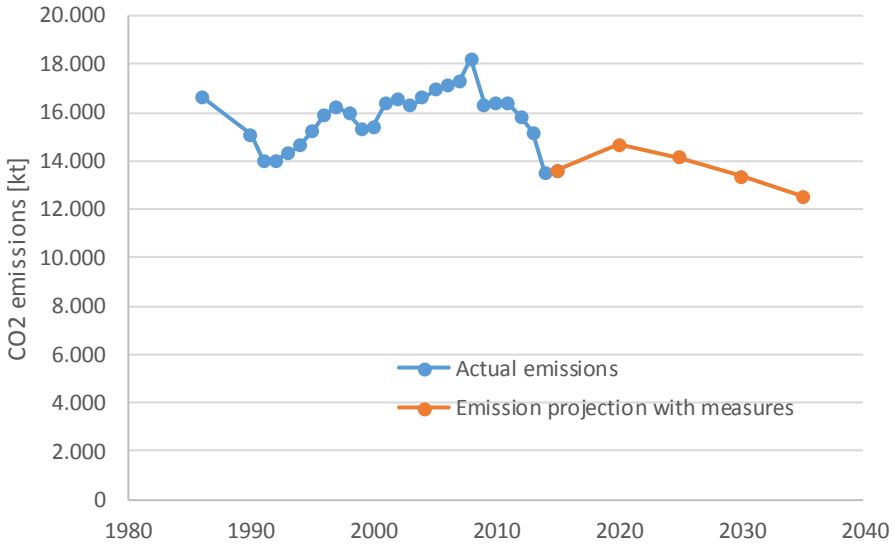

Figure 24: CO_2 emissions trend without sinks up to and including 2015, and emissions trend according to projection with measures until 2035

5.2.2 Methane

Compared to 2015, methane emissions increased by 3.4% by 2020 due to an increase in agriculture and fugitive emissions. From 2020, emissions are decreasing, reaching 78.0 kt CH_4 in 2030, which is 4.3% less than compared to 2015. By 2035, the emissions are further reduced to 75.5 kt. Compared to 2005; emissions are 13.1% lower in 2020 and 19.6% lower in 2030.

The main source of methane emissions is agriculture and its share is increasing. It amounts to 58% in 2015, 61% in 2020, 66% in 2030, and 68% in 2035. Emissions in agriculture increase from 2015 to 2030, especially by 2020. This is followed by the waste sector whose emissions and consequently its share in total emissions are decreasing fast and fugitive emissions, which are also decreasing after a period of increase from 2015 to 2020. Waste emissions decrease by 6.5 kt by 2030 compared to 2015, while fugitive and agriculture emissions increase by 0.2 kt and 4.5 kt, respectively. CH_4 emissions from wood combustion account for 7% in 2015 and by 2030 they decrease considerably (by 1.7 kt) and amount to 5%.

In 2015–2035, the share of methane in total GHG emissions amounts to 12%.

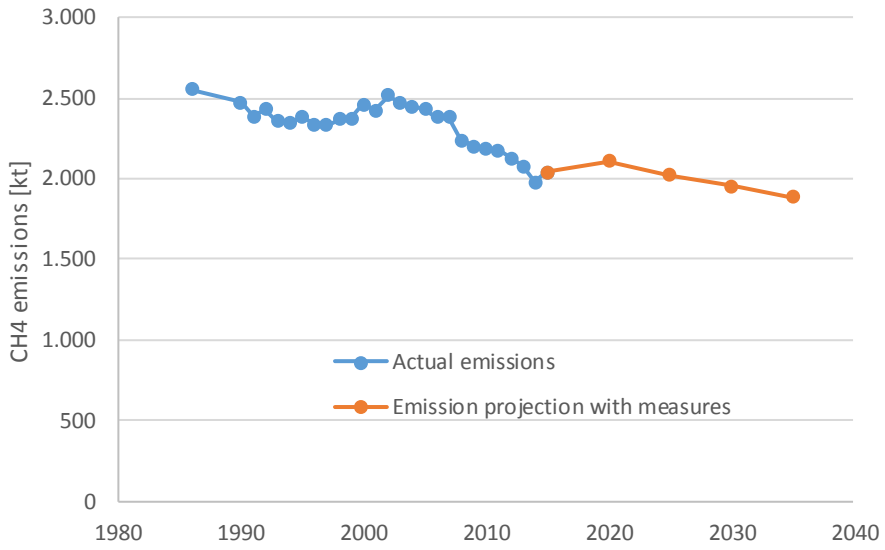

Figure 25: CH_4 emissions trend without sinks up to and including 2015, and emissions trend according to projection with measures until 2035

5.2.3 Nitrous Oxide

N_2O emissions are the only emissions which do not decrease by 2030. Compared to 2015, they increase by 9.0% by 2020, and by an additional 1.0% by 2030 in regard to 2020. The emissions start decreasing only after 2030. In 2035, they are 0.6% lower than in 2030. Emissions in 2020 are 7.6% higher compared to 2005, and in 2030 8.7% higher compared to 2005.

The main source of N_2O emissions is agriculture, where a good two-thirds of emissions are generated. At the same time, this source is the most responsible source

for an increase in emissions, as the emissions increase by 0.2Mt between 2015–2030. Other sources include combustion of fuels (16% in 2030), with the most emissions being generated in transport, industrial processes (10%) and waste (6%). From 2015 to 2030, emissions increase in all sectors.

In 2020, the share of nitrous oxide in total GHG emissions amounts to 5%, and in 2030, it amounts to 6%.

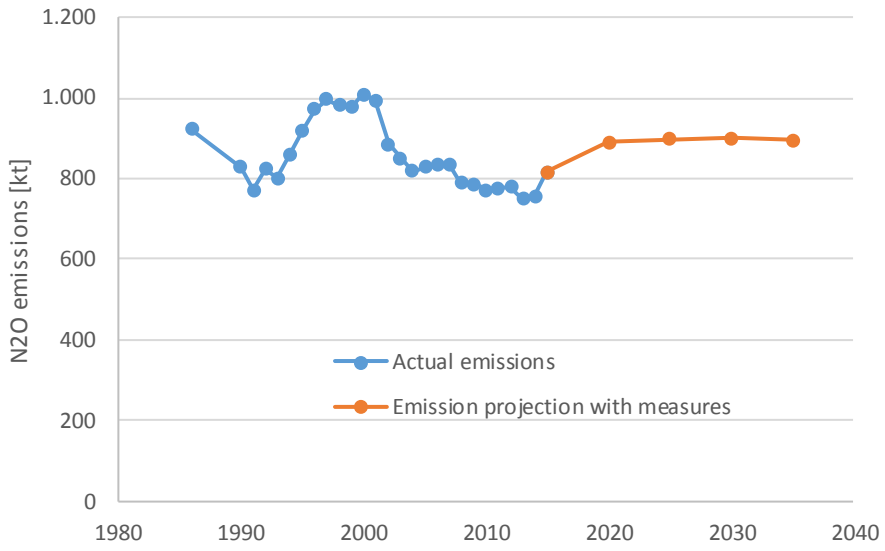

Figure 26: N_2O emissions trend without sinks up to and including 2015, and emissions trend according to projection with measures until 2035.

5.2.4 F-gases

According to projections, F-gases emissions decrease significantly by 2020 (by 14% compared to 2015), and after that year, the reduction is further strengthened due to the implementation of the measures arising from the new EU regulation, which covers applications in which F-gases are used, and EU directive on air conditioning systems used in cars. In 2030, amounting to 132 kt CO_2 eq., emissions are 64.9% lower compared to 2015, and in 2035, they are 78.2% lower compared to 2015. Compared to 2005 emissions are 3.7% higher in 2020 and 57.8% lower in 2030.

The highest share of emissions is due to HFC. It amounted to 92% in 2015, but it will be reduced to 79% in 2030. In 2015, PFC emissions represent 4% of emissions, but their share increases to 12% by 2030. SF_6 emissions represent 4% of emissions in 2015 and 9% in 2030. The reduction of F-gases emissions is mostly the result of the reduction of HFC emissions.

In 2015 and 2020, F-gases represent 2% of total GHG emissions, but their share decreases to 1% by 2030.

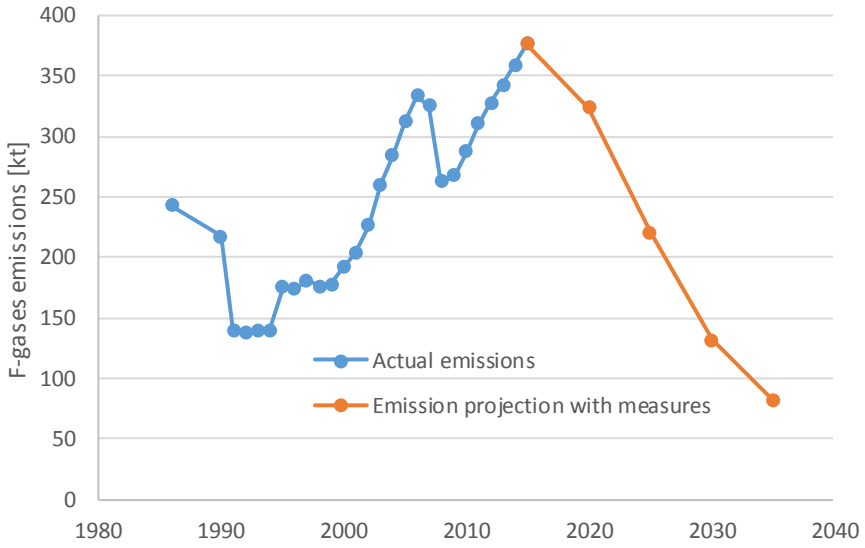

Figure 27: F-gas emissions trend up to and including 2015, and emissions trend according to projection with measures until 2035.

5.2.5 Emissions by Sector

TRANSFORMATIONS AND FUGITIVE EMISSIONS

Transformations (1.A.1) mostly include emissions from the production of electricity and heat where the greatest share of emissions is generated from coal-based thermal power plants. Emissions are also generated by gas-powered units and production of district heat by district heating systems. The emissions trend in the future is mostly characterised by the reduction in the electricity production generated by coal-based units and their replacement by gas-powered units (partially also by small CHPs), and an increase in the use of renewable energy sources (RES). The share of RES is also increased in the district heating systems. Emissions generated from coal-based units decrease by 2.2 Mt CO_2 eq. by 2030 compared with 2015, whereas emissions generated by the combustion of gas increase by 0.3Mt CO_2 eq. Emissions due to the combustion of RES increase only by 0.003 Mt CO_2 eq., as it is considered that combustible RES is CO_2 neutral.

Fugitive emissions (1.B) include emissions generated by the distribution of gas and liquid fuels, coal mining and flue gas desulfurization. By way of reducing the need for coal use, the fugitive emissions from coal mining and desulfurization decrease.

Since 2008 onwards, GHG emissions have been decreasing. In 2015, they only amounted to 4.9 Mt CO_2 eq., which is 30% less than in 2008. By 2020, an increase in emissions due to the increase in operating hours of the Šoštanj Thermal Power Plant is planned in accordance with the investment plan. Lower emissions in 2014 and 2015 are, inter alia, a result of the launch of the new coal-based unit at the Šoštanj Thermal Power Plant. In 2014, a massive construction of the new coal-based unit took place which created a disruption in the operation of Šoštanj Thermal Power Plant as a whole, thus resulting in a lower annual volume of electricity production. Also, the

production in hydroelectric power plants was record-breaking. In 2015, the new unit 6 was in operation and, for better efficiency, less coal was used for producing a similar amount of electricity compared to 2013. By 2020, an increase in electricity demand and consequently, an increase in production will also be expected in coal-based thermal power plants. After 2020, emissions will be reduced due to the reduction of the generated electricity in Šoštanj in accordance with the investment plan and partial replacement of coal with gas at the Ljubljana Thermal Power Plant. In 2035, GHG emissions will only amount to 55% of the emissions in 2008. Compared to 2005 emissions are 36% lower in 2030.

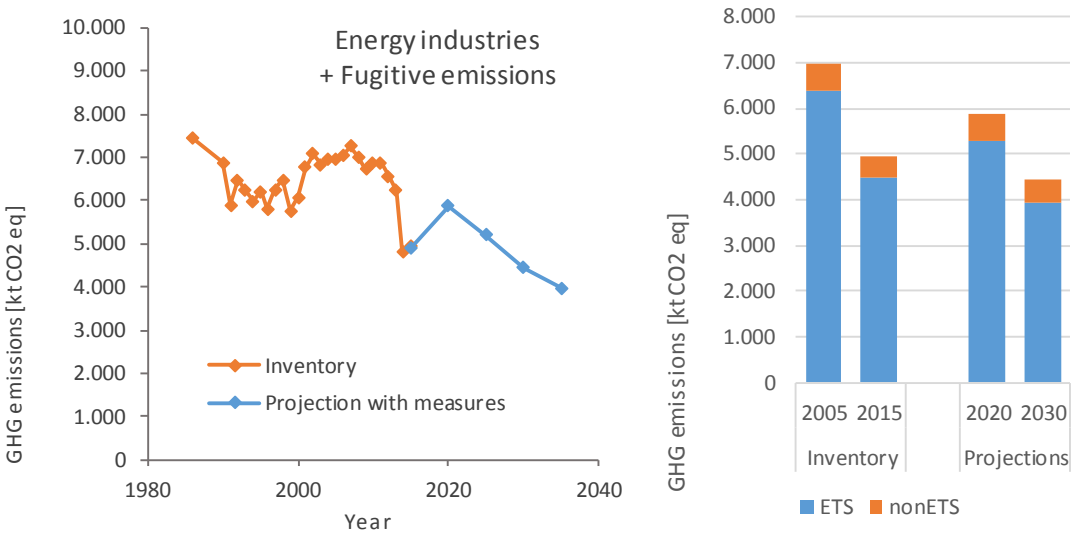

Figure 28: GHG emissions in the transformation and fugitive emissions sectors – emissions trend in 1986–2015 period and projection with measures by 2035 (left), including the distribution of emissions into ETS and non-ETS (right)

The greatest share of emissions in the sector is incorporated into the GHG emissions trading scheme (ETS) – Figure 28. The share is slightly decreasing, amounting to 91% in 2015, 90% in 2020, and 88% in 2030.

Transformations accounted for 27% of total emissions in 2015, 30% in 2020, and until 2035, the share is reduced to 24%. The share of fugitive emissions amounts to 2% in 2015, 3% in 2020, and by 2035, it will decrease again to 2%.

INDUSTRY AND CONSTRUCTION

The emissions due to the combustion of fuels in industry and construction (1.A.2) will increase by 2035, but they will not exceed the value achieved in 2008, in spite of the fact that the value added achieved in 2035 will be 86% higher than the one achieved in 2008. The increase in emissions is a result of economic growth, although, due to the increase in energy efficiency and greater use of RES, the emissions growth index is lower than the value added growth index. By 2020, the value added will increase by 28% and by 75% by 2030 compared to 2015, while GHG emissions will increase by 7% by 2020 and by 29% by 2030. Compared to 2005 emissions are 17% lower in 2030.

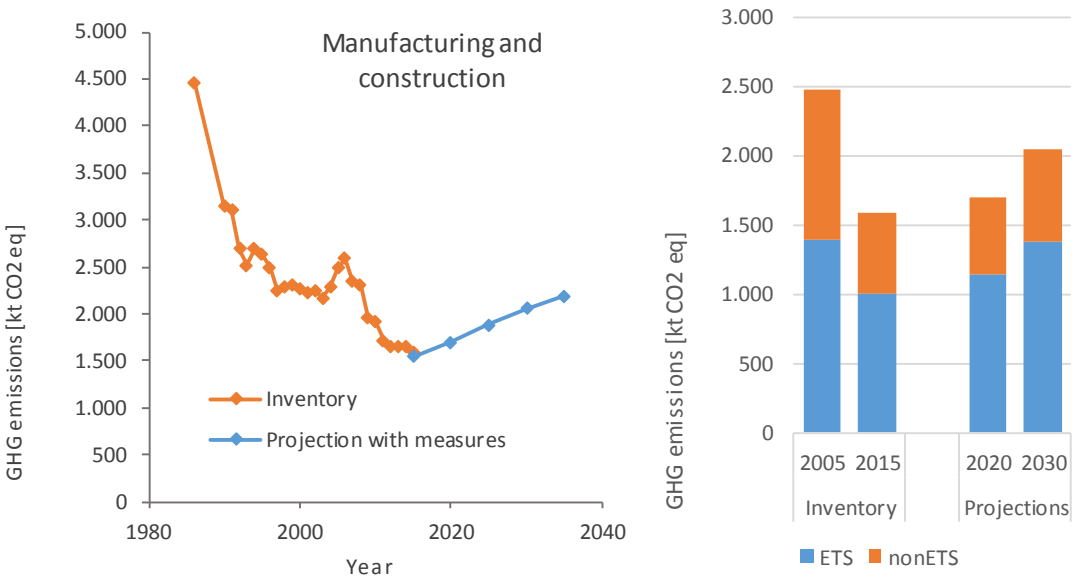

Figure 29: GHG emissions from fuel combustion in industry and construction – emissions trend in 1986–2015 period and projection with measures by 2035 (left), and the distribution of emissions into ETS and non-ETS (right)

In industry, as well as in transformations, ETS emissions are prevailing, but less pronounced. In 2005, ETS emissions account for 56%, in 2015 63%, and by 2030, their share will increase to 68%.

In 2015 and 2020, emissions due to the combustion of fuels in industry and construction will amount to 9%, and by 2035, the share will gradually be increased to 14%.

TRANSPORT

In 2014, emissions generated by transport took over the long-held top position occupied by emissions from the transformation sector, which therefore made transport the largest source of emissions in Slovenia. Transport is a sector in which the highest growth of emissions was recorded in the past, for example 18% in 2008. Regardless of its intense past, less exponential growth is expected in the future. On the other hand, there is also the fact that projections for this sector are the most uncertain.

Further growth of transport on Slovenian roads is expected by 2035. The projections show an increase in passenger transport by 24% in the 2015–2035 period, and by 66% in regard to freight transport. Building a railway infrastructure will mean that the share of rail freight transport will not be reduced until 2035. Promoting public passenger transport and building the infrastructure affects the increase in the share of railways in passenger transport, rising from 3% to 4%, whereas in bus transport, it affects the maintenance of the current share. Energy consumption due to significant improvement in vehicle efficiency, changes in the structure of vehicle fleet, and partially due to changes in behaviour and transport mode, increases significantly less

than transport activity or it actually decreases. Energy use in passenger transport is 19% lower in 2035 compared to 2015, while energy use in freight transport is 43% higher. The use of biofuels additionally contributes to lower emission values with their share of 1.7% in 2015 increasing to 6.5% in 2020 and remaining at a similar level even after that year, as well as the increased use of other alternative fuels with lower CO_2 emissions (liquefied petroleum gas and natural gas); or without CO_2 emissions (electricity and hydrogen). Emissions in 2030 are 18% higher compared to 2005.

The implementation of measures described above maintains the transport emissions under the emissions levels recorded in 2008, according to the projection with measures. In 2008, emissions amounted to 6,158 kt CO_2 eq., while according to the projection with measures, the highest emissions levels are achieved in 2020, amounting to 5,415 kt CO_2 eq., 1% lower compared to 2015. After 2020, emissions are decreasing, especially after 2030. Emissions are supposed to be 3% lower in 2030 than in 2015, and by 12% in 2035, (Figure 30 – left). The increase in emissions between 2015 and 2020 is the result of the increase in the transport activity that other emissions reduction measures in transport failed to nullify. All emissions from transport are included in non-ETS emissions.

Transport accounted for 32% of total emissions in 2015, 30% in 2020, and 32 % in 2030 and in 2035 for 31%.

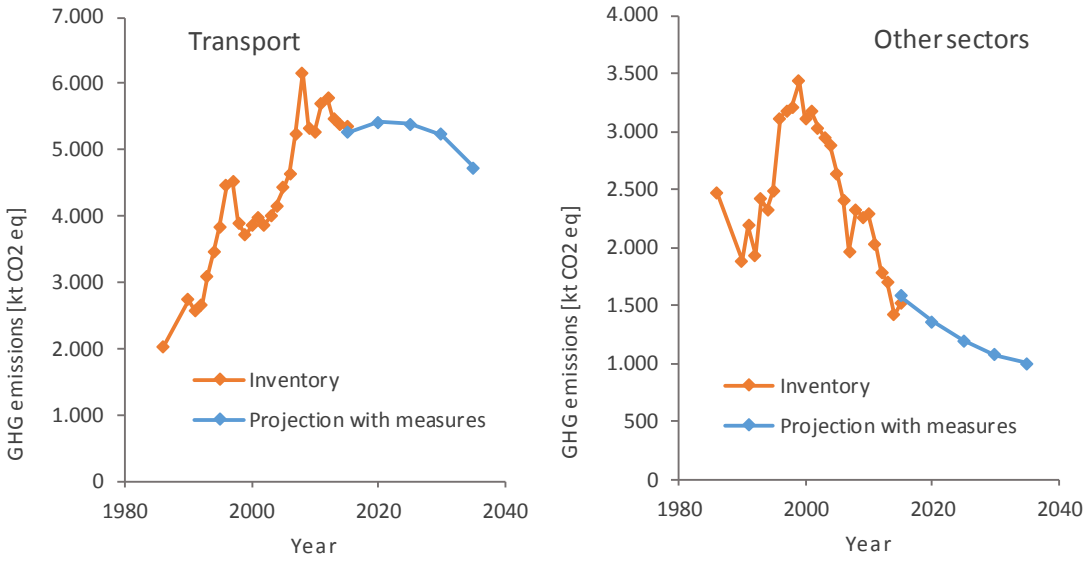

Figure 30: GHG emissions due to transport (left) and for the other sectors (right) in the 1986–2015 period and according to the projection with measures by 2035

OTHER SECTORS

GHG emissions generated in other sectors which include energy use in households, services and agriculture decrease significantly (Figure 30 – right) In fact, the projection anticipates very ambitious implementation of measures in these areas, specifically, phasing-out of fuel oil-powered boilers, the great share of boilers using wood biomass and heat pumps, a significant increase of solar collectors installed and

high level of energy renovation of residential and non-residential buildings turning them into energy efficient buildings. In spite of an increase in the surface of residential buildings (by 11% in the 2015–2030 period) and non-residential buildings (by 14% in the 2015–2030 period), these measures have an effect on the reduction of emissions.

Compared to 2015, emissions are 10% lower in 2020. They decrease additionally by 2030, being thus 29% lower compared to 2015 and 34% lower in 2035. Compared to 2005, emissions are 48% lower in 2020 and 59% lower in 2030.

In 2015, other sectors represent 9% of total emissions, while the share of the sector is reduced to 6% by 2035.

INDUSTRIAL PROCESSES

Emissions generated in industrial processes have decreased significantly since 2008 which was partially due to the economic crisis, partially due to the closure of some plants for the failure to satisfying requirements from environmental permits. Emissions have then been increasing from 2009 to 2015. According to projections, the trend continues until 2020, when it is reversed. Growth is a consequence of production growth. It is anticipated that by 2020, cement production, which is the main source of emissions in this sector, will reach the level of emissions obtained in 2009, and by 2025, the level achieved in 2007. An important segment in industrial processes is represented by HFC emissions, which will reduce by 70% by 2030 compared to 2015 owing to the implementation of the directive on emissions from mobile air-conditioning systems (replacement of refrigerants) and the new regulation on F-gases (reduction of leakages from the equipment, replacement of refrigerants, quota system for HFCs on the EU level).

Compared to 2015, emissions are 12% higher in 2020, 8% in 2030, and 5% in 2035. The greatest share of emissions in the industrial process sector is included in ETS (62% in 2020, 73% in 2030). Compared to 2005 emissions are 10% lower in 2030.

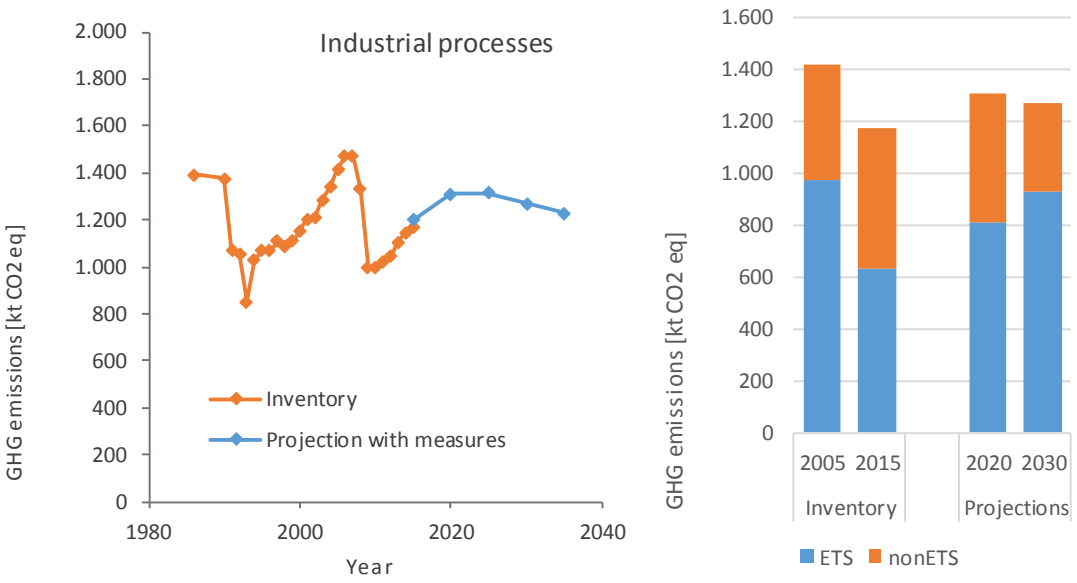

Figure 31: GHG emissions due to industrial processes – emissions trend in the 1986–2015 period and projection with measures by 2035 (left), including the distribution of emissions into ETS and non-ETS (right)

In 2015, the emissions share from industrial processes in total emissions amounts to 7%, and by 2035, it increases to 8%.

AGRICULTURE

Compared to 2015, agriculture emissions increase by 9% by 2020, whereas a minimum growth of emissions is projected for the period between 2020 and 2030 so that, compared to 2015, by 2030, emissions are 10% higher (Figure 32 – left). In 2035, the level of emissions is equal to the one in 2030. Compared to 2005 emissions are 8% higher in 2030. The increase in emissions is the result of an increase in livestock, whereby an increase to numbers already achieved in the recent years is not being projected, and maintenance of similar nitrogen consumption levels as measured in the present. The following measures have been planned for regulating emissions from agriculture: increase of the efficiency of farm animal breeding, introducing rearing methods by way of which GHG emissions are decreased and more efficient nitrogen cycles in agriculture. A long-term goal of the agricultural policy is the regulation of emissions by increasing food self-sufficiency and preservation of farming land, which was included in the projections.

