REPUBLIC OF SLOVENIA

SLOVENIA'S FOURTH BIENNIAL REPORT UNFCCC

MARCH, 2020

LIST OF ABBREVIATIONS

AEA	Annual emission allocation
AN sNES	National Action Plan for Nearly Zero-Energy Buildings Up to 2020
AN URE	Energy Efficiency Action Plan
EARS	Slovenian Environment Agency
BAT	Best available techniques
GDP	Gross domestic product
BEV	Battery electric vehicle
CCU	Carbon capture and utilisation
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CH4	Methane
CO2	Carbon dioxide
CRF	Common Reporting Format
CŠOD	Centre for School and Outdoor Education
DH	District heating
DRI	DRI Investment Management, Company for the Development of
	Infrastructure
DRSI	Slovenian Infrastructure Agency
DSEPS	Long-Term Strategy for Promoting Investments in the Energy Renovation of
	Buildings
EC	European Commission
EEA	European Environment Agency
EED	EU Directive on Energy Efficiency (2012/27/EU)
Eco Fund	Slovenian environmental public fund
EKS	Energy Concept of Slovenia
EAFRD	European Agricultural Fund for Rural Development
ELENA	joint initiative by the EIB and the European Commission providing grants
	for technical assistance
ELKO	Light fuel oil
ENSVET	Energy counselling for citizens
ERU	Emission reduction units
ERTMS	European Railway Traffic Management System
ESD	Decisions 4006/2009/EC on the efforts of Member States to reduce
	greenhouse gas emissions to meet the Community's greenhouse gas
	emission reduction commitments up to 2020
ERDF	European Regional Development Fund
ETCS	European train control system
ETS (EU-ETS)	EU Emission Trading System
EU	European Union
EUREM	The education for European Energy Manager
EUROSTAT	Statistical Office of the European Communities
EZ	Energy Act
GIS	Slovenian Forestry Institute

GWP	Global-warming potential
HPP	Hydropower plants
HFC	Hydrofluorocarbons
HWP	Harvested wood products
IJPP	Integrated public passenger transport
IJS-CEU	Institute Jožef Stefan – Energy Efficiency Centre
IPCC	Intergovernmental Panel on Climate Change
IT	Information technology
ITI	Integrated territorial investments
ITS	Integrated Transport Strategy
JE	Nuclear power plant
РРТ	Public passenger transport
JZP	Public-Private Partnership
KIS	Slovenian Agriculture Institute
KOPOP	Agri-environment-climate payments
LEC	Local Energy Concept
LIFE	LIFE is a European financial mechanism intended exclusively for measures
	in the field of environmental protection, nature conservation and mitigation
	and adaptation to climate change
LULUCF	Land Use, Land-Use Change and Forestry
MMR	Monitoring Mechanism Regulation for GHG emissions
MESP	Ministry of the Environment and Spatial Planning
SME	Medium and small enterprises
MzI	Ministry of Infrastructure
neETS	devices, emissions or sectors outside the EU-ETS scheme (see also ESD)
NECP	National Energy and Climate Plan
LCS	Low carbon society
NOx	Nitrogen oxides
NGO	Non-governmental organisations
OP ECP	Operational Programme for the Implementation of the EU Cohesion Policy
OP NGP	Operational Programme for the implementation of the National Forest
	Programme 2017-2021
OP GHG-2020	Operational Programme for Reducing Greenhouse Gas Emissions by 2020
OPZG	Framework Programme for the Transition to a Green Economy
PDCA	Plan – Do – Check – Act
PFC	Per-fluorocarbons
PM	Particulate matter
PN	Production device
RDP	Rural Development Programme
PURES	Rules on Efficient Energy Use in Buildings (Official Gazette of the Republic
	of Slovenia, Nos. 52/10 and 61/17 – GZ)
PV	photovoltaic (solar) power plant
ReNGP	Resolution on National Forest Programme
ReNPRP30	Resolution on the National Programme for the Development of Transport of
	the Republic of Slovenia until 2030
ReNPURSK	Resolution on the National Programme on Strategic Orientations for the
	Development of Slovenian Agriculture and Food Industry "Our Food, Rural
	and Natural Resources 2021"

ReNPVO20-30	Resolution on the National Environment Protection Programme for the 2020-
	2030 period
RES	Renewable energy sources
RS	Republic of Slovenia
SF6	Sulfur hexafluoride
CHP	Cogeneration
TDS	Transport Development Strategy
SRS	Development Strategy of Slovenia
SORS	Statistical Office of the Republic of Slovenia
HP	Heat pumps
TEB	Brestanica Thermal Power Plant
TEN-T	Trans-European Transport Network
TEŠ	Šoštanj Thermal Power Plant
TE-TOL	Ljubljana Heat and Power Plant
GHG	Greenhouse gases
UNFCCC	United Nations Framework Convention on Climate Change
LPG	Liquefied Petroleum Gas
EEU	Energy Efficiency (Efficient energy use)
WLTP	Worldwide Harmonised Light Vehicles Test Procedure
NG	Natural Gas
ZVO	Environment Protection Act

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1 Executive summary

INFORMATION ON GHG EMISSIONS AND TRENDS, GHG INVENTORY INCLUDING INFORMATION ON NATIONAL INVENTORY SYSTEM

Total emissions of GHG in 2017, sinks not considered, amounted to 17,453 kt CO₂ eq., which represents a 14.5% decrease of emissions compared to the year 1986. 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. Since 2012 emissions started to decrease until 2014, while in the last three years a slow increase has been observed.

 CO_2 emissions are dominant and in 2017 represented 81.7% of overall emissions of greenhouse gases, followed by CH_4 with 12.0 %, N₂O with 4.0 % and F-gases with 2.2 %.

Energy is by far the most important sector accounting 80.2 % in 2017, with transport being the largest source representing 31.7 % in total emissions. Agriculture accounted 9.7 % of all emissions.

QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20% compared to 1990 levels, in order to contribute to achieving the ultimate objective of the UNFCCC: 'to stabilise GHG concentrations at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system', or, in other words, to limit the global temperature increase to less than 2°C compared to temperature levels before industrialization. The definition of the Convention target for 2020 is documented in the revised note provided by the UNFCCC Secretariat on the 'Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention'. EU provided additional information relating to its quantified economy wide emission reduction target in a submission as part of the process of clarifying the developed country Parties' targets in 2012.

In 2009, the EU established internal rules under its 2020 Climate and Energy Package. These rules underpin the EU 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, reduction that is equivalent to a 14 % reduction compared to 2005 levels. This 14 % reduction objective is divided between the ETS and ESD sectors. These two sub-targets are: a 21% reduction target compared to 2005 for emissions covered by the ETS (including domestic and international aviation) and a 10% reduction target compared to 2005 for ESD sectors, shared between the 28 Member States (MS) through individual national GHG targets.

Slovenia is committed to increase its emissions in sectors covered by the ESD (non-ETS) by less than 4% compared to 2005. The quantified annual reduction targets for Slovenia, as set by EU Decisions and expressed as annual emission allocations (AEAs) in tonnes CO₂-equivalent, are 12.3 million in 2013, increasing to 12.4 million in 2016 and after correction in 2017 12.2 million increasing to 12.3 million in 2020 (according to AR4 GWPs). The cumulative amount of AEAs for the period 2013–2020 is set at 98.5 Mton CO₂ equivalents.

In the period 2013-2017 Slovenian ESD emissions were lower than the target values. Considering projections it is expected that Slovenia will meet its reduction targets for the period up to 2020.

PROGRESS IN ACHIEVEMENT OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS AND RELEVANT INFORMATION

Until recently, the Operational Programme for Reducing GHG Emissions until 2020 with a View to 2030 (OP GHG-2020) was a key implementation document in the field of reducing GHG emissions in Slovenia for sources not included in the ETS (emissions under the Decision 2009/406/EC). In 2020, the National Energy and Climate Plan (NECP) was adopted in accordance with the Regulation on the Governance of the Energy Union (2018/1999/EU), which assumes the role of the implementation document in the field of mitigating the climate change from OP GHG-2020. The NECP is a broader document than the OP GHG-2020, as it covers all emission sources, including ETS, integrates two action plans in the field of energy efficiency and renewable energy sources, and further covers the security of supply, internal energy markets and research and development. Both documents are built on sectoral strategic documents.

The EU-ETS is the most important multisectoral instrument which encourages companies included in this system to reduce GHG emissions through reducing the amount of emission allowances in the market and thus having an impact on the allowance prices. In Slovenia, 38% of GHG emissions are covered in the EU-ETS. The environmental tax for air pollution with CO₂ emissions also significantly contributes to reducing emissions in Slovenia through an energy price supplement. Instruments derived from European legislation (use of best available techniques, minimum requirements and labelling of energy-using products, obligation to achieve savings for energy suppliers) limit the use of technologies producing higher emissions or consume more energy, and promote the implementation of EEU and RES measures. The necessary condition for successful implementation of measures is a high level of awareness and information of users and decision-makers and qualification of operators and managers, which is also complemented by integrating content into the education process.

In terms of transformations, effect of technological modernisation of the thermal energy sector will be significant and will have an impact on reducing coal consumption for producing electricity as well as promoting the production of electricity from RES and in CHP with higher efficiency. Additionally, RES and CHP are also promoted in district heating.

Instruments in the energy consumption sectors intensively promote the implementation of EEU measures and RES use (in the industry also waste heat in combination with district heating), to the greatest extent through financial incentives in the form of subsidies and loans with favourable interest rates (Eco Fund, European funds, funds of ministries, Climate Change Fund). There is also an important instrument in the field of buildings, i.e. the energy efficiency code in buildings, and great emphasis is placed on creating a stimulating environment for renovating multi-apartment buildings. In implementing measures, it is also important to support socially disadvantaged households. Very important instrument especially in public buildings is also energy contracting.

Transport is a sector where in the past the trend of emissions was reversed compared to other sectors, which is why it has a special emphasis in the NECP. The instruments are divided into four sections – promotion of public passenger transport (PPT) which can be associated with promoting non-motorised transport modes for sustainable mobility. To this end, a very large amount of funds is provided to improve infrastructure (in particular, railway infrastructure), while a single ticket and connecting different modes of PPT with passenger vehicle transport through P+R are also important. The measure of sustainable freight transport is divided into two sections – promoting railway freight transport (through investments in the railway infrastructure) and improving the efficiency of road freight transport. The third set of measures concerns the increase in transport efficiency and promotion of using fuels with low CO₂ emissions, which will contribute most to reducing emissions in transport. The last set includes transport planning.

Today, agriculture represents just under 10%, but it is seen as a sector where the reduction in emissions will be difficult to achieve. Therefore it is important to strive for reducing emissions in this sector. The measures focus on increasing the efficiency of animal breeding through consultancy and financial incentives, promoting breeding with low emissions (grazing and producing biogas from livestock manure) and rational fertilising of crops with nitrogen.

In industrial processes it is important to implement European legislation in the field of F-gases which will significantly contribute to reducing emissions through substituting substances. In the field of waste, a reduction in the quantity of landfilled biodegradable waste has already been achieved, the collection of landfill gas has been arranged; measures now focus on reducing the volume of waste generated in the light of reducing the need for resources, while urban waste water management must also be arranged to contribute to reducing emissions from urban waste water treatment. Slovenia is rich in forests, so sustainable management of forests and CO₂ sinks has an important place among the climate change mitigation measures.

PROJECTIONS

The projections were prepared in 2019 within the LIFE ClimatePath2050 project. The base year was 2017.

According to the projection with measures, by 2020, emissions will decrease to 17,128kt CO₂ eq., by 2030, to 16,874kt CO₂ eq., and by 2040, to 16,018kt CO₂ eq. According to the projection with additional measures, emissions will reduce to 16,703kt CO₂ eq. in 2020. In 2030, emissions will amount to 13,079kt CO₂ eq., while in 2040 they will amount to 6,781 kt CO₂ eq. Compared to 2017, emissions are 2%, 3% and 8% lower in 2020, 2030 and 2040 in the projection with measures and 4%, 25% and 61% lower in the projection with additional measures. The projection without measures records significantly higher emissions and a reverse trend. In 2020, the emissions are estimated at 20,634kt CO₂ eq., in 2030 at 22,010kt CO₂ eq., and in 2040 23,544kt CO₂ eq.

CO₂ emissions represent a major part of greenhouse gas emissions in Slovenia. According to the projection with measures, their share in total GHG emissions is increased from 82% in 2017 to 84% in 2030 and 2040. In the projection with additional measures, the share is slowly decreasing, namely in 2020, to 81%, in 2030 to 80% and after 2030 it is reduced significantly and is 67% in 2040. According to the projections with measures and with additional measures, methane emissions are reducing. N₂O emissions are the only emissions with no pronounced reduction. According to the projection, F-gas emissions will be significantly reduced by 2040.

According to the projection with measures, emissions from transformations and fugitive emissions reduce by 7% by 2030 compared to 2017, and by 12% by 2040. Emissions from industry will increase by 2040, while emissions from transport will increase by 2030 and then reduce to be 8% higher in 2040 than in 2017. Emissions from other sectors are reduced sharply (2030 -46% compared to 2017 and -62% in 2040). In industrial processes, in 2030, emissions are down by 11%, and in 2040 by 17% while waste emissions by 53% and 66% respectively. Emissions in agriculture are increasing.

According to the projections with additional measures, emissions from transformations and fugitive emissions will be reduced by 40% by 2030 and by 73% by 2040 compared to 2017. Significant decreases are also projected in other sources; in industry by 25% by 2030 and by 46% by 2040, in transport by 10% and 66%, in other sectors by 57% and 79%, in industrial processes by 12% and 61%, and in waste by 53% and 66%, respectively. In agriculture, the minimum reduction is achieved, namely by 2% by 2030 and by 9% by 2040.

In accordance with instructions, fuels for international navigation and aviation are not included in the projections presented above. CO₂ sinks increase by 2030 and then reduce. According to the projection with measures, sinks will amount to -5,721kt CO₂ eq. in 2030, while according to the projection with additional measures they will amount to -6,421kt CO₂ eq.

According to the projection with measures, non-ETS emissions will amount to 10,946kt CO₂ eq. in 2020, while according to the projection with additional measures they will be 10,727kt CO₂ eq. According to the projection with measures, emissions amount to 10,621kt CO₂ eq. in 2030, which is 10% lower than in 2005. According to the projection with additional measures, emissions will reduce by 26%. It follows that Slovenia will achieve the target for 2020 according to both projections, while the target for 2030, which is 15% reduction in emissions for Slovenia, will be achieved according to the projection with additional measures. By far the biggest source of non-ETS emissions is transport that represents more than half of the emissions.

2 Information on GHG emissions and trends, GHG inventory including information on national inventory system

2.1 Greenhouse gas emissions from 1986 to 2017

2.1.1 Description and Interpretation of Emission Trends for Aggregated GHG emissions

Total emissions of GHG in 2017, sinks not considered, amounted to 17,453 kt CO₂ eq., which represents a 14.5% 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) 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. Since 2012 emissions started to decrease until 2014, while in the last three years a slow increase has been observed.

2.1.2 Description and Interpretation of Emission Trends for by Gas

CO₂ emissions in 2017 represented 81.7% of overall emissions of greenhouse gases. CO₂ 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 14.5% in 2017. CH₄ emissions represented 12.0% of total emissions in 2017 (13.1% in 1986)

and were by 21.6% lower than in 1986. N₂O emissions represented 4.0% of total emissions and were by 14.8% lower than N₂O emissions in 1986. F-gases represent 2.2% of total emissions and some gases (HFCs and SF₆) 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.



Figure 1: GHG Emissions in Slovenia by gas

2.1.3 Description and Interpretation of Emission Trends by Sector

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 and Waste (Figure 2 and Table 1).



Figure 2: GHG Emissions in Slovenia by sector

By far the most important sector is <u>Energy</u>, which in 2017 accounted for 80.2% of total GHG emissions. In this sector emissions have decreased by 14.5%, compared to the 1986. Within this sector, in the period 1986–2017, GHG emissions from the Energy Industry, as the biggest sub-sector, decreased by 28.1%. 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 started to decrease: in 2013 by 5.4%, in 2014 by 1.4% and in 2015 by 0.5%, while in 2016 a sharp increase by 6.9% was observed. In 2017 emissions decreased again by 3.4%. In the total, emissions from transport sector have increased since 1986 by 174%.

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 2015 by 3.6% compared to the previous year while in 2014, 2016 and 2017 an increase has been recorded. Altogether since 2008 due to the economic crises emissions from manufacturing industries and construction have decreased by 31.2%. In 2017 emissions increased by 5.0% from previous year but were 62.6% lower compared to 1986.