WASTE

Emissions from waste and waste waters have been decreasing fast since 2004 (Figure 32 – right), amounting to 521 kt CO_2 eq. In 2020, they amount to 448 kt CO_2 eq., which is 14% less compared to 2015, and 370 kt in 2030, which is 29% lower. In 2035, the emissions amount to 345 kt CO_2 eq. Copmared to 2005 emissions are 53% lower in 2030. The reduction is the result of the reduction in landfilled biodegradable waste. This figure will be achieved by reducing the volume of mixed waste (separate collection of waste and packaging, reduced volume of waste), sorting and processing

in collection centres and by mechanical biological treatment. From 2016, biodegradable waste will no longer be disposed of in landfills.

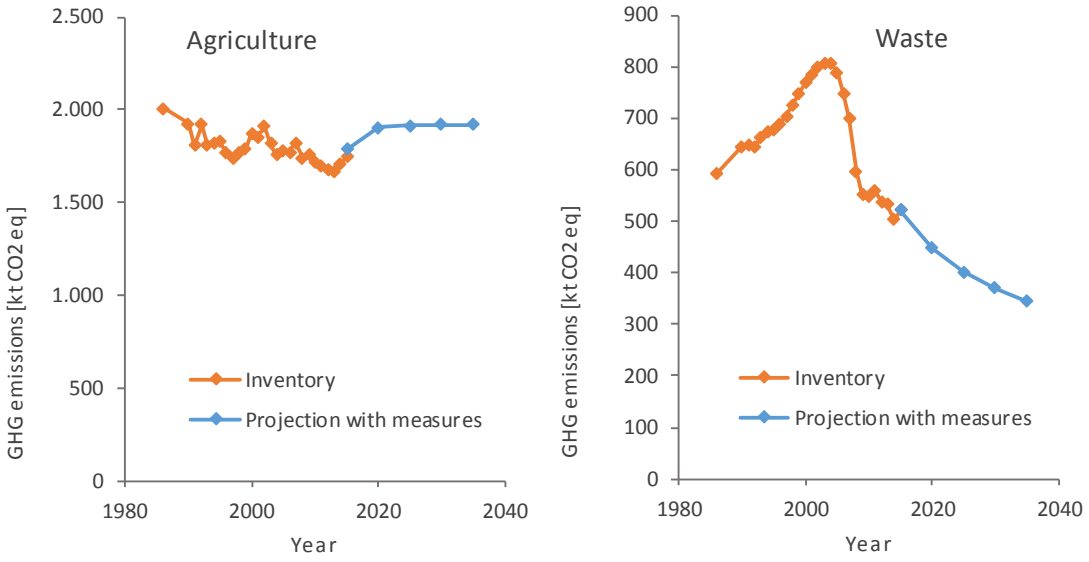

Figure 32: GHG emissions from agriculture (left) and from waste (right) in the 1986–2015 period and according to the projection with measures by 2035

5.2.6 Total Emissions of Greenhouse Gases

According to the projection with measures, by 2020, emissions will increase to 18,009 kt CO_2 eq., by 2030, they will decrease to 16,351 kt CO_2 eq., and by 2035, they will decrease to 15.378 kt CO_2 eq. Compared to 2015, emissions are 7.0% higher in 2020, 2.9% lower in 2030, and 8.6% lower in 2035. Compared to 2005, emissions are 12.1% lower in 2020 and in 2030, they are 20.2% lower.

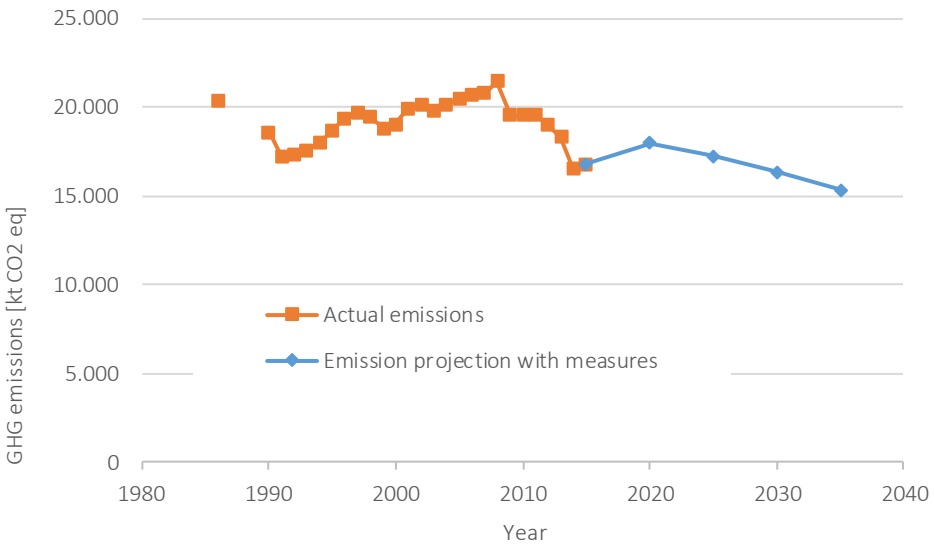

Figure 33: Emissions trend up to and including 2015 and emissions trend according to projections with measures from 2020 to 2035 (source: SEA, JSI-EEC, AIS)

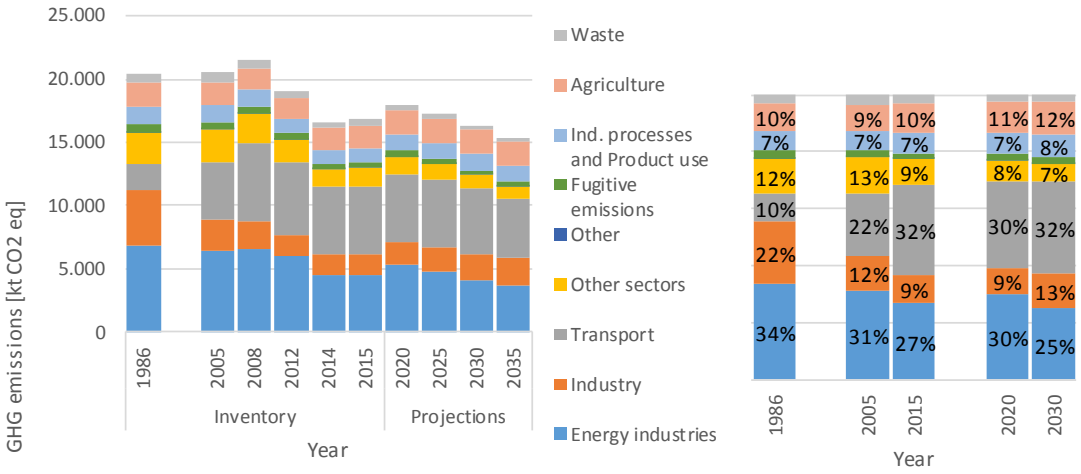

Figure 34: Sectoral GHG emission structures in selected years and projections with measures for 2020, 2025, 2030 and 2035 (source: SEA, JSI-EEC, AIS)

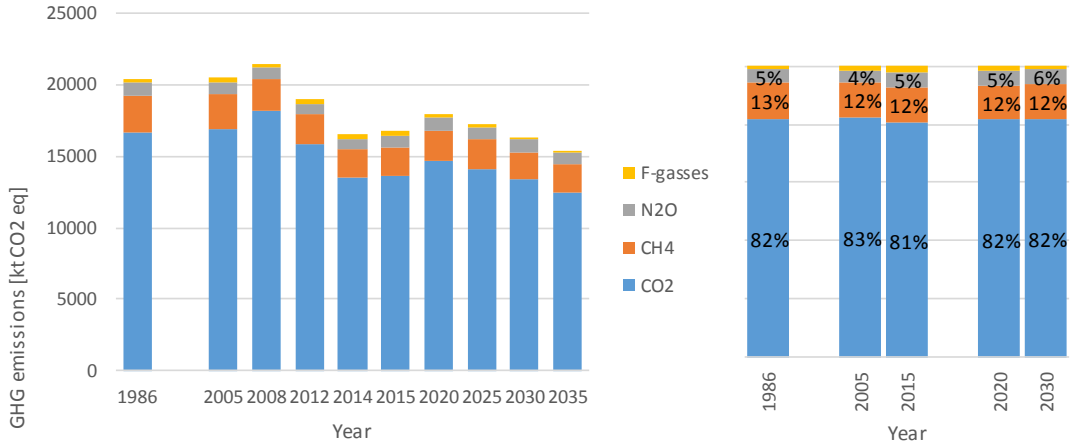

Figure 35: GHG emission structures by gases in selected years and projections with measures for 2020, 2025, 2030 and 2035 (source: SEA, JSI-EEC, AIS)

5.2.7 Emissions from international bunkers

Fuels for navigation and international aviation are not included in the projections. In 2015, the emissions from international bunker fuels represented 1.7% of emissions in the Republic of Slovenia. Emissions from international aviation represented 0.4% or 75 kt CO_2 eq., and emissions from international navigation represented 1.2% or 209 kt CO_2 eq.

According to projections, emissions from both categories will increase. International aviation emissions will be 31% higher in 2020 compared to 2015, while in 2030; they will be79% higher, while emissions from international navigation will increase by 89% in 2020 and by 141% in 2030.

Projections for international aviation were made on the basis of GDP growth, as a high correlation between these two variables has been shown in the past, and for international navigation, the projection was made on the basis of a transhipment projection in Luka Koper port from the Transport Development Strategy of the Republic of Slovenia.

Table 21: Projections of emissions from the sales of fuels to international aviation and international navigation

		2015	2020	2025	2030	2035
International aviation	[kt CO_2 eq.]	75	98	116	134	134
International navigation	[kt CO_2 eq.]	209	394	448	502	529

5.2.8 Projections of CO2 Sinks

CO_2 sinks resulting from forest management in Slovenia are an important factor in reducing emissions and mitigating climate change. In 2015, sinks resulting from forest management amounted to -5.903kt CO_2, which is 35% of GHG emissions in Slovenia. Taking into account emissions and sinks from other subsectors in the sector "Land use", land use change and forestry is a net emissions sink of -5,629kt CO_2 eq.

Slovenia currently does not have projections of emissions and sinks for this sector, but the "LIFE ClimatePath2050" project is being carried out, which will make projections of CO_2 sinks and emissions in the sector "Land Use, Land-Use Change and Forestry" (LULUCF) by 2050 for preparation of a strategy for low GHG emissions. The projections will be ready by mid 2019.

5.3 EU-ETS in the Projections

Emissions projections for operators included in the EU-ETS system have been determined by applying the following assumptions: in the production of electricity and heat sector, all central-supply companies have been included in ETS (TEŠ, TE-TOL, TEB)[59], while in regard to companies providing local supply of electricity and heat (district heating), the ETS share has been determined for each fuel separately for the units of co-generated electricity and heat and for boilers on the basis of shares from 2013. For the combustion of fuels in industry sector, the ETS share has also been determined on the basis of ETS share per individual fuel in 2015 while the ETS share in industrial processes has been determined for each process.

In 2013, the ETS volume changed in accordance with the EU legislation – quite a few companies have fallen out of the system, but on the other hand, the Talum company, which produces primary and secondary aluminum, has fully entered the system. To allow for the comparability of results, the same ETS volume has been anticipated for the period prior to 2013 and for the period after 2013. Differences arise in emissions from industry (both from the combustion of fuels and from industrial processes).

Table 22: Actual ETS emission in 2005, 2008, 2012 and 2013, assuming ETS scope after 2012, and emission projections by 2035 for projection with measures (source: SEA, JSI-EEC)

		2005	2008	2010	2015	2020	2025	2030	2035
		Actual emissions (scope after 2012)				Projection with measures			
1. Energy	[kt CO_2]	7,778.8	7,864.6	7,434.8	5,476.3	6,415.7	5,905.6	5,306.4	4,977.8
A. Fuel combustion	[kt CO_2]	7,696.4	7,776.6	7,343.5	5,420.9	6,332.3	5,832.6	5,243.7	4,925.5
1. Transformations	[kt CO_2]	6,301.1	6,404.9	6,209.0	4,420.9	5,191.9	4,563.3	3,858.0	3,440.2
2. Industry and Construction	[kt CO_2]	1,395.3	1,371.7	1,134.5	1,000.0	1,140.3	1,269.3	1,385.7	1,485.3
B. Fugitive emissions	[kt CO_2]	82.4	88.0	91.4	55.4	83.4	73.0	62.7	52.3
2. Industrial processes and product use	[kt CO_2 eq.]	973.3	888.8	565.6	633.3	811.6	899.5	926.2	927.9
TOTAL	**[kt CO_2 eq.]**	**8,752.1**	**8,753.4**	**8,000.4**	**6,109.6**	**7,227.3**	**6,805.2**	**6,232.5**	**5,905.7**

After significantly lower ETS emissions in 2014, due to the construction of the new coal-based unit, and due to the launch of the new, more efficient coal-based unit TEŠ 6 in 2015, and the interruption of the operation of TEŠ 5, the ETS emissions will be 17% higher by 2020 compared to 2015, but after 2020 they will decrease. Emissions are the most reduced in transformations. In 2030, emissions are 3% lower compared to 2015, and in 2035, they are 9% lower. In 2020, emissions from other sources are 21% higher compared to 2015, and by 2035, they increase further, so that they 46% higher. Fugitive emissions are further decreased, but emissions in the industry increase (from fuel combustion and processes). Emissions arising from fuel combustion in industry increase by 39% by 2030, and those arising from processes by 46%. By 2030, total ETS emissions will increase by 1% compared to 2015, and decrease by 29% compared to 2005.

[59] TET has not been in operation since 2013.

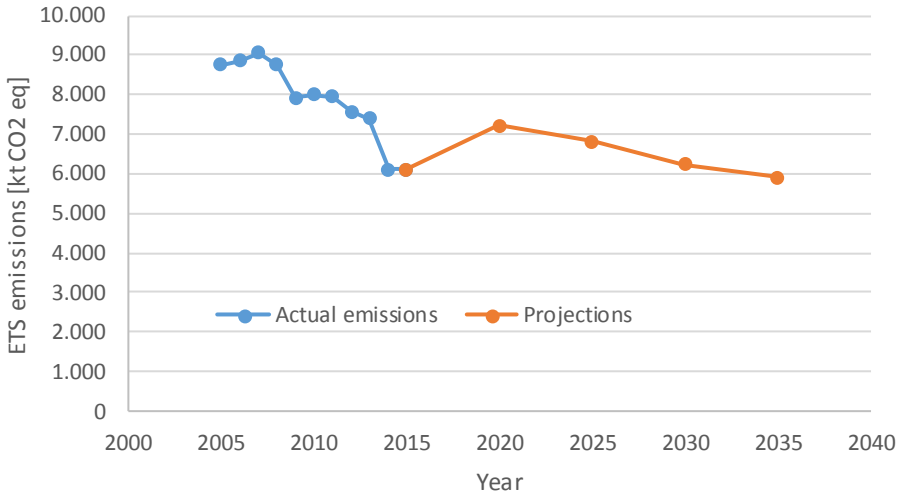

Figure 36: Actual ETS emissions and projections with measures by 2035

Table 23: Share of ETS emissions in total GHG emissions by sector

		2005	2008	2012	2013	2015	2020	2025	2030	2035
		Actual emissions (scope after 2012)					Projection with measures			
1.A.1. Transformations	[kt]	98%	98%	97%	97%	97%	96%	96%	95%	94%
1.A.2. Industry and Construction	[kt]	56%	61%	60%	63%	63%	67%	68%	68%	68%
1.B. Fugitive emissions	[kt]	16%	19%	21%	17%	15%	17%	17%	16%	16%
2. Industrial processes and product use	[kt]	69%	57%	55%	59%	54%	62%	68%	73%	76%
TOTAL	[kt]	43%	40%	40%	40%	36%	40%	39%	38%	38%

The share of emissions from sources included in the ETS scheme varies by sector, which is clearly shown in the presentation of emission trends by sector in the figures (Figure 28, Figure 29, Figure 31). Almost all emissions from the transformation sector are included in the ETS system, and the share is slightly reduced by 2035 due to the reduction in emissions from electricity generation. In 2005, emissions from ETS sources represent 56% in industry and construction sectors and they increase to two-thirds by 2020 and remain at the same level after 2020. The increase is the result of a greater increase of emissions from sources which are included in ETS than from other industrial sources. It must be noted that, for the sake of ensuring the comparability of results, the same scope of installations included in the ETS has been anticipated for the 2005–2012 period as is in the period after 2012. In regard to fugitive emissions, ETS emissions include emissions from desulfurisation, which account for 16% or 17% in period 2020–2035. The share of ETS emissions also increases in the industrial processes sector after 2015, especially due to the increase in cement production between 2020 and 2030. Likewise, the same range of installations included in the ETS structure has been anticipated for the entire period as has been anticipated for the period after 2012. Cement production comprises 58% of ETS emissions in industrial

processes in 2015 and 60% in 2035. In regard to total GHG emissions, ETS sources represent 40% in 2020, but by 2035, their share is reduced by 2 percentage points.

5.4 Non-ETS in the Projections

Within the scope of the EU objective for reducing GHG emissions by 20% by 2020, the target set for Slovenia for the non-ETS sector allows for an increase in emissions of 4% compared to 2005. In addition to the 2020 target, the Commission has also set interim yearly emissions (for 2013–2019), which (for Member States with permitted emission increase) follow a linear trajectory from 2009 to 2020. The linear trajectory was set in the Commission Decision No 2013/162/EU of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC. On 31 October, the Commission adopted the Implementing Decision on the adjustments to Member States' annual emission allocations for the period from 2013 to 2020 (2013/634/EU), by way of which the adjustment has been determined for the target trajectory referred to in the Decision No. 2013/162/EU in accordance with the quantity of rights as a result of the changes regarding range of installations in the EU-ETS system after 2012. In 2017, the Commission adopted an adjustment of annual targets in order to ensure compliance with the reporting methodology, which affected the target emissions in 2017–2020. Considering both Decisions, the target emissions for Slovenia are as follows (by applying GWP from the fourth report: IPCC – 4AR):

Table 24: Target trajectories for non-ETS emissions in the 2013–2020 period (source: EC)

		2013	2014	2015	2016	2017	2018	2019	2020
Slovenia	[kt CO_2 eq.]	12,324	12,354	12,384	12,413	12,203	12,238	12,273	12,307

In July 2016, a proposal for the Effort Sharing Regulation (ESR) was published by the Commission containing a proposal for GHG emissions targets from sources which are not included in the ETS for the 2021–2030 period. A 15% reduction in emissions is proposed for Slovenia by 2030 compared to 2005.

Emissions projections for sources which are not included in the ETS system have been calculated by deducting ETS emissions from total emissions.

According to the projection with measures, non-ETS emissions amount to 10,722 kt CO_2 eq. in 2015, and minimally rise to 10,781 kt CO_2 eq. by 2020 but after that they decrease to 9,472 kt CO_2 eq in 2035. Emissions between 2015–2020 are considerably lower than the target trajectory, which is also seen from the figure (Figure 37). Emissions are 13% lower in 2015 and 12% lower in 2020. This is mostly the result of the complexity of attaining the target share of RES in the gross final energy consumption in 2020. Compared to 2005, emissions are 8% lower in 2020 and in 2030, they are 14% lower.

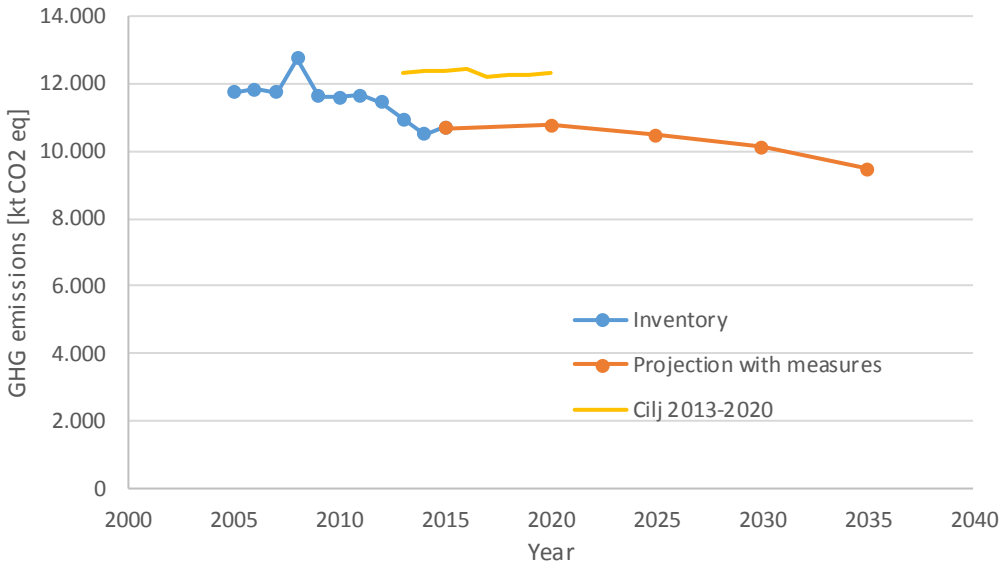

Figure 37: Non-ETS emissions trend in the 2005–2015 period and emissions trend according to projection with measures from 2020 to 2035 compared to target trajectory 2013–2020 (source: JSI-EEC, AIS)

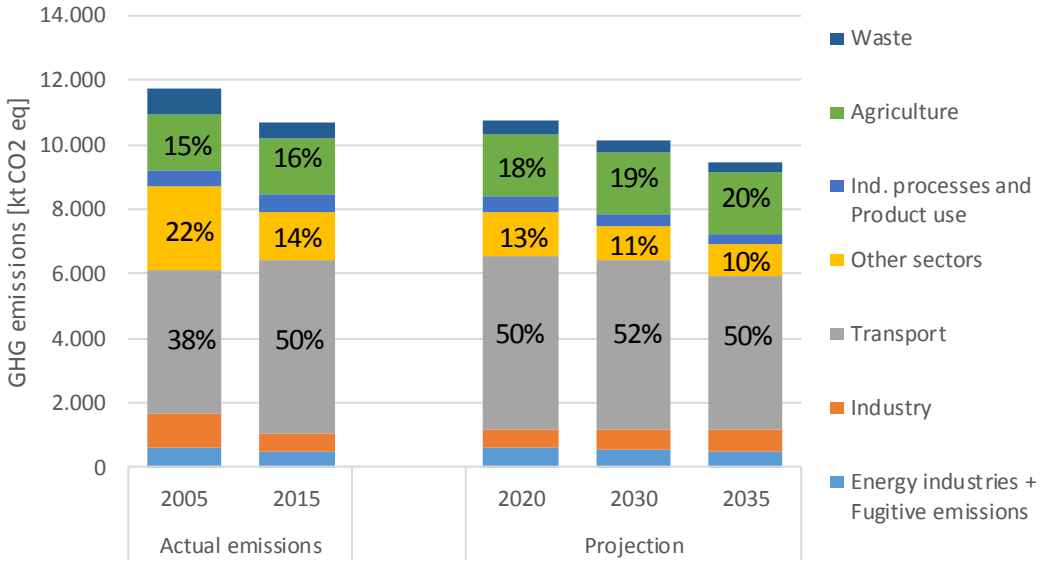

Figure 38: Non-ETS emission structure in 2005 and 2015 and according to the projection for 2020, 2030 and 2035 (source: JSI-EEC, AIS)

By far the greatest share of emissions in the non-ETS sector is generated by transport, which represented 50% of all non-ETS emissions in 2015 while its share amounted to 38% in 2005. According to the projection, the transport emissions first increase and then decrease but due to the reduction of total non-ETS emissions, their share increases to 52% by 2030 and by 2035, it decreases back to 50%. In terms of significance, the sector is followed by the agriculture sector and other sectors. Compared to 2015, emissions from agriculture will increase, but in 2035, their values stay the same, which is why their share will also increase i.e., from 16% to 20%. It is completely opposite in the case of other sectors where the share decreases

significantly. It is more than halved compared to 2005. In 2030, 7% is contributed to non-ETS emissions by industry and construction, transformations and fugitive emissions represent 5%, waste 4%, and industrial processes 3%.

Table 25: Emissions from sources which are not included in EU-ETS (non-ETS) in 2005, 2008, 2012, 2013 and 2015 and the projection by 2035

GHG [Gg CO2 eq.]						**Projection with measures**					
Sector/year	**2005**	**2008**	**2012**	**2013**	**2015**	**2020**	**2025**	**2030**	**2035**	**2020/2005**	**2030/2005**
Prod. of el. en. and heat and fugitive emissions	589	574	558	534	454	599	559	518	477	2%	-12%
Industry and Construction	1,090	676	653	605	591	556	608	666	701	-49%	-39%
Transport	4,429	5,699	5,773	5,460	5,359	5,419	5,393	5,225	4,735	22	18%
Other sectors	2,632	2,030	1,787	1,705	1,514	1,357	1,196	1,073	994	-48%	-59%
Industrial Processes	443	436	473	451	539	498	414	345	300	12%	-22%
Agriculture	1,774	1,696	1,679	1,663	1,744	1,904	1,913	1,921	1,921	7%	8%
Waste	788	559	537	533	521	448	402	370	345	-43%	-53%
TOTAL	**11,746**	**11,672**	**11,461**	**10,951**	**10,722**	**10,781**	**10,485**	**10,119**	**9,472**	**-8%**	**-14%**
Target trajectory and TARGET 2020				12,324	12,384	12,307					
Distance to the TARGET (emissions/target-1)				-11%	-13%	-12%					

5.5 The total effect of Policies and Measures

The total effect of measures was determined by a comparison between projection with measures and a projection without measures by sector. Effects of individual measures have also been determined by means of models which are used for projections by way of which it has been ensured that no double counting of effects may occur.

The total effect of measures in 2020 amounts to 1,143 kt CO_2 eq., and to 4,543 kt CO_2 eq. for 2030. By far the greatest effect is accounted for by CO_2, followed by CH_4. More interesting is the effect of measures across sectors. By far the biggest effect of the measures is in the transport sector due to vehicle efficiency improvement, increased use of the of low carbon fuels, structural changes in transport types, followed by energy supply due to the technological modernisation of thermal power plants, and an increase in the RES share in electricity generation. The effect of measures in other sectors is also significant; the same applies to industrial processes, where the effect is mainly a consequence of the decreased HFC emissions. The smallest effect of measures is seen in agriculture, which confirms how difficult it is to reduce emissions in this sector

Table 26: Total effect of measures by gas for the scenario with measures

Effect of the implemented and adopted measures		2020	2025	2030	2035
CO_2	[kt CO_2 eq.]	828	2,194	3,765	5,096
CH_4	[kt CO_2 eq.]	202	301	385	438
N_2O	[kt CO_2 eq.]	15	27	41	52
F-gases	[kt CO_2 eq.]	98	224	352	404
TOTAL	[kt CO_2 eq.]	**1,143**	**2,745**	**4,543**	**5,990**

Table 27: Total effect of measures by sector for the scenario with measures

Effect of the implemented and adopted measures		2020	2025	2030	2035
Energy supply (Transformations)	[kt CO_2 eq.]	63	689	1,393	1,812
Industry	[kt CO_2 eq.]	18	68	127	202
Transport	[kt CO_2 eq.]	601	1,161	1,869	2,630
Other sectors	[kt CO_2 eq.]	159	285	380	450
Fugitive emissions	[kt CO_2 eq.]	0	53	107	160
Industrial Processes	[kt CO_2 eq.]	98	224	352	404
Agriculture	[kt CO_2 eq.]	25	49	72	72
Waste	[kt CO_2 eq.]	179	217	243	261
TOTAL	[kt CO_2 eq.]	**1,143**	**2,745**	**4,543**	**5,990**

5.6 Comparison with the Projections in Previous Reports

Projections with measures and additional measures in the Sixth National Communication are higher than the last projections. The main reason for the lower emissions in 2015 in the

newer projections is the prolonged economic crisis, which resulted in lower emissions in the industry and transport sectors, faster replacement of fuel oil with, in particular, wood biomass in households and the service sector, and lower emissions in transformations. In the transport sector, the impact of the changed ratio between the prices of motor fuel in Slovenia and the neighbouring countries is also important. In addition to the above-mentioned, there were also lower emissions in the agriculture, due to lower livestock numbers, and waste sector, in particular due to faster implementation of measures than envisaged. Implementation of measures beyond 2020 is similar to older projections, since emissions in 2030, in contrast to emissions in 2020, are 6% or 7% lower in all three projections, while the projection presented in this report shows that the emission reduction rate is higher, with emissions 9% lower, which implies that the measures were implemented more intensively.