Emissions from other sectors fluctuate a lot from year to year and are mostly influenced by air temperature in winter time. In 2017 they were by 40.1% lower than in 1986 and by 8.2% lower than in the previous year.

Fugitive emissions from fuel represent only 2.9% of emissions in the sector and have decreased by 31.1% compared to the emissions in 1986.

Since 1986, GHG emissions from <u>Industrial Processes</u> 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 - 2017 slowly increased by 20%. The most important GHG of this sector was carbon dioxide, with 66.0% of emissions from this category, followed by HFCs with 29.6%, N₂O with 1.7%, and PFC and SF₆ with 1.4% and 1.3%, respectively. In this sector, no CH₄ emissions have occurred since 2011. The main source is Mineral industry, of which the production of cement and lime alone contributed almost 40% of the GHG emissions in this sector.

<u>In Agriculture</u> as the second most important sector, emissions in 2017 amounted to 1,688 Gg CO₂ eq, which represents 9.7% of all emissions. Agriculture represents the main source of methane and N₂O emissions, namely 56.5% of all methane emissions and 68.7% of all N₂O emissions. In the agricultural sector, N₂O emissions accounted for 28.6% of emissions, and CH₄ emissions accounted for 70.3% of emissions while CO₂ emissions accounted for 1.1%. GHG emissions from agriculture sector show small oscillations but the general trend is on the decrease. In 2017, emissions were 11.8% below the base year. The most important sub-sector is emissions from enteric fermentation, which contributes 55.2% of all emissions from agriculture, followed by emissions from agricultural soils, with 25.8; the rest is contributed by emissions of methane and N₂O from animal manure (17.8%) while CO₂ emissions due to the liming and urea applications represent only 1.1% of emissions in this sector.

In the <u>LULUCF</u> sector, the CO₂ sink was estimated at 1,524 Gg CO₂ eq in 2017, which is 68.6% less than in 1986. The decrease in sinks was primarily the result of a decrease in timber growing stock in existing forests also due to natural disasters in the recent years.

Methane emissions from the <u>Waste</u> sector are the second largest source of methane and represent 23.1% of all methane emissions in Slovenia in 2017. The fraction of methane emissions in this sector amounts to 87.1%, while the remaining part represent N₂O (8.0%) and CO₂ emissions (4.9%). Solid waste handling contributes 61.2% to the total emissions from this sector, wastewater handling 30.8 %, incineration of waste 4.9% and composting 3.0%. Emissions in 2017 were 21.6% lower than in 1986 which is mainly due to the decrease in emissions from waste waters which are 49% 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 by 42.6%. In 2013 the emissions were for the first time lower compared to the base year and in 2017 they were lower by 8.3%.

	1986	1990	1995	2000	2005	2010	2015	2016	2017	Change to 1986	Change to 2016
1. Energy	16,381	14,649	15,114	15,247	16,537	16,322	13,399	14,243	14,000	-14.5	-1.7
A. Fuel Combustion	15,789	14,137	14,627	14,775	16,011	15,800	13,029	13,846	13,591	-13.9	-1.8
1. Energy Industries	6,841	6,375	5,725	5,594	6,448	6,340	4,562	4,929	4,915	-28.1	-0.3
2. Man. Industries and Construction	4,460	3,151	2,634	2,277	2,485	1,916	1,591	1,598	1,679	-62.4	5.0
3. Transport	2,022	2,728	3,792	3,808	4,416	5,255	5,362	5,734	5,541	174.0	-3.4
4. Other Sectors	2,424	1,851	2,475	3,093	2,658	2,287	1,510	1,581	1,452	-40.1	-8.2
5. Other	41	32	1	3	3	3	4	4	4	-90.0	13.8
B. Fugitive Emissions from Fuels	593	512	487	472	526	522	370	397	408	-31.1	2.9
1. Solid Fuels	551	461	442	424	474	474	335	359	369	-33.1	2.6
2. Oil and Natural Gas and other	42	50	45	48	53	48	36	38	40	-6.1	5.4
2. Industrial Processes	1,408	1,393	1,073	1,162	1,426	1,007	1,142	1,144	1,208	-14.2	5.6
A. Mineral Industry	743	694	543	598	636	479	453	432	497	-33.1	15.1
B. Chemical Industry	98	88	88	113	137	89	60	62	65	-33.5	4.6
C. Metal Industry	471	551	374	334	425	127	208	218	223	-52.7	2.1
D. Non-energy products	8	8	7	14	25	12	24	24	30	273.6	23.9
E. Electronics industry	NO	NO									
F. Product uses as ODS substitutes	NO	NO	33	46	144	252	342	352	357	100.0	1.5
G. Other product manufacture and use	89	52	29	56	60	47	55	55	36	-59.2	-34.9
H. Other	NA	NA									
3. Agriculture	1,915	1,841	1,757	1,801	1,709	1,667	1,700	1,722	1,688	-11.8	-2.0
A. Enteric Fermentation	981	935	904	949	916	903	936	951	932	-5.0	-2.0
B. Manure Management	413	408	351	334	318	300	299	305	301	-27.2	-1.4
C. Rice Cultivation	NO	NO									
D. Agricultural Soils	468	445	460	489	451	440	446	445	436	-6.8	-2.0
E. Prescribed Burning of Savannahs	NO	NO									
F. Field Burning of Agricultural Residues	NO	NO									
G. Liming	44	44	29	17	14	13	11	11	11	-75.0	0.1
H. Urea applications	9	9	12	12	12	11	9	9	8	-8.6	-12.2
I. Other carbon-containing fertilizers	NO	NO									

Table 1: GHG emissions and removals in Slovenia by sectors and sub-sectors 1986-2017 in kt CO₂ eq.

	1986	1990	1995	2000	2005	2010	2015	2016	2017	Change to 1986	Change to 2016
4. Land Use, Land-Use Change and Forestry	-4,850	-4,463	-3,205	-4,238	-7,346	-6,394	-3,915	-2,404	-1,524	-68,6	-36,6
A. Forest Land	-4,535	-4,558	-3,285	-3,939	-7,254	-6,184	-3,511	-2,016	-1,155	-74.5	-42.7
B. Cropland	-110	-119	-198	-233	-226	-212	-162	-158	-152	37.5	-3.9
C. Grassland	-215	-189	-248	-510	-325	-347	-371	-362	-343	59.7	-5.2
D. Wetlands	2	3	2	1	7	27	2	2	2	-28.6	-5.3
E. Settlements	441	442	464	510	609	422	243	221	199	-54.8	-9.9
F. Other Land	15	15	23	9	18	22	6	6	5	-64.3	-3.2
G. Harvested wood products	-457	-67	28	-85	-185	-129	-129	-102	-86	-81.2	-15.8
H. Other	NO	NO									
6. Waste	710	757	777	865	848	630	578	572	557	-21.6	-2.6
A. Solid Waste Disposal	372	433	483	568	594	394	340	355	341	-8.3	-4.0
B. Biological treatment of solid waste	NO	NO	NO	NO	3	5	12	13	17	100.0	31.6
C. Incineration and open burning of waste	2	2	1	3	3	7	27	24	27	1272.9	16.6
D. Waste water treatment and discharge	336	322	294	294	248	224	198	180	172	-49.0	-4.7
E. Other	NO	NO									
6. Other	NO	0.0	0.0								
Memo Items.											
International Bunkers	59	49	58	69	130	133	283	461	579	888.4	25.5
Aviation	59	49	58	69	61	73	75	61	74	26.9	21.6
Navigation	NO,NA	NO,NA	NO,NA	NO,NA	69	60	209	400	505	100.0	26.0
Multilateral Operations	NO	NO	NO	1	0	0	1	1	1	100.0	11.3
CO ₂ Emissions from Biomass	2,535	2,353	2,202	2,074	2,771	3,138	2,957	3,008	2,992	18.0	-0.6
Long term storage of C in waste disposal sites	2,141	2,738	3,662	4,783	5,839	6,642	6,929	6,933	6,933	223.8	0.0
Total CO ₂ Eq. Emissions without LULUCF	20,415	18,639	18,721	19,076	20519	19626	16820	17,681	17,453	-14.5	-1.3
Total CO ₂ Eq. Emissions with LULUCF	15,565	14,177	15,516	14,837	13173	13232	12905	15,278	15,929	2.3	4.3

2.2 The national system

2.2.1 Summary information on National Inventory Arrangements

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 (see Figure 2 below).



Figure 3: Data flow in the Slovenian Inventory System

A Memorandum of Understanding has been concluded with institutions that participate in inventory preparation, binding these institutions to submit quality and verified data to the Environmental Agency in due time.

Part of the legal and institutional arrangements in place as basis for the national system concerns the data availability for the annual compilation of the GHG inventory. The main data source for the Slovenian inventory preparation is the Statistical Office of the Republic of Slovenia (SORS). The compilation of several statistics is regulated by European and Slovenian statistical legislation and partly complemented by contracts at national level.

At the beginning of 2007, the agreement between Statistical Office of the Republic of Slovenia (SORS) 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.

Other data sources include reporting obligations under national and European regulations and reports of companies and associations. 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.

2.2.2 Overview of inventory planning, preparation and management

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.



ACT April - June, Inventory Improvement - Assessing the effectiveness of the NIS - Prepare improvement plan

CHECK January – April

- Inventory evaluation - Implementing QA activities
- Implementing G - Verification

DO January – April

Reporting

- Preparing of the NIR and Annexes
- Implementing the results of QA/QC
- Implementing the results of EU initial check
- Reporting 15 March to EU,





PLAN August - September Inventory planning – updating the following documents if necessary: - Manual of procedures - QA/QC plan - Table with responsibilities

- Inventory timeline



Figure 4: The inventory cycle

This structure is 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 3.

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.

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.

2.2.3 Quality assurance, quality control and verification plan

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 became official guidance for GHG reporting since 2015. The manual is improved and updated regularly.

The inventory management as part of the quality management system includes a control system for data and calculations, for records and their archiving as well as documentation on QA/QC activities. This ensures the necessary documentation and archiving for future reconstruction of the inventory and for the timely response to requests during the review process.

More detailed information on inventory data and inventory arrangements can be found in Section 1 of the Slovenian National Inventory Report 2019.

2.2.4 Summary information on Changes to National Inventory Arrangements

There were no significant changes of the inventory system since the last Biennial Report.

3 Quantified economy-wide emissions reduction target

3.1 The EU target under the Convention

In 2010, the EU submitted a pledge to reduce its GHG emissions by 2020 by 20% compared to 1990 levels, in order to contribute to achieving the ultimate objective of the UNFCCC: 'to stabilise GHG concentrations at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system', or, in other words, to limit the global temperature increase to less than 2°C compared to temperature levels before industrialization (FCCC/CP/2010/7/Add.1). The definition of the Convention target for 2020 is documented in the revised note provided by the UNFCCC Secretariat on the 'Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention' (FCCC/SB/2011/INF.1/Rev.1 of 7 June 2011). EU provided additional information relating to its quantified economy wide emission reduction target in a submission as part of the process of clarifying the developed country Parties' targets in 2012 (FCCC/AWGLCA/2012/MISC.1).

The EU's accounting rules for the target under the UNFCCC are more ambitious than the rules under the Kyoto Protocol, for example, including outgoing flights, and adding an annual compliance cycle for emissions under the Effort Sharing Decision (ESD; non-ETS) or higher Clean Development Mechanism (CDM) quality standards under the EU Emissions Trading System (EU ETS) (FCCC/TP/2013/7). Accordingly, the following assumptions and conditions apply to the EU's -20% commitment under the UNFCCC:

- The EU Convention pledge does not include emissions/removals from Land Use, Land Use Change and Forestry; however this sector is estimated to be a net sink over the relevant period. EU GHG inventories include information on emissions and removals from LULUCF in accordance with relevant reporting commitments under the UNFCCC. Accounting for LULUCF activities only takes place under the Kyoto Protocol¹;
- The target covers the gases CO₂, CH₄, N₂O, HFCs, PFCs and SF₆;
- The target refers to 1990 as a single base year for all covered gases and all Member States. Emissions from outgoing flights are included in the target;,
- A limited number of CERs, ERUs and units from new market-based mechanisms may be used to achieve the target: in the ETS, the use of international credits was allowed up to specific levels set in the EU ETS Directive, amounting to over 1500 million CER and ERU entitlements in the period up to 2020). Quality standards also apply to the use of international

¹ The LULUCF Decision (Decision 529/2013) requires to prepare and maintain annual LULUCF accounts according to the rules set out in the Kyoto Protocol; however, these accounts do not contribute to the achievement of the EU Convention pledge

credits in the EU ETS, including not allowing the use of credits from LULUCF projects and certain industrial gas projects. International credits will no longer be used for EU ETS compliance in the system's fourth trading period (2021-2030). In the ESD sectors, the annual use of international credits is currently limited to up to 3% of each Member State's ESD emissions in 2005, with a limited number of Member States being permitted to use an additional 1% from projects in Least Developed Countries (LDCs) or Small Island Developing States (SIDS), subject to conditions; from 2021 onwards, as with the EU ETS, international credits will no longer be used for compliance under the ESD.

• The Global Warming Potentials (GWPs) used to aggregate GHG emissions up to 2020 under EU legislation were those based on the Second Assessment Report of the IPCC when the target was submitted. For the implementation until 2020, GWPs from the IPCC AR4 will be used consistently with the UNFCCC reporting guidelines for GHG inventories.

The above information is summarised in Table below ().

Parameters	Target
Base Year	1990
Target Year	2020
Emission Reduction target	-20% in 2020 compared to 1990
Gases covered	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆
Global Warming Potential	AR4
Sectors Covered	All IPCC sources and sectors, as measured by
	the full annual inventory, partly international
	aviation.
Land Use, Land-Use Change, and Forests	Accounted under the Kyoto Protocol,
(LULUCF)	reported in EU inventories under the
	Convention. Assumed to produce no debits
Use of Flexible Mechanisms	Possible subject to quantitative and
	qualitative limits

Table 2: Key information on joint quantified economy-wide emission reduction target of the EU-28 and its Member States

3.2 The EU target compliance architecture

3.2.1 The 2020 Climate and Energy Package

In 2009, the EU established internal rules under its 2020 Climate and Energy Package². These rules underpin the EU 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, reduction that is equivalent to a 14 % reduction compared to 2005 levels. This 14 % reduction objective is divided between the ETS and ESD sectors. These two sub-targets are:

² http://ec.europa.eu/clima/policies/package/index_en.htm

- a 21 % reduction target compared to 2005 for emissions covered by the ETS (including outgoing flights);
- a 10 % reduction target compared to 2005 for ESD sectors, shared between 28 Member States through individual national GHG targets.



The distribution of the total target across the ETS and ESD is shown below.

Figure 5: GHG targets under the 2020 Climate and Energy Package (source: European Commission)

Under the EU ETS Directive as revised for the system's current trading period from 2013 to 2020 (Directive 2009/29/EC), a single ETS cap covers EU Member States and three participating non-EU countries (Norway, Iceland and Liechtenstein), and there are no further individual caps by country. Allowances allocated in the EU ETS from 2013 to 2020 decrease by 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012).

The vast majority of emissions within the EU, which fall outside the scope of the EU ETS, are addressed under the Effort Sharing Decision (ESD) (Decision 406/2009/EC). The ESD covers emissions from all sources outside the EU ETS, except for de minimis aviation emissions, international maritime emissions, 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 (cars, lorries), buildings (in particular heating), 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 58% of total GHG emissions in the EU in 2017³.

³ European Environment Agency (2019); Trends and projections in Europe 2019. Tracking progress towards Europe's climate and energy targets; https://www.eea.europa.eu/publications/trends-and-projections-in-europe-1/at_download/file

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 (see Figure 5). Under the Effort Sharing Decision, national emission targets for 2020 are set, expressed as percentage changes from 2005 levels. These changes have been transferred into binding quantified annual emission limits for the period from 2013 to 2020 (Commission Decisions 2013/162/EU and 2013/634/EU), denominated in annual emission allocations (AEAs). At country level, 2020 targets under the ESD range from -20% to +20%, compared to 2005 levels.

The target levels have been set on the basis of Member States' relative Gross Domestic Product (GDP) per capita. Up to certain limitations, the ESD allows Member States to make use of flexibility provisions for meeting their annual targets: carry-over of over-achievements to subsequent years within each Member State, transfers of AEAs between Member States and use of international credits (credits from Joint Implementation and Clean Development Mechanism).