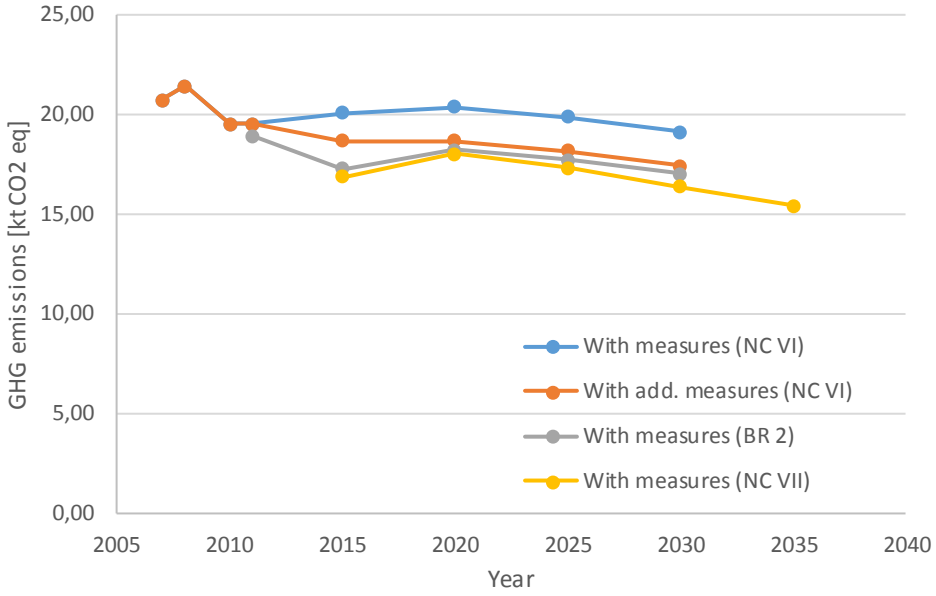

Figure 39: Comparison of the Fifth National Communication projections and second biennial communication with the projections in this Communication

5.7 Uncertainty in Projections

Uncertainty in projections stems from the following: uncertainty in statistical data applied as the basis for projections (statistical data, emission factors); models applied in projections which represent a simplified image of real-life developments; uncertainty in scenarios regarding the implementation of policies and measures as these change in time, and in addition, it is hard to anticipate an actual effect of measures since they are subject to numerous factors that affect them; and uncertainty in the future economic, technological, and social development which includes uncertainty in energy prices; the growth in energy supply and demand; the behaviour of the main players on the market and other factors.

The results of emission projections for the energy industry is mostly subject to the implementation of measures considered in regard to renewable sources of energy and energy efficiency which will mostly depend on the funds available. The prices of energy

products and emission coupons, that have shown a very dynamic movement in the past, exert a considerable impact.

One of the sources of uncertainty are also scenarios for the future development of gross domestic product, which have a particularly significant impact on energy use and consequently on emissions in industry and transport. The scenario, which was used in projections, was developed in 2013 and amended in 2017 so as to make it more in line with the interim period trends. The scenario is for the purpose of planning the budget in short-term projections highly conservative. This is also shown by the comparison of an average added value growth in 2013−2016 period arising from projections and the average growth of gross domestic product on the basis of statistical data. An analysis of the past data has shown that these two parameters match well, so a comparison is possible. The average growth of added value in projections is estimated at +0.6%, while the average gross domestic product was +2.8%, which shows a significant difference. It may be concluded that the projection of the added value underestimates the economic recovery of Slovenia although, on this basis, it is hard to conclude that this also implies higher emissions since, as a result of higher added value, there are more investment activities and, therefore more EE and RES measures.

The largest uncertainty for Slovenia in the preparation of projections stems from the transport sector. High uncertainty in projections regarding transport accounts for transit transport, firstly, because modelling its volume is difficult, and secondly, because the purchase of fuel for transit transport is a highly variable category which mostly depends on the ratio between the prices for motor fuels in Slovenia and in neighbouring countries. Transit transport has a significant impact on the Slovenian energy balance due to the smallness of Slovenia. In 2008, when the sale of fuel to transit transport reached its peak, the sale of motor fuel to foreign vehicles in Slovenia represented 30%. The uncertainty regarding transport is also the result of the uncertainty regarding the implementation of measures in connection with the transport policy in which regard little was given in the past for the promotion of public transport and for the development of railway transport, in spite of plans, since the main development axis was the construction of road network.

Uncertainties regarding agriculture emissions have been assessed according to IPCC (2000). These uncertainties have been assessed by individual sources of emissions while the aggregated uncertainty has been calculated according to the A Rule in case of additive quantities and according to the B Rule when the assessments have been the product of the data on activity and on emission coefficient (IPCC, 2000). The Manual EMEP/CORINAIR (2002) has also been used in assessing uncertainty regarding base data and emission factors. In regard to methane emissions, the uncertainty has been assessed to amount to 19% while in regard to nitric oxide to 230%. The uncertainty in regard to emissions of both gases generated in agriculture has been assessed to amount to 135%

5.8 The Sensitivity of Projections

Considering the fact that in Slovenia the development of the transport sector is most uncertain and, in addition to this, it represents the most important source of emissions from

non-ETS sectors, a sensitivity analysis was performed for the transport sector. A sensitivity analysis for projections has been made in regard to the impact of transit transport, and the scenarios regarding the implementation of transport and environmental policies in the transport sector have been compared.

Table 28: Sensitivity analysis for GHG emissions projections in the transport sector in regard to the assumptions about transit transport and the implementation of measures for transport policy

[%]	2015	2020	2025	2030	2035
Projection with measures	100	103	102	99	90
Intensified implementation of transport and environmental policy measures at the same volume of fuel sales to foreign vehicles as in the projection with measures	100	103	101	97	85
Projection with measures while taking into account higher volume of transit transport	100	124	124	122	111
Projection with additional measures while taking into account lower volume of transit transport	100	92	91	89	81

The range between the highest and the lowest projection regarding GHG emissions in transport presented in the table above amounts to 30%. The projection with measures presumes that the majority of measures for the adopted transport policy strategy from 2015, which encourages the use of public transport and a higher share of rail freight transport, and the 2014 operational programme of measures to reduce greenhouse gas emissions, will be implemented. In regard to the fleet, the with measures scenario predicts a moderate scenario concerning penetration of new technologies. With regard to the share of biofuels, it is predicted that the share in 2020 will amount to 6.5%, which will not be enough to reach the target RES share. After 2020, the total share will be maintained at this level and will enable achieving the target share according to the proposal of the new RES directive from the Commission winter legislative package. In regard to the purchase of fuels on the part of transit transport in Slovenia, it is assumed that the price of motor fuels in Slovenia will be comparable to price in neighbouring countries which means that approximately half of vehicles in transit will buy fuel in Slovenia. A projection that predicts an intensified implementation of the transport and environmental policy measures, presupposes a consistent implementation of the transport strategy from 2015 and a much more ambitious promotion of alternative fuels. As regards to transit transport, assumptions are the same as in the projection of measures. The upper limit of projections sensitivity has been calculated on the basis of the projection with measures, except that a higher volume of fuel sales to foreign vehicles of 70% was predicted. This is due to changed price ratios and increased transit vehicle transport through Slovenia. The lower limit of projections sensitivity has been calculated on the basis of the projection with measures while assuming that the retail price in Slovenia is higher than in neighbouring countries, with no possibility to apply for the reimbursement of the minimum excise duty, which will result in a minimum share of foreign vehicles that will buy fuel in Slovenia.

The sensitivity analysis of total emissions in regard to the transport scenarios presented above has shown that the emission trend in transport has a significant impact to total emissions. Emissions in 2020 according to the scenario, which represents the upper sensitivity limit, amount to 19.0 Mt CO_2 eq., which is 14% more emissions than in 2015; however, emissions in 2020 according to the scenario, which represents the lower sensitivity limit, amount to 17.3 Mt CO_2 eq., which are 4% higher than emissions in 2015. In 2030, the emissions range is maintained at a similar level: emissions according to the scenario which represents the upper sensitivity limit amount to 17.4 Mt CO_2 eq., and emissions according to the scenario which represents the lower sensitivity limit amount to 15.7 Mt CO_2 eq.

Table 29: Sensitivity analysis for total GHG emissions projections in regard to the assumptions about transit transport and the implementation of measures for sustainable transport and environmental policy

[%]	2015	2020	2025	2030	2035
Projection with measures	100	107	103	97	92
Intensified implementation of transport and environmental policy measures at the same volume of fuel sales to foreign vehicles as in the projection with measures	100	107	103	97	90
Projection with measures while taking into account higher volume of transit transport	100	114	110	104	98
Projection with additional measures while taking into account lower volume of transit transport	100	104	99	94	89

An even greater impact is recorded by the sensitivity analysis regarding transport emissions in case of non-ETS emissions since transport represents more than 50% of these emissions. In the sensitivity analysis, the share of transport in non-ETS emissions ranges from 57% in the scenario applied for the upper sensitivity limit, to 47% in the scenario applied for the lower sensitivity level.

Table 30: Sensitivity analysis for GHG emissions projections of non-ETS in regard to the assumptions about transit transport and the implementation of measures for sustainable transport and environmental policy

[%]	2015	2020	2025	2030	2035
Projection with measures	100	101	98	95	88
Intensified implementation of transport and environmental policy measures at the same volume of fuel sales to foreign vehicles as in the projection with measures	100	101	97	93	86
Projection with measures while taking into account higher volume of transit transport	100	111	109	106	99
Projection with additional measures while taking into account lower volume of transit transport	100	95	92	89	84

5.9 Methodology

ENERGY

In order to prepare emissions projections for the energy sector as defined by IPCC guidelines, a system of models was used in which the main tool is a reference energy ecological model called REES-SLO2, made in the MESAP environment. The technology-orientated "Reference Energy-Ecological Model for Slovenia (REES-SLO2)" was developed in the MESAP environment in the form of a linear network model for processes and connections (a reference energy system), which enables consistent modelling of energy use based on the needs of energy services and emissions calculations, costs and other effects. The tools, models and methodology were verified in a series of preliminary studies and have been used as a basis for many strategic documents for the development of the energy sector and the reduction of greenhouse gas emissions and air pollutants. The set of models includes the following models:

- model for the assessment of the market penetration of energy saving technologies and other technologies for GHG emissions reduction (PET SLO), that calculates market shares of individual technologies with final users as a response to changing price signals, financial incentives, information campaigns, technological progress, minimum requirements etc. Efficient use of energy measures in the energy-intensive fields are also modelled separately. The assessment of the market shares of certain technologies and their technological and cost parameters serve as input data in the basic model of the reference energy system (REES-SLO2).
- REES-SLO2 calculates the envisaged final energy use balances and assesses the local production of electricity based on the proportions of different technologies in the final use structure and connections with influential parameters (the levels of economic activity by sector, the number of households, useful floor area of buildings etc.). The final use of electricity divided by sector, purpose, and production in local supply systems (in industrial, distribution, and private units) is transferred for processing by the program in order to analyse the load shape.
- With the help of a model for the optimisation of electricity production in free market conditions, the total production, use of electricity and system prices are calculated, as well as the quantities to be provided by individual producers. The calculation is based on the optimisation of all supply offers from producers considering prices on international markets, taking into account the technical limitations of individual facilities and the objectives regarding the stability of the system.
- The proportions of electricity production in individual units calculated in Point 3 and related costs are transferred to the MESAP/REES-SLO2 model. Other balances are calculated for the whole planning period in the MESAP model: primary and gross final energies, balances of emissions (CO_2, CH_4, N_2O, SO_2, NO_X, NMVOC, NH3, PM 2,5) and total costs.

TRANSPORT

Two models were used for transport emissions projections. For the assessment of the movements of energy consumption, an energy model for transport was prepared, which is a

part of the REES-SLO2 model. The basis for the calculation of energy use in transport was an estimation of the development of the transport volume. The assessment of the transport volume development for passenger and freight transport was made with the PRIMOS model, which is a typical 4-stage model (production, attraction, distribution and choice of means of transport, and loading). The cornerstone of the national transport model assessment is the traffic situation in Slovenia, where the model is very precise, but it (to lesser extent, in particular due to commerce) also covers an area that extends from the Atlantic Ocean to the Black Sea and from the Baltic to the Mediterranean Sea. The REES-SLO2 model also examines the share of transit vehicles that buy fuel in Slovenia and the share of biofuels, while in the PET-SLO model; the structure of newly acquired personal vehicles is assessed.

Transport emissions were determined using emission factors of the GAINS model developed by the IIASA institute.

INDUSTRIAL PROCESSES

The projections of emissions in industrial processes were made on the basis of an industrial production growth projection for processes, during which emissions occur, taking different emission factors for different activities into account. In the projection of PFC emissions, a study of the Talum company, which is the only primary aluminium producer in Slovenia and also the only source of CF_4 in C_2F_6 emissions, was taken into account. HFC projections were produced with a model, designed in the Excel environment that included all sources of HFC emissions. The model assumed the most likely future development of equipment in the area of cooling and air conditioning techniques, and heat pumps and the further development of the vehicle fleet of personal motor vehicles equipped with air-conditioning. Due to the F-Gas Regulation, it was assumed that HFCs with a high GWP factor would gradually replace HFCs with a low GWP factor or other substances. Until 2020, for the SF_6 emissions from electrical equipment for the installation of new equipment, the 2000–2011 average was assumed, and subsequently a tenth of the average, while the gas emission factor decreased by 1% until 2020 on the basis of the ECOFYS study (Rhiemeier J. M., et al.; Update on global SF6 emissions trends from electrical equipment – Edition 1.1).

WASTE

Solid waste emission projections were made using the IPCC methodology. Emissions for waste deposited before 1977 that were mainly in a disorganised or badly compressed condition, where covering the landfills was only realised after they were closed, were estimated according to the simplified IPCC methodology. When assessing landfill emissions with waste dumped after 1977, which was partly compressed and compacted, where most landfills were covered at the time, a more accurate IPCC methodology, using time series, was applied. In the calculation, a reduction in the depositing of biodegradable waste was envisaged in accordance with the quantitative bases for the waste management program. The composition of biodegradable volume has also been aligned with the quantitative bases for the waste management program.

For the wastewater emissions calculation, an IPCC methodology was used. The following input data were used to assess CH_4 emissions:

- planned biological treatment of municipal and industrial organically loaded wastewater until 2015 in the Republic of Slovenia,
- the organic burden,
- the proportion of actually decomposed organic substances,
- the conversion factor and the use of produced gas.

N_2O emissions were assessed according to the IPCC methodology with the assumption that all wastewater nitrogen ends up in the water environment.

AGRICULTURE

Agriculture emission projections were carried out according to the methodology prescribed by the IPCC. The IPCC methodology anticipates agriculture emission projections based on statistical data on the physical volume of crop and animal production, taking into account specific procedures characteristics of particular countries or areas. Data on the extent of crop production and domestic animal production is treated separately, despite their interdependence. The model based on the IPCC methodology therefore does not enable optimisation at the level of the agriculture sector as a whole, but only with regard to separate segments. SORS statistical data and information obtained from experts in the agricultural sector were used for the assessment.

6 CLIMATE CHANGE IMPACTS, VULNERABILITY AND ADAPTATION

6.1 Introduction

In the period since the last National Report, Slovenia has made major steps in the field of climate change impact assessment over four years, which have made possible further progress in the field of assessing vulnerability, and then the preparation and adoption of the first cross-cutting strategic document on climate change adaptation.

In December 2016, the Government of the Republic of Slovenia adopted the Strategic Framework for Climate Change Adaptation, which provides guidelines for the planning and implementation of climate change adaptation measures. An Interdepartmental Working Group on Climate Change Adaptation was established in 2016 as well the project Assessments of Climate Change Impacts in the 21st Century started at the Environmental Agency of the Republic of Slovenia. The project already offers appropriate expert groundwork and first estimates of the effects of climate change in the coming period, which will then enable the preparation of an Action Plan on Climate Change Adaptation in the future.

6.2 Climate change impacts assessments

6.2.1 Starting points

In order to prepare expert groundwork for adaptation to climate change in Slovenia, the knowledge of past changes in climate and the assessment of future climate conditions is crucial. Very important, in addition to the changed average conditions, are estimates of the frequency, character and duration of extraordinary weather and weather-related phenomena, which have the greatest impact on us, our environment and our activities.

In the framework of the project "Climate variability of Slovenia", the Slovenian Environmental Agency examined in detail the past climate variability in Slovenia both in terms of average conditions and in terms of extraordinary phenomena. On the basis of the knowledge of past trends, within the framework of the project "Assessments of Climate Change Impacts in the 21st Century", climate change assessments for the future and climate change impact assessments are being prepared for some extraordinary events, such as heat waves, droughts, extraordinary precipitation phenomena, high water conditions.

In the period 1961–2011, the most significant changes were seen in the average annual air temperature, which on average increased by 1.7 degrees Celsius.

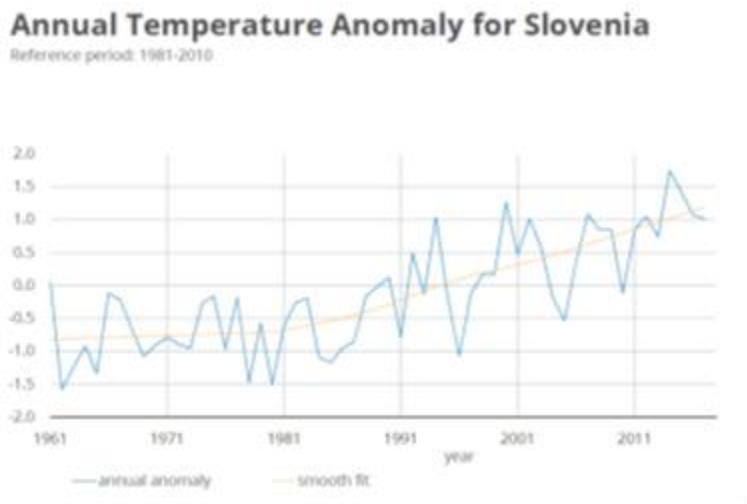

Figure 40: The deviation of the average air temperature from the average 1981-2010 in the territory of Slovenia between 1961 and 2017

Model calculations are used in assessing the future climate. Calculations of climate models are based on the various possible projections of the greenhouse gas concentration in the atmosphere by the end of the 21st century (the so-called Representative Concentration Pathways (RCP)). Due to insufficient spatial resolution, the calculations should be corrected (Bias Correction) for use in the climate and relief diverse regions of Slovenia. For the needs of the study of extraordinary events, calculations are made at least on a daily basis. The corrected model calculations represent input data for assessing the impacts of changed climatic conditions on individual natural and human systems, cultural heritage, the status of watercourses and groundwater, water supplies in the soil, agricultural and other plants, etc.

Climate change estimates in terms of temperature and precipitation, including exceptional events such as heat waves, droughts, storms with strong winds, falls and hail, floods, etc. represent the basis for adaptation to climate change. Among sectors that are closely related to weather and climate and are already adapting to a certain extent to the changed climatic conditions and will need to continue to adapt, in line with scenarios and conditions, are in particular agriculture and forestry, water management, energy, tourism, spatial planning, building and health. Also, the climate change assessment needs to be taken into account in the relevant disaster risk assessments for, environmental impact assessments for projects and strategic documents, etc.

The obtained estimates are the basis for:

- preparation of strategic documents for adaptation to climate change in Slovenia;
- supplementing the risk assessments against various natural and other disasters in Slovenia;
- completion of impact assessments for major projects (investments with the support of European funds).

6.2.2 Prepared estimates

Within the framework of the project " Assessments of Climate Change Impacts in the 21st Century", in the period 2016-2017, for the three periods in the future (2011-2040, 2014-2070 and 2071-2100), taking into account three possible projections of the greenhouse gas concentration in the atmosphere (very optimistic RCP2.6, moderately optimistic RCP4.5 and pessimistic RCP8.5 scenario) estimates of the changes for the following climate variables were prepared:

- air temperature,
- soil temperature,
- surface water temperature,
- temperature of the sea,
- groundwater temperature,
- water content in the soil,
- amount of precipitation,
- the quantitative status of watercourses,
- water supply of aquifers,
- phenological development of selected plant species.

The climate change scenarios show that the air temperature in Slovenia will continue to rise. Compared with the period 1981-2010, it will increase on average by 1°C throughout the country in the period up to 2040, and for an additional degree C until 2070.

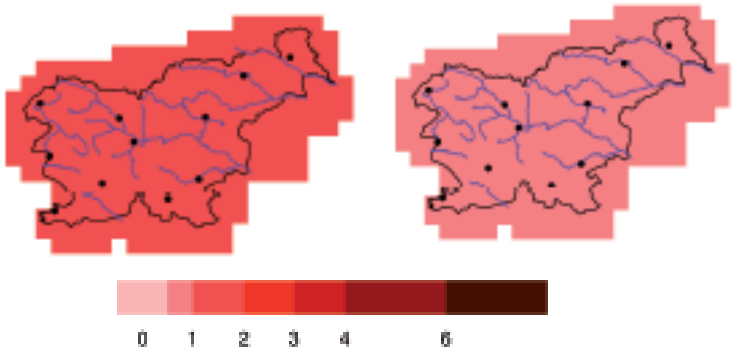

Figure 41: Change in air temperature in the period 2011-2040 (left) and 2041-2070 (right) compared to the period 1981-2010, according to the RCP4.5 greenhouse gas emissions projections

For precipitation, the climate scenarios show greater uncertainty, but signals are becoming more pronounced as we go looking further into the future. At the annual level, the changes are only visible in the second 30-year period (2041-2070), when the amount of precipitation will increase in the eastern half of Slovenia. At the seasonal level, the changes are already visible in the first thirty year period.

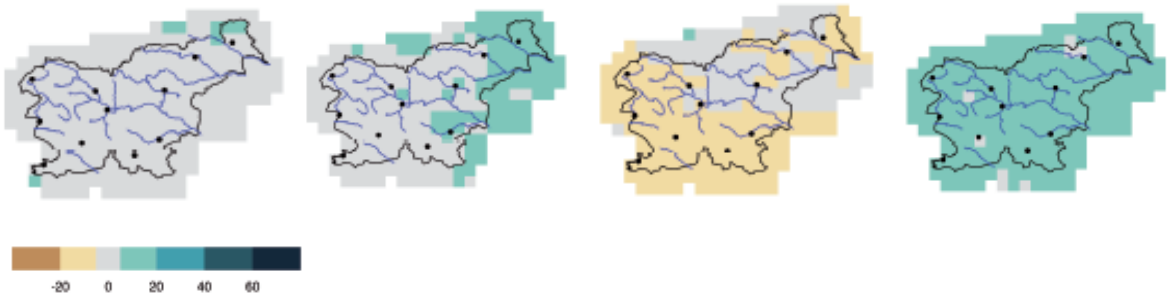

Figure 42: Predicted changes in precipitation compared to the period 1981-2010 (from left to right: annual in the period 2011-2040, annual in the period 2041-2070, summer in the period 2041-2070, winter in the period 2041-2070), according to the greenhouse gas emissions projections RCP4.5

Changes in the frequency of occurrence, duration and severity are also estimated for:

- heatwaves,
- agricultural droughts, droughts on surface waters and droughts of underground water sources,
- high water conditions,
- frost.

On the basis of the estimated changes in climate variables, climate change impact assessments were also prepared for:

- state of the soil for agriculture;
- growing conditions;
- future high water conditions on surface waters;
- future drought conditions on surface waters;
- water supply of aquifers in Slovenia.

The projection of changes in the 100-year flow (flow rate with a return period of 100 years - Q100) shows for the next thirty years (2011-2040 and 2041-2070), mainly an increase in Q100 compared to the period 1981-2010. The increase is mainly visible in the eastern half of the country in the period 2011-2040

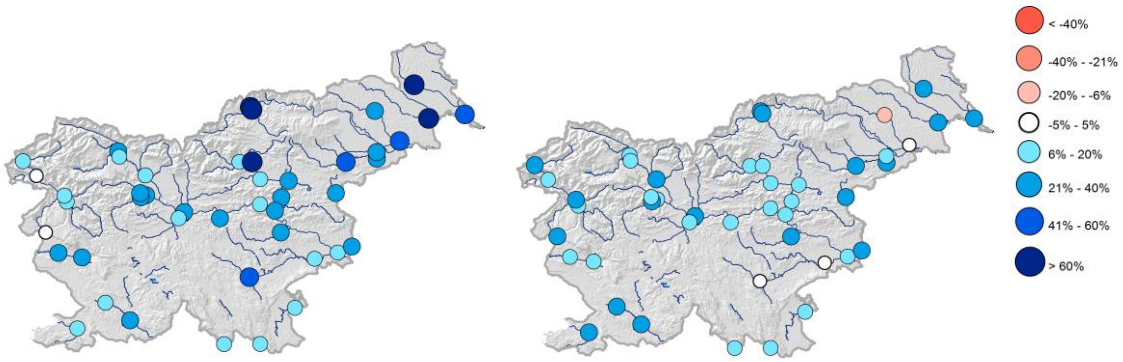

Figure 43: Change in the annual flow in the periods 2011-2040 (left) and 2041-2070 (right) compared to the period 1981-2010, according to the RCP4.5 greenhouse gas emissions projections

To assess the abovementioned impacts, extensive databases have been prepared, which will also be useful for further research into the impacts of climate change:

- databases of daily data of all key climate variables and their trends for the future in a resolution of 12 km;
- daily rainfall, minimum, maximum and average daily temperatures and daily evapotranspiration (resolution 1 km) for the period 1981-2010;
- database of homogenized water temperature lines and analysis of trends in surface waters, groundwater and sea.