3.2.2 Monitoring progress towards the 2020 ESD targets

Monitoring, reporting and verification of the ESD targets mainly takes place through the submission of national GHG inventories by Member States. Chapter III of Commission Implementing Regulation 749/2014 sets out strict criteria on the basis of which the national GHG inventories and GHG emissions of Member States are reviewed annually at the EU level. Based on this review, the European Commission issues an implementing decision on Member States' ESD emissions in the given year, which might lead to Member States facing penalties or other consequences.

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. These reviews are carried out within a shorter time frame than the current UNFCCC inventory review so as to enable using flexibility provisions and taking corrective action, where necessary, at the end of each relevant year.

3.2.3 The Slovenian reduction targets under the ESD (non-ETS) and its progress until 2017

The quantified annual reduction targets 2013-2020 of Slovenia were set to 12.324 Million AEAs in 2013, and to 12.533 Million AEAs in 2020. Targets for intermittent years follow the linear interpolation between the listed values. Thus, Slovenia committed not to increase emissions in sectors covered under the ESD by more than 4% by 2020 compared to 2005 levels.

In accordance with Article 27 of Regulation (EU) No 525/2013 and on the basis of the GHG inventory data as reviewed under Article 19 of that Regulation, the Commission examined the impact of the use of the 2006 IPCC Guidelines – and of the changes to the UNFCCC methodologies used – on Member States' GHG inventories. The difference in the total greenhouse gas emissions relevant to Article 3 of the

Decision No 406/2009/EC exceeded 1% for most Member States. In the light of this outcome, all Member States' annual emission allocations for the years 2017 to 2020 as contained in Annex II to Decision 2013/162/EU should be revised in order to take into account the updated inventory data reported and reviewed pursuant to Article 19 of Regulation (EU) No 525/2013 in 2016. Valid AEAs for the period 2013-2020 are presented in the table below.

Year	Annual emission allocations [kt CO ₂ eq]	Year	Annual emission allocations [kt CO ₂ eq]
2013	12,324	2017	12,203
2014	12,354	2018	12,238
2015	12,384	2019	12,273
2016	12,413	2020	12,307

Table 3: AEAs for the period 2013-2020 for Slovenia

In the year 2017, verified emissions from stationary installations covered under the EU-ETS in Slovenia amounted to 6.57 million tonnes of CO₂ equivalents. With total GHG emissions of 17.45 Mt CO₂ equivalent (without LULUCF) the share of EU-ETS emissions is 48 %.



Figure 6: Trends in greenhouse gas emissions and the division to EU-ETS and ESD for Slovenia

ESD emissions in 2017 of Slovenia amounted to 10.88 Mt CO₂ eq, being 11 % below the target for that year. ESD emissions in 2013 amounted to 10.97 Mt CO₂ eq. Emissions have been lower that the target values every year from 2013-2017. Considering projections it is expected that Slovenia will meet its reduction target for the period up to 2020 (Figure 6).

4 Progress in the achievement of quantified economy-wide emission reduction targets and relevant information

4.1 Background and recent policy development

Until recently, the Operational Programme for Reducing GHG Emissions until 2020 with a View to 2030 (OP GHG-2020) was a key implementation document in the field of reducing GHG emissions in Slovenia for sources not included in the ETS (emissions under Decision 2009/406/EC). It aims to change Slovenia into a resource-efficient, green and competitive low-carbon economy. The Government of Slovenia adopted it in December 2014.

In 2020, Slovenia adopted the National Energy and Climate Plan (NECP) in accordance with the Regulation on the Governance of the Energy Union (2018/1999/EU), which assumes the role of the implementation document in the field of mitigating the climate change from the OP GHG-2020. The NEPC is a broader document than the OP GHG-2020, as it covers all emission sources, including ETS, and also integrates two action plans in the field of energy efficiency and renewable energy sources, and further covers the security of supply, internal energy markets and research and development.

Most of the measures already being implemented today are 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. Examples of this are the EEU and RES measures, which simultaneously reduce air pollution from SO₂, NO_x pollutants and dust particles, and reduce GHG emissions and also contribute to other sectoral objectives (e.g. security of energy supply). In the future, these efforts will be intensified in the implementation of climate policy.

The NECP takes over existing measures from action and operational programmes, reshapes them, upgrades them and adds new measures necessary to achieve more ambitious emission reduction targets by 2030. The NECP is based on strategic documents covering various sectors contributing to GHG emissions (Table 2).

Document title	Adoption	Implementation management	Energy supply	Transport	Buildings	Industry	Agriculture	LULUCF	Waste
General									
Slovenian Development Strategy 2030 (SRS)	2017, Government of the Republic of Slovenia	Government Office for Development	✓	~	✓	~	~	~	~
Climate change									
National Energy and Climate Plan (NECP)	2020, Government of the Republic of Slovenia	Ministry responsible for energy	×	*	*	~	~	~	•
Resolution on the National Environment Protection Programme for the 2020–2030 period (ReNPVO20– 30)	2020 Government of the Republic of Slovenia	Ministry responsible for environmental protection	~	*	~	~	1	~	~
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							•
Energy									
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	Ministry responsible for energy			~				

Table 4: Strategic documents of the Republic of Slovenia relevant to the mitigation of climate change.

Document title	Adoption	Implementation management	Energy supply	Transport	Buildings	Industry	Agriculture	LULUCF	Waste
	Republic of Slovenia New strategy in preparation								
Energy Concept of Slovenia (ECS)	In preparation	Ministry responsible for energy	~	~	~	~			
Transport		·							
Transport Development Strategy of the Republic of Slovenia (TDS) by 2030.	2015, Government of the Republic of Slovenia	Ministry responsible for transport		~					
Resolution on the National Programme for the Development of Transport of the Republic of Slovenia until 2030 (ReNPRP30)	2016 Government of the Republic of Slovenia	Ministry responsible for transport		~					
Agriculture									
Resolution on the National Programme on Strategic Orientations for the Development of Slovenian Agriculture and Food Industry "Our Food, Rural and Natural Resources 2021" (ReNPURSK)	2020, Government of the Republic of Slovenia	Ministry responsible for agriculture					~		
Forestry									
Operational Programme for the implementation of the National Forest Programme 2017–2021 (OP NGP)	2017, Government of the Republic of Slovenia	Ministry responsible for forestry						~	

4.2 Regional and local activities in the field of climate change

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, in the future with NECP. 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 energyrelated 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 set by the Ministry responsible for energy. Practically all municipalities have adopted an LEC. Important decisions for reducing GHG emissions are also adopted by municipalities within the scope of municipal spatial plans.

Environment protection programmes have been adopted by all Slovenian urban municipalities; these programmes also include objectives for reducing emissions of air pollutants for the improvement of the air quality, and for reducing GHG emissions and air pollutants emissions. They also include EEU measures for achieving objectives set in regard to light pollution. Air quality plans have been adopted by all municipalities with excessive particle pollution (PM₁₀ particles). The EEU measures, simultaneously also being measures for reducing GHG emissions, hold an important role. The implementation of measures is promoted by the State by providing additional subsidies financed from the Climate Change Fund.

Within the framework of the Operational Programme for Implementing the European Cohesion Policy for 2014–2020 under investment priority no. 4: Sustainable use and production of energy and smart networks, the municipalities were able to apply for financial resources to construct an integrated transport strategy (ITS). 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, contributing to reduced energy consumption, greenhouse gas emissions, and pollution. Through ITS municipalities include reducing GHG emissions in the transport sector. The municipalities have begun to cooperate at the regional and international levels and engage in developing regional integrated transport strategies. The latter are not mandatory, nor are any guidelines given on the part of the State.

In 2019, the Gorenjska region was the first to draw up a sustainable energy and climate plan completely on its own initiative. Through other projects (e.g. LIFE), the municipalities have also drawn up other documents/strategies, e.g. Adaptation strategy for agriculture in the municipality of Ajdovščina.

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 CO₂ 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 2019, there were 30 Slovenian municipalities included, of which 29 submitted their action plans for sustainable energy.

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 cooperating 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. The Association of Municipalities and Towns of Slovenia is becoming increasingly active in the field of climate change and is considering establishing a commission for the climate crisis within its organisation.

Within the LIFE IP Care4Climate project, an action is also carried out to integrate local communities into the transition to a low-carbon society (LCS). The purpose of the activities is to empower local communities, in particular municipalities, to contribute to the goal of reducing GHG emissions through the implementation of community-based projects in the field of energy, mobility, local circular economy and food supply.

4.3 Multi-sectoral instruments

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

Sectors affected by the implementation of the measure: *energy industries, manufacturing industries and construction, industrial processes*

The objectives of GHG emission 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 trading between member states – 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 rewording innovation contributing to the reduction of GHG emissions.

A decision was made at the EU level that the market stability reserve mechanism will be crucial for reaching the objective of the EU ETS sector by 2030.. It was defined by Decision (EU) 2015/1814, and was put into practice at the beginning of 2019. In 2018, the legal framework was adopted for the fourth stage of the EU-ETS, i.e. from 2021 to 2030, with the following amendments:

- After 2021, the scope of emission allowances in the market will be reduced by 2.2% annually (and not 1.74% as in the period from 2013 to 2020);
- There was a decrease in the number of industries involved in the so-called carbon leakage, and the number of allowances allocated free of charge will thus be reduced compared to the previous period.
- Innovation 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.
- The level of free allocations given to installations the operation of which is estimated to increase or decrease by more than 15% on the basis of a moving average of two years compared to the baseline level is being adjusted.

In the third phase, after 2013, 49 installations in Slovenia were included in the GHG emission trading system and these represented 38% of total GHG emissions in 2017. Installations are distributed in the following IPCC sectors: Energy industries, where

majority of the emissions are included in the EU ETS; fuel use in Manufacturing industries and construction, where 63% of GHG emissions of this sector are included in the EU ETS; and Industrial processes, where 57% of GHG emissions are included in the EU ETS. Since 2013, the EU ETS also includes aviation.

Since 2013, Member States may, at the request of the operator, exclude the so-called small installations from EU ETS, the emissions of which are less than 25,000 tonnes of carbon dioxide equivalent and having a rated thermal input power during combustion below 35MW without emissions from biomass in each of the previous three years prior to the next period (2016–2018 for the 2021–2025 period). Excluded installations are required to implement the so-called alternative measures to achieve an equivalent contribution to emissions reduction. The Ministry of the Environment and Spatial Planning imposed that the equivalent measure is the payment of environmental tax due to CO₂ (CO₂ tax), taking into account that the respective tax is not paid to the level of free-granted emission allowance. If the average price of allowances is more than 30% higher than the environmental tax, the operator must pay the environmental tax in the amount of the average price of allowances.

In the 2005–2018 period, emissions of the EU ETS sector decreased, i.e. by 27% in the energy industries sector, by 22% in manufacturing industries and by 25% in industrial processes.

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 to each Member State. Although without a legally binding national objective, Slovenia exceeds this level. For the period until 2030, the objective of reducing emissions by 43% was set.

The Ministry of the Environment and Spatial Planning (MOP) 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 AIR POLLUTION DUE TO CO₂ Emissions

Sectors affected by the implementation of the measure: *manufacturing industries and construction, other sectors (energy use in households, the service sector and agriculture) and transport*

The legal basis addressing environmental tax for air pollution due to CO₂ include the Environmental Protection Act⁴ and the Decree on environmental tax on carbon dioxide emissions⁵.

⁴ Environmental Protection Act (Official Gazette of the Republic of Slovenia, No. 39/06 – official consolidated text, 49/06 – ZMetD, 66/06 – Constitutional Court Decision, 33/07 – ZPNačrt, 57/08 – ZFO-1A, 70/08, 108/09, 108/09 – ZPNačrt-A, 48/12, 57/12, 92/13, 56/15, 102/15, 30/16, 61/17 – GZ, 21/18 – ZNOrg and 84/18 – ZIURKOE)

⁵ Decree on environmental tax on carbon dioxide emissions (Official Gazette of the Republic of Slovenia, No. 48/18)

The Environmental Protection Act, which presents the umbrella document and addresses the fundamental prerequisite for sustainable development, protection against environmental stress. Within this scope, the Act lays down a framework: the fundamental principles and measures of environmental protection, environmental monitoring, economic and financial instruments of environmental protection, as well as public services for environmental protection and other issues related to environmental protection.

The environmental tax instrument has been introduced in order to internalise the external costs of air pollution due to CO2 emissions and, being an economic instrument, was aimed at reducing CO₂ emission through the fuel price and therefore aimed at reducing environmental pollution. The CO₂ tax improves the competitiveness of renewable energy sources and of other energy products with lower specific emissions and the competitiveness of energy efficiency measures. The Decree on environmental tax on carbon dioxide emissions⁶, which imposes an obligation to pay environmental tax for air pollution due to CO₂ emissions was updated in 2018. The updated decree does not bring major changes and relates in particular to effective implementation and harmonisation with the Excise Duty Act and the minimum level of taxation applicable to fuel. The unit of air pollution with CO₂ emission remains €17.3 €/t of CO₂. It is planned that CO₂ tax will increase (at least 5% per year) and approach the ETS coupon price⁷ by 2030. The measure has effects simultaneously with other measures for promoting improvements in energy efficiency and fuel substitution in transport and in buildings. Companies included in the EU ETS system (holders of permits to emit greenhouse gases) are exempt from environmental tax.

(M-3) Use of best available techniques – environmental permits

Sectors affected by the implementation of the measure: *industrial processes, manufacturing industries and construction, energy industries, waste, 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 their control. In this manner, the selection of new installation is influenced and the replacement of existing installation is encouraged so that the equipment must meet the conditions and provisions from the directive or standards from the reference documents. The Directive also specifies the emission limit values for large combustion plants. The Directive is also

⁶ Decree on environmental tax on carbon dioxide emissions (Official Gazette of the Republic of Slovenia, No. 48/18)
⁷ The current economic situation is very unstable due to the COVID-19 pandemic and is also reflected in the field of the emission allowance market. In the recent period, a large decline in the ETS allowance price was recorded (on 5/3/2020, the ETS allowance was €23.90/t of CO₂, on 19/3/2020, the ETS allowance price was €16.03/t of CO₂). The uncertainty in this area is therefore profound.

complemented with other EU measures, such as Directive on the reduction of national emissions of certain atmospheric pollutants ("NEC Directive") (2016/2284).

In Slovenia, this instrument contributed to important reduction of GHG emissions in industrial processes, when the old electrolysis unit was stopped since it failed to meet the standards of the best available technologies. Consequently, PFC emissions were reduced by approximately 85%. This measure also contributed to the technological modernisation of the thermal power sector.

(M-4) TAXES AND CHARGES

Sectors affected by the implementation of the measure: *manufacturing industries and construction, other sectors (households, the service sector, agriculture) and transport*

The primary role of public finances is to ensure stable sources of revenue, including energy taxation (environmental tax for air pollution due to CO₂ emissions, excise duty, contribution to support EEU and contribution to support the production of electricity from renewable energy sources (RES) and high-efficiency cogenerations (CHP)). The State is limited with requirements on the minimum energy taxation imposed by the Directive on restructuring the Community framework for the taxation of energy products and electricity**Napaka! Zaznamek ni definiran**. Duties and taxes are also an important instrument with which a state can influence the price of final energy and also the price ratio between energy products and thereby attain the objectives of environmental and energy policy. The contribution to support EEU is expected to increase gradually by 2030.

The Excise Duty Act of 2016 remains in force and regulates the system and introduces an obligation to pay excise duty on alcohol and alcoholic beverages and tobacco products as well as energy products and electricity. Excise duties for self-supply of electricity from renewable energy sources remain to be charged only for net electricity consumed, which encourages the exploitation of renewable energy sources. The excise duties on electricity according to the volume of consumption also remain chargeable – large consumers pay less – which, however, does not support climate energy targets. Contrary to the objectives to reduce GHG emissions, a system of excise duty exemption also remains applicable, 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 excise duties on petroleum products increased in the period from 2008 to 2019:

- petrol by 33%, the highest excise duty in 2013, when it amounted to 0.53 €/litre
- diesel fuel by 29%, the highest in recent years was in 2016 and 2017, when it amounted to 0.43 €/litre;
- extra light fuel oil by 578%, the highest excise duty has not changed since 2016; it amounts to 0.16 €/litre.

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 products), 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, cogeneration 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 of 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 reimbursement of excise duty, which is contrary to the objectives of reducing GHG emissions. This should not jeopardise the competitiveness of the agricultural sector and the achievement of the OP GHG-2020 notes that these reimbursements have been increasing over the years and that the value of the indicator moves away from the intended target.

The Green Budget Reform project closed in 2019 provided an overview of the incentives influencing the environment. The continuation of work in the field of green budget policy – greening the taxation and budgetary policy will also take place in Slovenia within the framework of the EU Green Deal. Measures are planned at the EU level: revision of the Energy Tax Directive, promoting green budgets of Member States, etc. The objective is to refocus public investment, consumption and taxation, and create a supporting environment to promote and finance private investments, while also adequately addressing the exemption from excise duties on fossil fuels, which are in contradiction with the objectives of OP GHG and are not decreasing. The formulated changes will follow the principles of a just transition for all and promotion of sustainable behaviour of all sectors of the economy.

(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 the non-governmental 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.

An eight-year project IP LIFE Care4Climate will significantly contribute to a more harmonised approach in the field of awareness-raising and education (also training) that will promote measures through awareness-raising, education and training of key stakeholders and help Slovenia achieve its targets for reducing GHG emissions from 2020 to 2030. In addition to the Ministry of the Environment and Spatial Planning (MOP) acting as a leading partner, there are 15 partners of public, nongovernmental and also private sector participating in the project. The project will last from 1/1/2019 to 31/12/2026. It includes the following activities, which will be the cornerstone of a future integrated training and education system in the field of adapting to and mitigating the effects of climate change:

- Drawing up a training plan for transition to a low-carbon society and establishing a national qualification platform;
- Preparation, implementation and monitoring of training programmes in the field of energy efficiency, renewable energy sources and green technologies and confirmation of knowledge obtained;
- Integration of local communities into the transition to a low-carbon society;
- Strengthening the capacity for the transition to a low-carbon society in higher education;
- Strengthening the capacity of the public administration (national and local authorities) for the transition to a low-carbon society and the implementation of participative processes.

The National Energy and Climate Plan adopted on 27 February 2020 envisages several instruments in the field of training, education, communication and energy and climate literacy in a total value of approximately EUR 17 million per year. Measures are foreseen to raise awareness and literacy of the public with regard to the expected effects of climate change and the reduction of exposure to the impact of climate change, sensitivity and vulnerability of Slovenia, adaptation to climate change and enhancing resistance. In addition, in order to reduce impacts on air quality, the promotion of energy use from biomass will be complemented by awareness-raising and education of users for the proper use of wood biomass systems, suitable conditions for the technical functioning of chimney sweeping services will be established and workshops on sustainable forest management for forest owners will be prepared. The funds of the Climate Fund are also an important source for the implementation of the activities mentioned above.

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 matter. 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 under 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 also established.

In addition to the portal, Borzen also organised the "Sustainable Energy – Locally 019" conference in 2019 (also in 2017, 2018), the first student hackathon (2018) on sustainable energy, a media campaign on the radio also addressing the field of EEU, the prize contests "Moja zelena dežela" (in English: "My Green Country"), an advertising campaign of EEU measures, new episodes of the environmental cartoon series "Lepši svet 2" (in English: "Better World 2") in cooperation with RTV Slovenija, "Trajnostna energija 018; Naša obljuba za lepši svet" (In English: "Sustainable Energy 018; Our Promise for a Better World"); the company also made an invitation to tender for a partial reimbursement of costs for carrying out education projects in the field of EEU and RES for the young, created a board game - two packs of cards on the topic of RES and EEU, and prepared a pilot project in collaboration with the Slovenian Philanthropy - self-sufficient power plant.

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 2018, there were 58 qualified independent energy consultants operating in 55 offices of the ENSVET network. Altogether, they participated in 9,546 activities (providing advice in the form of written reports, online advising, articles, broadcasts on national television, lectures, schools, etc.). Among these activities, there were 7879 pieces of written advice, which is only 2% less than planned 8000 pieces of advice from the annual work programme and the most in the history of the ENSVET network. This norm will increase on a yearly basis with the purpose of achieving the objective pursued, i.e. 10,000 pieces of advice in 2020. In the field, the consultants addressed and evaluated the quality of the implementation of 148 projects supported by the Eco Fund. The Eco Fund also completed the implementation of the new corporate identity. A week of energy consultancy was also organised and took place in 10 shopping centres.

In 2017, the Eco Fund issued an invitation to tender for co-funding nongovernmental organisations (NGOs) in the amount of EUR 600,000 (EUR 300,000 from the Climate Change Fund and EUR 300,000 from the Eco Fund), and co-funded projects were implemented in 2018 and early 2019. 28 applications were received; 10 projects were awarded in the total amount of EUR 553,000 including the awarenessraising and communication projects. In 2018, a new invitation to tender was published for co-funding nongovernmental organisations, and the funds in the amount of EUR 550,000 were provided from the Climate CFund. The awarded projects will be implemented in the 2019–2021 period.

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 2018, Umanotera finished the "Slovenia is lowering its CO₂ emissions" project. The project identified good practices in Slovenia, which aim to significantly reduce CO₂ emissions and contribute to promoting the principles of sustainable development. 20 good practice examples were compiled and presented in a catalogue. In 2017/2018, the Ministry of the Environment and Spatial Planning financed the relocation of the website www.slovenija-co2.si to a new infrastructure, update and refreshment of content. The LIFE ClimatePath2050 project continued with a number of events and activities (including a photo contest, climate scoreboard for municipalities) that contributed to communication and raised the awareness on climate change.

The EN-LITE Society for Strengthening Energy Literacy continued its activities in the field of iENERGY: digital, interactive, education and awareness-raising platform. The handbook called Transition to a Green Economy (Fit media) was published representing global trends of sustainable development in Slovenia and fundamental strategic directions of EU by 2020.

In 2018, the Climate Change Fund also financed the project Climate file-articles on the subject of climate change published in EOL magazine; the magazine was also distributed to Slovenian schools. Climate content was also highlighted in EOL magazine in 2019.

In 2018, the Climate Change Fund provided EUR 700,000 for non-governmental organisations for content including awareness-raising, education, and training.

Awareness-raising campaigns in the field of transport are also not being monitored systematically. Promotional activities have been implemented in the framework of the Integrated Public Passenger Transport (IJPP) project and other projects, which is also planned for the future.

One of the most visible promotional events was again the European Mobility Week, which included 77 municipalities in 2018.

Within the OP ECP (in 2019), the Soft Measures of Sustainable Mobility project has been introduced and will last until 2021. The project encompasses the implementation of five measures promoting sustainable mobility including also awareness-raising campaign and promotion of sustainable mobility, and providing education on sustainable mobility in nursery schools and primary schools. The awareness-raising campaign is worth 1.8 million euros.

FOCUS is also involved in the IDEA project to develop innovative approaches in the field of energy poverty. The main objective is to improve the existing and develop new innovative education methods and training materials on energy poverty for adults. In 2019, the project continued. Cycling breakfasts were also organised to raise awareness of the use and importance of the bicycle as a means of transport. In 2018, 5 breakfasts were organised.

The Clear 2.0 project (Slovenian Consumer's Association with partners) also continued by promoting the transition to a low-carbon society within the scope of

which the awareness of consumers is raised of the importance of using local renewable sources in households, advantages of low-carbon technologies, guidance on the choice/purchase and use of heating and cooling technologies in households.

EDUCATION

By way of the NECP, 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 nursery schools and elementary and secondary schools, optional subjects regarding the environmental protection in general upper secondary schools and elementary schools, etc.). 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 need 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 Soft Measures of Sustainable Mobility project also includes the measure to provide education on sustainable mobility in nursery schools and primary schools. The project is implemented in three school years from 2018–2019 and ends on 31/7/2021. All nurseries and schools received revised handbooks "Sustainable Mobility – Handbook for nursery school teachers" and "Sustainable Mobility – Handbook for nursery school teachers" and "Sustainable Mobility – Handbook for primary school teachers". The handbooks contain a series of instructions, materials and examples of activities on sustainable mobility. The materials for parents (leaflets) and a travel diary for children in primary schools were also published. In the 2019/2020 school year, more than 120 primary schools (26,545 students) and 111 nursery schools (14,949 children) are participating in the project through activities.

In the 2018/2019, a new category of topic, i.e. climate change, was added to the programme of Eco Schools. The topic of climate change is also included in conferences and education courses organised for headteachers and others included in the education system by the competent ministry.

In the annual programme of education for the elderly for 2018, the Ministry of the Environment and Spatial Planning prioritised the education of the elderly on the sustainable development and climate change, for which EUR 20,000 was earmarked from the Climate Change Fund in 2018. Within the scope of the same programme, the education of various target groups on climate change and measures for the transition

to a low-carbon society was also highlighted, for which the Climate Change Fund planned to earmark (2018) EUR 129,500.

Slovenia is also involved in the Climate Kic network (<u>www.climate-kic</u>); Innovation for climate action, which also includes education.

The 2020–2030 National Environmental Action Programme (NEAP) expects that the principle of sustainable development is established as one of the key principles of education process in Slovenia.

In 2019–2020, the updating of the national guidelines of education - training and education for sustainable development (ESD) from 2017 is foreseen, whereby the points of view of climate change must be updated.

The systematic review of the field of tertiary education, professional education and training and university education are planned to be made within the framework of the LIFE Care4Climate project. Within this project, international summer schools of the political ecology and four research camps on the topic of transition to a low-carbon society and climate change mitigation are also envisaged.

TRAINING

In terms of development, energy and material efficiency in conjunction with sustainable use and local energy supply are the most important segments of modern society. The accelerated development of these fields, based on the growth in the quality of energy services along with a smaller energy input, is one of the fundamental elements of the transition to a climate neutral society and will have a key effect on the competitiveness of Slovenian society in the future. Therefore, it is crucial that we continue to strengthen the already highly developed competences of Slovenian companies in this area. Article 341 of the Energy Act (EZ-1) regulates the implementation of training programmes for independent experts carrying out inspections of air-conditioning and heating systems, and independent experts providing energy performance certificates. Training for regular inspections of airconditioning systems has been conducted by the Laboratory for Heating, Sanitary, Solar and Air-Conditioning Engineering of the Faculty of Mechanical Engineering since 2014. Since 2012, training for experts providing energy performance certificates is also taking place and consists of 4 days of lectures and individual production and presentation of two certificates (calculated and measured).

Since 2008, education for energy managers is carried out in Slovenia under the "European Energy Manager – EUREM" international programme. In terms of the number of energy managers that have completed the EUREM on a per capita basis, Slovenia is the leading country in the European Union. Education activities and training programmes were also conducted (some of them are still being performed) including within the scope of various projects and programmes — for example, the education for engineers and architects in the field of 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 (RDP), which also includes the transfer of knowledge and information activities in the field of agri-environmentclimate content, several different training programmes in the field of Agri-Environment-Climate Payments (AECP), ecological farming and animal welfare have been conducted in recent years. Under the M01.1 submeasure, three public procurement contracts were successfully carried out in 2018 to conduct training in the field of animal welfare, one public procurement for regular education in the field of agri-environment-climate payments and one public procurement for the training within the measure Ecological farming. Since the start of implementing the 2014– 2020 RDP, 20,115 participants have joined the training in the field of agrienvironment-climate payments (preliminary and regular training), 9,753 participants have joined the training in the field of ecological farming, and 14,828 in the field of animal welfare (up to 31 December 2018). Programmes for animal welfare, plans for conversion to organic farming and programmes of activities for farms were also prepared in the ecological farming and agri-environment-climate payments measures.

(M-6) GREEN ECONOMIC GROWTH

Sectors affected by the implementation of the measure: *manufacturing industries and construction, other sectors and transport*

One of the objectives of the OP GHG-2020 is to support the transition to an economy with growth which is not based on the 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 therefore 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 in particular focuses on issues of sustainable consumption and production, supporting innovation and research and reducing subsidies which are contrary to the objectives of reducing GHG emissions.

OP GHG objectives also include the transition of economy based on energy efficiency and reduction of GHG emissions supported by research and innovations. The transition represents an opportunity for green economic growth across sectors: buildings, transport, agriculture, industry and waste. The OP GHG-2020 in particular focuses on issues of sustainable consumption and production, supporting innovation and research and reducing subsidies which are contrary to the objectives of reducing GHG emissions. The transition to a low-carbon economy in all sectors is a high priority objective in the OP ECP for 2014–2020 period, together with the strengthening of research, technological development and innovation. Financial incentives within the scope of the OP ECP, which support the transition to a low-carbon economy – reducing the impact on climate change and the reduction of GHG emissions, which have not been adequately targeted in the past:

- EUR 53 million was earmarked for research and innovations (financial breakdown 2018).
- EUR 86.4 million was earmarked to promote the development of entrepreneurship (financial breakdown 2018)

A new programme for the use of European structural and investment funds for the 2021–2027 period is also being prepared, but has not yet been finalised.

With the help and through close cooperation of all EU members, the EU is seeking a new Green Deal to intensify ambition in the field of reducing the impact on climate change and achieve net-zero emissions through measures and by:

- Forming a more ambitious climate policy;
- Developing a new industrial strategy with an emphasis on clean industry based on the circular economy;
- Providing smart sustainable mobility;
- Greening of agricultural policies;
- Preserving and protecting biodiversity;
- Increasing ambition in the field of achieving zero emissions;
- Providing a sustainable mindset in all EU policies.

At the same time, it is necessary to address energy poverty and ensure clean, safe and accessible energy for all. The Green Deal envisages the implementation of a series of measures based on development and research, which will enable the creation of a net-zero carbon society. In the field of taxes and fees, the greening of tax reforms as well as within the entire public financial system is expected.

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

Sectors affected by the implementation of the measure: *other sectors (energy use in the public sector, service sector and households), transport*

Eco-design requirements for energy related products are defined in Article 327 of the EZ-1; they come from Directive No. 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products. The requirements are transposed to the Slovenian legal order directly with Commission Regulations. Currently there are 28 regulations for products covering a wide range of products and horizontal technologies: electric motors, ventilation units, heating installations, air conditioning units, processes chillers, transformers, commercial refrigerators, household appliances, televisions, lamps and energy consumption in stand-by mode.

The regulations lay down minimum requirements for energy efficiency, and for certain products also other environmental parameters, such as noise, NOx emissions. The regulations are updated regularly. The last adopted regulations also focus on the efficiency of resource use, e.g. through the request for the accessibility of spare parts and information on the repair for minimum number of years, etc.

The requirements for energy labelling of products are defined in Article 328 of the EZ-1, stemming from the Energy Labelling Directive, which was last updated through the Regulation (EU) 2017/1369 establishing a framework for energy labelling8. 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. The first five regulations for products have been renewed recently based on the directive and will enter into force in 2021. Regulations will be updated regularly. Labelling is in force for 16 products. These requirements are also transposed directly to the Slovenian legislation.

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 necessary savings under the mandatory enduse energy-savings scheme.

(M-8) **ENERGY SAVINGS ACHIEVED AT END-USERS THROUGH THE NATIONAL** ENERGY EFFICIENCY OBLIGATION SCHEME FOR ENERGY SUPPLIERS

Sectors affected by the implementation of the measure: other sectors (energy use in the public sector, service sector and households), manufacturing industries and construction, transport

The scheme of the mandatory final energy savings for companies selling energy, established in accordance with Article 7 of the Energy Efficiency Directive (EED)⁹, is governed by the Decree on Energy Savings Requirements adopted in 2014¹⁰. Obliged parties, i.e. all suppliers of electricity, gas, liquid and solid fuels to end-customers, had to achieve energy savings of 0.5% in 2017, and in the following years 0.75% of the energy sold in the previous year.

In 2018, obliged parties achieved a reduction in energy use by 281.9 GWh, which is 12% more than in the previous year. 38% of all savings were achieved in industry, 20% in transport and 18% in the energy transformation, distribution and transmission sectors. The most savings were achieved through the installation of heat

⁸ 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

⁹ 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. ¹⁰ Official Gazette of the Republic of Slovenia, No. <u>96/14</u>

and electricity co-generation systems (22%), followed by adding additives to motor fuel (19%), installation of energy-efficient lighting in buildings (15%) and the exploitation of waste heat in industry (8%). Together, these measures accounted for almost two-thirds of all the savings achieved. Obliged parties exceeded the requirement from *AN URE and* the *Decree* by 12.5%. The reduction of CO₂ emissions achieved through the implemented measures was estimated at 86kt CO₂/year in 2018.

The implementation of the measure will continue in the future. The requirement of achieving energy savings will continue in the 2021–2030 period in accordance with the *Directive (EU) 2018/2002 amending Directive 2012/27/EU on energy efficiency*¹¹ adopted in December 2018.