The prepared contents are schematically shown in Figure 44.

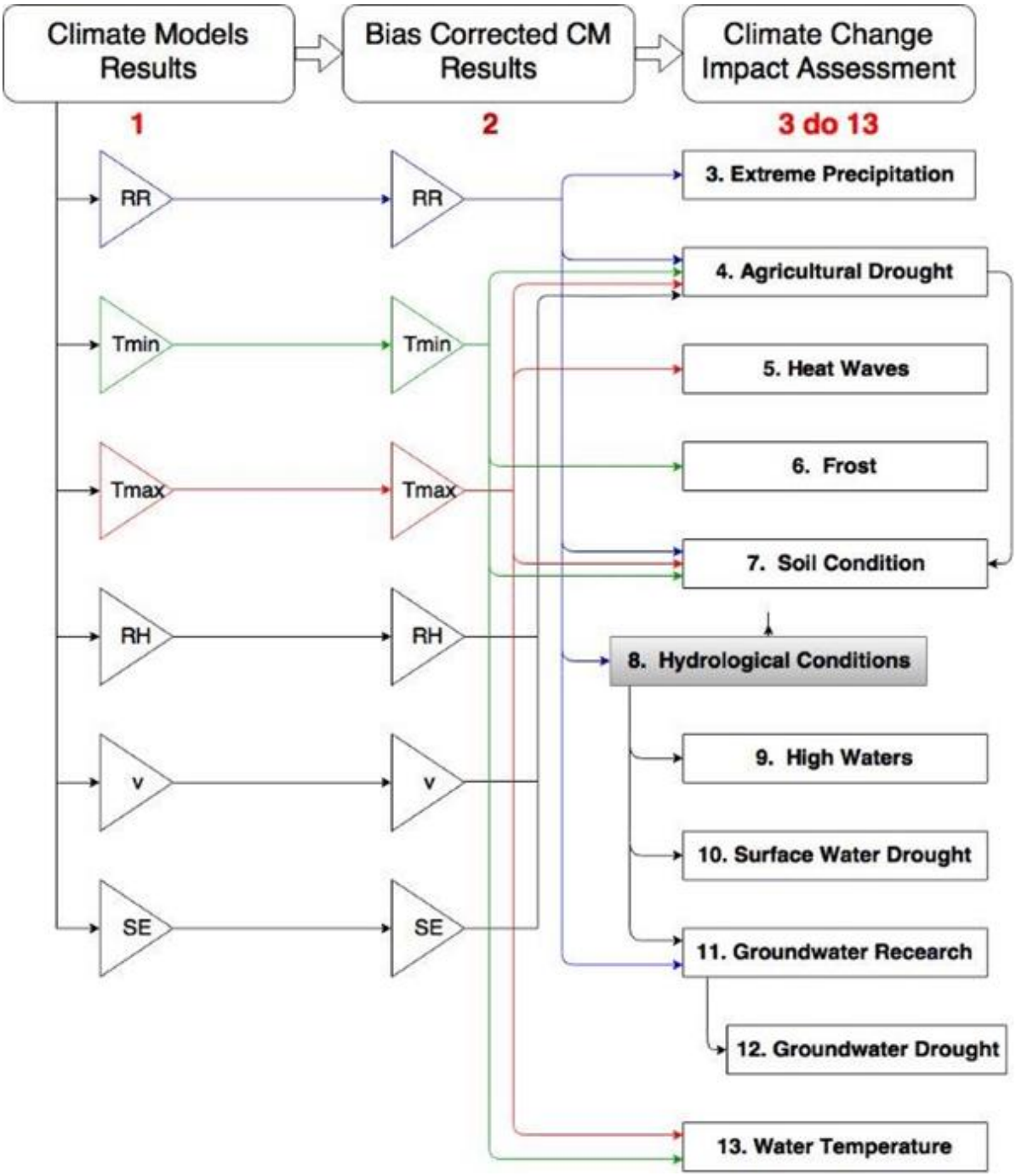

Figure 44: Schematic depiction of prepared databases of climate variables and their estimated changes as well as prepared climate change impact assessments

The assessments of climate change impacts on individual sectors will continue in the future. In 2018, the first part of the climate change impact assessment on water and energy sources will be prepared. In the context of impacts on energy resources, impact assessments will be prepared for:

- wind potential,
- hydroelectric potential,
- temperature deficit and surplus.

Based on the results of previous years, an integrated indicator for drought monitoring in all sectors (meteorological, hydrological and agricultural droughts) will be developed for the needs of climate change impact assessment on water resources. With the newly developed water balance model mGROWA-SI, climate change impact assessments will be prepared for seasonal changes in the water balance, which will have a major impact not only on the energy sector, but on the entire water supply sector. The effects of seasonal changes will be explored for:

- snow conditions (snow is an important water balance link for transferring water from cold to warm part of the year),
- total outflow,
- the quantity of groundwater.

Considering the needs of individual sectors in the following years, we plan to assess climate change impacts on:

- the potential of solar energy,
- biodiversity,
- the sea and the coast,
- human health,
- avalanches,
- the occurrence of torrential floods,
- danger of fires.

6.3 Vulnerability assessment and adaptation measures

The Strategic Framework for Climate Change Adaptation, adopted by the Government on 7 December 2016, represents the first step towards the development of a comprehensive cross-sectoral adaptation process. Thus it primarily includes guidelines for greater integration of adaptation into all policies, measures and practices.

Detailed are individual horizontal orientations and steps on the path of adaptation to climate change:

- Integrating consideration of climate change impacts in all activities (through the steps of coordinating contents and planning processes, especially in development and spatial planning, and enhanced use of environmental impact assessment tools);
- Wider cooperation, through steps such as interdepartmental cooperation, involvement in European and international projects and processes (good practice case

is the Center for Drought Management in South-East Europe, DMCSEE), networking with other stakeholders in the framework of existing partnerships and the search for synergies;

- Continuous capacity building through the steps of providing climate services (climate change scenarios and their impacts), upgrading and linking databases, and establishing regular cooperation between researchers and decision makers;
- Education and training, awareness raising and communication, through the steps of analysing the situation and updating curricula, programs and other curricular documents, in particular by linking and upgrading already existing good practices, projects and initiatives, in particular further developing good practices and preparing and implementing communication campaigns and regular work with the media.

The overall goal is to reduce Slovenia's exposure, sensitivity and vulnerability to climate change impacts, and increase the climate resilience and adaptive capacity of society. In order to measure the success of achieving this goal and directing the priority preparation of local and regional adaptation strategies, the indicator for measuring the vulnerability of Slovenia is also in development. It combines a set of variables by category (exposure, sensitivity, adaptive capacity) and data sources that will be able to offer a picture of vulnerability at both municipal and state level.

The climate change vulnerability indicator represents the sum of the exposure and sensitivity as well as adaptive capacity.

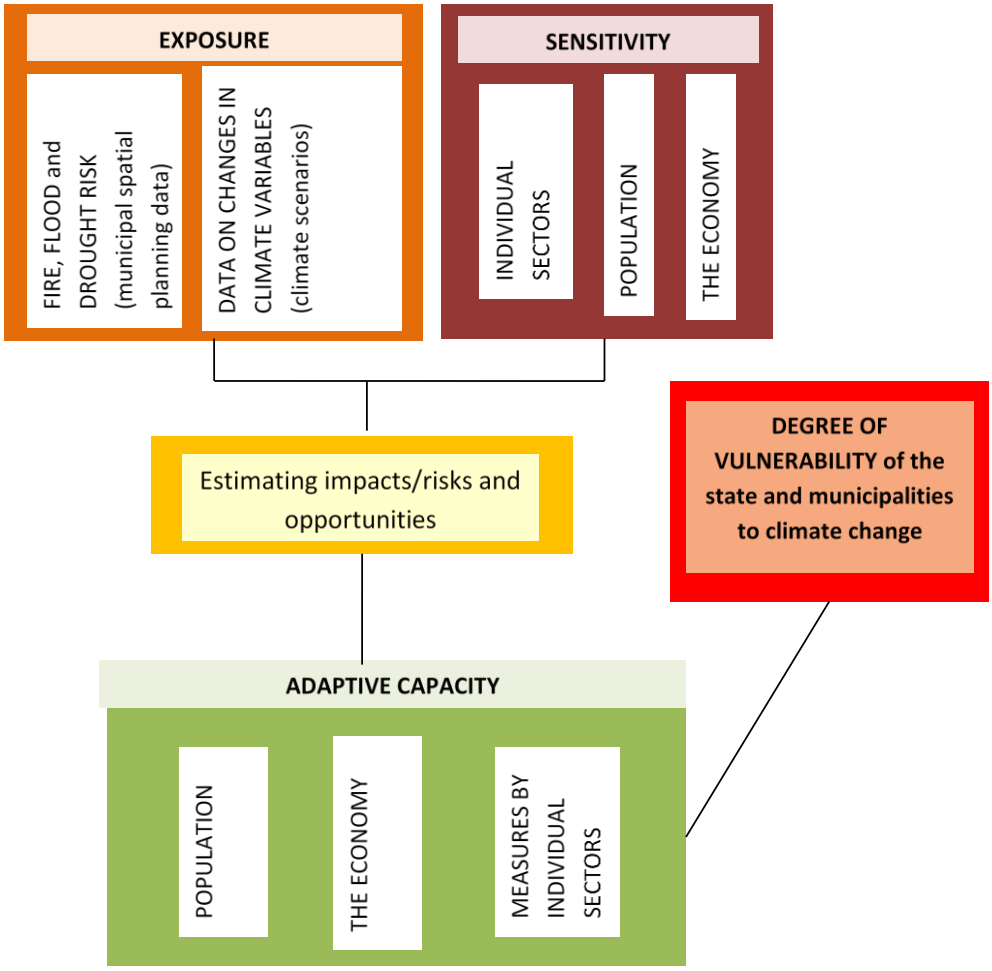

Figure 45: Schematic depiction of the structure of the vulnerability indicator of Slovenian municipalities and the state

The preparation of the vulnerability indicator for municipalities, which is already in general presented in the Annex 4 of the Strategic Framework for Climate Change Adaptation, will be the basis for the classification of municipalities according to their vulnerability to the impacts of climate change. This classification will guide the preparation of a call for co-financing the strategies for adapting municipalities or of the regions envisaged in 2018 in the Ordinance on the Program for the Use of the Climate Change Funds in years 2017 and 2018 (Official Gazette of the Republic of Slovenia, No. 84/16). Municipality and Regional Adaptation Strategies will aim for a review of the climate resilience of existing development and spatial planning documents, processes and contents, and identify disparities and priority areas for adaptation measures at these levels.

6.3.1 Areas of action

While a comprehensive program of measures for climate change adaptation (Action Plan) will be prepared based on the results of the climate impact assessments, the need for adaptation action was addressed in the context of related topics in the 2014-2018 period, especially in the following areas:

- Sustainable and integrated water resources management; The River Basin Management Plan for the Danube and Adriatic River Basins for the period 2016-2021 was adopted, which also defines measures in the area of adaptation to climate change.
- Reduction of flood risk: on the basis of defined areas of significant impacts of floods in the Republic of Slovenia (i.e. preliminary flood risk assessment), the Flood Risk Reduction Plan was adopted in June 2017 defining measures of comprehensive flood defence, taking into account climate change impacts.
- Drought risk management: In 2006, Slovenia accepted a mandate for the organization of the work of the Drought Management Centre for South-eastern Europe, DMCSEE (within the framework of the UN Convention to Combat Desertification, the UNCCD, and the World Meteorological Organization, WMO), expert groundwork was prepared for the national action plan for drought management and soil degradation, and the DriDanube project is ongoing, which will provide tools for assessing and responding to droughts in the SEE region.
- Spatial planning: a new law on spatial planning was adopted, which provides for regional spatial plans. In the process of environmental impact assessment, impacts of climate change will also be considered.
- Biodiversity conservation: Slovenia has set up special protection areas and implemented several individual projects with included climate change impact assessments, and some are still underway. An updated Management Program by 2020 for NATURA 2000 sites is being implemented.
- Natural disasters: Slovenia prepared the National Disaster Risk Assessment and in 2016 the document was also upgraded with an available assessment of the impacts of climate change, as well as some individual disaster risk assessments already incorporated available climate data risk in their assessments. The Ministry of Health, for example, prepared a "Risk Assessment for the Dangers of Biological, Chemical, Environmental and Unknown Origin to Human Health" and complemented it with consideration of climate impacts on the occurrence of infectious diseases.
- Agriculture and Forestry: as early as 2008, the Climate Change Adaptation Strategy for Slovenian Agriculture and Forestry Sectors provided guidelines for adaptation that have been carried out in the past in the framework of the Action Plan for Adaptation (2010-11), and in recent years mainly in the framework of legislative solutions and measures such as in the area of prevention (education, training, provision of guidelines), as well as in the field of mitigating the consequences of natural disasters (co-financing agricultural insurance, providing disaster relief and rehabilitation, etc.).
- Cultural Heritage: In August 2017 the Architectural Policy of Slovenia: Architecture for people was adopted, that sees spatial planning and construction as activities that contribute to climate change adaptation. Guidelines for the energy renovation of cultural heritage buildings have been produced and published, and they specify, among other, a set of measures for energy refurbishment that improve energy efficiency of cultural heritage buildings. The procedures necessary for the successful planning and implementation of energy refurbishment measures are set forward, which also represent a measure of adaptation to climate change.

- Information and awareness rising: The SEA, together with the NIJZ, regularly informs the public in cases of dangerous climatic and hydrological events (providing instructions to the inhabitants). The SEA also regularly publishes climate change information and in newsletters information on climate monitoring. In the area of awareness-raising, project Slovenia reduces CO_2, also included climate adaptation examples among good practices, and events, consultations and guidelines for decision-makers were prepared.
- International development cooperation: in the Resolution on international development cooperation and humanitarian aid, adopted in 2017, the fight against climate change, includingclimate change adaptation, is one of the two priority areas for development cooperation, indicating an increase in the share of adaptation measures in the future.

It is important to highlight public health activities, implemented activities related to warning and awareness raising programs. Climate change in particular strengthens certain environmental factors that can directly or indirectly affect human health. The Ministry of Health and the National Institute of Public Health (NIJZ) thus find that more people die in the heatwave period than otherwise. Vulnerability of people varies according to age, health status, socio-economic status and living environment (countryside, city). So, for example, in the period of heatwaves, more people die due to cardiovascular diseases, particularly vulnerable are elderly people whose number and proportion of population is growing in Slovenia. Heat waves also strengthen other factors of human health, such as ambient air pollutants (particles and ozone), create more favorable conditions for the reproduction and spread of pathogens, vectors and allergenic plants. In 2017, the SEA and the NIJZ set up a renewed forecasting and display of data on ambient air pollution. They identified the levels of pollution and recommendations for people on days with excessive air pollution with particles and ozone. The NIJZ, in cooperation with dermatologists and with the support of the Ministry of Health, has been implementing the Safe in the Sun program for a decade aimed at informing the target population about the harmful effects of sunlight and the measures that can effectively prevent these consequences. This could contribute in the long term to stopping the increase in skin cancer in Slovenia (especially melanoma type). The program targets preschool children in kindergartens and schoolchildren.

A special example of good practice in the field of adaptation is taking place in the Vipava Valley region. The Ajdovščina Development Agency has prepared and is implementing LIFE ViVaCCAdapt project. In the framework of the project, a strategy for adapting agriculture to climate change has already been prepared, and pilot actions are currently being implemented that support the decision-making process for irrigation and plant green windbreaks. More about the project on the website: http://www.life-vivaccadapt.si/.

6.4 Information Provision

Currently, Slovenia has not yet established a special portal with information on adaptation to climate change, information on national activities are provided at the European portal ClimateADAPT (http://climate-adapt.eea.europa.eu/).

7 FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

In accordance with Article 9 of the Paris Agreement, the relevant decisions of the UN Convention on Climate Change, commitments and decisions at the EU level, in particular the decisions of the Economic and Financial Affairs Council (ECOFIN) and the Environment Council (ENVI), on climate finance to assist developing countries in implementing long-term climate policy measures, Slovenia is also striving towards increasing the volume of climate finance.

The EU Member States, including Slovenia, follow the commitment of the Paris Agreement to mobilise USD 100 billion per year by 2020 for assistance and implementation of measures for reducing greenhouse gas emissions and adapting to climate change in developing countries. The assistance includes financial resources, a transfer of the "climate-friendly technologies" as well as strengthening administrative capability of developing countries in this area.

In recent years, Slovenia has been increasing its climate finances. In 2016, Slovenia contributed EUR 3 million for climate finance or assistance in developing countries, which represents an increase of 26% as compared to 2015.

The volume of Slovenia's climate finance in recent years was seen as below:

2013 – EUR 1,960,525

2014 – EUR 2,266,840

2015 – EUR 2,393,155

2016 – EUR 2,976,505

For 2017, Slovenia's climate assistance of EUR 3,500,000 is estimated.

Slovenia will strive to maintain the climate change assistance on the level of around EUR 3,500,000 by 2020.

Slovenia's climate finance is shown as part of the official development assistance (ODA) through UN. In 2016, Slovenia has for the first time also added resources from the "Slovenian climate change fund" (around EUR 1 million per year), where resources are gathered from the sale of allowances from the EU-ETS greenhouse gas emissions trading scheme. The aim is to allocate at least EUR 1 million per year for climate finance from the fund by 2020.

In 2016, regarding a total of about EUR 3 million of climate finance, Slovenia has devoted around EUR 1 million to multilateral assistance in the form of grants; and almost EUR 2 million grants for bilateral assistance, especially for projects in the Western Balkan countries (mainly Kosovo, Albania, Montenegro, and former Yugoslav Republic of Macedonia). In this respect, Slovenia has tried to offer about half of the assistance to projects for adaptation to climate change, while the other half targeted projects regarding the reduction of the greenhouse gas emissions, including projects that concern both areas, some of which include the transfer of knowledge, technologies or good practices from Slovenia to these countries.

Slovenia regularly reports about its climate finance in accordance with article 16 of the Regulation on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change (No 525/2013/EU), also known as "MMR".

In the draft development assistance programme for developing countries, which also includes climate finance, Slovenia plans to increase the annual contribution from the climate fund by 2030 in order for the total climate finance to reach between EUR 6 and EUR 7 million in 2030. The current share of climate finance in 2016 amounts to around 15% of the total ODA, and by 2030, it would be expected to increase at least to 30%, which is twice the increase in the share of climate finance, both in absolute amount and in the share of all ODA resources. In the field of climate finance, Slovenia will also follow joint decisions and guidelines, both at EU and UNFCCC level agreements.

8 RESEARCH, DEVELOPMENT AND INNOVATION, AND SYSTEMATIC OBSERVATION

8.1 Introduction

In Slovenia, a vast number of research studies and development and innovation projects regarding climate change and related issues, also known as "low-carbon society areas" have been conducted or are still being implemented today. Various programmes and projects from these areas, such as projects for the development of low-carbon technologies or projects for the preparation of expert bases for different policies have been or are being financed by the ministries working in the field of science and technology or examining different areas of low-carbon society. The problem lies in fragmentation of these projects and programmes as well as in a lack of information regarding research topics and their results. There is also a lack of systematic monitoring and evaluation of these results and their effects and absence of a uniform website, where an information catalogue regarding research on climate change would be published. In addition to this, summaries for decision makers should also be available, especially in cases where the research is at least partly financed by public funds. Only through transparency and wide availability will the research findings be possible to be integrated into policies for climate change adaptation and mitigation, and synergies with relevant development policies established, for example, when it comes to transition to a green economy or green growth and efficient use of resources.

8.2 Research, development and innovation: system view

Slovenian and EU strategic and programme documents in the field of research, development and innovation emphasise the importance of societal challenges, which also include environmental challenges. The documents also emphasise the use and transfer of knowledge. **Strategy for Strengthening The European Research Area (ERA)**[60], among six priority areas for the creation of a strong ERA, sets two, which are particularly relevant for environmental policy:

- Optimal transnational cooperation and competition – defining and implementing common research agendas on grand challenges, raising quality through Europe-wide

[60] It is recorded in the "ERA Roadmap 2015–2020" document, confirmed by the Competitiveness Council in May 2015, identifying key tasks according to priority areas (and the mechanisms for their implementation), which will, assuming effective implementation with all partners (MS and others), most likely have a substantial impact on European science and research and innovation systems. According to: "Slovenian ERA ROADMAP", http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/doc/Zakonodaja/Strategije/ERA_Roadmap.pdf.

open competition, and constructing and effectively running key research infrastructures on a pan-European level;

- Optimal circulation, access to and transfer of scientific knowledge – also via the digital ERA – to guarantee the access to and the uptake of knowledge by all.

The key document for establishing an effective national research and innovation system for Slovenia is the **Research and Innovation Strategy of Slovenia 2011–2020 (RISS)**[61]. RISS represents a redirection to a more target-oriented governance of research, development and innovation (RDI), and is supplemented by the Slovenian Smart Specialisation Strategy (S4) adopted in 2015. In terms of content RISS is also complemented by the Slovenian Industrial Policy (SIP), adopted in 2013. The revised strategic documents, including the National Higher Education Programme 2011–2020[62] adopted in 2011, represent a good basis for structural change; however, to realise a successful and effective national RDI system, exceeding the currently insufficiently integrated management of research and innovation is necessary.

In its introduction, the RISS draws attention to the challenges that we face at the beginning of the 21st century, which will affect the fundamental restructuring of the world as we know today. Environmental migration will be added to growing political and economic migration. The world will face shortages of natural resources such as energy, food and water, and major threats associated with climate change. These challenges call for critical reflection and investigation of the causes of this situation, and require above all a change of lifestyle and changes in our socio-economic behaviour. A high quality of life and a fairer society will be built by a sustainable lifestyle and a sustainable economy. The strategic objective of the national research and innovation system is therefore: "To establish a modern research and innovation system that will allow for a higher quality of life for all through critical reflection of society, efficiency in addressing societal challenges, increased value added per employee, and assurance of more and higher quality workplaces." One of the measures with the expected impact on environmental objectives are in particular a more efficient transfer of knowledge, creation of smart specialisation fields of state or region, measures to support an innovative economy.

[61] Resolution on Research and Innovation Strategy of Slovenia 2011–2020 (ReRIS11-20) is available on: https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/103975.

[62] http://www.arhiv.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/odnosi_z_javnostmi/8.9.10_NPVS.pdf.
The information society is often highlighted as an important area of RDI, but documents for this area will not be summarised since they do not address the particular environmental challenges and the transition to the green economy. On the EU level, one of these documents is the Digital Agenda for Europe, and the relevant document on the national level is DIGITAL SLOVENIA 2020 – Development Strategy for the Information Society until 2020 (http://www.mju.gov.si/fileadmin/mju.gov.si/pageuploads/DID/Informacijska_druzba/DSI_2020.pdf)

In accordance with the EU guidelines, the Slovenian Government adopted the **Slovenian Strategy for Strengthening the European Research Area 2016–2020**[63] in May 2016, in which it defined the Slovenian vision of the ERA as: By 2030, Slovenia will join the group of countries, which are according to the Innovation Union Scoreboard[64] innovation leaders. According to the Innovation Union Scoreboard performance indicators, Slovenia is currently an innovation follower. Nevertheless, the "Slovenian ERA ROADMAP" refers to the country's relatively good starting position with positive growth trends attributed to the comparably intensive RDI policy in the past 15 years prior to the adoption of the document, good RDI capacities in the public sector and a high RDI intensity in the private sector[65], which was also a result of changes in legislation on tax relief for RDI activities and the collaboration in instruments, co-funded with European cohesion funds (e.g. centers of excellence, competence centres and development centres of the Slovenian economy). Positive developments in RDI can to a greater extent also be contributed to a well-developed but dispersed research infrastructure and its internal accessibility, some areas of excellence in academic and industrial research, and the integration of Slovenian researchers in a wider European landscape with successful cooperation in FP7 and Horizon 2020, including ERA-NET and SME instruments.

Nevertheless, the national and international studies have shown many weaknesses that should be addressed in the process of establishing an effective national RDI system, such as: partiality and the underdevelopment of incentives for RDI that do not systematically address the entire innovation cycle and are thematically scattered, resulting in great dispersal of public and private RDI expenditures and a gap between public and private RDI expenditures; a low success rate achieving research and innovation outcomes and thus questionable nature of investment quality; a lacking link between stable institutional funding, the obtained results and their impact; and a low level of public and private sector internationalisation. Particularly serious is also the decline of the government budget appropriations for RDI (GBAORD): expenditures for research and development (in terms of share of GDP) are above the EU average, but the investments of the public sector have been declining since 2012. As stated in the Development Report, by 2015, they had fallen to the level of 2006, which shows that economic policy does not take sufficient account of the importance of these investments for increasing productivity and competitiveness.[66]

[63] Available on: http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/doc/Zakonodaja/Strategije/ERA_Roadmap.pdf

[64] The Innovation Union Scoreboard (IUS) stipulates annual comparable assessment of success rates for research and innovation in EU Member States and relative advantages and weaknesses of their research and innovation systems.

[65] However, in the Development Report 2017, IMAD points out that the innovation activity of companies in the period 2012–2014 is weak and stagnating. Source: Kmet Zupančič, Rotija (ed.), 2017. Development Report 2017. IMAD, Ljubljana. Available on: http://www.umar.gov.si/fileadmin/user_upload/razvoj_slovenije/2017/POR_2017.pdf.

[66] Kmet Zupančič, Rotija (ed.), 2017. Development Report 2017. IMAD, Ljubljana.

8.2.1 Research for resolving societal challenges

Jointly Addressing Key Societal Challenges is in the "Slovenian ERA ROADMAP" document treated as a Priority area 2A. The document points out that societal challenges, among others climate change, preservation of biodiversity, demographic challenges involving aging and population growth and food safety, have become the main factor stimulating research in the past few years. Transnational cooperation in RDI will therefore significantly contribute to the realisation of the 2030 Agenda for Sustainable Development and the role of RDI is also indispensable in achieving successful implementation of policies on mitigation and adaptation to climate change (Paris Agreement on Climate Change). Being complex and interlinked, global challenges need to be addressed through a comprehensive and balanced approach considering all, i.e. environmental, economic and social dimensions of sustainable development.[67] Among the objectives and measures under this priority area, an increased cooperation in EU instruments is foreseen, for example, with targeted co-funding of transnational public research and strengthening the role of SRIAs (Strategic Research and Innovation Agenda) of Joint Programming Initiatives (JPIs) in devising priorities of RDI policy on the national level. Establishment of new approaches to integrate social sciences and humanities (SSH) in other scientific fields (natural, technical, biotechnical, medical sciences) is also foreseen.The main thematic and financial instruments for achieving the objectives of ERA became **framework programmes** (FP)[68], particularly important has become joint programming (JP). The activities of the current Horizon 2020 framework programme are divided into the following three basic pillars: strengthening **excellent science and EU research,** strengthening the **industry's leading role** in research and innovation, and contributing to tackling societal challenges (3rd pillar: K**ey societal challenges).** The priority areas of the key societal challenges pillar are presented in the table below, together with data on the performance of Slovenian researchers in these areas during the first three years of the Horizon 2020 programme[69] implementation. Environmental challenges, including climate change, are addressed in particular in four of the seven priority areas of this pillar:

[67] Slovenia's cooperation in this EU ERA ROADMAP priority is already mentioned in the previous chapter.

[68] The title of the FP7 was the "Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007–2013)", now the 8th framework programme for research and innovation for the 2014–2020 period is being implemented – Horizon 2020 (H2020); preparations for the FP9 are underway.

[69] Data for the cut-off date 31/05/2017. Source: eCORD database, forwarded by MESS.

	Signed grant agreements with at least one participant in the selection	EU financial contribution to all participations in the selection
Health, demographic change and wellbeing	27	€7,567,807.00
Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy	22	€5,196,093.00
Secure, clean and efficient energy	50	€20,271,045.00
Smart, green and integrated transport	33	€16,267,724.00
Climate action, environment, resource efficiency and raw materials	32	€11,422,265.00
Europe in a changing world - inclusive, innovative and reflective societies	15	€2,173,213.00
Secure societies – Protecting the freedom and security of Europe and its citizens	9	€3,390,766.00

Joint Programming presents a change in European cooperation in the field of RDI. It encompasses all forms of transnational cooperation, including Joint Programming Initiatives (JPI), the ERA-NET instrument, initiatives according to Article 185 of the TFEU (Treaty on the Functioning of the European Union), Joint Technology Initiatives (JTI), as well as other programmes, like EUREKA and COST, that follow the essence of the ERA message, i.e. the need to exceed traditional dispersion of research efforts in the EU through better harmonisation and cooperation. Slovenia is active in these instruments, currently participating in five of the ten JPIs, 31 ERA-NET instruments, four out of five initiatives according to Article 185 of the TFEU and in four of the 8 JTIs. To name only the initiatives that are related to environmental objectives:

- Slovenia as a full member participates in JPI JPND (neurodegenerative diseases), JPI URBAN EUROPE (social challenge of urban areas), JPI More Years, Better Lives (social challenge of demographic changes) and as an observer state in JPI Healthy Diet for Healthy Life (social challenge of the public health and quality of life), and JPI Climate (social challenge of climate change).
- Slovenia has representatives in four JTIs: FCH2 (public private initiative in the field of fuel cell and hydrogen energy technologies), BBI (bio-based industries), IMI2 (development of the next generation vaccines, medicines and treatments), F4E (Fusion for Energy – Development of Fusion Energy), and Shift2Rail (fostering research and innovation in the railway sector).

8.2.2 Development and innovation

When it comes to environmental objectives, the most relevant is the **Eco-Innovation Index**, according to which Slovenia with an increasing growth trend[70] falls within the EU average during 2014–2016. The biennial report for 2014–2015 focuses on the transition to a circular economy and recommends, inter alia, support measures for "hardware" and "software" eco-innovation, i.e. for the development of technologies and technical infrastructure as well as for the development of skills, knowledge and business models. Conventional support

[70] In the 2016 report, Slovenia is ranked 7th among 28 EU Member States with an index of 104.

instruments would be sufficient for the first set, but the development of "software" requires innovative approaches in policy making, so that changes in thinking patterns for sharing, processing, reuse and repair can be attained. The Slovenian report for this period highlights the gap between the declarative support and the actual measures for the transition to a circular economy, and explains that it is crucial for Slovenian companies to join this process, which is being accelerated within the EU.

Priority area 5A **Scientific Knowledge Transfer** in the SI-ERA document includes several measures that are partly included in RISS. In 2015, the **Slovenian Smart Specialisation Strategy (S4)**[71] identified narrower priority areas, that show most potential for Slovenia's further development. S4 was prepared as one of the previous conditionalities (Ex-ante Conditionalities) to draw on European funds and is based on several sector documents[72]. Among others, the conclusions from the analysis of investment measures in the Centres of Excellence, Competence Centres and Economy Development Centres, which were funded with EUR 244 million from the cohesion envelope in the past financial perspective, were taken into account. These R&D support funds, in partnership with the industry and development cores of the private and the public sector, have attracted an additional EUR 200 million of investments, and 29 consortia with over 324 partners and 2,500 developers who have created an approximate 898 intellectual rights, were funded.

S4 is a platform for concentrating development investments in areas where Slovenia has the critical mass of knowledge, capacities and competences and where there is innovation potential for placing Slovenia within global markets and thus enhancing its recognisability. The introductory vision of the document states: "S4 strategic objective is SUSTAINABLE TECHNOLOGIES AND SERVICES FOR A HEALTHY LIFE on the basis of which Slovenia will become a green, active, healthy and digital region with top-level conditions fostering creativity and innovation focused on the development of medium- and high-level technological solutions in niche areas. In priority niche areas Slovenia will no longer act as a follower but as a co-creator of global trends which is, indeed, S4 mission." Green, sustainable, circular is not an alternative but mainstream, based on empirical data.

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[71] Slovenian Smart Specialisation Strategy:
http://www.svrk.gov.si/fileadmin/svrk.gov.si/pageuploads/Dokumenti_za_objavo_na_vstopni_strani/S4_dokument_potrjeno_na_VRS_150920.pdf. It was adopted by the Slovenian Government on 20/9/2015, and European Commission on 3/11/2015.
More about the European smart specialisation concept and current processes on the platform http://s3platform.jrc.ec.europa.eu/

[72] For example, the Slovenian Industrial Policy (SIP) (adopted by the Slovenian Government in February 2013), whose inclination to green growth is also reflected in the initial vision: "By improving the business environment, supporting entrepreneurship and innovation, and through the development of promising technological and industrial areas that address social challenges, the SIP will create conditions for the continuous restructuring of existing industry into energy, materially, environmentally and socially effective industry of knowledge and innovation for new, more durable and better employment opportunities, and greater integration into the international flows of business."
(http://www.mgrt.gov.si/fileadmin/mgrt.gov.si/pageuploads/DPK/SIP/SIP_-_vladni_dokument.pdf)

The four key targets of S4 (raising the value added per employee, increased share of high-tech intensive products in export, increased share of export of knowledge-intensive services in total export, and increased overall entrepreneurial activity) do not affect the environment, green economy and sustainable development directly. There are also no significant environmental targets among the objectives for individual areas of application, with the exception of networks for the transition to circular economy (contributing to the increase in material efficiency). However, it is clear from the set of topics that many activities will (also) contribute to the transition to a low-carbon economy, which is why the S4 process is presented in more detail.

The basis for concentrated investment in research, development and innovation are the priority areas of S4 application, which guide to sustainable technologies and services at the operational level:

- healthy working and living environment with the concept of "smart cities and communities" and the concept of "smart buildings and homes, including wood chain",
- natural and traditional resources for the future with sustainable food production and sustainable tourism as well as networks for the transition to circular economy,
- (s) industry 4.0 with investments in factories of the future, health – medicine, mobility, and development of materials as end products.

For the preparation of S4, through a process of entrepreneurial discovery, a partnership was built into the S4 preparation process (2014–2016), which is also the fundamental part of the S4 implementing level done with establishing the **SRIPs – Strategic Research and Innovation Partnerships** (2016–2022+)[73]. SRIPs' objective is to strengthen the RDI integration of independent stakeholders (economy, research organisations and other relevant development stakeholders) in all nine areas of S4 application, with the aim to systematically integrate into international value chains and provide a comprehensive support environment in Slovenia, including the human resources development.

Each of the nine areas of S4 application witnessed the establishment of one partnership by the end of 2016. SRIPs follow the principles of openness and balance between the membership categories, and there are already over 500 different stakeholders who are cooperating[74]. The cooperation between stakeholders in SRIPs is built on development of common strategic guidelines, coordination of R&D activities, sharing of capacities, development of human resources, exchange of knowledge and experience, networking and collective representation of interest abroad and in the national institutions. Operational plans for these areas originate from specification of S4 focus areas with objectives, which are defined in SRIPs' action plans (operational and development strategies). Action plans with

[73] More information regarding SRIPs on the website:
http://www.svrk.gov.si/si/delovna_podrocja/strategija_pametne_specializacije/strateska_razvojno_inovacijska_partnerstva_srip/

[74] Engaging within SRIPs is foreseen (through collaborative communication platforms or tools) as well as communication between partnerships and with various audiences.

focus areas and technologies[75] were approved by the Working Group of State Secretaries for the Implementation of S4 in July 2017. SRIPs operate in different organisational forms, such as value chains, horizontal networks, and independent innovation clusters.

Financial incentives for research and innovation in the areas of smart specialisation are foreseen in the **Operational Programme for the Implementation of the EU Cohesion Policy in the period 2014–2020 (OP ECP)**[76], in particular in the priority axes "International competitiveness of research, innovation and technological development in line with smart specialisation for enhanced competitiveness and greening of the economy" and "Dynamic and competitive entrepreneurship for green economic growth". In 2016 and 2017, several tenders have already been implemented or are underway. The Ministry of Economic Development and Technology will ring-fence some EUR 290 million for S4 areas of application by the end of programming period 2014–2020. For financing S4 areas, the Slovenian Ministry of Education, Science and Sport will allocate around EUR 200 million.

The Smart Specialisation Strategy supports the **green growth of the economy** set of the **Framework Programme for a Transition to a Green Economy** (OPZG)[77], which is based on key areas of transition to a green economy, including, inter alia, eco-innovation as a fundamental factor for facilitating the green economy and promoting open circulation of knowledge regarding green solutions.

8.2.3 Research, development and innovation for environment protection in the new national environmental action programme (NEAP)

The draft of the National Environmental Action Programme (NEAP)[78] addresses identified weaknesses in this area, with the main objectives being:

- better understanding of the environment, i.e. improving the knowledge and database for Slovenia's environmental policy and for implementing this policy through different stakeholders and at different levels;
- developing and adopting innovative technologies and non-technological innovations that will accelerate the transition to green, low-carbon and resource-efficient economy and society.

When it comes to ensuring research, development and innovation for environment protection, it will be necessary to progress towards achieving the objectives:

[75] S4 priority table

[76] http://www.eu-skladi.si/sl/dokumenti/kljucni-dokumenti/op_slo_web.pdf

[77] This is the second out of ten sets of the OPZG, covering, among others, sustainable resource management, green practices in agriculture and forestry, as well as horizontal and supporting measures.
http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/pomembni_dokumenti/opzg_akcijski_nacrt_in_nacrt_aktivnosti.pdf

[78] Public consultation on the draft document, October 2017:
http://www.mop.gov.si/si/medijsko_sredisce/novica/article/1328/7793/
Document adoption is foreseen in the 1st half of 2018.

- of Slovenia being ranked as an innovation leader in eco-innovation indicators and technologies by 2030,
- of targeted investment in research and development which would contribute to filling the knowledge gaps,
- that in the programming period 2021–2030, 60% of research activities would contribute to a sustainable development and 35% to climate change mitigation and adaptation.

In order to attain objectives, the draft NEAP document anticipates several measures:

- providing research for the elimination of knowledge gaps by prioritising the study of specific sets[79] and integrated addressing of environmental challenges,
- ensuring that Slovenian Ministry of the Environment and Spatial Planning (MESP) establishes a monitoring system for measures in the field of research, development and innovation to address environmental challenges in terms of achieving key area objectives;
- improving access to scientific and research findings addressing environmental challenges, and implementing other measures to improve communication with various audiences with the help of a dedicated information platform set up by the MESP;
- ensuring that the MESP, in cooperation with partners and stakeholders, establishes a platform for strengthening the integration of "environmental/sustainable" and "research/development/innovation" sphere with the aim of:
    - systematic and comprehensive tackling of key environmental challenges, including a common strategic consideration for a more detailed definition of the knowledge gap;
    - identifying appropriate instruments and activities to address key challenges;
    - contributing to the quality of the bases for the development and implementation of environmental policy and its stakeholders;
    - targeted integration into international platforms and programmes in key areas.

8.3 Research on climate conditions by the Slovenian Environment Agency (SEA)

In 2013, the project "Climate Variability in Slovenia" was carried out by the SEA. The result of the project is an integrated temporal and spatial analysis of the changes and trends in climate variables in Slovenia based on homogenised series. Results of the project are accessible on the http://meteo.arso.gov.si/met/sl/climate/pss-project/ and in the publication:

[79] among which, also the green economy as a systemic change that includes sustainable transitions of social and technical systems towards sustainable production and consumption, with emphasis on food, energy, mobility and urban systems;

Podnebna spremenljivost Slovenije v obdobju 1961–2011 1–4. (Climate change and variability in Slovenia from 1961 to 2011 1–4)

Homogenised time series of the main variables were the basis for preparing climate scenarios in the local scale. First climate change scenarios by SEA were prepared in 2014 on the basis of the old greenhouse gas scenarios (SRES A1B). In the meantime, the 7th IPCC report was published, based on the model simulations with the new greenhouse gas scenarios (Representative Concentration Pathways – RCP). In 2015, the SEA started the project on the climate change assessment in Slovenia until the end of the 21st century. Detailed climate projections in the local scale were prepared for Slovenia, which are based on the results of global and regional climate models from the EURO-CORDEX project and take into account historical homogenised measurements. The changes of the air and soil temperatures, surface and groundwater temperatures and sea temperatures, soil water content, precipitation levels, quantity of watercourses, aquifer supply, and phenological development of selected plant species were analysed for three periods in the future (2011–2040, 2014–2070 and 2071–2100), taking into account three possible scenarios of greenhouse gas emissions in the atmosphere (highly optimised RCP2.6, moderately optimised RCP4.5 and pessimistic RCP8.5). A detailed project report will be prepared in the first half of 2018 and will be published on the website http://meteo.arso.gov.si/met/sl/climate/change/, where short summaries of the reports are published as well. In the next years, the impacts of climate change on individual sectors (energy, water, agriculture, health, etc.) will be prepared on the basis of already prepared scenarios.

The SEA operates as a national focal point for the Drought Management Centre for South Eastern Europe (DMCSEE), which primarily helps countries in the region with establishing drought monitoring, for which operation monitoring and forecasts for all water balance elements need to be established. In order to strengthen competences and capacities in the field of monitoring and mitigation of drought, the SEA became a partner in the Interreg project DriDanube, which closely involves countries of the Danube region. The three-year project began at the beginning of 2017 and the SEA is the leading partner. The aim of the project is to achieve a better response in times of drought and better cooperation between all operational services and political decision makers of the region on national and regional levels. Within the project framework, a Drought User Service (DUS) web-browser interface will be established, which will be used to monitor drought emergence and its effects while using modern methods of collecting data from satellites. A drought management strategy will also be prepared for each participating country, which will give clear guidance on how to overcome the weaknesses in the decision-making process in the event of a drought and improve the response in a region/country or how to change a reactive response into a proactive one. At the end of the project, the solutions will also be applied to the entire region, which is monitored by the DMCSEE

8.4 Projects and studies for provision of expert bases for climate policy

In terms of providing scientific and professional bases for the planning, implementation and monitoring of national policies, the **target research programmes (CRPs)**[80] mechanism is particularly relevant. It is a form and a method of implementing the Slovenian Development Strategy and the National Research and Development Programme. Formed in 2001, it was designed as an instrument for the country to meet its needs on a national level as well as in the research and general public sphere regarding specific priority issues, as a system of interdepartmental integration for the planning and implementation of network research and development projects in particular areas of public interest. The main purpose of the CRPs is to create research bases for decisions regarding the preparation, adoption and implementation of development policies in public interest, as well as monitoring and controlling the policy implementation. The realisation of their purpose is difficult because the final project reports are not always publicly available.

Considering the principles of interdisciplinarity, multidisciplinarity and interinstitutionality, the CRP mechanism is realised within individual CRP focal points, which represent a broader thematic area of research and connect several sectoral areas according to the national development priorities. The definition and breakdown of the focal points into thematic sets has changed over the years. In 2016, the Ministry of the Environment and Spatial Planning participated in a programme on environment and space ("Težišče 8: Okolje in prostor"), the objectives of this programme were also relatable to other programmes[81].

Within the framework of the LIFE programme, the **LIFE ClimatePath2050** project is underway. The goal of the project is to contribute to climate change mitigation by setting up a decision-support system to help Slovenian national authorities better shape actions by 2030, so as to achieve the 2050 targets for GHG reductions set out in the Paris Agreement. The project will enhance the use of quantitative GHG projections to support the development of the national mid-century climate strategy. It will carry out multi-criteria assessment of the impacts of GHG mitigation scenarios, including sectoral criteria and macroeconomic impact assessment. It will also support enhanced implementation of climate policies by improving monitoring of the implementation of, access to, and use of monitoring results to support the preparation of corrective measures. The project is coordinated by Jozef Stefan Institute and will run from June 2017 to June 2021.

The specific project objectives are to:

[80] https://www.arrs.gov.si/sl/progproj/crp/

[81] such as integrating disease prevention measures, identifying human and environmental exposure to chemicals, fiscal and economic policy, effective creativity, bidirectional flow and the use of knowledge for economic development and quality jobs.
For monitoring the implementation of S4, two CRPs are being carried out: a CRP for the preparation of new empirical bases for the revision of S4, and CRP for the preparation of the SRIP evaluation methodology.

- Prepare long-term GHG projections up to 2050 for various sectors and alternative scenarios with additional climate mitigation measures and their impacts;
- Upgrade and complement the existing set of models and methodologies for the preparation of GHG projections and impact assessments;
- Set up a coordination process to facilitate the interaction of analysis (greenhouse projections and impact assessments) with policy-making processes so as to be fully aware of objectives, consequences of particular actions, problems, alternative solutions, and potential trade-offs;
- Establish a robust system for tracking the progress of climate mitigation actions through an enhanced monitoring, reporting, and evaluation system, while at the same time reducing the administrative burden of monitoring and reporting;
- Achieve a higher level of knowledge and the capacity to use quantitative modelling tools among decision-makers and stakeholders; and
- Promote the transfer of the approaches, methods and results of the project for use in other sectors and countries, and in local climate action planning and implementation.

For a faster and more efficient planning and implementation of appropriate mitigation and adaptation measures to climate change, the **Climate Change Funding Programme** facilitates the preparation of expert bases i.e., shorter projects and studies, especially regarding:

- projections and other expert bases preparation for planning measures,
- analysis of the macroeconomic effects of implementing measures to reduce greenhouse gas emissions,
- scenarios and other expert bases preparation for planning and implementing specific measures in particular areas of climate policy,
- assessing the effectiveness of the operation of individual trade system areas with emission coupons (development of methodologies, system status analysis, possible improvements),
- adopting changes to European legislation on mitigation and adaptation to climate change.

Expert bases for particular areas of climate policy measures are also commissioned by the competent ministries.

8.5 Systematic observation

Systematic observation and air and water measurements are carried out by the Environment Agency of the Republic of Slovenia (SEA). In order to monitor the state of weather, climate and water quantity, it established a network for classic and automatic measurements of meteorological and hydrological variables. For the climate monitoring, an archive of historical measurements is particularly valuable, since only long-term homogeneous sets of climate variables are able to identify climate change. In Slovenia, hydrological data have also been collected for more than a hundred years, and therefore,

the national database already contains around 35 million records. For the assessment of climate change and its effects on the water cycle, a long series of historical hydrological records are also of great importance. Within the Operational Programme for the Development of Environmental and Transport Infrastructure (OP ROPI) for the 2007–2013 period, the SEA has carried out a project to upgrade the system for monitoring and analysing the state of the water environment in Slovenia (known as "BOBER"). The purpose of the project was to increase the capabilities of the comprehensive research and monitoring of factors in the water cycle. In the course of the project, hydrological and meteorological network of measurements were upgraded and updated.

During monitoring, meteorological and hydrological data are systematically controlled. Upgrading data control is homogenisation, by means of which the artificial effects on measurements (instrument change, change in the surroundings of the measuring point...) are eliminated from the time series. Homogenised time series are the basis for analysis of the past climate change. In 2013, the Climate Change and Variability Project was completed at SEA, during which systematic homogenised strings of the main climate variables were developed and their trends calculated. At the end of the series, the arrays are regularly updated with new measurements, and in the coming years, the process of homogenisation in the updated series will be repeated.

On the basis of verified measurements and homogenised time series, the SEA regularly monitors the state of the climate on a monthly basis and evaluates the deviations of climate variables from long-term reference values (http://meteo.arso.gov.si/met/sl/climate/current/). The state of hydrological conditions for both surface and groundwater is monitored continuously (http://www.arso.gov.si/vode/podatki/amp/ and http://www.arso.gov.si/vode/podatki/podzem_vode_amp/) at a annual level in the form of annual reports (http://www.arso.gov.si/vode/poro%c4%8dila%20in%20publikacije/ and http://www.arso.gov.si/vode/podzemne%20vode/). In addition to regular monitoring, in the event of exceptional weather and hydrological events, reports are being prepared that cover a detailed analysis of the extreme event and an assessment of the exceptionality within the climate change (http://www.arso.gov.si/vode/poro%c4%8dila%20in%20publikacije/ and http://meteo.arso.gov.si/met/sl/climate/natural-hazards/).

9 EDUCATION, TRAINING AND PUBLIC AWARENESS

9.1 Introduction - General Characteristics

According to the Eurobarometer[82] opinion poll in 2017, more than seven out of ten Slovenian respondents think that climate change is a "very serious" problem (71%, the EU average of 74%). Approximately one out of ten (11%, the EU average of 12%) Slovenian respondents think that climate change is the single most urgent issue. About two thirds of the respondents (66%) said that they have commenced with activities with regard to fighting climate change in the past six months, which is substantially higher than the EU average (49%). When provided with specific examples of the activities, that proportion is increased to 96%, which suggests that many do not link specific activities with climate change. Interesting answers were given regarding the following activities:

- 84% of respondents try to reduce their waste and regularly separate it for recycling (the EU average of 71%),
- almost two thirds try to cut down on consumption of disposable items whenever possible (65%, the EU average of 56%),
- Slovenia has one of the biggest shares in purchasing local and seasonal food (62%, the EU average of 49%),
- when it comes to buying a new household appliance, lower energy consumption is an important factor (50%, the EU average of 37%),
- the proportion of those who regularly use alternative transport options (35%) as opposed to using their private car is also above the EU average (26%), although it is lower than the one in 2015 (52%),
- the respondents in Slovenia are also above average when it comes to home insulation for reducing energy consumption (almost twice as much – 35% – as the EU average of 18%).

Belief that the reduction in imports of fossil fuels from third countries could be an economic benefit for the EU is slightly lower among the Slovenian respondents than the EU average (59%, the EU average of 65%). Higher is the proportion of those who think that it is important for the government to take more decisive measures for increasing the RES share by 2030 (94%, the EU average of 89%) and to provide support for improving the EE by 2030 (93%, the EU average of 88%).

Questions about the perception of the gravity of climate change were also a part of the **Research on energy efficiency in Slovenia (REUS)** conducted periodically by the Informal Echo Agency. The summary of the results for 2017 (the survey took place in May 2017):

[82] https://ec.europa.eu/clima/citizens/support_en

- The assessment of climate change severity has in general, increased statistically significantly according to the previous measurement in 2015. 37% of respondents assessed climate change as an extremely serious problem (in 2015, this estimate was given by 29% of respondents).
- The assessment of the severity of climate change for Slovenia is slightly lower. Approximately half (46%) of the respondents scored the severity for Slovenia with between 7 and 9, while 23% of respondents saw the problem as extremely serious (score 10).
- The respondents' assessment of the impact of climate change on their daily lives was lower than in comparison with the general assessment of the problem and assessment of the problem for Slovenia. Only 17% of the respondents believe the problem of climate change will have an extremely serious impact on their daily lives.

The key players in the area of Article 6 of the UNFCCC and Kyoto Protocol implementation with regard to public awareness of the problem of climate change, causes and consequences as well as activities to fight climate change are at the governmental level in 2012 the Ministry of the Environment and Spatial Planning (MESP), Ministry of Infrastructure (MI), Ministry of Economic Development and Technology (MEDT), Ministry of Agriculture, Forestry and Food (MAFF), Ministry of Finance (MF) and the Government Communication Office (GCO). The above-mentioned ministries are also active in the areas of education and training on climate change, where the lead government bodies are the ministry responsible for education (Ministry of Education, Science and Sport – MESS) and the ministry responsible for employment policy and lifelong learning (Ministry of Labour, Family, Social Affairs and Equal Opportunities).

Education and communication activities in the field of climate change and related issues (e.g. good practice in the fields of waste, water and energy) were implemented by government agencies (e.g., the Slovenian Environment Agency – SEA) as well as other entities (education and training organisations, non-governmental sector, media, business sector, local communities etc.). They were financed from different sources, including the state budget, EU funds and various international sources.

9.2 Training and Education: System Approach

Responsibilities and powers relating to the development and operation of an education and training system have been allocated to the Ministry of Education, Science and Sport (MESS), local communities (municipalities), expert councils appointed by the Government of the Republic of Slovenia, and institutions established to develop and provide advice on education (National Education Institute of the Republic of Slovenia, Institute of the Republic of Slovenia for Vocational Education and Training, Slovenian Institute for Adult Education, and National Examinations Centre).

There is relevance for education about climate change in several subjects addressed in the context of environmental education (which has a long tradition in the educational system of Slovenia) and more recently introduced education for sustainable development – e.g. in the

framework of energy efficiency, renewable energy sources, sustainable consumption and sustainable transport.

Pursuant to the UN Agenda 21 (1992), the **United Nations Decade of Education for Sustainable Development (2005-2014)** was implemented under the auspices of UNESCO. In European countries, the implementation of Decade of ESD was guided by the UN Economic Commission for Europe (UNECE) Strategy for Education for Sustainable Development[83] and on the basis of this strategy; the Slovenian Ministry of Education adopted the **Guidelines for Education on Sustainable Development from Preschool to Pre-university Education** (MESS, 2007)[84]. The main purpose of these guidelines is to implement the education for sustainable development in the Slovenian school system and to emphasise that ESD is not only considered as an addition to the existing general education and its purpose is not only the protection of nature; it is a comprehensive, integral and coherent pedagogic process, including the relationship between humans and nature as well as relationships between people. Furthermore, it leads to an understanding of a versatile connection between the natural, economic, social and political system and the interdependence of people living in different parts of the world; namely, it tries to solve the current and future environmental and social issues of humanity in an active and coherent manner (p. 2). In 2008, an important umbrella legislative amendment followed. One of its main objectives for education is the education for sustainable development and active participation in a democratic society, including in-depth knowledge of, and a responsible attitude to, oneself, one's health, other people, one's own and other cultures, natural and social environments, and to future generations (**Organisation and Financing of Education Act** – ZOFVI, Article 2). The **White Paper on Education** (2011) also emphasised education for sustainable development, which would require a paradigm shift in knowledge and values, and according to the document, the principle of sustainable development should become one of the key education principles of education in Slovenia. As it turns out, these recommendations have not been sufficiently taken into account.