4.4 Energy supply

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

Sectors affected by the implementation of the measure: *energy industries and fugitive emissions*

In the past, measures have already been taken to modernise the thermal power sector in terms of technology. By 2014, Units 1–3 were permanently shut down in the Šoštanj Thermal Power Plant (TEŠ), in 2015 a new Unit 6 started to operate and will gradually replace the production of all other existing units of the power plant. In 2018, TEŠ Unit 4 also stopped operating. In 2014, the coal unit stopped its operation at the Trbovlje Thermal Power Plant and in 2012 also the Trbovlje Hrastnik Mine, which was the main fuel supplier. In 2008, the Ljubljana Thermal Power Plant (TE-TOL) started co-firing wood biomass and coal (wood biomass replaced 20% of coal). In 2018, Unit 6 was installed at the Brestanica Thermal Power Plant, and Unit 7 started to be constructed in 2019 to replace old Units 1–3. For further reduction of GHG emissions, the following planned measures are crucial:

TEŠ: The Contract on the Arrangement of Mutual Relations between the Government of Republic of Slovenia and Šoštanj Thermal Power Plant from 2012 defines a gradual reduction of GHG emissions, stating an emissions ceiling of annual CO₂ emissions from the units 5 and 6 for the 2016–2054 period. 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. TEŠ Unit 5 is expected to operate until 2030. The NECP envisages gradual abandonment of the use of domestic and imported coal for energy purposes or its reduction by at least - 30% by 2030. The precise timetable for abandoning the use of coal in Slovenia, including shutting down the Velenje Mine and Unit 6 will be determined by the strategy for the abandonment of coal use and restructuring of coal regions according to the principle of fair transition, which will be adopted by 2021.

¹¹ 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.

• TE-TOL: In 2019, the contract was signed for the performance of an investment in the gas steam unit which will replace coal units 1 and 2 in 2022. Unit 3, where co-firing of wood biomass and coal is carried out, will gradually be replaced by the unit on wood biomass.

The main mechanisms for achieving the implementation of the above measures are: GHG emissions trading system (EU ETS), efficient operation of electricity markets, environmental permit requirements relating to air pollutant emissions, support scheme for electricity produced in co-generation of heat and electricity with high efficiency and from RES, ensuring the reliability of electricity supply (the NECP lays down a target that at least 75% of electricity required must be generated in Slovenia) and the possibility of State guarantees in taking long-term loans.

(M-10) PROMOTION OF ELECTRICITY GENERATION FROM RES AND HIGH EFFICIENT ELECTRICITY AND HEAT CO-GENERATION

Sectors affected by the implementation of the measure: *energy industries, manufacturing industries and constructions, other sectors (energy use in the service sector, public sector, agriculture and households)*

The promotion scheme for 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 too slow a development in CHP. As it has been shown over time that the majority of all new entrants into the scheme are represented by the most expensive technologies, the amended Energy Act (EZ-1)¹² in 2014 introduced a full renewal of the support scheme with the goal of managing its costs. Amendments to the 2009¹³ 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 electricity from the new RES generation unit and CHP generation unit, and consequently there were no investments in such devices¹⁴. On 10 October 2016, the European Commission authorised Slovenia to provide State aid to electricity producers from RES and CHP generation units¹⁵. Since the notification of the support scheme expired on 31 December 2019, Slovenia asked for and in August 2019 obtained the consent of the European Commission for extending the operation of support scheme¹⁶ for 6 years, i.e. until the end of 2025.

¹² 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.

¹³ Commission decision SA.28799 Support for production of electricity from renewable energy sources and in co-generation installations, OJ C 285, 26.11.2009.

¹⁴ 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.

¹⁵ Decision State aid SA.41998 (2015/N) – Slovenia, of 10/10/2016, No. C(2016) 6592 final.

¹⁶ Decision State aid SA.54949 (2019/N) – Slovenia, of 9/8/2019, No. C (2019) 5983 final

Since the entry into force of EZ-1, support has been limited to installations with lower thresholds of the nominal capacity (10MW for RES generation units, with the exception of generation units utilising wind power (50MW) and 20MW for CHP generation units). The renewal of the scheme provides support in the form of guaranteed purchase only to installations with a power up to 500kW, while larger installations can only receive operating premium. 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. For the installation to enter the scheme, it must be selected on the basis of an open public call by the Energy Agency (Article 373). The Centre for RES/CHP Support is responsible for implementing the scheme; said centre operates within the organisation of the market organiser, Borzen. In accordance with the EZ-1, the Energy Agency selects projects and decides on their acceptance or refusal to enter the scheme.

EZ-1 also encourages co-generation by introducing the mandatory use of RES, CHP and waste heat in district heating systems (Article 322) (M-11). 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). Additional support for co-generation is also found in Guarantees of origin for electricity 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, fuels used for electricity and heat co-generation are exempt from the payment of excise duty, in accordance to the Excise Duty Act (ZTro-1)¹⁷.

The installation of high-efficiency CHP units is also promoted by the Rules on Efficient Use of Energy in Buildings¹⁸, 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 or if at least 50% of a building is supplied from an energy efficient district heating or cooling system. The efficient co-generation of electricity from RES is also promoted by Guarantees of origin.

In 2017, the CHP support scheme system included installations with the total of 82.4MW of electric power installed, which generate a total of 295GWh of electricity. According to the previous year, the installed power was reduced by 7.9%, primarily as the scheme did not allow new installations to enter. In 2018, the installed power of the included installations was slightly decreased and amounted to 80.8MW while they produced 320GWh of electricity. The reduction in GHG emissions due to the operation of CHP systems on fossil fuels is estimated at 224.3kt CO₂ eq. in 2017 and at 216.3kt CO₂ eq. in 2018.

In 2017, the RES support scheme syste

 ¹⁷ Official Gazette of the Republic of Slovenia, No. 47/16.
¹⁸ Official Gazette of the Republic of Slovenia, Nos. 52/2010 and 61/17-GZ.

m included RES installations with a total of 342.2MW of electric power, which generated a total of 650GWh of electricity, or only 4.9% more than a year before. In 2018, electric power of installations amounted to 329.8MW, which generated 4.8% more than in 2017, i.e. 618GWh. These installations include by far the most solar power plants, with their number having increased dramatically in the 2011–2013 period. In total, in 2017, the installations on RES included in the support scheme contributed to the reduction of GHG emissions by 190.5, and by 183.7kt CO₂ eq in 2018.

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. From the start of the new support scheme in 2016, the Energy Agency announced 5 public calls for the application of projects of electricity generating plants from RES and in CHP for entry into the support scheme, namely in December 2016, September 2017, February and December 2018 and June 2019. Within the scope of each of these public calls, 10 million euros were put in place, i.e. a total of EUR 50 million. 285 projects with a total rated electric power of 325.9MW were selected. The largest number of projects have been selected for the installation of internal combustion engines (30%), followed by solar and wind power plants with 25% or 22%. The maximum rated electrical power foreseen, i.e. twothirds, fell to wind power plants, followed by internal combustion engines with 15%. With projects to build wind power plants selected under a public call in February 2018, it is planned to install nearly 108MW of new rated electrical power, representing one third of the total power of all validated projects. Due to problems in terms of geographical location, it is hard to expect all these projects to be actually launched.

In addition to funds from the support scheme, investment incentives for the installation of co-generation units can also be obtained through calls under Energy efficiency obligation scheme for energy suppliers. The installation of CHP units is also encouraged by the public Eco Fund by providing loans for investments with favourable interest rates.

In 2017, investment subsidies were tendered to promote the construction of new smaller installations for the production of electricity from RES (wind energy and small hydroelectric power plants with a maximum power of 10MW) amounting to EUR 4 million, while in 2019 there were subsidies for the installation of solar power plants amounting to EUR 10 million. The last call will finance operations until 2022 within the scope of the Operational Programme for the Implementation of the European Cohesion Policy 2014–2020 (OP ECP).

In order to increase 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 (RDP), 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.

In Slovenia, there is also potential for further construction of hydropower plants (HPP), e.g. on the lower Sava River (HPP Mokrice) and the middle Sava River. Large HPP have a major impact on the environment, and that is why the NECP plans to implement the following activities in this field: supplementing the regulations for more efficient and sustainable spatial placement of plants, preparing analysis of alternatives and the specificity of hydropower and the necessity of its exploitation to achieve the objective of GHG emission neutrality and ensuring the implementation of applicable programmes, harmonising and supplementing the rules governing and facilitating the implementation of the public benefit procedure in protected areas.

The Decree on Self-supply of Electricity from the Renewable Energy Sources¹⁹ entered into force on 15 January 2016. For households and small business consumers and through the amendment from 2019, including consumer groups and not only owners but also tenants, 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 rated power of the self-sufficient installation must not exceed the 0.8-times the power the of the installed fuses . 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 electricity (kWh) will be read at the same measuring point at the end of the accounting period.

In 2018, 1,302 installations were newly connected to with a total rated power of 13.12MW according to the data of distribution system operator, which is twice as many as in 2017. Together, there are 2,156 installations connected with a total rated power exceeding 20MW. The large majority of connected installations are solar power plants, there are 9 small hydropower plants, and the first wind power plant was also connected in 2018.

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

Sectors affected by the implementation of the measure: *energy industries, manufacturing industries and constructions, other sectors (energy use in the service sector, public sector, agriculture and households)*

¹⁹ Official Gazette of the Republic of Slovenia, No. 97/2015.

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 Implementation of the European Cohesion Policy (OP ECP)²⁰ and the Rural Development Programme (RDP)²¹.

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. In 2019, there was a change in the respective Article, namely the requirements were harmonised with the Directive 2012/27/EU on energy efficiency. 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 50% of heat combination generated from at least two sources referred to in the first three indents. Distributors must meet this obligation no later than by 31 December 2020.

The National Energy and Climate Plan sets out the objective of increasing the share of RES and waste heat and cold in district heating and cooling systems per year by 1% in accordance with the Directive (EU) 2018/2001.

For 2018, the Energy Agency, in terms of energy efficiency, analysed 90 district heating systems still in line with the initial requirements of Article 322 of the EZ-1. There were 52 energy-efficient district heating systems or 58%, which is 3 percentage points less than a year before. Data for 2019 are not yet available.

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. Within the scope of the calls RES district heating systems 2016 (DO OVE 2016) and RES district heating systems 2017 (DO OVE 2017), 14 projects were completed by the end of 2019, 4 projects are in progress, for which 5.9 million euros of grants were earmarked. The total increase in RES production is projected to amount to 21.4GWh. In September 2019, the Ministry of Infrastructure published the third call (DO OVE 2019) for financial incentives to invest in the RES district heating systems (with the maximum power of 10MW) and RES district heating microsystems (with the maximum power of 1MW). The total funds approximately amount to 20 million euros.

²⁰ Operational Programme for the Implementation of the European Cohesion Policy 2014–2020, Government of the Republic of Slovenia, December 2014, <u>http://www.eu-skladi.si/sl/dokumenti/kljucni-dokumenti/op_slo_web.pdf</u>

²¹ Rural Development Programme, https://www.program-podezelja.si/sl/kaj-je-program-razvoja-podezelja-2014-2020

In the Rural Development Programme, 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). Funding will be available in 2020.

The funds to promote the development of systems will also be provided by 2030 in line with the National Energy and Climate Plan. In addition to existing purposes, funds will also be earmarked for the integration of sectors (energy storage devices, "power2heat", etc.)

The Eco Fund provides the possibility to obtain a loan with favourable rates for the establishment or restructuring of installations for CHP and also for construction of a district heating and cooling system.

4.5 Energy Use

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

Sectors affected by the implementation of the measure: *manufacturing industries and construction*

At the beginning of 2020, the National Energy and Climate Action Plan²² was adopted which envisages both sectoral and multi-sectoral measures for the efficient use of energy, the reduction of GHG emissions and the increase in the use of renewable energy sources. The measures provided below are in line with the time frame set by NECP, namely by 2030 with a view to 2040.

Focusing on targeted sectoral measures to encourage EEU and RES measures in industry in general, the following measures may be highlighted: financial incentives in the form of reimbursable grants and non-reimbursable grants.

In the context of financial incentives in the form of reimbursable grants, further strengthening of the promotion of measures in industry (use of best available techniques) and the preparation of targeted support mechanisms, also for promoting energy performance contracting, are envisaged.

Non-reimbursable financial incentives for the EEU and RES in industry are foreseen within the Eco Fund and EU cohesion funding scheme. The expansion of the range of measures, an increase in funds and support activities are foreseen. Financial incentives for EEU and RES for small and medium-sized enterprises, incentives for introducing the energy management systems and loans with subsidised interest rate for environmental investments are also envisaged. In order to reduce process emissions in industry, non-reimbursable financial incentives and the preparation of

²² Integrated National Energy and Climate Plan of the Republic of Slovenia, the Government of the Republic of Slovenia, February 2020

support schemes in connection with incentives for demonstration projects are foreseen; the measure is aimed at the ETS and non-ETS sector and envisaged from 2021 onwards.

Non-reimbursable incentives also include incentives for measures to reduce GHG emissions in industry through the measures of circular economy. The NECP envisages the preparation of a non-reimbursable incentive scheme for measures enabling a transition to a low-carbon circular economy. The existing measures and instruments need to include conditions and criteria of circular management, which is envisaged in 2020. Support for the implementation of pilot projects of circular economy and other incentives to reduce emissions in industry, in line with the new European Green Deal, is foreseen in 2021. New incentives for measures that reduce GHG emissions through a transition to production by introducing new products (lighter products, products with longer life cycle, reuse of products or materials, waste reduction and recycling, replacement of natural gas with synthetic gas or H₂) are also foreseen to be implemented in 2023.

The State promotes energy efficiency and the exploitation of renewable energy sources in industry including within the scope of other fees for energy products, notably through tax policy and different incentives (multi-sectoral or horizontal measures). In 2021, the plan provides for an upgrade of the energy efficiency obligation scheme and the gradual increase of the energy-efficiency contribution for the provision of necessary special-purpose assets for implementing EEU and RES measures. Fiscal incentives for enterprises in the form of relief to carry out investments are envisaged in 2022. An exemption scheme will also be upgraded for the payment of the contribution to provide support for the production of electricity from RES and CHP. Since 2024, only undertakings having their own production of electricity or heat from RES (e.g. at least 5% of the annual electricity demand) will be eligible for this.

In the context of tax policy and standards and regulations, a gradual reduction and abolition of incentives for fossil fuels and thus environmentally harmful incentives are envisaged. To this end, the impact of the abolition of incentives to various sectors (including industry) and public finance will be examined. It is also envisaged to reduce the reimbursement of excise duties on energy products in industry by 2030 (in accordance with the EU legislation) – the condition for reimbursement from 2022 onwards will be the certificate obtained in accordance with ISO 50.001 or ISO 14.001. Appropriations of current incentives will be reallocated to introducing effective green technologies, development of business solutions and creation of new jobs.

Industry will have, and partially already has, a significant role in providing system services, such as provision of heat in the local environment (the exploitation of waste heat) and adaptation of electricity production and consumption. To this end, incentives for efficient district heating systems (the use of waste heat in district heating systems) and incentives for the integration of RES and local adaptation of production and consumption are foreseen.

The NECP is planning at least a 30% share of RES in industry, taking into account the use of waste heat, whereby it also envisages 1.3% of the annual increase in the share of RES in heating and cooling in industry, including waste heat and cold, which is in line with the requirements of Article 23 of the recast Directive (EU) 2018/2001 on the promotion of the use of RES.

The establishment of appropriate incentives or economic signals is essential for the network integration of RES and the local adaptation of production and consumption and the participation of industrial undertakings in system services. Such incentives are foreseen in 2021. In addition to the aforementioned, incentives (technical and personnel support) are also foreseen to promote local energy communities and RES communities in which the industry may also be involved. In 2021, analysis and removal of legislative barriers for the development of energy and RES communities, development of financial instruments and support for the preparation of major joint projects at locations with greater use of electricity are foreseen. The promotion of investments in technologies for the conversion of excess electricity generated from RES and the integration of energy storage networks with transformation is envisaged in 2022, namely within the framework of the European Regional Development Fund.

Provision of energy suppliers' obligations to achieve final energy savings at end consumers continues, while the upgrade of the instrument implementation is foreseen. To this end, it is necessary to continue improving the monitoring of the implementation of the scheme and ensure the conditions for its stable operation. The revision of the method for calculating energy savings is also planned in order to eliminate irregularities which could cause unrealistic high savings and therefore low price on the market.

Industry is an important consumer of natural gas, since it uses more than 75% of the total final use of natural gas in Slovenia. To decarbonise gas supply, the NECP foresees developmental incentives for early implementation of pilot projects for the following technologies: Power 2 gas, injecting biogas and for the construction of units for the production of gases of renewable origin in the natural gas network. To this end, it will be necessary to analyse and enforce the incentive tax and excise duty policies to promote decarbonisation in gas supply (foreseen in 2021); prepare a regulatory and supporting environment for the gases of renewable origin (foreseen in 2022) and set out the target shares of gas from RES in the network by 2030 (foreseen in 2024).