To complement the ESD Guidelines, the document **Quality Criteria for ESD-Schools**: Guidelines to enhance the quality of Education for Sustainable Development was also published (National Education Institute Slovenia, 2008).[85] In accordance with the guidelines of the UNECE ESD Strategy and the Slovenian ESD Guidelines, the concept of environmental education, which has had a long tradition in Slovenia, was expanded in the following years. After adopting the ESD Guidelines, several execution documents were

[83] UNECE (United Nations Economic Commission for Europe) Strategy on Education for Sustainable Development was adopted at a high-level meeting of the ministers of education and environment in Vilnius in 2005. UNECE: UN, Economic Commission for Europe Access on: http://www.unece.org/?id=24444.

[84] Guidelines for Education for Sustainable Development from Preschool to University Education: http://www.mss.gov.si/fileadmin/mss.gov.si/pageuploads/podrocje/razvoj_solstva/trajnostni_razvoj/trajnostni_smernice_VITR.doc

[85] Kriteriji kakovosti šol, ki vzgajajo in izobražujejo za trajnostni razvoj. Vodnik za dvig kvalitete vzgoje in izobraževanja za trajnostni razvoj: http://www.ensi.org/global/downloads/Publications/228/KVALITATIVNI%20KRITERIJI_ZA_SOLE_2.pdf

published – in the field of general education, one of these documents was the curriculum for environmental education as education for sustainable development for elementary school (proposal) and general upper secondary schools (adopted), and elective subjects for environmental education ("environmental education" in elementary school and "environmental studies" in general upper secondary schools). These documents upgrade and complement environmental education with other educational areas in terms of an integrative approach to education for sustainable development. In the national curriculum of elementary and secondary schools, mitigation of climate change is included in several subjects.

In the 2016–2017 period, the National Education Institute of the Republic of Slovenia performed an **analysis of curricula and curriculum documents** in terms of the integration of key concepts and key competences of sustainable development, compliance with the principles of ESD and didactic approaches/methods and forms of work for achieving the objectives in the field of ESD, with the resources of the Climate Change Fund (MESP). Identified shortcomings refer to the fundamental principles of this educational concept and show that sustainable development is not yet taught as a broad and comprehensive concept involving interconnected environmental, economic and social issues, with environmental categories as the most frequently represented. In spite of a higher representation, some very relevant environmental categories are not included in curricula and curriculum documents (such as low carbon economy, adaptation to climate change, sustainable mobility, sustainable construction, circular economy) or can only be found in one or two curricula (ecosystem services, planetary restrictions, green technology and green jobs were found in only one curriculum), while some are not properly addressed. Because of the rapid development of environmental sciences and policies, a number of conceptual dilemmas arise while transferring new findings to the education process. (Eco) systemic thinking and a comprehensive approach are not sufficiently encouraged. Lower taxonomic categories are predominant, especially in the general upper secondary school programme. However, the strategic approach to dealing with sustainable development (SD) is relatively often identified from the general objectives, but later on, the inclusion of SD can no longer always be recognized from the operational objectives. Environmental actions are more frequently conceived than objectives aimed at long-term changes in mentality or responsibility of the students/individuals. Particularly problematic is the involvement of the aspects of SD in the mostly selective parts of curricula, which obviously prevents all pupils/students from equivalent education for SD. In higher grades of elementary and general upper secondary school, students have the opportunity to choose the subjects (environmental education, environmental studies), which enable them to learn more about all aspects of SD, and more often anticipate the active role of students and encourage them to connect with the wider environment. However, these subjects are only offered in a limited number of schools. Many of the principles of sustainable development are covered only by the general objectives of the curriculum, and the principles of lifelong learning, partnerships at a local, regional, national and international level and intercultural dialogue are poorly developed. Analysis of implemented curriculum on a smaller sample of more active educational institutions has shown that, despite the exceptional variety of activities and the obvious consideration of the strategic approach to the implementation of ESD, school environments are still often dominated by one-off environmental activities, and only a smaller part of the

activities is aimed at changing the mind-set and introducing the "systemic treatment" of the SD field.

On the basis of the findings of the analytical part and in accordance with the wider concept of education for sustainable development, outlines (recommendations) for implementing the transition to a green economy were developed within the project of the National Education Institute in 2017. They relate to pre-school, elementary and general upper secondary school, and are relevant for teachers as well as school leaders; they are prepared in order to manage an effective implementation of curricula and the development of school institutions in the field of ESD, and also provide a basis for the preparation of learning materials and planning the development and innovation projects.

In the field of vocational and professional education, **competence for sustainable development** is being introduced. The proposal for the introduction of competence for sustainable development was elaborated in the framework of the Institute of the Republic of Slovenia for Vocational Education and Training (CPI) in years 2011-2013, and based on the principle that all jobs in the country can be "made green". Therefore it is important that competence for the management of sustainable development combining the environmental, social and economic responsibility of organisations and individual jobs can be integrated into all forms of education and training. In 2015, the proposal for competence with amendments was approved by the Sectoral Committee for Occupational Standards Sustainable Development as a methodological tool for integrating sustainable contents into occupational standards. However, a pilot implementation of the competence into some occupational standards has been conducted since 2014. It was shown that, due to a professionally demanding competency record, field-specific recommendations will be required.

In 2014, according to the publication on qualification structure[86] in the field of environmental protection (Kvalifikacijska struktura s področja varstva okolja), the following qualification system was used:

- one level 3 qualification and two on the level 5 of the SQF (Slovenian Qualifications Framework), which are acquired in the formal education system, and three national vocational qualifications;
- 12 qualifications obtained in the formal education system at the level of post-secondary and higher education (levels 6. – 10 of the SQF), five of them on level 8 (Master's degree). Education programmes have been implemented in more than ten public and private schools.

Literally all programmes of the vocational and professional education involve generic or key competences, which include protection of the environment, rational energy use and safety at work. In most of the programmes, especially the ones in the field of technology, this content is a part of the subject regarding environment protection and safety at work. The "Bologna reform" introduced new subjects and their content is relevant to the

[86] http://www.nok.si/assets/PDF/Slovensko-ogrodje-kvaliifikacij/SOK-Varstvo-okolja-web.pdf

development of a low-carbon society (e.g. sustainable use of energy and the environment) in study programmes of different fields.

When it comes to the system for **adult education**, the key document from this field is the Resolution on the Master Plan for Adult Education in the Republic of Slovenia for 2013–2020[87] (ReNPIO13-20), according to which the protection of the environment is seen as an opportunity for searching development solutions, the development of synergies between the objectives of economic, social and environmental development as a concept of the green growth and economy as well as their subfields. Since 2007, adult education has been implemented with the development and expertise tasks of the Slovenian Institute for Adult Education (SIAE) in the field of general informal education (informal interdisciplinary programme, two textbooks, including dictionary, training of trainers). The aim of the informal education is to raise awareness by learning through experience and reflection about Slovenian cases at different levels. In the 2016–2017 period, the SIAE implemented the project "Implementation of an adult training programme for sustainable development and transition to the green economy in relation to climate change", which was funded by the Climate Change Fund.

For objectives related to climate change, the amount of support in the **OP ECP** (Operational Programme for the Implementation of the EU Cohesion Policy 2014–2020) document, priority axis 10 "Knowledge, skills and lifelong learning to enhance employability", is set to EUR 8 million. Within this objective, activities for strengthening knowledge, skills and lifelong learning, which would enable faster adaptation to changes in the labour market and thus transition to a low-carbon society, are planned. A new system of vocational and professional education is also planned, according to which curricula, professional standards and catalogues will be updated. There is relevance for education about climate change in several subjects addressed in the context of environmental education (which has a long tradition in the educational system of Slovenia)[88] and more recently introduced education for sustainable development – e.g. in the framework of energy efficiency, renewable energy sources, sustainable consumption and sustainable transport. Learning about climate change was also integrated into global education projects in Slovenia, especially as part of programmes of the Ministry of Foreign Affairs.

9.3 Education, training and climate change awareness-raising as a cross-sectoral domain

In the **OP GHG-2020 (**Operational Programme for Reducing GHG Emissions until 2020[89]**)**, which was approved by the Slovenian Government in December 2014, the measure on

[87] http://www.pisrs.si/Pis.web/pregledPredpisa?id=RESO97

[88] For more information on past development of environmental education see 6 NC, pp 161 – 165 (https://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/6nc-si_en_v.2.pdf

[89] http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/zakonodaja/varstvo_okolja/operativni_programi/optgp2020.pdf

capacity building for the implementation of GHG mitigation measures and coordination is defined, which also specifies the following objectives:

- education and training for the transition to a competitive low-carbon society;
- strengthening human resources for establishing new green jobs;
- information on the benefits of climate change mitigation and the practical aspects of implementing the measures.

Following the adoption of the OP GHG-2020, the Slovenian Government also adopted the following programme and action documents that regulate the implementation of measures in the field of informing, awareness raising, training and education:

- Operational Programme for the Implementation of the EU Cohesion Policy 2014–2020 (OP ECP), 2015;
- biennial Climate Change Funding Programme,
- Framework Programme for Transition to a Green Economy (OPZG) with OPZG Action Plan and Plan of Activities of the Ministries and Government Services' Operational Plan for the 2015–2016 period.

Education is important for empowering young people and adults to work and live in the green economy; therefore, **education regarding green economy** is one of the key horizontal measures of the Framework Programme for Transition to a Green Economy – **OPZG**[90] (Government of the Republic of Slovenia, 2015), supporting the transition to a low-carbon society, the efficient use of natural resources, and green jobs. In that regard, it is not only the education of young people that is important, but it is also necessary to incorporate skills into the concept of lifelong learning, where special attention should be devoted to the working population (in order to overcome differences regarding knowledge and competences). Other important areas of measures are also changes in consumption and production patterns, changes in how educational activities are carried out (including greening educational infrastructure by reducing the environmental impact and increasing material and energy efficiency, and introducing a sustainable lifestyle and the functioning of educational institutions), creating suitable support environments for producing and transferring knowledge, and empowering young people to creatively solve problems while acquiring and using the knowledge.

In 2017, the preparation of the National Environmental Action Programme was under way[91]. The draft document anticipates that in the future, more decisive progress should be made regarding objectives in the field of education for environmental protection:

90 http://www.vlada.si/fileadmin/dokumenti/si/projekti/2016/zeleno/opzg_akcijski_nacrt_in_nacrt_aktivnosti.pdf

91 Public consultation on the draft document, October 2017: http://www.mop.gov.si/si/medijsko_sredisce/novica/article/1328/7793/

- full implementation of the sustainable development principle as one of the key education principles in Slovenia and that at the same time, education is established as a key support system for achieving the objectives of sustainable development and environmental protection,
- empowerment of young people and adults to work and live in the green economy,
- environmental literacy as the key component of functional literacy.

In order to achieve these objectives, a systematic, professional and appropriate source-based process for carrying out the concept of training and education for sustainable development (ESD) with an integrated approach at all education and training levels in Slovenia will have to be established. Moreover, it will be necessary to ensure that policy frameworks, plans, strategies, programmes and processes at national, regional and local level, related to the social, economic and environmental dimension of sustainable development, include ESD as a tool for implementation and that ESD becomes also a part of bilateral and multilateral frameworks for development cooperation. In order to improve the employability of an individual, the competence for sustainable development will have to be integrated into all professional standards and training at all levels.

In order to attain the above enumerated objectives, the draft NEAP document anticipates also measures on a operational level.

During the 2015–2017 period, many activities have been coordinated within the **Climate Change Funding Programme** and with cooperation between MESP and other stakeholders, but coordination could be further strengthened. In the 2015–2017 period, the Climate Change Fund financed several education, training and awareness-raising projects, such as: "Slovenia is Reducing CO2: Good Practices 2015", training multi-dwelling building managers, educating chimney sweeping businesses and other companies involved in the design, installation and maintenance of small combustion installations, educating on air quality, educating elementary school teachers about energy efficiency, organizing education seminars at the Ellen McArthur Foundation for civil servants and others. In 2015, a tender for co-financing NGOs working in the field of climate change, awareness-raising, education and training of targeted public was conducted, under which the projects regarding community-based management of life resources, sustainable mobility in practice, and Zero Waste tourism were funded.

An important measure of the OP GHG-2020 in this field is the preparation of a detailed training plan for the transition to a competitive low-carbon society, which will determine the needs for training. OP GHG-2020 is planning another measure on human resource development for a transition to a low-carbon society, in particular with regard to strengthening education and training activities in areas where new jobs will be created, and training steps for implementing individual measures.

The programme by the Ministry of Infrastructure for promotion of **sustainable mobility** in municipalities is being implemented with the OP ECP funds and involves drawing up Comprehensive Mobility Strategies (CPS) for at least 30 urban municipalities. Training for

CPS planners has already been carried out in 2015, which was provided by the Ministry in cooperation with the Slovenian Platform of Sustainable Mobility. This training transferred the concept of sustainable mobility planning to approximately 70 experts in the field of transport and spatial planning. When coordinated activities are taking place in several municipalities, the European Mobility Week project is becoming one of the most important projects in the field of sustainable mobility promotion.

The Ministry of Infrastructure finances and promotes education, training and information activities regarding energy, energy renovation and sustainable construction in accordance with several strategic and operational documents, including: National Energy Efficiency Action Plan 2014–2020 (AN-URE 2020), National Renewable Energy Action Plan 2010–2020 (AN OVE) and Action Plan for Nearly Zero-Energy Buildings (AN sNES)[92]. Some of these activities are financed from the OP ECP funds, some from the Climate Change Fund and from other sources. Important contractors are Eco Fund (Slovenian Environmental Public Fund) and Borzen (Slovenian electricity market operator).

The Ministry of Agriculture, Forestry and Food is responsible for training measures on reducing GHG emissions from the field of **agriculture and forestry.** Daily activities of the **agricultural public advisory service (JSKS)** are crucial when it comes to giving advice to agricultural holdings on production and breeding technologies as well as reducing soil contamination and the content of harmful substances in food. In doing so, JSKS also follows the environment protection objectives and trains farmers to implement the contents of the Rural Development Programme 2014–2020. Establishment of the "short food supply chains" between producers and consumers is one of the priority tasks of the Ministry of Agriculture and the Environment. Within the campaign to increase local food consumption, the Ministry carried out several promotion projects, and among the reasons for doing this was the fact that longer transport routes pollute the environment.

In Slovenia, climate change education is also included in **global education programmes**, especially within the programmes by the Ministry of Foreign Affairs. The Ministry coordinates these activities in cooperation with other ministries and partners, especially from the non-governmental sector.[93] The aim of the global education concept developed in Slovenia is to encourage individuals and communities to engage in resolving key common challenges of humankind that lead to globally responsible and active individuals and communities. There is an emphasis on interdependence and individual's involvement in global trends and both formal as well as informal education are involved. Global education covers areas such as: environmental awareness, sustainable development, intercultural and intergenerational communication, human rights (and the fight against racism), democracy, social justice, peace, active citizenship, conflict prevention. The global education domain was also included in the activities of the European Year for Development 2015.

[92] More information on the energy portal: http://www.energetika-portal.si/.

[93] http://www.mzz.gov.si/zunanja_politika_in_mednarodno_pravo/mednarodno_razvojno_sodelovanje_in_humanitarna_pomoc/politike_mrs/globalno_ucenje/

9.4 Education, training and climate change awareness-raising on climate change: examples of material, high-profile projects, good practices

In the last decade, the number of project, education, training and activity developers has increased. These activities often include information and awareness-raising campaigns.

Some of these projects are carried out in kindergartens, elementary and secondary schools and other educational institutions. In addition to traditional networks (such as Eco-School Networks, the European Network of Health Promoting Schools, the UNESCO Associated Schools), more school networks have been established (e.g., School Eco Gardens Network, Institute for Sustainable Development programme), a number of materials have been published (often not sufficiently taken into account, especially after projects are completed), web portals on environment and sustainable development have been established, a sustainable infrastructure has been established and teachers and other stakeholders have been trained.

Contractors include environmental and other non-governmental organisations, the Slovenian Environment Agency, Eco Fund, various ministries, Borzen (the Slovenian electricity market operator), energy companies and local energy agencies, business entities, various agencies and institutes, art institutions and others. These projects are funded from different sources, either private, local, state, European or international. In the following paragraphs we can present only a few of the many ambitious programmes and projects for sustainable development.

One of the programmes, which follows the principles of target documents on environmental education and education for sustainable development and is one of the well-established programmes in the country, is the **Eco-School programme**[94], which is coordinated by the DOVES-FEE society. The programme has been implemented since 1995 and is also supported by the European Commission and the UN. Its aim is to promote environmental education and awareness of young people, especially the importance of environment and human health protection. In the course of all these years, Eco-Schools have had a tremendous impact on environmental awareness of the population, especially young people, and Slovenia is considered to be one of the most successful countries regarding the implementation of this programme. In the 2010/2011 school year, 628 Eco-Schools have been registered, 423 of those received an eco-flag (meaning that they managed to fully implement the programme), a few dozen of these were secondary schools. In the 2015/2016 school year, 712 institutions were participating (35% of Slovenian kindergartens and schools). More than 132,000 children and 15,950 educators and teachers from Slovenia were involved in the environmental projects (eco-coordinators or project managers).

Slovenian Environment Agency publishes many documents, which inform and raise awareness on climate change.

[94] The international "Eco-School" programme is one of the programmes devised by the international Foundation for Environmental Education – FEE.

- Publications:
    - Environment and Energy in Slovenia (Okolje in energija v Sloveniji; Environment Agency of the Republic of Slovenia, in preparation),
    - Driving in green gear (Na poti v zeleni prestavi; issued by the Slovenian Environment Agency, Institute for Youth Participation, Health and Sustainable Development and No Excuse Slovenia youth organisation, 2017, 21,506 KB), Brochure on Environment, Transport and Health (Brošura o okolju, prometu in zdravju; issued by the Slovenian Environment Agency and the Ministry of Infrastructure, 2016, 393 KB),
    - The European environment: state and outlook 2015 Synthesis report on data sampled in the four decades during the implementation of the EU policy agenda,
    - Environmental indicators in Slovenia (issued by the Environment Agency of the Republic of Slovenia, July 2014, 3,146 KB),
    - Environment and traffic in Slovenia (Okolje in promet v Sloveniji; issued by the Slovenian Environment Agency, November 2008, 745 KB), Climate change and variability in Slovenia from 1961 to 2011, 1–4 (Slovenian Environment Agency, 2016, 2017)
    - Drought and Water Framework Directive – Drought management as a basis for implementing the Water Framework Directive (Suša in vodna direktiva – Upravljanje s sušo kot podlaga za upravljanje v sklopu vodne direktive; Slovenian Environment Agency, Global Water Partnership, 2015)
    - Assessment of climate change by the end of the 21st century – Summary of temperature and precipitation averages (Ocena podnebnih sprememb do konca 21. stoletja – Povzetek temperaturnih in padavinskih povprečij; Slovenian Environment Agency, 2017)
    - Assessment of climate change by the end of the 21st century – Summary of environmental factors with impact on agriculture and forestry (Ocena podnebnih sprememb do konca 21. stoletja – Povzetek dejavnikov okolja z vplivom na kmetijstvo in gozdarstvo; Slovenian Environment Agency, 2018)
- Bulletin: SEA monthly bulletin (containing reviews of monthly data on meteorology, agrometeorology, hydrology, air pollution and water course and underground water quality) (Slovenian Environment Agency).
- Websites:
    - www.arso.gov.si (meteorological data, climatological data, publications),
    - http://nfp-si.eionet.europa.eu/ (information and communication network for collecting and reporting environmental data on the state level, data provision in support of political decisions, and their disclosure to Slovenian and European public).
    - http://kazalci.arso.gov.si/ (environmental indicators with graphs, maps and comments show the direction of the environmental development in Slovenia. The website provides access to more than 180 indicators based on data that indicate status, characteristics or development of a certain phenomenon).

http://www.arso.gov.si/zrak/kakovost%20zraka/poro%c4%8dila%20in%20publikacije/kakovost_letna.html (annual reports on the quality of air in Slovenia)

- http://www.arso.gov.si/vode/poro%C4%8Dila%20in%20publikacije/povrsinske_letna.html (reports on the quality of the surface water)
- http://www.arso.gov.si/vode/poro%C4%8Dila%20in%20publikacije/ (reports and publications on the water)
- http://www.mop.gov.si/si - (Ministry of the Environment and Spatial Planning website)

Many projects and activities in the field of climate change have been carried out under the slogan **"Slovenia is Reducing CO2"**:

- a series of six climate consultations took place as part of the **"Slovenia is Reducing CO2: Climate Consultations"** project from May 2010 to January 2011. The consultations were one of the actions within the framework of the partnership in EU affairs communication between the European Commission and the Slovenian Government and intended for discussions about challenges and orientations for implementation of the commitments under the climate and energy package. They provided the basis for drafting recommendations to decision-makers;
- two projects in the framework of the **"**Slovenia is Reducung CO2: Good Practices[95]**"** project have taken place within the framework of the partnership in EU affairs communication between the European Commission, the Slovenian Government and the European Parliament, and implemented by Umanotera, the Slovenian Foundation for Sustainable Development. In relation to projects, a number of Slovenian and foreign good practices were presented to the public in the 2012 and 2013 Catalogue, on the www.slovenija-co2.si website, and in short animated films from the following priority areas: (1) energy efficiency, renewable energy sources and energy renovation of buildings, (2) sustainable mobility, (3) sustainable forest management, processing of wood in crafts and industry, wood as a construction material and wood fuel supply, (4) organic farming, supply networks with sustainably produced food, (5) sustainable rural development, (6) sustainable production and consumption, (7) adaptation to climate change. The selected good practices were presented to the interested public in more detail at workshops, at site visits and at the websites www.slovenija-co2.si. Recommendations have also been made for decision makers for further dissemination and use of good practices.
- the third project, **"Slovenia is Reducing CO2: Good Practices"** was financed by the MESP from the climate change fund from August 2015 to August 2016, and was again implemented by the Umanotera foundation. The project expert group chose 23 good practices from the seven priority areas, similarly to the first two projects, but only practical solutions from Slovenia were selected. Again, the selection criteria included contributions on mitigation of the climate change effects and adaptation to them, and promotion of the principles of sustainable development, as well as possibilities for

[95] www.slovenija-co2

contribution to economic competitiveness and employment. More detailed presentations of good practices, with image and video material, were published twice a month on the web and social networks. Good practices were put on Google Maps together with others that were selected in the previous years (63 good practices in total). A catalogue of good practice for reducing CO_2 emissions and a compilation video with presentations of 20 good practices from the previous years were prepared.

European Mobility Week[96] with its **Car-Free Day** is a major annual campaign for sustainable mobility, implemented by the Ministry of Infrastructure. The objective of the initiative is to inform the public of the consequences of the excess use of cars and road transport in general, and changes in mobility habits. The campaign warns of climate change and of everything that creates a "climate" of cities: living quality, air quality, noise, traffic safety, quality of public surfaces, social integration of the population and general atmosphere in cities. Municipalities are of the key importance in this campaign, since they have a detailed knowledge of the transport-related issues in individual places and can also define traffic regimes in cities in the fastest possible manner and contribute to sustainable mobility.

European Mobility Week has taken place every year since 2002 between September 16 and 22. The last day is devoted to the **Car-Free Day**. Slovenia joined the project already in the first year. The Ministry of Infrastructure invites local communities to participate and helps them to implement the project by preparing awareness-raising publications and different activities. The number of participating municipalities is constantly increasing. The number of participants kept increasing for many years and from 30 participating municipalities there were suddenly 60 in 2015; in 2016, there were already 74 municipalities participating in the initiative, which is a record number. **In 2016, European Mobility Week** took place under the slogan "Smart mobility. Strong economy." (research clearly shows that cities with sustainable mobility have noticeable economic benefits), and in 2017 under the slogan "Sharing gets you further" (by using shared forms of transport we can reduce our expenses and lower our carbon footprint, and best of all, we can meet new people and make our journey more sociable).

Within the framework of the cross-border cooperation project between Slovenia and Austria ("Health-Care – Sustainable Food Awareness")[97], four modules were made in 2014, which can be directly or with modifications on different levels included in the educational content by the teachers. The main purpose of the project was to inform the younger population about the importance and quality of the organic food, to familiarise them with the benefits of organic farming in terms of environmental protection, to teach them about the importance of sustainability for our common future and to show them, what and how can each individual contribute to the common cause.

The **Sun Safety Programme** is aimed at improving the state of the skin cancer in Slovenia, which is on the rise and strongly associated with exposure to UV radiation and the

[96] https://www.tedenmobilnosti.si/2017/

frequency of the sunburns, in the long term. Its objectives are to change the people's attitude to sun exposure and to further ensure that as many people as possible will use sun protection consistently. The programme has been running in kindergartens since 2007, in elementary schools since 2010. Evaluation has shown a positive reception of the content and method of implementation, as well as a significant improvement in awareness of the rules of sun protection in children and their parents. Since 2010, the programme has been listed as one of the tasks of the annual programme for public health, which are being implemented by the regional healthcare services and are confirmed by the Ministry of Health.

The **Traditional Slovenian Breakfast** is a national project implemented by the Ministry of Agriculture, Forestry and Food and various partners in order to improve awareness about the significance of local food self-sufficiency**,** local food production and processing and in the framework of the public procurement system, to stimulate the supply activities of the food produced in local environment. The MAFF also prepares guidelines and recommendations for planning and implementing accompanying educational activities that support the basic goal and purpose of the project. The aim is to ensure that as many Slovenian children as possible get to attend these activities during the event (a day in November), during a field trip (e.g., science field trip), and during the school year.

Within the European project **ACHIEVE (2011-2014)**, Focus, the association for sustainable development, has searched for practical and structural solutions that will help people in the EU reduce the risk of energy poverty. The project included a one-week training programme for energy consultants (mostly selected from the unemployed) and the visits of these consultants to households with a high poverty risk. Its activities were complemented through activities of other projects (e.g., REACH, 2014–2017) and have become a regular part of the energy advisors' activities (ENSVET network).

Other examples of good practices and teaching materials:

- didactic energy polygon in Velenje and projects of the Inter-company training centre in Velenje;
- the annual campaign "Earth-friendly School/Preschool" (Planet Earth Society);
- Fit media company with its "Green Slovenia" trademark;
- GOLEA Energy Agency's projects and publications;
- projects for sustainable mobility implemented by Focus Association for Sustainable Development;
- synergy business model by Informa Echo, agency for integrated communication.

Numerous examples of good practice in information and communication about climate change are presented at national and international selections, web portals, presentations and visits (e.g., the **National Energy Path of Slovenia** and projects **Slovenia is Reducing CO_2: Good Practices)**.

[97] http://www.bioimpulse.eu/sl/. The main Slovenian partner was the Department for Organic Farming, Field Crops, Vegetables and Ornamental Plants of the Faculty of Agriculture and Life

The "**Energy Consulting for Citizens – ENSVET"** programme offers individual, free, independent energy counselling and information, education and awareness-raising activities for promotion of measures for the efficient energy use and renewable energy resources to citizens in the local environment. Counselling is given in the ENSVET offices around Slovenia by qualified independent energy consultants. They offer free advice and free-of-charge consultations and help in selecting, planning and implementing investment measures for the efficient use of energy and the use of renewable resources in residential buildings. These consultations increase public awareness of energy, energy savings and reduce greenhouse gas emissions, thus facilitating the implementation of certain energy policy measures and programmes. According to the first and third paragraphs of Article 352 of the Slovenian Energy Act, ENSVET network is organised by Eco Fund, together with local communities concerned (municipalities). Eco Fund is also the network's coordinator and organises the activities of municipal consulting offices and the energy advisors.