The NECP envisages development support for the introduction of new green technologies and technological restructuring of enterprises through incentives for a transition to a climate neutral society. The key will be to increase the volume of funds and ensure the predictability and continuity of instruments also in the future financial period.

Financial incentives for demonstration projects will represent a fundamental framework for promoting innovation in industry. According to the NECP, demonstration projects in the field of EEU, RES, the solution for the transition to the

climate neutral and circular economy and other measures of reducing GHG emissions in industry will be supported. It is planned to prioritise the promotion of projects for exploiting waste heat, production and use of low-carbon fuels (synthetic gas, H₂, recycled carbon fuels etc.), production of geothermal electricity, cascading use of heat and cold, EEU measures, smart networks and communities, measures to improve material efficiency and exploitation of RES in industry.

Some industrial sectors will also play an important role in the energy exploitation of waste in accordance with the Waste Management Plan and the Waste Prevention Programme. In 2020, the NECP envisages the production of more detailed energy balance of waste in Slovenia and waste energy potential and to carry out at least two pilot projects of processing waste into synthetic fuel. A review of the classification of waste from the wood-processing industry and waste from wood-cutting products is also planned in order to use the waste as energy material and exploit these materials in Slovenia.

The necessary public financial resources to implement measures are one of the key conditions for achieving the targets for renewable energy sources and efficient use of energy in industry. The total scope of the necessary incentives for industry (without additional funds for research and innovation) is estimated to be around 0.4 billion euros according to the NECP.

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

Sectors affected by the implementation of the measure: *other sectors (energy use in the 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: The Action Plan for Nearly Zero-Energy Buildings Up to 2020 (AN sNES)²³ 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)²⁴ by way of which Slovenia has set a goal to significantly improve the energy efficiency of buildings. In February 2018, the Amendment to the Long-Term Strategy for Promoting Investments in the Energy Renovation of Buildings²⁵ was adopted and identified the fields which are already addressed in the existing LTSERB, but in the course of the implementation of the strategy it has been found that they need to be more specifically addressed and upgraded. The areas of quality management, financial instruments design and the issue of a moderately developed energy contracting market were exposed as critical.

 ²³ Action Plan for Nearly Zero-Energy Buildings Up to 2020 (AN sNES), Government of the Republic of Slovenia, April 2015
²⁴ Long-Term Strategy for Promoting Investments in the Energy Renovation of Buildings, Government of the Republic of Slovenia, October 2015

²⁵ Amendment to the Long-Term Strategy for Promoting Investments in the Energy Renovation of Buildings, Government of the Republic of Slovenia, February 2018

In May 2015, the Energy Efficiency Action Plan 2014–2020 (AN URE 2020)²⁶ 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 the 2017–2020 period (AN URE 2020)²⁷. A renewal of the Rules on Efficient Use of Energy in Buildings with a Technical Guideline (PURES) is planned for 2020, together with the accompanying technical guidelines.

In February 2020, the Integrated National Energy and Climate Plan of the Republic of Slovenia²⁸ was adopted which lays down objectives, policies and measures in the field of buildings by 2030 (with a view to 2040). At the end of 2019, the Republic of Slovenia has started to prepare the Long-Term Climate Strategy, which provides the main guidelines and vision in individual sectors by 2050. The vision of both documents is approximately net-zero emissions in the buildings sector by 2050 by maintaining a high level of energy renovations of buildings, by converting the heating systems to centralised heating systems and RES technologies. The renovations and new constructions are directed towards achieving almost zero emissions in their life cycle and other construction and renovation objectives. Sustainable renovations of buildings will be encouraged, i.e. to renovate a building from other aspects as well (e.g. earthquakes, fire, radon). The NECP sets the objective of reducing the use of final energy in buildings by 20% by 2030 compared to 2005 and reducing the emissions by at least 70% in the same period.

One of the supporting documents of the NECP is the Long-Term Strategy for Supporting the Renovation of Buildings by 2050, where a more detailed timeline with measures and progress indicators at the national level will be defined, namely to ensure a long-term reduction in GHG emissions to provide a high energy efficient and decarbonised national building stock and to contribute to the cost-effective transformation of existing buildings into almost zero-energy buildings. The timeline will contain framework milestones for 2030, 2040 and 2050 and explain how these milestones contribute to the achievement of the Union's energy efficiency targets in accordance with the Directive 2012/27/EU. The document is expected to be adopted in the second half of 2020.

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 the integrated planning of buildings, residential quarters and settlements within the scope of spatial planning;

²⁶ Energy Efficiency Action Plan 2014–2020, Government of the Republic of Slovenia, May 2015

²⁷ Energy Efficiency Action Plan 2017–2020, Government of the Republic of Slovenia, December 2017

²⁸ Integrated National Energy and Climate Plan of the Republic of Slovenia, the Government of the Republic of Slovenia, February 2020

- 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 existing building or its individual part;
- 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 the field of buildings, 2 pilot projects were completed by the end of 2018 within the OP ECP, namely the pilot project of energy renovation of a public building with characteristics of almost zero-energy building (Energy retrofit of the Bohinj Centre for School and Outdoor Education) and the pilot project involving a larger number of buildings or a complex of buildings (Energy retrofit of a complex of three court facilities in Celje, Slovenj Gradec and Murska Sobota). In the period 2019–2020, 2 pilot projects are being carried out, namely the pilot project of integrated energy retrofits with several operators following the principle of public-private partnerships (JZP) (Šmarje pri Jelšah) and the pilot project of energy retrofits of five buildings of the cultural heritage of the Ministry of Culture.;
- a support scheme for the renovation of 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));

(M-14) PROMOTION OF EFFICIENT ENERGY USE AND RENEWABLE ENERGY SOURCES IN HOUSEHOLDS

Sectors affected by the implementation of the measure: *other sectors (energy use in households)*

The main measure for promoting energy efficiency and use of renewable energy sources in households continue to remain financial grants allocated by the Eco Fund for such investments in one-apartment and two-apartment buildings since 2008, and since 2009 for multi-apartment buildings. The 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 Change Fund are also made available by the Eco Fund in said tenders. The set of calls for EEU and RES measures in households has been extended slightly over the last period by the Eco Fund, namely with a call to replace old combustion installations in joint boiler rooms of multi-apartment buildings in 2017, calls for new joint investments in higher energy efficiency of old multi-apartment buildings or buildings with three or more individual parts in 2016 and 2019 and a call for almost

zero-energy buildings in 2019. In total, EUR 41.3 million of Eco Fund grants in the 2017–2018 period funded investments in households with a value of EUR 216.3 million, which resulted in an annual reduction in final energy consumption by 303GWh, and CO₂ emissions by 38kt.

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 energy efficiency obligation scheme for energy suppliers (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).

Implementation of all the mentioned measures will continue in the future. In 2019, 5 calls under the Eco Fund were opened for households, namely for EEU measures and RES use (74SUB-OB19), for almost zero-emission buildings (73SUB-sNESOB19), for new joint investments in higher energy efficiency of older buildings with three or more individual parts (67SUB-OBPO19), for socially disadvantaged citizens for the replacement of combustion devices on wood biomass with new ones (69SUB-SOCO19) and for the replacement of old combustion devices in joint boiler rooms of multi-apartment buildings (48SUB-SKOB17). In total, 28.8 million euros of grants were provided for within these calls. In 2020, the Eco Fund provides for up to EUR 15 million of grants from contributions to implement EEU and RES measures in residential buildings, while drawing funds from the Climate Change Fund available from the previous year²⁹. In addition, some of the sources to increase efficient energy use in households are also envisaged in the framework of the OP ECP. Within the scope of the invitation to co-finance the energy retrofits of residential buildings under the integrated territorial investment (ITI) from 2017, more than EUR 1.5 million of grants were allocated for 8 projects, and approximately EUR 400,000 will be allocated for the same purpose in 2020. Initially, 11.8 million euros was earmarked for this measure, and with a change in the ECP OP, the remainder of the funds, approximately 9.8 million euros, was transferred to the sustainable mobility measure, also within the scope of implementing ITI. In order to implement measures in 500 households facing the problem of energy poverty, EUR 5 million of funds are foreseen in the OP ECP. The initial pilot call for the implementation of EEU measures in 100 households with low income amounting to EUR 1 million will be made in 2020. Within the scope of the OP ECP, the implementation of a pilot project for integrated energy retrofits of multi-apartment buildings according to the criteria of nearly zero-energy renovation is also planned. Annual energy savings are projected to increase by more than 100GWh 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

²⁹ Business and Financial Plan of the Eco Fund for the year 2020, January 2020 (<u>https://www.ekosklad.si/informacije/o-skladu/poslovni-nacrt/poslovni-in-financni-nacrt-za-leto-2020</u>)

renovation projects for vulnerable groups of population. Under this scheme, the Eco Fund has earmarked EUR 100,000 from the Climate Change Fund for reducing energy poverty in 2019**Napaka! Zaznamek ni definiran.**, and will start to implement the already mentioned project within the scope of OP ECP in 2020.

In addition to the NECP 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 EFFICIENT ENERGY USE AND RENEWABLE ENERGY SOURCES IN THE PUBLIC SECTOR

Sectors affected by the implementation of the measure: *other sectors (energy use in the public sector)*

In the 2017–2018 period, EEU and RES use in the public sector was promoted mostly by grants for energy renovation of buildings provided from the Cohesion Fund within the scope of the OP ECP. By the end of 2018, a total of 9 tenders for energy efficiency improvements in building, in particular those used by municipalities, buildings of the wider and narrower public sector. In total, almost EUR 113 million were available within these tenders, while almost EUR 42 million were approved for 69 projects. By the end of 2018, 37 projects were carried out, with which a reduction in final energy use was achieved by 18GWh, and CO₂ emissions by 5.4kt. At the same time, pilot projects in the field of public buildings are also carried out within the scope of the OP ECP. By the end of 2018, two projects were completed, which contributed to a reduction in the final energy use by 0.9GWh, and CO₂ emissions by 0.3kt per year, while 2 projects are in progress.

In 2019, new calls for energy retrofits of buildings were published within the OP ECP. EUR 17.6 million of grants are provided for co-financing energy retrofits of buildings owned and used by municipalities. EUR 3.7 million was allocated to six projects. EUR 14.1 million was provided for the energy retrofitting of buildings of the wider public sector owned by the State, and a total of EUR 1.8 million was allocated to two projects and EUR 7.6 million for the buildings of the narrower public sector. In the context of all tenders, private funding may be provided by beneficiaries themselves or in combination with a private partner in the event of energy contracting and projects must be completed by the end of September 2021. New tenders or calls to tender for these purposes will also be published in 2020. In order to improve the drawing of cohesion funds for the energy renovation of buildings of the wider and narrower public sector, the call for co-financing of the preparation of documentation for the renovation from the funds of ELENA technical assistance was published in 2019. Almost 1.6 million euros of grants were available. A new call will be published in 2020. The OP ECP envisages that the annual use of primary energy in

buildings of the public sector by 2023 is reduced by 113.7GWh due to energy renovation of 1.27 million m² of area surface³⁰.

The funds for EEU measures and RES use in the public sector in the 2017–2018 period were also earmarked by the Eco Fund. In the framework of the public call for tenders for municipalities for new investments in the construction of almost zero-energy buildings of general social interest from 2016, EUR 5.6 million was earmarked for 11 investments in the 2017–2018 period. At the end of 2017, the public call for new investments in RES use and higher energy efficiency of buildings owned by the public sector was published. In 2018, 15 projects were supported by the EUR 159,000 of grants. In total, projects within the scope of both calls achieved a reduction in energy use by 2.6 GWh and in CO₂ emissions of 0.7 kt annually.

In 2019, two calls of the Eco Fund were opened for the public sector. Within the scope of the first call, EUR 17 million in the form of grants has been allocated again to municipalities for constructing almost zero-energy buildings of general social interest, while the other call is intended for new investments in EEU measures and RES use, which are also implemented by legal persons in addition to local communities. EUR 7 million of grants is provided. It is planned that similar invitations to tender will be also published in 2020, namely EUR 6 million of grants will be earmarked for constructing almost zero-energy buildings, and EUR 5 million for EEU measures and RES use including legal persons³¹. Grants for these calls are provided from a contribution paid per energy use in order to increase energy efficiency. Moreover, the public sector can also obtain favourable Eco Fund loans for the implementation of the EEU measures and the use of RES, while the measures in this sector are also implemented under the energy efficiency obligation scheme.

In the period up to 2020, the Eco Fund, in the scope of energy efficient obligation scheme, and ERDF programmes will continue to provide the public sector with subsidised loans and grants. 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 of 1.8 million m² of surface area, the annual energy consumption on the part of the public sector is expected to reduce by 240GWh 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

³⁰ OP ECP, 3rd Amendment, 4.1

⁽https://www.eu-skladi.si/sl/dokumenti/kljucni-dokumenti/programme_2014si16maop001_4_1_sl.pdf) ³¹ Business and Financial Plan of the Eco Fund for the year 2020, January 2020 (<u>https://www.ekosklad.si/informacije/o-skladu/poslovni-nacrt/poslovni-in-financni-nacrt-za-leto-2020</u>)

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 a greater effect of public funds invested in energy renovation of public buildings in the period leading to 2030, an important measure will be promoting energy-performance contracting, ensuring the distribution of risks and a suitable leverage in the financing of such projects, which is highlighted already in NECP, and even more by the new LTSERB. The LTSERB promotes the establishment of 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 the broader and narrower public sector. 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 Infrastructure³².

In accordance with the EED³³, 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 m² 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 the EZ-1; a decree where the Government defines who has to setup energy management system and minimal content of it was adopted in 2016³⁴. The energy management system is obligatory for buildings with a useful floor area of more than 250m², 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 the 2017– 2018 period, the Ministry of Infrastructure established a system of energy accounting for public sector buildings, where energy suppliers send reports by the end of March for the previous year. The field of green public procurement is governed by the Decree on Green Public Procurement³⁵, which was revised in 2017. The green public procurement is mandatory for 20 subject-matters of public procurement, e.g. electricity, heating installations, lighting equipment, road design and construction, etc. The Decree does not set out environmental requirements but determines the

³² Guidelines for Implementing Measures Aiming at Energy Efficiency of Public Sector Buildings Following the Principle of Energy Performance Contracting, Ministry of Infrastructure, December 2013.

³³ EU Directive on Energy Efficiency (2012/27/EU)

³⁴ Decree on energy management in the public sector (Official Gazette of the Republic of Slovenia, No. 52/16)

³⁵ Decree on green procurement: Official Gazette of the Republic of Slovenia No. 51/17, 64/19

environmental aspects that must be taken into account when awarding public contracts and objectives to be achieved in each public procurement procedure for certain subject-matters.

4.6 Use of energy in transport

(M-16) PROMOTION OF PUBLIC PASSENGER TRANSPORT

Sectors affected by the implementation of the measure: transport

Policies and measures for the promotion of public passenger transport are included in the following documents: Strategy³⁶, Programme for the Development of Transport in the Republic of Slovenia³⁷ and NECP.

Public passenger transport (PPT) in Slovenia is governed by the Road Transport Act³⁸ and Railway Transport Act³⁹. In 2019, there were amendments introduced to the Road Transport Act governing the conditions for introducing a single ticket, free transport for students with disabilities, the inclusion of categorised athletes to the subsidised ticket system, the determination of dedicated funds for single ticket and an extension of the existing system of concessions for the implementation of public passenger transport. Slovenia provides the basic needs for connectivity and the mobility of the population in its territory through an economic public service for regular public transport. The State provides financial compensation for providers if the costs of transport are not covered by the sale of tickets. At the same time, the State provides subsidies for pupils and students.

The Ministry responsible for transport has introduced an electronic single ticket under the Integrated Public Passenger Transport project (IJPP). The electronic single ticket enables the use of one electronic card for different modes of public transport and different carriers throughout Slovenia. Important for combining these services was the coordination of timetables between different carriers and modes of transport. The system was introduced in 2016 for pupils and students, and extended to all users in 2019, namely by introducing monthly anonymous single tickets and daily and weekly single tickets. In 2020, the introduction of a personal monthly single ticket is also planned, which will be more affordable. In 2019, the new fast lines between large cities in the country were introduced. The establishment of a public passenger transport system operator is envisaged to take care of the coordinated development of the PPT. A website or mobile app is also foreseen which will enable the purchase and validation of tickets, as well as obtaining information on PPT in one place, as well as other possible modes of transport.

³⁶ Transport Development Strategy of the Republic of Slovenia by 2030

 ³⁷ Resolution on the National Programme for the Development of Transport of the Republic of Slovenia until 2030 (ReNPRP30)
³⁸ 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, 67/19}

³⁹ 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)

Within the framework of the Operational Programme for the Implementation of the European Cohesion Policy for the period 2014–2020 (OP-ECP), the funds were earmarked for the construction of the park and ride parking lots at the personal vehicle-public transport transfer points. In 2019 and 2020, the funds will be earmarked for improving the PPT infrastructure, and additional funds will be awarded through the Integrated Territorial Investments mechanism (ITI). To encourage municipalities in establishing an effective public passenger transport system and promote its use, calls will be aimed to arrange infrastructure covering renovation, upgrade and new construction in the field of railway and bus systems and multimodal passenger nodes involving the integration of micro-mobility. The NECP provides further incentives for the introduction of new public passenger transport schemes, and also foresees drawing up a strategy for the development of public passenger transport.

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. In 2019, a study of regional railway lines was introduced laying down measures to improve rail passenger transport. Among its measures, the NECP envisages upgrading regional lines for passenger transport, development of stations, introducing a digital platform to link all possibilities of public transport, and fleet renewal. A major step in the fleet renewal will be made in 2020 and 2021 when 54 new passenger carriages will be put into operation.

Within the ministry responsible for transport, a directorate 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, sustainable mobility and transport policy.

The Ministry prepares a new sustainable mobility act to also regulate the area of public passenger transport, namely from the perspective of PPT management and planning, integration with other modes of sustainable mobility, a stable source of financing measures to promote PPT, the harmonisation of timetables, defining standards of PPT accessibility, arrangement of PPT lines, legalisation of yellow lanes.

(M-17) SUSTAINABLE FREIGHT TRANSPORT

Sectors affected by the implementation of the measure: transport

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 and also in the NECP. The strategy has the following objectives: to establish efficient railway transport (the electrification of the whole Slovenian railway network, modernisation, upgrades and newly-built facilities for higher speeds and load capacities) 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 transit cargo from the roads to the railways were accepted by the Transport Development Strategy in the 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. Priority is given to the provision of TEN-T standards in the Slovenian corridor network.
- 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

The most recent 6-year plan of investment in transport and infrastructure as an implementing document of the programme envisages additional activities in the field of railway infrastructure in relation to the transport development programme, particularly in the area of regional lines, urban nodes and upgrading stations. In the 2020–2025 period, an estimate of EUR 1,669 million is foreseen to be spent in the railway infrastructure.

The NECP also contains the measure to improve railway infrastructure and the measure to improve road freight transport (increase the load capacity of goods vehicles, provision of road infrastructure standards, use of e-tolling system as a tool for transport management), and other measures promoting co-modality (inclusion of external costs into tolls and other taxes, modernisation and development of intermodal transport units, studying and introduction of tolling policy with a view to redirect transport flows to railway).

Foreseen measures on railways by 2030 will allow railway freight and passenger transport to almost double.

Slovenia is highly exposed to transit transport due to its position at the crossroads between the 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 longterm solution to the problem is possible only by redirecting goods transport from the roads to the 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 recent years, the share is around one quarter.

(M-18) PROMOTION OF INCREASE IN VEHICLE EFFICIENCY, ENERGY-EFFICIENT DRIVING, HIGHER VEHICLE 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 reduce CO₂ emissions per kilometre for new vehicles,
- 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 the first binding targets for average CO₂ emission for new cars. Pursuant to the Regulation 443/2009⁴⁰, emissions should not exceed 95g/km after 2021. Pursuant to the Regulation 2019/631, CO₂ emission of new cars must be reduced by 15% by 2025, and by 37.5% by 2030 compared to 2021. This Regulation also introduces targets for light goods vehicles, namely reducing their emissions by 15% by 2025 and by 31% by 2030 compared to 2020. By 2020, the targets for light goods vehicles have been set out in the Regulation 510/2011. The target of 147 gCO₂/km applies for 2020. In 2018, average emissions from new passenger vehicles in Slovenia amounted to 120g CO₂/km. Due to a large difference between factory data regarding emissions and fuel consumption and real life values, a new measurement standard has been introduced, i.e. WLTP. The new standard entered into force in September 2018 for all newly registered vehicles. From 2021, the European Commission will collect data on actual emissions and compare them to measurements in laboratories.

For heavy goods vehicles, the EU also adopted targets for CO₂ emissions in Regulation 2019/242 in 2019. The target for 2025 is to reduce emissions by 15% relative to the reference emissions in the period 1 July 2019 - 1 June 2020, and by 30% in 2030. Pursuant to the regulation, the targets currently apply for large lorries, while in 2022 the Commission will propose, along with the assessment of the measure, the extension to other heavy goods vehicles, including buses.

⁴⁰ 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.

Informing and awareness raising is mostly carried out through labelling the fuel consumption of passenger vehicles. Slovenia transposed Directive 1999/94/EC⁴¹ relating to the availability of consumer information on efficient fuel consumption and CO₂ emissions into the Slovenian legal order through the Decree on consumer information on fuel economy and CO₂ emissions of ambient air pollutants in respect of new passenger cars (Official Gazette of the Republic of Slovenia, No. 24/2011), which replaced the applicable decree from 2010. 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 abovementioned, they must also prepare a manual on efficient fuel consumption and CO₂ emissions.

The Decree on Green Public Procurement (Official Gazette of the Republic of Slovenia, No. 51/2017/64/2019) 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 CO₂ 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 CO₂ emissions^{42,43}. The proposal of a new Act has been submitted to public discussion, but so far a progressive taxation is too mild. The annual duty for the use of road vehicles is determined by the vehicle's engine capacity, whereby electric vehicles are exempted from duty. The NECP envisages a change in the Motor Vehicles Tax Act to include more progressive taxation with regard to CO2 emissions, as well as to introduce progressivity according to CO₂ in the annual road use charges.

PROMOTION OF ENERGY-EFFICIENT DRIVING AND HIGHER 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.

Tips for energy efficient driving are already included in driving lessons. The NECP envisages the development of new innovative approaches to promote energy efficient driving: new mobile apps monitoring efficiency, examination of the

⁴¹ 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. ⁴² 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. ⁴³ Taxation applies to vehicles designed primarily for the transport of people (up to 10 people).

possibilities for lowering the permitted speed on motorways, and incentives for insurance or deletion of penalty points.

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. These measures are also stated in the NECP in addition to providing system support for car-pooling. The measures in this field should also be included in the new Sustainable Mobility Act.

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). Measures are envisaged to provide the appropriate charging infrastructure for electric vehicles, and compressed or liquefied natural gas 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 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, and by providing subsidies for buying a vehicle. In 2020, the Eco Fund reduced the amount of the subsidy from EUR 7,500 for the battery electric vehicle (BEV) to EUR 6,000, while the subsidy for a light goods vehicle is EUR 4,500. Subsidies are also available for vehicles of L category. The NECP foresees that subsidies will gradually decrease until 2025, when they are supposed to be abolished. In addition, the NECP envisages to introduce higher subsidies if an old car is deregistered. In 2020, EUR 3 million of assets are available for subsidies to citizens.

The Eco Fund also encourages the purchase of buses that run on alternative fuels. In 2019, the Eco Fund opened a tender on grants for the purchase of electric and hybrid buses and buses on compressed or liquefied natural gas from the budget of the Climate Change Fund.

The Eco Fund also opens 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 addition, the Eco Fund also encourages the establishment of charging stations for electric vehicles in protected nature areas and Natura 2000 areas. The co-financing of smart charging stations is also envisaged as part of the OP ECP.

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.

In Slovenia, the Decree on renewable energy sources in transport (Official Gazette of the Republic of Slovenia, No. 64/16) has been 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 10.0% 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 2015/1513, 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. The NECP sets an objective for biofuels in transport for 2030 at 11%⁴⁴, whereby the share of advanced biofuels must be increased in accordance with the EU Directive 2018/2001. The target share of RES in transport equals 21% according to the NECP. In 2018, the share of RES in transport was 5.5% in Slovenia.

(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 Infrastructure Agency . Incentives for the arrangement of cycling infrastructure (stands and canopies for bicycles, cycling routes, etc.) are planned from the European Cohesion Policy funds in the 2014–2020 period through calls for sustainable mobility measures (2017-2020), the CTN mechanism (2017–2023) and agreement for the development of regions (2017–2023). Since 2018, funds for cycling infrastructure are also earmarked from the Climate Change Fund. Measures

⁴⁴ The share of biofuels in the consumption of liquid fuels in road and railway transport without LPG

that encourage cycling have also been defined in comprehensive transport strategies that are a condition to receive grants. The Ministry of Infrastructure, Slovenian Infrastructure Agency and Company for the Development of Infrastructure are implementing a project for marking the cycling network based on the Rules on bicycle connections adopted in 2018 (Official Gazette of the Republic of Slovenia, No. 29/18).

The NECP envisages further promotion of the construction of the cycling infrastructure and preparation of a national cycling strategy.

In 2011, the bicycle rental system called BicikeLJ was introduced in Ljubljana, the capital of Slovenia. At the end of 2019, the system provided 790 bicycles to be rented from 79 bicycle stations. On average, every bicycle in the BicikeLJ system was used 8 times in one day. Smaller bicycle rental systems also operate in towns such as Velenje, Šoštanj, Ravne na Koroškem, Jesenice, Kranj, Piran, Murska Sobota 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.

Within the scope of public tenders for the award of funds, the funds are also intended for pedestrians, namely for sidewalks, footpaths, joint traffic area, mixed paths for pedestrians and cyclists, footbridges, elevators. Funds are available within the scope of the OP ECP, CTN and also the Climate Change Fund. The NECP envisages the implementation of this measure in the future financial period.

(M-20) DEVELOPING INTEGRATED TRANSPORT STRATEGIES IN MUNICIPALITIES

Sectors affected by the implementation of the measure: transport

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

For drawing up integrated transport strategies, resources were available within the framework of the OP ECP and also through the Eco Fund. In 2017 and 2018, 80 municipalities drafted the respective strategies.

A platform for sustainable mobility has been established, which is the support service to the Slovenian municipalities, regions and institutions for disseminating content/information/publications for an integrated transport planning, cycling, walking, P + R hubs, etc.

Further activities in the field of transport planning in municipalities take place within the framework of the LIFE IP Care4Climate project, under which the platform for sustainable mobility will be upgraded, and the guidelines for the preparation of integrated transport strategies will be reviewed and potential sources for financing the ITS measures will also be examined. Municipalities must have an adopted ITS to receive State or EU funds for other measures of sustainable mobility.

The Sustainable Mobility Act is being prepared and will also cover the field of planning and drawing up strategies of sustainable mobility (e.g. ITS). The respective act could prescribe a mandatory ITS preparation for large cities/municipalities/regions and incentives for small municipalities, the obligation to implement long-term sustainable urban mobility measures for municipalities, a commitment to regional transport planning (regional ITS) and inter-municipal cooperation in preparing strategies and measures.

4.7 Industrial Processes

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-gas 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 the devices containing F-gases for reducing leakage and safe handling of F-gases.

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.

(M-22) REDUCTION IN EMISSIONS OF F-GASES 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 14/6/2006) 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.

4.8 Agriculture

In January 2020, the Resolution on the National Programme on Strategic Orientations for the Development of Slovenian Agriculture and Food Industry "Our Food, Rural and Natural Resources 2021" (ReNPURSK) was adopted by the National Assembly of the Republic of Slovenia. Four harmonised fields in terms of content include the Sustainable and competitive production and processing of food and Sustainable management of natural resources and the provision of public goods. Within the framework of the field Sustainable and competitive production and processing of food, priority topics are determined that provide food safety and production of safe, quality and affordable food. Sustainable management of natural resources and the provision of public goods also includes prioritising the mitigation of climate change and respective adaptation. Achieving two important objectives of the resolution, namely ensuring food safety and reducing greenhouse gas emissions, can only be achieved by reducing emissions per unit of produced food. Other environmental and socio-economic objectives must also be taken into account. In order to achieve the objectives of the resolution, an effective transfer of knowledge into practice and quicker implementation of modern farming processes with low greenhouse gas emissions are important. The "Our Food, Rural and Natural Resources 2021" resolution recognised a weakness in the agricultural system of knowledge and innovation. In order to improve the situation, a horizontal objective called Strengthening of knowledge building and transport was formed.

(M-23) INCREASE IN THE EFFICIENCY OF DOMESTIC 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 methane and nitrogen released 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 area for improvement in this sector, and these possibilities can only be used by training producers about the ways of 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; 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) PROMOTING BREEDING METHODS WITH LOW EMISSIONS

Sectors affected by the implementation of the measure: agriculture

Greenhouse gas emissions can be reduced through breeding methods. This includes mainly pasture grazing of grass-feeding animals and the production of biogas from livestock manure. Both breeding methods reduce emissions from the storage of livestock manure.

By cattle pasture grazing, emissions of methane generated by the storage of livestock manure are avoided. Pasture grazing also contributes to a reduction in emissions due to the use of fossil gases in the harvesting and transport of foodstuffs for animals in indoor 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 (AECP) 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 (Animal Welfare).

By producing biogas from livestock manure, we avoid emissions of methane from the storage of livestock manure and reduce ammonia emissions and thereby indirect emissions of nitrous oxide. Within the framework of the Investments in Physical Assets of the Rural Development Programme, it is possible to co-fund the construction of biogas plants, but the option has not been exploited so far.

(M-25) RATIONAL FERTILISATION OF AGRICULTURAL PLANTS WITH NITROGEN

Sectors affected by the implementation of the measure: agriculture

Efforts in this area are directed into more efficient use of mineral and livestock manure. 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 livestock manure. 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 (RDP 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 Sodelovanje (in English Cooperation).

4.9 Waste

(M-26) REDUCTION OF LANDFILLED BIODEGRADABLE WASTE

Sectors affected by the implementation of the measure: waste management

The quantity of biodegradable waste in Slovenia was almost zero in 2017.

In 2018, the European Commission adopted a new legislative package in the field of waste, which contains five directives. The package also includes amended legislative proposals on waste with ambitious targets: the EU's common goal in the field of recycled municipal waste by 2025 is 55%, 60% by 2030 and 65% by 2035, and a binding target of reducing the amount of waste that ends up at landfills to a maximum of 10% of municipal waste by 2035. The EU has also taken important steps in the introduction of the circular economy. According to the action plan in 2015, a new strategy for plastic within the circular economy was adopted in 2018, and, in 2019, the Directive 2019/904 on the reduction of the impact of certain plastic products on the environment, which sets the targets regarding recycling bottles (30% by 2030) and 25% by 2025 for PET bottles. It also lays down the objective that 90% of bottles should be collected separately up to 2029. The biodegradable waste collection will be mandatory from 2025.

The main measures, which in the past contributed to reducing the quantities of landfilled 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 share of separately collected waste between municipalities are large; that is why the aim here would be to transfer the good practices of municipalities with good results to less successful

municipalities. The separate collection of biodegradable waste has been compulsory since July 2011. 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 EU objectives. 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 minimum quantities of deposited biodegradable waste:

- raising taxes on disposing of waste on landfills 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" principle 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.

(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.

(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 2017, 4.0kt of methane was captured, which is 21% of the methane generated by landfills. Landfill gas is mostly used for generation of electricity.

(M-29) IMPROVEMENT OF WASTE WATER MANAGEMENT

Sectors affected by the implementation of the measure: waste management

The Directive 91/271/EEC concerning urban waste-water treatment binds Slovenia to arrange the urban waste-water management. For this purpose, the Republic of Slovenia is adopting the Operational programme for the discharge and treatment of urban waste water (hereinafter: Operational Programme), which is in the final stage of adoption and it is foreseen to enter into force in 2020. The Operational Programme is one of the key implementing acts for achieving targets of water protection against pollution through discharge of the urban waste water. The Operational Programme lays down measures to comply with the fitting requirements and to improve the level of infrastructure equipment for the discharge and treatment of urban waste water. The main objective of the measures set out in the Operational Programme is the gradual reduction in methane emissions from urban waste water. The programme envisages various measures to achieve the necessary objectives, namely:

- Gradual increase in the population's connection to well-operated public sewage systems.
- Due to the expansion of the public sewage system, the number of septic tank systems that have a significant impact on methane emissions and surface and underground water pollution is reduced.
- The extension and improvement of the public sewage system helps to eliminate poorly managed sewage systems; the greatest emphasis in the concrete measure is on the last element of the sewage system, i.e. the urban waste water treatment plant. The measure provides for improvements and upgrading of wastewater treatment plants.