LIFE Capacity Building is a project, implemented by the Ministry of the Environment and Spatial Planning from January 2016 to June 2018. The project is primarily aimed at enhancing knowledge of the preparation and management of projects under the terms of the LIFE programme for everyone interested in the LIFE programme who would like to actively participate in projects as applicants, partners, or are only interested in funding the project. One of the programme's tasks is focused on measures regarding climate change. The main goals of the project are: to improve the quantity and quality of MESP's activities for implementation of LIFE programme; to improve Slovenia's effectiveness at implementation of LIFE programme (higher success rate of project proposals, better connection with the policy implementation); better promotion of results and their integration into policies and programmes. A number of workshops, training events, materials, various events and other education activities, information and counseling are planned within the scope of project.

9.5 Non-Governmental Organisations and Public Participation

Non-governmental organisations (NGOs) and organised civil society are the key contributors to the development and implementation of democracy and human rights. By involving a large number of individuals, they are an important component of participation in an open democratic society. Because of their knowledge and independent expertise, they can generously contribute to the decision-making processes, which have prompted the governments of all levels – local, regional or national – as well as international institutions to take into account the relevant experience and competences of NGOs when designing and implementing policies.

NGOs have an important role to play in public information and awareness, especially those who work in the field of environment protection and nature conservation. There are 27 NGOs active in the field of environmental protection, and 36 societies that act in the public interest in the field of nature conservation.

Sciences of the University of Maribor.

When it comes to environment issues, NGOs are important cooperation agents, since their activities are implemented by stakeholders who are aware of their social responsibility. They enforce principles of environment and nature protection and sustainable development at all levels of political decision-making processes and activities. The most important operating area of NGOs for environmental and nature protection is undoubtedly influencing the policy and legislation planning in Slovenia and on the EU level, and raising public awareness regarding environment and sustainable development (as seen in the previous chapters). The Ministry of the Environment and Spatial Planning has been trying to enhance the dialogue with this important part of the civil society for several years.

Slovenia's new strategic document for the development of NGOs and volunteering[98] highlights, among other things, that only an efficient, cohesive and stable non-governmental sector that can act transparently, responsibly and ethically, can actually help social development, increase social welfare, quality of life and social security. The strategy is aimed at achieving the following objectives: establishing a supportive environment for the functioning and development of NGOs, strengthening the role of NGOs in the planning and implementation of public policies at local and national level, strengthening the involvement of NGOs, the economy and cross-sectoral partnerships (economy, NGOs, public administration), facilitating transparency, integrity and responsibility of NGOs. Measures, which include a measure for increasing the number of permanent jobs in NGOs and implementation of field analyses for transfer of public services, will be implemented by the MJU (Ministry of Public Administration), line ministries and the MESP. AN important instrument to support the non-governmental sector is financed from the European Social Fund. Resources from this fund were used to strengthen the capacities of NGOs for advocacy, organisational development of NGOs and implementation of public services in order to strengthen their capacity for cooperation in preparing and implementing public policies.

In 2007, Focus, the association for sustainable development, Umanotera, foundation for sustainable development, CIPRA Slovenia, association for the protection of the Alps, the Slovenian E-forum and Institute for Sustainable Development have established, with the financial assistance of the MESP, the **Environmental Centre** as the framework for operations of environmental non-governmental organisations. The Environmental Centre has become the centre for the integration of interested members of the public, while enabling access for the wider public to information and publications of environmental protection and sustainable development. Simultaneously, with better organisation and cooperation of environmental non-governmental organisations, the Environmental Centre has been increasing its importance in decision-making processes. The Environmental Centre also provides the basic infrastructure and assistance to non-established or newly-established environmental non-governmental organisations and civil initiatives.

[98] *NGOs and Volunteering Development Strategy, proposal* approved by the Council of the Government of the Republic of Slovenia for the promotion *of the development of volunteering*, volunteer and *non-governmental organisations*, on 14/ 9/ 2017.

The Slovenian platform of civil society for sustainable development is Plan B for Slovenia – a network of NGOs for sustainable development (established in 2007), which aims to support the long-term sustainable operation of environmental NGOs and to strengthen the qualification of environmental NGOs by encouraging their active role in the democratic processes of policy formulation and in monitoring implementation of policies, and also by encouraging their participation and partnership. Its objective is also to improve the awareness of citizens and to encourage their engagement in environmentally-oriented public matters. In the 2012–2014 period, the partners of the Plan B for Slovenia project were: in addition to Umanotera, Slovenian foundation for sustainable development, which runs the network, CIPRA Slovenia, Ecologists Without Borders society, Focus, the association for sustainable development, the Institute for Sustainable Development (ITR) and Legal-Informational Centre for NGOs. The Plan B for Slovenia network has 34 members and is interested in collaborating with all non-governmental organisations working in the field of environment protection and sustainable development.

The Manifesto of the civil society for development of Slovenia titled also **For a Prosperous Society the Network of Life** (Za družbo blaginje v trdni mreži življenja; January 2018) is a response of organisations for civil society to the current social issues. Its aim is to promote a wider public, political and academic debate on the further necessary steps in Slovenia and to overcome the imposed unity of the developmental paradigm of neo-liberal capitalism. More than 30 organisations and experts working in the fields of social affairs, environmental protection, social sciences and the economy, participated in the preparation of the text. In addition to offering specific solutions, they also propose measures for a fair climate and energy transition and other measures with positive effects on environmental and climate challenges.

Annex A

List of Abbreviations and Units of Measurement

Abbreviations:

AGEN-RS	Energy Agency of the Republic of Slovenia
AECP	Agri-Environment-Climate Payments
AIS	Agricultural Institute of Slovenia
AN OVE	National Renewable Energy Action Plan
AN sNES	National Action Plan for Nearly Zero-Energy Buildings Up to 2020
AN URE	Energy Efficiency Action Plan
ARRS	Slovenian Research Agency
BAT	Bast available tehnique
CH_4	Methane
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CO_2	Carbon dioxide
CO_2 eq.	CO2 (greenhouse gas emissions expressed in a common unit; calculations are based on the global warming potential (GWP) of specific gases, as prepared by the IPCC in the 4thAR)
COPERT	Software program which is developed as a European tool for the calculation of emissions from the road transport sector.
CORINAIR	Coordination d'information enviromentale project partiel air
COST	European Co–operation in the field of Scientific and Technical Research
CPS	Comprehensive Transport Strategy
CRF	Common reporting format
CRP	Target Research Programmes
CSEUR	Consolidated System of EU registries
DMCSEE	Drought Management Centre for South Eastern Europe
DO OVE	District heating system on RES
DOLB	District heating system on wood biomass
DRSC	Directorate for National Roads
DSM	implementation of programs for the efficient use of energy by the energy supply company (Demand Side Management)
EAFRD	European Agricultural Fund for Rural Development
Eco Fund	Slovenian environmental public fund
ECS	Slovenian energy concept
EED	Energy Efficiency Directive (2012/27/EU)
EEU	Energy efficiency measures

EMAS	"EU instrument for environmental management of organizations (Eco-Management and Audit Scheme)"
EMEP	Programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (European Monitoring and Evaluation Programme)
ENSVET	Energy counseling for citizens
EPBD	Directive on the energy performance of buildings (2002/91/EC)
ERA	Strategy for Strengthening The European Research Area
ERDF	European Regional Development Fund
ERTMS	The European Railway Traffic Management System
ETCS	European train control system
ETS	Emissions trading scheme
EU	European Union
EU ETS	EU emissions trading scheme
EU-BR2	EU second Biennial report
EUREM	European EnergyManager Training
EZ-1	Energy Act
F-gases	Fluorinated gases: Hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF_6)
FOD	First order decay method for estimating emissons from waste landfilling
FSF	Fast-start Finance (FSF) for the 2010–2012 period
GAINS	A scientific tool that identifies cost-effective emission control strategies to protect the atmosphere
GAW	Global Atmosphere Watch
GBC	Green building Council
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gasses
GPG 2000	Good Practice Guidance and Uncertainty Management in National Greenhouse Gas InventoriesIPCC 2000
GZS	Chamber of Commerce and Industry of Slovenia
HFC	Hydrofluorocarbon
HPP	Hydro power plant
HSE	Holding Slovenske elektrarne – Slovenian Power Plants Holding Company

IMAD	Institute of Macroeconomic Analysis and Development
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
IPPT	Integrated Public Passenger Transport
ISEE	Information system for emission inventories
ITI	Integrated Territorial Investments
ITL	International Transaction Log (in the Kyoto Protocol framework)
JEK	Krško Nuclear Power Plant
JPI	Joint Programming Initiatives
JRC	Joint research centre
JSI-EEC	Jozef Stefan Institute - Energy Efficiency Centre
JTI	Joint Technology Initiatives
KNLB	Boilers on wood biomass
LEC	Local Energy Concept
LIFE	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU
LOS	Low Carbon Society
LTSERB	Long-term Strategy for Promoting Investments in the Energy Renovation of Buildings
LULUCF	Land Use, Land-Use Change and Forestry
MAFF	Ministry of Agriculture, Forestry and Food
MC	Ministry of Culture
MCRS	Motorway Company in the Republic of Slovenia
MEDT	Ministry of Economic Development and Technology
MESP	Ministry of the Environment and Spatial Planning
MESS	Ministry of Education, Science and Sport
MF	Minisrty of Finance
MI	Ministry for infrastructure
N_2O	Nitrous Oxide
NEAP	National Environmental Action Programme
NECP	National Energy and Climate plan
NEP	National Energy Programme
NFDP	National Forest Development Programme
NGO	Non-governmental organisations

NIJZ	National Institute of Public Health
NOT	Low Carbon Tehnologies
NO_x	Nitrous Oxides
ODA	Official development assistance
ODS	Ozone depliting substances
OP ECP	Operational Programme for Implementing European Cohesion Policy
OP GHG-1	The Operational Programme for Reducing GHG Emissions until 2012
OP GHG-2020	The Operational Programme for Reducing GHG Emissions until 2020
OP NGP	Operational Programme for the Implementation of the National Forest Programme
OP ROPI	Programme of Environmental and Transport Infrastructure Development
OPZG	Framework Programme for the Transition to Green Economy
PFC	Perfluorocarbons (CF4 and C2F6)
PM	Particulate Matter
PPT	Public Passenger Transport
PRP	Rural Development Programme
PURES	Rules on Efficient Use of Energy in Buildings with a Technical Guideline
QA/QC	Quality assurance/quality control
RCP	Representative Concetration Pathways
RDI	Research, development and innovation
ReNEP	Resolution on the National Energy Programme
ReNFP	Resolution on the National Forest Program
RePPRS	Resolution on the Transport Policy of the Republic of Slovenia
RES	Renewable energy sources
RISS	Research and Innovation Strategy of Slovenia
RS	Republic of Slovenia
S4	Slovenian Smart Specialisation Strategy
SAVE	EU energy efficiency programme
SEA	Slovenian Environment Agency
SF_6	Sulfur hexafluoride
SFS	Slovenia Forest Service
SIA	Slovenian Infrastructure Agency
SI-NC6/BR1	6th National Communication and 1st Biennial Report to the UNFCCC
SIP	Slovenian Industrial Policy

SLEG	Statistical yearbook of the Energy Economy
SME	Small and medium enterprises
SO_2	Sulfur dioxide
SORS	Statistical Office of the Republic of Slovenia
SRIP	Strategic Research and Innovation Partnership
SVRK	Government Office for Development and European Cohesion Policy
SŽ	Slovenian railways
TDS	Transport Development Strategy for the Republic of Slovenia
TEB	Brestanica Thermal Power Plant
TEN-T	Trans-European Transport Network
TEŠ	Šoštanj Thermal Power Plant
TET	Trbovlje Thermal Power Plant
TE-TOL	Ljubljana heat and power plant
toe	Tonne of oil equivalent
UN	United Nations
UNCCD	UN Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
URSZR	Administration of the Republic of Slovenia for Civil Protection and Disaster Relief
WMO	World Meteorological Organization
ZRMK	Building and Civil Engineering Institute
ZVO	Environmental Protection Act

Units of measurement:

k… kilo (10^3)
M… Mega (10^6)
G… Giga (10^9)
T… Tera (10^{12})
P… Peta (10^{15})
g... gram
t... tonne
J… joule
Ha… hectare
/a… per annum

Annex B

Greenhouse Gas Inventories

Please follow the link:

http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php

then choose Slovenia, CRF (12 April 2017), tables svn-2017-crf-12apr17.zip

Annex C

Greenhouse Gas Emissions Inventories for the Years 1986, 2000, 2005. 2010 and 2015 and Projection with Measures for the Years 2020, 2025, 2030 and 2035

1986	CO_2 eq (inventory)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply[99]	6,933	472	27				7,431
Transport	1,975	22	31				2,028
Industry	5,472	16	118	0	233	10	5,850
Fuel combustion in industry	4,408	11	39				4,458
Industrial processes	1,064	6	79	0	233	10	1,391
Other sectors	2,214	180	71				2,465
Agriculture	53	1,324	627				2,004
LULUCF	-4,850	0	51				-4,799
Waste	2	542	50				593
TOTAL	**16,650**	**2,556**	**924**	**0**	**233**	**10**	**20,372**

2000	CO_2 eq (inventory)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	5,685	356	24				6,065
Transport	3,632	23	202				3,858
Industry	3,160	11	63	47	130	15	3,426
Fuel combustion in industry	2,250	3	22				2,276
Industrial processes	910	8	41	47	130	15	1,150
Other sectors	2,921	131	50				3,103
Agriculture	29	1,222	622				1,874
LULUCF	-6,167	0	51				-6,116
Waste	3	714	51				768
TOTAL	**15,430**	**2,459**	**1,012**	**47**	**130**	**15**	**19,093**

2005	CO_2 eq (inventory)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	6,583	363	27				6,973
Transport	4,348	15	66				4,429
Industry	3,508	14	67	153	142	18	3,902
Fuel combustion in industry	2,455	6	25				2,485
Industrial processes	1,054	9	42	153	142	18	1,417
Other sectors	2,462	122	48				2,632
Agriculture	25	1,178	571				1,774
LULUCF	-7,540	1	49				-7,490
Waste	3	735	50				788
TOTAL	**16,930**	**2,426**	**829**	**153**	**142**	**18**	**20,498**

[99] Emissions from Energy industries (CRF 1.A.1) and Fugitive emissions (1.B) are included in Energy supply

2010	CO_2 eq (inventory)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	6,413	285	28				6,726
Transport	5,633	8	57				5,699
Industry	2,332	5	17	217	29	17	2,616
Fuel combustion in industry	1,683	5	17				1,704
Industrial processes	649	0	0	217	29	17	912
Other sectors	1,794	114	49				1,957
Agriculture	0	1,058	843				1,901
LULUCF	-9,620	1	0				-9,619
Waste	5	497	60				562
TOTAL	**16,178**	**1,966**	**1,103**	**217**	**29**	**17**	**19,509**

2015	CO_2 eq (inventory)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	4,653	256	21				4,931
Transport	5,296	7	57				5,359
Industry	2,286	5	95	346	16	15	2,763
Fuel combustion in industry	1,570	5	17				1,591
Industrial processes	717	0	79	346	16	15	1,172
Other sectors	1,316	149	49				1,514
Agriculture	20	1,181	543				1,744
LULUCF	-5,664	0	35				-5,629
Waste	27	439	54				521
TOTAL	**13,598**	**2,037**	**819**	**346**	**16**	**15**	**16,831**

2020	CO_2 eq (with measures projection)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	5,524	327	24				5,874
Transport	5,352	4	63				5,419
Industry	2,578	5	99	297	16	12	3,006
Fuel combustion in industry	1,675	5	16				1,697
Industrial processes	903	0	83	297	16	12	1,310
Other sectors	1,180	133	44				1,357
Agriculture	22	1,277	606				1,904
LULUCF	0	0	0				0
Waste	30	363	55				448
TOTAL	**14,686**	**2,108**	**890**	**297**	**16**	**12**	**18,009**

2025	CO_2 eq (with measures projection)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	4,879	296	21				5,195
Transport	5,323	4	65				5,393
Industry	2,859	5	105	193	16	12	3,191
Fuel combustion in industry	1,853	5	19				1,877
Industrial processes	1,006	0	87	193	16	12	1,314
Other sectors	1,034	119	44				1,196
Agriculture	22	1,285	606				1,913
LULUCF	0	0	0				0
Waste	34	312	55				402
TOTAL	**14,151**	**2,021**	**897**	**193**	**16**	**12**	**17,290**

2030	CO_2 eq (with measures projection)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	4,155	264	19				4,438
Transport	5,156	5	64				5,225
Industry	3,073	6	112	104	16	12	3,323
Fuel combustion in industry	2,025	6	21				2,052
Industrial processes	1,048	0	91	104	16	12	1,271
Other sectors	924	106	43				1,073
Agriculture	22	1,293	607				1,921
LULUCF	0	0	0				0
Waste	38	277	55				370
TOTAL	**13,369**	**1,951**	**899**	**104**	**16**	**12**	**16,351**

2035	CO_2 eq (with measures projection)						
Sector	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	TOTAL
Energy supply	3,720	233	17				3,969
Transport	4,669	7	59				4,735
Industry	3,211	6	114	54	16	12	3,414
Fuel combustion in industry	2,157	6	23				2,186
Industrial processes	1,055	0	91	54	16	12	1,228
Other sectors	853	98	43				994
Agriculture	22	1,293	607				1,921
LULUCF	0	0	0				0
Waste	38	252	54				345
TOTAL	**12,514**	**1,888**	**894**	**54**	**16**	**12**	**15,378**

Annex D

Table of Parameters for the Projection with Measures and the Projection with Additional Measures

Table 31: Projection parameters

Projection parameters used				HISTORICAL VALUES			PROJECTION WITH MEASURES			
				2005	2010	2015	2020	2025	2030	2035
GDP			MEUR[05]/a	29,227	31,842	32,477	36,284	41,859	47,175	51,907
GDP growth			[%]	3.6	1.7	0.4	2.2	2.9	2.4	1.9
POPULATION			[1000 inhabitants]	1,998	2,047	2,063	2,017	2,014	1,999	1,977
INTERNATIONAL PRICES	COAL		EUR[08]/GJ	NA	NA	NA	3	3	4	NE
	PETROLEUM OIL		EUR[08]/GJ	NA	NA	NA	15	16	16	NE
	GASES		EUR[08]/GJ	NA	NA	NA	8	8	9	NE
PRICE OF CO_2 PERMITS			EUR[08]/t CO_2	NA	NA	NA	18	23	30	NE
ENERGY INDUSTRY				**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
ENERGY SUPPLY	TOTAL		[PJ]	301.74	301.93	272.33	286.13	285.67	280.56	276.48
	LIQUID FUELS		[PJ]	102.72	102.93	92.50	90.94	87.51	80.77	69.68
	SOLID FUELS		[PJ]	64.16	60.93	44.73	45.61	39.81	33.19	32.62
	NATURAL GAS		[PJ]	38.90	36.10	27.81	40.68	43.85	47.88	52.04
	RES		[PJ]	32.40	46.92	44.04	53.43	57.51	58.49	59.11
	NUCLEAR ENERGY		[PJ]	64.19	61.71	61.62	63.09	63.09	63.09	63.09
	WASTE		[PJ]	0.54	0.97	1.80	1.08	1.14	1.46	2.13
	NET IMPORT OF ELECTRICITY		[PJ]	-1.17	-7.63	-0.17	-8.69	-7.25	-4.31	-2.19
ELECTRICITY PRODUCTION BY FUEL	TRANSFORMATIONS	TOTAL	[GWh]	15,117.0	16,433.0	15,100.4	17,923.7	18,146.1	18,018.4	18,373.2
		LIQUID FUELS	[GWh]	37.0	9.0	17.3	13.5	11.3	9.6	9.5
		NATURAL GAS	[GWh]	340.0	548.0	403.6	1,471.7	1,433.1	1,397.8	1,408.9
		COAL	[GWh]	5,275.0	5,289.0	4,385.2	5,001.5	4,472.4	3,871.6	3,820.1
		RES	[GWh]	3,575.4	4,740.4	4,355.7	5,647.7	6,440.0	6,950.1	7,345.3
		NUCLEAR EN.	[GWh]	5,884.0	5,657.0	5,648.0	5,783.3	5,783.3	5,783.3	5,783.3
		WASTE	[GWh]	5.6	189.6	290.5	5.9	5.9	5.9	5.9
FINAL ENERGY CONSUMPTION		TOTAL	[PJ]	203.2	208.5	195.5	203.1	205.3	205.6	203.1
	INDUSTRY	TOTAL	[PJ]	69.0	53.2	51.4	56.2	61.8	67.2	72.3
		LIQUID FUELS	[PJ]	9.3	5.2	3.9	3.7	4.4	5.1	5.4
		NATURAL GAS	[PJ]	22.6	20.2	16.8	18.8	21.0	23.5	25.3

Table 31: Projection parameters – continued.

Projection parameters used				HISTORICAL VALUES			PROJECTION WITH MEASURES			
				2005	2010	2015	2020	2025	2030	2035
		COAL	[PJ]	3.3	2.0	1.6	2.2	1.9	1.6	1.4
		RES	[PJ]	0.5	1.0	1.5	3.2	3.8	4.3	4.8
		ELECTRICITY	[PJ]	25.8	19.8	22.3	25.4	27.6	29.7	32.0
		DISTRICT HEAT	[PJ]	2.6	2.2	2.1	2.0	2.2	2.3	2.6
		WASTE	[PJ]	4.7	2.8	3.1	0.8	0.8	0.8	0.7
	TRANSPORT	TOTAL	[PJ]	60.8	74.4	74.8	81.2	81.4	79.7	74.3
		GASOLINE	[PJ]	28.5	24.6	18.3	12.9	10.4	8.9	7.4
		DIESEL	[PJ]	31.4	46.5	53.4	59.4	60.6	59.3	53.6
		AVIATION FUEL (JET)	[PJ]	1.0	1.1	1.1	1.4	1.7	1.9	2.2
		OTHER LIQUID FUELS (UNP)	[PJ]	0.0	0.2	0.6	1.6	1.8	1.3	0.7
		NATURAL GAS	[PJ]	0.0	0.0	0.0	0.2	0.9	1.9	3.1
		RES	[PJ]	0.0	1.9	1.3	5.0	4.9	4.4	3.9
		ELECTRICITY	[PJ]	0.0	0.0	0.1	0.8	1.1	1.7	2.6
		HYDROGEN	[PJ]	0.0	0.0	0.0	0.0	0.0	0.2	0.7
	HOUSEHOLDS	TOTAL	[PJ]	49.6	55.5	46.5	43.6	40.1	36.7	34.6
		LIQUID FUELS	[PJ]	16.8	12.9	6.4	5.6	4.1	2.8	2.0
		NATURAL GAS	[PJ]	4.1	4.8	4.3	5.2	5.1	4.7	4.5
		COAL	[PJ]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		RES	[PJ]	13.6	22.0	21.0	18.5	17.3	16.0	15.2
		ELECTRICITY	[PJ]	10.6	11.6	11.5	11.3	11.1	10.8	10.6
		DISTRICT HEAT	[PJ]	4.6	4.2	3.2	2.9	2.7	2.4	2.3
	SERVICES and AGRICULTURE	TOTAL	[PJ]	23.8	25.3	22.9	22.1	22.0	22.0	22.0
		LIQUID FUELS	[PJ]	12.8	11.0	6.9	4.7	4.0	3.6	3.3
		NATURAL GAS	[PJ]	1.1	1.0	2.1	1.7	2.0	2.2	2.3
		COAL	[PJ]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		RES	[PJ]	0.1	0.7	0.4	2.6	3.0	3.3	3.4
		ELECTRICITY	[PJ]	8.7	11.0	11.6	11.4	11.4	11.3	11.2
		DISTRICT HEAT	[PJ]	1.0	1.5	1.8	1.7	1.7	1.7	1.7

Table 31: Projection parameters – continued.

Projection parameters used				HISTORICAL VALUES			PROJECTION WITH MEASURES			
				2005	2010	2015	2020	2025	2030	2035
DEGREE DAYS			[°C day]	3,278.1	3,181.1	2,841.4	2,976	2,976	2,976	2,976
ADDED VALUE IN INDUSTRY			MEUR[05]/a	8,753	9,170	9,250	10,184	11,776	13,232	14,435
				2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030	2025-2030
VALUE ADDED BEFORE ACTIVITY	Real growth rate		[%]	3.9	0.9	0.2	1.9	2.9	2.4	1.8
Passenger transport			[million pkm]	36,508	42,691	44,995	48,660	51,430	54,362	55,830
Goods transport			[million tkm]	23,577	32,475	36,355	42,673	48,900	56,046	60,349
Number of vehicles			[million of vehicles]	0.94	1.08	1.13	1.15	1.18	1.19	1.18
			[vehicle/inhabitant]	0.469	0.528	0.552	0.572	0.585	0.596	0.596
RESIDENTIAL FLOOR AREA			[1000 m2]	57,693	62,185	63,130	67,697	69,943	72,190	74,436
NUMBER OF HOUSEHOLDS			[1000]	725	793	824	854	875	869	859
SERVICE SECTOR FLOOR AREA			[1000 m2]		24,631	26,714	28,175	29,424	30,505	31,587
NUMBER OF ANIMALS										
CATTLE	Dairy cows		[1000 head]	120	109	113	104	100	96	96
	Other cattle		[1000 head]	332	361	371	402	406	410	410
PIGS			[1000 head]	547	396	271	500	500	500	500
POULTRY			[1000 head]	2,837	4,114	5,063	5,000	5,000	5,000	5,000
SHEEP			[1000 head]	129	130	109	130	130	130	130
FERTILISER AND MANURE CONSUMPTION			[kt of nitrogen]	54.5	52.7	53.1	62.9	63.3	63.7	63.7

Table 31: Projection parameters – continued.

Projection parameters used				HISTORICAL VALUES			PROJECTION WITH MEASURES			
				2005	2010	2015	2020	2025	2030	2035
SOLID MUNICIPAL WASTE - generated			[kt]	845	802	929	904	920	936	949
WASTE MANAGEMENT	DEPOSITED		[%]	94	51	28	21	20	20	20
	THERMALLY TREATED		[%]	0	0	0	0	0	0	0
	SEPARATE COLLECTION, COMPOSTING		[%]	6	49	52	79	80	80	80

Annex E

Slovenia's Third Biennial Report

Slovenia's 3rd Biennial Report

BR-1. Introduction

Slovenia's Third Biennial Report has been elaborated in accordance with the UNFCCC biennial reporting guidelines for developed country Parties (Decision 2/CP.17) and it forms a part of the Slovenia's 7th National Communication (DP7) under the UNFCCC.

Slovenia's obligation in the first commitment period (2008-2012) of the Kyoto Protocol was to reduce its greenhouse gas emissions (GHG) by 8% relative to its base emissions. For the second commitment period Slovenia decided to fulfil its commitment jointly with other EU Member States and Iceland. EU's quantified GHG emission reduction target until the end of the period 2013-2020 is -20% compared to 1990 levels. The emission reduction target of the EU for 2030 is 40% compared to 1990 levels.

This biennial report contains Slovenia's summary information on GHG emissions and emission trends for the time period 1986-2015, summary information on its quantified emission reduction target, short overview on emission reduction measures and their effects, emission projections until 2035 under "with measures" scenario, and information on the provision of public financial support to developing countries.

BR-2. Greenhouse Gas Emissions and Trends

In this chapter, information on Slovenia's GHG emissions and emission trends for the period 1986-2015 is summarised on the basis of emission inventories submitted to UNFCCC on 12th April 2017.

Extensive information is presented in Chapter 3 of 7NC. The chapter presents data on direct greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Common tables are presented in Common Tabular Format (CTF) Table 1.

BR-2.1 Summary Information on Greenhouse Gas Emissions and Trends

The base year of Slovenia is 1986 for the greenhouse gases CO_2, CH_4, N_2O and 1995 for the F-gases HFCs, PFCs and SF_6.

Slovenia's total GHG emissions (without LULUCF) amounted to 16,831 kt CO_2 eq in 2015, which is 17.4% less than in 1986. With LULUCF included, Slovenia's net GHG emissions amounted to 11,202 kt CO_2 eq in 2015, a reduction by 28.1% compared to 1986. LULUCF, particularly forests, represent a sink between 3.5 and 7.8 Mt CO_2 eq per year.

In 2015, CO_2 had the largest share of Slovenia's GHG emissions (80.8%), followed by CH_4 (12.1%) and N_2O (4.9%). F-gases represented the remaining 2.2% of Slovenia's total GHG emissions.

Most of GHG emissions in Slovenia are generated in the energy sector, which was responsible for 81.8% of total GHG emissions in 2015. Emissions in this sector have decreased by 18.2% compared to base year emissions. Emissions from transport, representing the largest subsector in energy sector, increased by 158.9% in the period 1986-2015, their largest share generating from road transport. The second significant subsector is transformation, where emissions in 2015 were by 33.3% lower than in 1986. Most of the reduction happened in the last years. There was also a considerable reduction in GHG emissions from industry. In the period 1986-2005, emissions decreased by 49.0% and until 2015 they additionally decreased by 30.1% also due to the economic crisis. Emissions from subsector other sectors were on the increase until 1999 and have been on the decrease since, especially intensely since 2010. In 2015 they were by 37.7% lower than in 1986. Fugitive emissions also belong to energy sector and they contributed 2.8% to the total GHG emissions from this sector.

Emissions from industrial processes amounted to 1,172 kt CO_2 eq in 2015, which represented 7.0% of total GHG emissions. The most important GHG in this sector was CO_2 with 61.2% of emissions, followed by HFCs with 29.5%, PFCs with 1.3%, and SF_6 with 1.3%. The main emission source was the production of non-metallic mineral products, of which the production of cement and lime contributed the most emissions.

In Agriculture as the second most important sector, emissions in 2015 represented 10.4% of all emissions. The majority of emissions is generated from enteric fermentation. Agriculture is the main source of CH_4 and N_2O.

In the LULUCF sector, the CO_2 sinks were higher than emissions. They amounted to 5,628 kt CO_2 eq in 2015, which is by 17.3% more than in 1986. The increase in sinks is primarily the result of an increase in timber growing stock in existing forests.

CH_4 emissions from the waste sector were the second largest source of CH_4 and represented 21.6% of all CH_4 emissions in Slovenia in 2015. The share of CH_4 emissions in this sector amounted to 84.4%, while the remaining part was contributed by N_2O (10.4%) and CO_2 (5.2%).

BR-2.2 National Inventory System

In Slovenia, the institution responsible for GHG inventories is the Slovenian Environmental Agency. In accordance with its tasks and obligations to international institutions, the Environmental Agency is charged with making inventories of GHG emissions, as well as emissions that are defined in the Convention on Long Range Transboundary Air Pollution (CLRTAP). In making the inventories, the Environmental Agency cooperates with numerous other institutions and administrative bodies which provide the necessary data on activities and other necessary data for the inventories.

In accordance with Slovenian legislation, the Slovenian Environmental Agency is charged with the overall coordination of activities necessary for the development of emission inventories, as well as with implementing inventories for the purpose of reporting to the UNFCCC and the European Commission.

The main source of data is the Statistical Office of the Republic of Slovenia (SORS); however, the Slovenian Environmental Agency obtains much of its data through other activities, which it performs under the Environmental Protection Act.

There were no significant changes in the system of emission recording in comparison to the previous biennial report. More detailed information on the system and its improvements are available in National Inventory Report (SVN_NIR_2017) and in 7NC.

BR-3. Quantified Economy-wide Emission Reduction Target

This chapter explains the EU and it's Member States pledge under the Climate Change Convention. For further information see the 7th National Communication & 3rd Biennial Report from the European Union under the UN Framework Convention on Climate Change.

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20 % compared to 1990 levels (UNFCCC, 2014a). As this target under the convention has only been submitted by EU-28 and not by each of its Member States (MS), there are no specified convention targets for single MS. Due to this, Slovenia as part of the EU-28, takes on a quantified economy-wide emission reduction target jointly with all Member States.

With the 2020 climate and energy package the EU has set internal rules which underpin the implementation of the target under the Convention. The package introduced a clear approach to achieving the 20 % reduction of total GHG emissions from 1990 levels, which is equivalent to a 14 % reduction compared to 2005 levels. This 14 % reduction objective is split between ETS and non-ETS sectors, formulating two sub-targets: a 21 % reduction target compared to 2005 for emissions covered by the ETS (including domestic and international aviation) and a 10 % reduction target for nonETS (ESD) sectors shared between Member States.

Under the revised EU ETS Directive[100], one single EU ETS cap covers the EU Member States and the three participating non-EU Member States (Norway, Iceland and Liechtenstein) and there are no further individual caps by country. Allowances allocated to the EU ETS from 2013 to 2020 decrease 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012). For further information on the EU ETS and see EU-3BR chapter 4.2.1.

Non-ETS emissions are addressed under the Effort Sharing Decision (ESD)[101]. The ESD covers emissions from all sources outside the EU ETS, except for emissions from domestic and international aviation (which were included in the EU ETS from 1 January 2012), international maritime and emissions and removals from land use, land-use change and forestry (LULUCF). It thus includes a diverse range of small-scale emitters in a wide range of sectors: transport, buildings, services, small industrial installations, fugitive emissions from the energy sector, emissions of fluorinated gases from appliances and other sources, agriculture and waste. Such sources accounted for 55 % of total GHG emissions in the EU in 2013.

While the EU-ETS target is to be achieved by the EU as a whole, the ESD target was divided into national targets to be achieved individually by each Member State. In the Effort Sharing Decision, national emission targets for 2020 are set, expressed as percentage changes from 2005 levels. For Slovenia the target was not to increase emissions by more than 4% by 2020 compared to 2005 levels.

These percentage changes have been transferred into binding quantified annual reduction targets for the period from 2013 to 2020 (2013/162/EU[102] and 2013/634/EU[103]), expressed in Annual Emission Allocations (AEAs). The quantified annual reduction targets for Slovenia in 2013 is set to 12.324 Million AEAs and to 12.533 Million AEAs in 2020. Targets for intermittent years follow the linear interpolation between the listed values. In 2017 AEA values for years 2017-2020 have been revised in order to take into account the updated inventory data reported and reviewed. New 2017 value is 12.203 Million AEA and new 2020 value is 12.307 Million AEAs.

In the year 2015, verified emissions from stationary installations covered under the EU-ETS in Slovenia amounted to 6.11 million tonnes of CO_2 equivalents. With total GHG emissions of 16.83 Mt CO_2 equivalent (without LULUCF) the share of ETS emissions is 36.3 %. Non-ETS

[100] Directive 2009/29/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community

[101] Decision No 406/2009/EC

[102] Commission decision of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (2013/162/EU)

[103] Commission Implementing Decision of 31 October 2013 on the adjustments to Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/ EC of the European Parliament and of the Council (2013/634/EU)

emissions were 10.72 Mt CO_2 equivalent, this is well bellow the target for 2015 (12.38 kt CO_2 eq in year 2015).

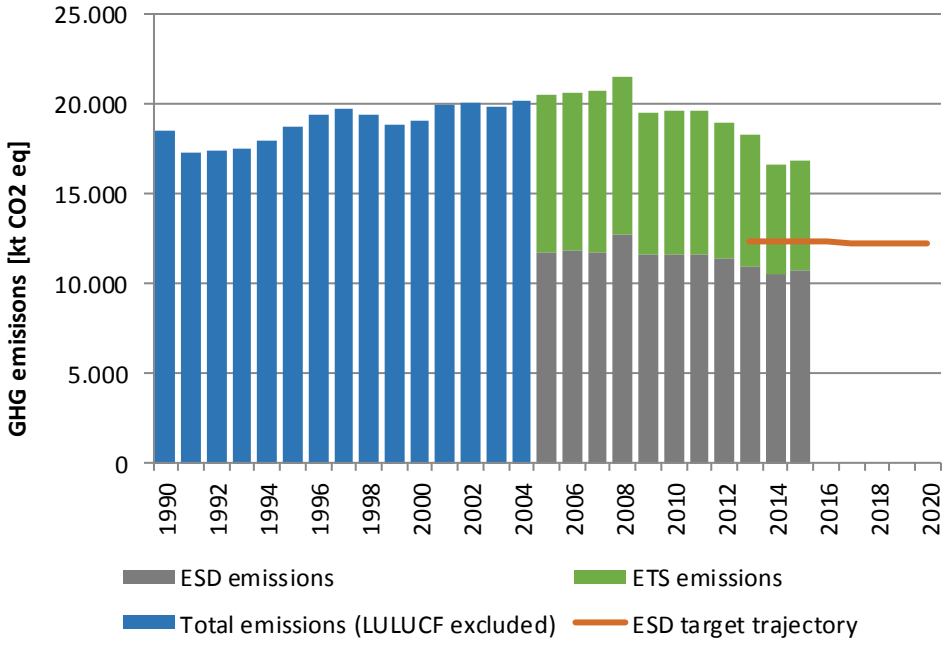

Figure BR-1: Trends in greenhouse gas emissions, separation into ETS and ESD and target trajectory for ESD emissions of Slovenia.

The use of flexible mechanisms is possible under the EU-ETS and the ESD. For the use of CER and ERU under the EU-ETS, please refer to the European BR3.

The ESD allows Member States to make use of flexibility provisions for meeting their annual targets, with certain limitations. There is an annual limit of 3% for the use of project-based credits for each MS. If these are not used in any specific year, the unused part for that year can be transferred to other Member States or be banked for own use until 2020.

As Slovenia (together with Austria, Belgium, Cyprus, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, Spain and Sweden) fulfils additional criteria as laid down in ESD Article 5(5), an additional use of credits is possible from projects in Least Developed Countries (LDCs) and Small Island Developing States (SIDS) up to an additional 1% of Slovenia's verified emissions in 2005. These credits are not bankable and transferable. Slovenia has a plan to reach its targets 2013-2020 under the ESD without the use of CERs and ERUs.

MONITORING ON PROGRESS TO 2020 ESD TARGETS

The ESD and the MMR have introduced an annual compliance cycle requiring a review of Member States' greenhouse gas inventories to ensure compliance with their obligations under the ESD in the period 2013–2020.

Monitoring, reporting and verification of the ESD targets mainly takes place through the submission of the national GHG inventories by Member States. Chapter III of Commission Implementing Regulation 749/2014 sets out strict criteria on which the national GHG

inventories and GHG emissions of MSs are reviewed annually at the EU level. Based on this review, Commission issues an implementing decision on MS ESD emissions in the given year, which might lead to MSs facing penalties or other consequences.

For further information see the EU's second and third Biennial Report.

BR-4. Progress in achievement of quantified economy-wide emission reduction targets: mitigation actions and their effects

Slovenia has committed itself to pursuing the objective of sustainable growth by way of a number of documents and decision-making processes at EU and national levels.

Slovenia adopted a new national development framework Slovenian Development Strategy 2030. One of the objectives of the new Strategy is also low-carbon circular economy and sustainable natural resource management. Consequently, sustainable development is defined as the horizontal principle of the national operational programmes, which is pursued in the framework of their priority axes. Regional, sectoral and municipal strategies, national programmes and other national strategies have to comply in terms of contents with general strategic directions of Slovenian Development Strategy.

The Operational Programme for Reducing GHG Emissions until 2020 with a View to 2030 (OP GHG-2020) was adopted in 2014. The OP GHG-2020 Programme is based on the adopted sectoral and development programmes defining the activities for the reduction of GHG emissions and complements them. Ministry for Environment and Spatial Planning is responsible for monitoring the implementation of the Programme. The report is prepared annually and forwarded to the Government. The report comprises an analysis on measure implementation in the past years, an analysis on achieving the objectives and suggestions on the improvement of implementation of measures and additional measures.

Environmental protection policies at local level are important for the preparation and implementation of GHG emission reduction measures aimed particularly at the use and local supply of energy, waste management and sustainable mobility. As an EU Member State, Slovenia has also undertaken to realize the European climate policy and implement the joint measures.

Measures and instruments for reducing GHG emissions in Slovenia are the following (measures and instruments are described in detail in Chapter 4 of 7NC):

- GHG emission allowance trading (The objective of the measure is to reduce emissions where this is most cost-effective.)
- An environmental tax on the pollution of air due to CO_2 emissions (Internalisation of the external costs of air pollution due to CO_2.)
- The use of best available techniques (Reducing energy consumption by using best available techniques.)
- Taxes and charges (Achieving stimulative environment for greater use of environmentally friendly fuels by influencing the price of fossil fuels.)

- Education and training, informing, awareness and promotion (A high level of awareness, information and knowledge is necessary for the successful implementation of measures.)
- Green economy growth (Long-term GHG emission reduction by transition to economy, growth of which is based on innovations that increase energy efficiency and reduce GHG emissions.)
- Energy efficiency labelling and minimal standards for products and appliances (Improvement of products and appliances in terms of energy efficiency.)
- Obligations on energy suppliers for energy savings (Increase of energy efficiency with final consumers of energy.)
- Technological modernisation of thermal energy sector (A number of large thermal power plants are already nearing the end of their life expectancy; therefore their replacement is being planned. This will also result in a larger share of natural gas.)
- Promotion of power generation from RES and high efficiency CHP (The promotion scheme is the basic instrument in this area, which is implemented in the form of fixed feed-in tariffs of electricity and operational support.)
- Promotion of district heating based on RES and of CHP with high efficiency (Increase of energy and emission efficient generation of heat for district heating.)
- Promotion of energy efficiency in industry (Besides a reduction in production costs, the state is also promoting efficient energy use in industry by various programmes.)
- Promotion of energy efficiency and the use of RES in buildings in general (Taking into account various aspects of energy efficiency and the use of RES in spatial planning, feasibility studies of alternative systems of energy supply, pilot projects, renovation of cultural heritage, energy performance contracting, trainings of stakeholders in the area of building renovations and RES technologies, excise duty policy)
- Promotion of energy efficiency and the use of RES in households (State promotes investments in households by subsidies and soft loans; consulting network ENSVET has been established)
- Promotion of energy efficiency and the use of RES in the public sector (The public sector must set an example for the population in implementing the measures. The measures are promoted by financial incentives, while an important factor will be green public procurements.)
- Promotion of the use of public transport (The objective of this measure is to increase the number of passengers using public transport, which greatly decreased in the past.)
- Sustainable freight transport (The objective of the measure is to extend and modernise the railway network, which represents a precondition for the transition of freight transport from road to railway.)
- Vehicle efficiency improvement, promotion of efficient driving, an increase of vehicle occupancy rate and promotion of the use of low CO_2 emission fuels (Specific use of vehicles will decrease due to European legislation which sets out allowed emissions per km for new passenger cars, fiscal pressure, informing and awareness rising. Also,

a non-negligible influence of green public procurement is present and financial incentives for clean vehicles are available. The shares of RES in sold quantities are prescribed until 2020 for motor fuel distributers.)

- Promotion of non-motorised traffic (Cycling and walking are two significant ways of mobility which can add to a decrease of GHG emissions. They play an important role in the integrated transport strategies for municipalities.)
- Development of integrated transport strategies for municipalities (Integrated strategies contribute to the increase in share of sustainable mobility, the improvement of infrastructure and change in behaviour.)
- Reduction of F-gas emissions from stationary equipment (Decrease in F-gas emissions by leak reduction, replacement and diligent handling with devices and introduction of quantitative cap for HFC gases on EU market.)
- Reduction of F-gas emissions from mobile air-conditioning in vehicles (The legislation lays down restrictions on the use of F-gases in air-conditioning systems in new cars.)
- An increase in the range of grazing for cattle (Grazing is promoted by subsidising measures and education; it produces lower emissions due to the avoidance of emissions generated through the storage of animal manure.)
- Rational fertilisation of agricultural land by nitrogen (Within the framework of the Rural Development Programme, numerous measures are implemented, directly contributing to a reduction in the use of mineral fertilisers.)
- A reduction in the quantity of deposited biodegradable waste (Slovenia has adopted several measures to reduce the amount of deposited biodegradable waste; for instance, separated collection of fractions, an environmental tax on waste disposal, treatment of waste before disposal, etc.)
- Waste reduction (A programme aiming to prevent waste generation was adopted.)
- Capture of landfill gas (The capture of landfill gas has been mandatory since 2005.)
- Sustainable forest management and CO_2 emission sinks (An increase in the wood supply simultaneously with an increase in CO_2 sinks are a result of the work planned by the Slovenian Forest Service based on the principles of sustainability, environmental friendliness and multi-purposeness.)

The monitoring system on achieving quantitative targets of GHG emission reduction in Slovenia has not changed in comparison to the previous biennial report. The improvement of the system is planned also by the help of the results of the LIFE Climate Path 2050 Programme started in 2017.

BR-5. Projections

Projections were prepared for 2020, 2025, 2030 and 2035 under with measures scenario.

According to the projection with measures, emissions will increase to 18,009 kt CO_2 eq until 2020, they will decrease to 16,351 kt CO_2 eq until 2030 and decrease to 15,378 kt CO_2 eq until 2035. In comparison to 2015, emissions are higher by 7.0% in 2020, by 2.9% lower in 2030 and by 8.6% lower in 2035. In comparison to 2005, emissions are 12.1% lower in 2020 and 20.2% lower in 2030.

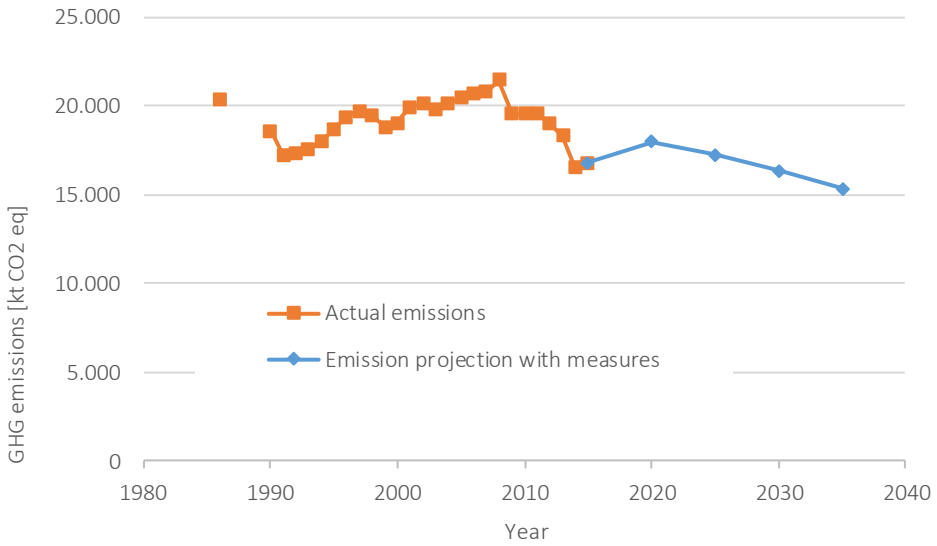

Figure BR-2: Actual emission trends until 2015 and trends according to projection with measures in the period 2020-2035 (Source: SEA, JSI-EEC, AIS)

Slovenia is permitted to increase its non-ETS emissions by 4% at most on the basis of the Decision 406/2009/ES. Annual emissions Slovenia must not exceed were determined by means of implementing acts on the basis of this target and reference year emissions. Annual emissions are presented in the Table BR-1 below.

Table BR-1: Target trajectory for non-ETS emissions in the period 2013–2020 (source: European Commission)

		2013	2014	2015	2016	2017	2018	2019	2020
Slovenia	[kt CO_2 eq]	12,324	12,354	12,384	12,413	12,203	12,238	12,273	12,307

According to projection with measures, non-ETS emissions in comparison to 2015, when they amounted to 10,722 kt CO_2 eq, will increase minimally to 10,781 kt CO_2 eq until 2020 and after that they will decrease and reach 9,472 kt CO_2 eq in 2035. Emissions in the period 2015-2020 are substantially lower than target trajectory, which can be also seen in the figure below. In 2015, they are by 13% lower and in 2020 by 12%. To a large extent this is a result of the complexity in achieving the target RES share in gross final energy consumption in 2020. In comparison to 2005, emissions are lower by 8% in 2020 and by well over 14% in 2030.

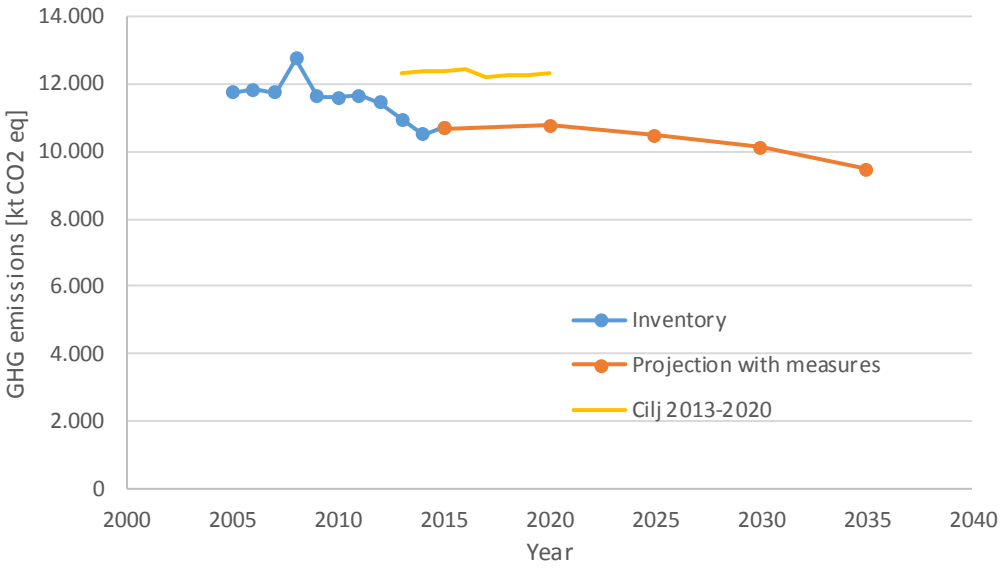

Figure BR-3: Actual non-ETS emission trends in the period 2005-2015 and trends according to projection with measures for the period 2020-2035 in comparison to target trajectory 2013-2020 (Source: JSI-EEC, AIS)

According to projections, it can be concluded there is great certainty that Slovenia will not exceed annual emission targets until 2020.

BR-5.1 Methodology and changes in methodology of projection preparation

Methodology of the preparation of the GHG emission projections is described in Chapter 5.9 of 7NC.

In comparison to the previous biennial report, a slightly upgraded system of models was used for the following sectors: industry, transport, waste, industrial processes and agriculture. Model database was updated in order to better reflect the latest trends.

BR-6. Provision of Financial, Technological and Capacity-Building Support to Developing Country Parties

In accordance with Article 9 of the Paris Agreement, the relevant decisions of the UN Convention on Climate Change, commitments and decisions at the EU level, in particular the decisions of the Economic and Financial Affairs Council (ECOFIN) and the Environment Council (ENVI), on climate finance to assist developing countries in implementing long-term climate policy measures, Slovenia is also striving towards increasing the volume of climate finance.

The EU Member States, including Slovenia, follow the commitment of the Paris Agreement to mobilise USD 100 billion per year by 2020 for assistance and implementation of measures for reducing greenhouse gas emissions and adapting to climate change in developing countries. The assistance includes financial resources, a transfer of the "climate-friendly technologies" as well as strengthening administrative capability of developing countries in this area.

In recent years, Slovenia has been increasing its climate finances. In 2016, Slovenia contributed EUR 3 million for climate finance or assistance in developing countries, which represents an increase of 26% as compared to 2015.

The volume of Slovenia's climate finance in recent years was seen as below:

2013 – EUR 1,960,525

2014 – EUR 2,266,840

2015 – EUR 2,393,155

2016 – EUR 2,976,505

For 2017, Slovenia's climate assistance of EUR 3,500,000 is estimated.

Slovenia will strive to maintain the climate change assistance on the level of around EUR 3,500,000 by 2020.

Slovenia's climate finance is shown as part of the official development assistance (ODA) through UN. In 2016, Slovenia has for the first time also added resources from the "Slovenian climate change fund" (around EUR 1 million per year), where resources are gathered from the sale of allowances from the EU-ETS greenhouse gas emissions trading scheme. The aim is to allocate at least EUR 1 million per year for climate finance from the fund by 2020.

In 2016, regarding a total of about EUR 3 million of climate finance, Slovenia has devoted around EUR 1 million to multilateral assistance in the form of grants; and almost EUR 2 million grants for bilateral assistance, especially for projects in the Western Balkan countries (mainly Kosovo, Albania, Montenegro, and former Yugoslav Republic of Macedonia). In this respect, Slovenia has tried to offer about half of the assistance to projects for adaptation to climate change, while the other half targeted projects regarding the reduction of the greenhouse gas emissions, including projects that concern both areas, some of which include the transfer of knowledge, technologies or good practices from Slovenia to these countries.

Slovenia regularly reports about its climate finance in accordance with article 16 of the Regulation on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change (No 525/2013/EU), also known as "MMR".

In the draft development assistance programme for developing countries, which also includes climate finance, Slovenia plans to increase the annual contribution from the climate fund by 2030 in order for the total climate finance to reach between EUR 6 and EUR 7 million in 2030. The current share of climate finance in 2016 amounts to around 15% of the total ODA, and by 2030, it would be expected to increase at least to 30%, which is twice the increase in the share of climate finance, both in absolute amount and in the share of all ODA resources. In the field of climate finance, Slovenia will also follow joint decisions and guidelines, both at EU and UNFCCC level agreements.