In the 2018–2028 period (period of the Operational Programme), the abovementioned measures could increase the number of connections to well-operated public sewage systems from 61% in 2017 to 100% by 2028. At the same time, the share of septic tanks will gradually decrease from ~33% (2017) towards 0% (by 2028). Septic tanks that will "drop off" from the measures due to unjustified investment will be dealt with by an individual small urban wastewater treatment plant (complying with the regulation and therefore qualifying as well-managed systems). The final aim of the measures is that the majority of urban wastewater is collected and properly processed in urban wastewater treatment plants, where all methane emissions generated in the treatment of urban waste water is captured and then used in cogeneration plants for the production of electricity and heat or flared.

4.10 Forestry

(M-30) Sustainable Forest Management and CO_2 emissions sinks

Sectors affected 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 CO₂ in recovered wood products (HWP) also contributes to the reduction of emissions. energy through 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 of the Resolution on the National Forest Programme (ReNGP) adopted in 2007. One of the ReNGP'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 2020⁴⁵ 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 2011–2020⁴⁶). 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 m³ of wood may be felled (75% forest growth per year), without endangering the stability of the forests, their habitats and other functions.

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.

⁴⁵ 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.

⁴⁶ 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 legally based on the Act on Forests and the Resolution on National Forest Programme (Official Gazette of the Republic of Slovenia, No. 111/07).

Within the scope of the LIFE Care4Climate project, a single system for monitoring emissions and sinks in the LULUCF sector is being established, which will enable better quality monitoring of the situation and the basis for better decision-making.

4.11 Assessment of the economic and social consequences of response measures

Annex I countries, including Slovenia, implement measures in the framework of the Kyoto Protocol, aimed at substantially reducing greenhouse gas emissions and contributing to climate change mitigation. The implementation of increasingly stringent environmental legislation and other measures aimed at fulfilling this obligation might be associated with a range of side effects. It is not excluded that potentially associated adverse economic effects could affect some developing and least developed countries having less capacity for adequate remedial response measures. The magnitude of these potential impacts is conditioned by the selection of the policy measures, their stringency, the size of the economy implementing the measures, as well as the characteristics of the possibly affected developing countries.

As a Member State of the European Union, Slovenia, designs and implements most of its policies in the framework of EU directives, regulations, decisions and recommendations. To ensure that all relevant possible impacts are taken into account, the EU has established processes that assess the economic and social consequences of climate policy measures. For the development of new policy initiatives through legislative proposals by the European Commission, an impact assessment system has been established in which all proposals are examined before any legislation is passed. It is based on an integrated approach which analyses both benefits and costs, and addresses all significant economic, social and environmental impacts of possible new initiatives.

When adopting national measure Slovenia is mindful of the principle that its policies and measures to reduce greenhouse gas emissions are designed in a way to have no, or minimum, adverse impacts on developing countries, particularly on the least developed ones. One of the examples in this regard is the possibility of carbon leakage which would entail higher greenhouse gas emissions in countries which have lower environmental standards. Slovenia is promoting the implementation of measures that ensure that carbon leakage would not take place. As regards fiscal policy instruments, no significant impact on third countries is expected from the already implemented fiscal policies and therefore no specific policies to offset any negative effects have been considered. Negative effects are also potentially linked with the increased promotion of biofuels, as increased demand and subsequent production of biofuels may be linked to rising commodity prices and potentially induced land use change. All biofuels on the market in Europe and Slovenia must comply with the sustainability criteria laid down in the Renewable Energy Directive (2009/28/EC) and its revision (2018/2001/EU). Only sustainable biofuels are allowed to be used for fulfilling the blending target.

4.12 Policies and measures no longer in place

No significant measure which helps reduce emissions by 2020 has not ceased to be implemented since the previous two-year report.

4.13 Monitoring and evaluation of progress in climate change measures

The trend of total GHG emissions is to be monitored through the GHG emissions records prepared by the Environmental Agency of the Republic of Slovenia. The Environmental Agency of the Republic of Slovenia also monitors ETS emissions. ETS and non-ETS emissions are reported annually to the European Commission in accordance with the implementing regulation EU 749/2014. Since 2015, the EU Member States have been obliged to provide the European Commission with all information on national measures and instruments for the mitigation of climate change by 15 March every two years in accordance with Regulations 525/2013 and 2018/1999.

On the basis of the OP GHG-2020, the implementation of the measures referred to in this programme is monitored annually through the report on implementing measures. The report contains an analysis of the emission trend, an analysis of trends in indicators by sector and measures and analysis of the implementation of measures. Within the scope of the LIFE ClimatePath2050 project, monitoring of the implementation of measures through the Climate Mirror has been upgraded, so that it is now covering all emission sources (including ETS) and is content enriched. The Climate Mirror is prepared on a yearly basis. The Climate Mirror consists of several papers covering indicators, a detailed description of the implementation of the measures in view of the intended implementation referred to in OP GHG-2020 or other action documents, more detailed analysis of three problematic measures and a review of the implementation of measures in ETS sectors. On the basis of the findings on the implementation of the measures, recommendations are made in the Climate Mirror concerning the improvement of measures and additional measures to achieve the necessary reduction in emissions. The Climate Mirror represents the basis for the Ministry responsible for the environment for the preparation of the report on the implementation of the OP GHG. The report on implementing the OP GHG is adopted by the Government of the Republic of Slovenia. All the reports of the LIFE ClimatePath2050 project are available on the project's website, while reports on implementing the OP GHG-2020 on the websites of the Government of the Republic of Slovenia and the Ministry responsible for the environment.

The Environmental Protection Act plays an important legislative role in achieving the climate objectives. The Environmental Protection Act (ZVO) 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.

4.14 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 is 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.

4.15 Use of units from market mechanisms and land use, changes in land use and forest management

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.

Slovenia has decided to report on the situation in the LULUCF sector for transparency and consistency reasons, although the LULUCF sector is not included in the EU 2020 target.

CTF Table 4 contains the annotation Not Applicable (NA), as LULUCF is excluded in the target and so the contribution of LULUCF is irrelevant to the mitigation actions involved. It contains no values, as no Kyoto Protocol units or other units are used for meeting the target.

CTF Table 4(a)I contains no values, as LULUCF is excluded in the target and so the net emissions/removals from activities under Articles 3.3 and 3.4 of the Kyoto Protocol as well as the related accounting quantities for the years since 2008 are irrelevant to mitigation actions involved.

CTF Table 4(b) contains no values, as no Kyoto Protocol units or other units are used for meeting the target.

5 Projections

Emissions projections have been made in 2019, taking 2017 as a base year, and take the utmost account of the recent development compared to projections made in 2017. The projections were made up to 2050 in five-year steps. For the purpose of this report, the projections by 2040 are presented.

5.1 Definition of Scenarios

The projections were calculated for scenarios with measures, with additional measures - moderate, with additional measures - ambitious, and without measures. This report presents a scenario with measures (WM), a scenario with additional measures - ambitious (WAM) and a scenario without measures (WOM). The scenario with measures takes into account all measures taken or adopted by the end of 2018. The scenario with additional measures by 2050 tries to reach net-zero emissions, which is why, in addition to existing measures, it envisages the intensive implementation of additional measures that contribute to a significant reduction in emissions. The scenario without measures shows emissions that would arise if the existing and additional measures were not implemented. The projection tries to simulate the situation without measures, which is a very complex task, as the effects of measures to reduce GHG emissions are highly diverse and it is often difficult to separate the effects of measures to reduce GHG emissions and other measures, and it is often difficult to determine development of the situation without measures. For this reason, the projection should only be taken as an illustration. For the majority of sectors, the base year for this scenario is 2005, and for some sectors one of the years before that. The only exceptions are other sectors and agriculture with 2017 as the base year. Unfortunately, this means that the scenario is not internally harmonised, but nevertheless it represents a sufficiently good indication of the impact of the existing measures, and is therefore presented nonetheless.

The projections were prepared under the LIFE ClimatePath2050 project, during which GHG emissions projection by 2050 were prepared, i.e. as a basis for the preparation of strategic documents. The first of the documents based on these projections was the National Energy and Climate Plan, adopted in February 2020.

Sector	Projection with measures	The projection with additional measures
Energy Supply - TRANSFORMATIONS	Fossil energy sources : Gradual reduction of electricity production in coal units (shutdown of TEŠ Unit 5 and TE-TOL by 2040); coal units are replaced by natural gas units	Fossil energy sources : More rapid reduction of electricity production in coal units (shutdown of TEŠ Unit 5 and TE-TOL by 2030, TEŠ Unit 6 CCU by 2035); coal units are replaced by natural gas units; natural gas is

Table 5: Presentation of main assumptions in the scenarios with measures and with additional measures

	RES : Construction of one new hydropower plant, current dynamics of development in other RES (PV, wind, etc.) Nuclear power : Operation of the existing unit up to 2043, no new unit foreseen District heating systems : current dynamics of development – energy product structure changes in order to meet the requirement of the Energy Act regarding the share of heat from RES and/or CHP	gradually replaced by synthetic gas RES : Construction of the last hydropower plant on the lower Sava River and majority of hydropower plants on the middle Sava River, intensive dynamics of development in other RES (PV, wind, etc.) Nuclear power : Operation of the existing unit to 2043, scenario without a new unit ⁴⁷ District heating systems : intensive dynamics of development – energy product structure accelerated to a higher share of RES (including waste heat) and/or CHP on synthetic gas
Energy use - INDUSTRY	EEU: Improving the energy efficiency of the processes in line with developments so far Fossil fuels : Transition to natural gas, reducing the use of light fuel oil, liquefied petroleum gas, abandonment of coal by 2035 CHP : Preserving the existing installations RES : Increasing use in line with the current dynamics Waste heat : Minimum use Material efficiency: Individual measures that have a minimal impact on the energy demand are introduced	 EEU: Intensive improvement of the energy efficiency of processes with a more rapid replacement of inefficient technologies Fossil fuels: The replacement of natural gas with electricity, with RES and also hydrogen where possible, synthetic gas replaces natural gas by 2050 CHP: Increase in volume RES: Intensive increase in use Waste heat: Significant increase in use Material efficiency: Measures that have an impact on the reduction of energy demand for the production of new materials and products are introduced CCU: For cement production
Energy use - BUILDINGS	EEU: Maintaining the current level of renovations. Increasing the share of deep renovations. Fossil fuels: Transition to natural gas – expansion of the network, phasing-out of other fossil fuels (light fuel oil, liquefied petroleum gas) District heating: Expanding the existing network and construction of new networks where economically viable RES: Used where there are no alternatives (excluding natural gas and district heating networks)	 EEU: Increase in the current level of renovations, intensive removal of obstacles. High share of deep renovations. Fossil fuels: Gradual phasing-out of natural gas. By 2050, the remainder (in particular floor heating and CHP) is replaced by synthetic gas. Prohibition on the purchase of boilers on light fuel oil. District heating: More intensive expansion of the existing network and construction of new networks RES: Intensive increase in use (heat pumps and wood)
TRANSPORT	all road network axes, modernisation of the railway network (TEN-T and certain	investments in rail infrastructure – construction of all planned connections (including regional), and

⁴⁷ Scenarios with and without new nuclear power plant were analysed in the LIFE ClimatePath2050 project. This report presents a scenario without a new nuclear power plant, but this does not prejudge the decision on the second unit of nuclear power plant. The scenario is selected for the demonstration because emissions are slightly higher.

	regional connections), improvement of the existing cycling infrastructure Change in modes of transport:	in cycling infrastructure Change in modes of transport: decline of the concept of passenger car ownership, intensive
	implementing measures that lead to an increased share of PPT, but the car pkm are still increasing. The share of railway freight transport is maintained in freight transport. Implementation of the transport development strategy. Vehicle fleet: Compliance with	implementation of measures that lead to an increased PPT share (stop car transport growth). The share of railway freight transport is increased in freight transport Vehicle fleet: More rapid electrification of the passenger car and light duty vehicle fleet, higher shares of alternative powertrains also
	EU legislation on average CO ₂ emissions for new vehicles. Biofuels: The increase in biofuels to a technically acceptable share (7% diesel, 5% gasoline). The introduction of biofuels of the second generation in line with EU RES directive.	for heavy duty vehicles and buses, replacement of liquid fossil fuels with synthetic fuels. Biofuels: The increase in biofuels to 11%. The introduction of biofuels of the second generation in line with EU RES directive.
Industrial Processes	Implementation of the F-gas Regulation and the Directive on the use of F-gases in mobile air conditioning systems	CCU for cement production, reduction of F-gases as in the projection with measures
Agriculture	Implementation of the Strategy for Implementation of the Resolution on Strategic Directions of the Slovenian Agriculture and Food Industry until 2040.	Measures to enhance the efficiency of breeding, accelerated construction of anaerobic digesters, fertilisation with low emissions.
Waste	Solid waste disposal: Projections of waste flows in the operational programme for municipal waste management from 2016. No biodegradable waste being landfilled. Wastewater: Expansion of sewage network and replacement of septic tanks with biological wastewater treatment plants.	The same as in the projection with measures.

5.2 Definition of sectors in projections

The projections use a sectoral breakdown as appears in Slovenian strategic documents to reduce GHG emissions (e.g. Operational Programme for the Reduction of GHG Emissions by 2020, National Energy and Climate Plan) that differs from the CRF classification. The link between the sectors used in the projections with CRF classification is shown in the table below.

Sector in projections	CRF sector
Transformations and Fugitive	1.A.1 Energy industries
Emissions	1.B Fugitive emissions
Industry and construction	1.A.2 Manufacturing Industries and Construction
Transport	1.A.3 Transport
General use	1.A.4 Other Sectors
	1.A.5 Other
Industrial Processes	2. Industrial Processes
Agriculture	3. Agriculture
Waste	5. Waste
Sinks	4. LULUCF

Table 6: Comparing sectors in projections with CRF sectors

5.3 Projection results

5.3.1 Total Emissions of Greenhouse Gases

According to the projection with measures, by 2020, emissions will decrease to 17,128kt CO₂ eq., by 2030, to 16,874kt CO₂ eq., and by 2040, to 16,018kt CO₂ eq. According to the projection with additional measures, emissions will reduce to 16,703 kt CO₂ eq. in 2020. In 2030, emissions will amount to 13,079 kt CO₂ eq., while in 2040 they will amount to 6,781 kt CO₂ eq. Compared to 2017, emissions are 2%, 3% and 8% lower in 2020, 2030 and 2040 in the projection with measures and 4%, 25% and 61% lower in the projection with additional measures. Compared to 2005, emissions were down by 17% and by 18% in 2020 and 2030 according to the projection with additional measures records significantly higher emissions and a reverse trend. In 2020, emissions are estimated at 20,634 kt CO₂ eq., in 2030 at 22,010 kt CO₂ eq., and in 2040 23,544 kt CO₂ eq.



Figure 7: Current emissions trend up to and including 2017, and emissions trend according to projections with measures, with additional measures and without measures from 2020 to 2040 (source: EARS, IJS-CEU, KIS)



Figure 8: Sectoral GHG emission structures in selected years and by projections with measures and with additional measures for 2020, 2030 and 2040 - left: total emissions; right: structure of emissions in percentages (source: EARS, IJS-CEU, KIS)

5.3.2 Carbon Dioxide

According to the projection with measures, CO_2 emissions were 13,987 kt CO_2 in 2020, which is 2% less than in 2017. By 2030, they increase by 1% compared to 2020, and between 2030 and 2040 they are reduced by 5% compared to 2030. According to the projection with additional measures, emissions are reducing throughout the period of 2020–2040, very intensively after 2030. In 2020, they are just under 5% lower than in 2017, 26% in 2030 and 68% in 2040 than in 2017.

CO₂ emissions represent a major part of greenhouse gas emissions in Slovenia. According to the projection with measures, their share in total GHG emissions is increased from 82% in 2017 to 84% in 2030 and 2040. In the projection with additional measures, the share is slowly decreasing, namely in 2020, to 81%, in 2030 to 80% and after 2030 it is reduced significantly and is 67% in 2040.

According to the projection without measures that tries to demonstrate the situation if measures to reduce GHG emissions are not taken, the emissions in 2020 are significantly higher than in 2017, which is a result of the non-implementation of measures from 2005 onwards or even earlier. After 2020, emissions are increasing and amount to 19,033kt of CO₂, in 2040 which is 15% more than in 2020.

The main source of CO₂ emissions is transport, which represents 38% in 2017, and its share increases in all projections. According to the projection with measures it increases to 44% in 2030 and 2040, according to projection with additional measures to 47% in 2030, and decreases to 40% in 2040. The increase of the respective share is due to a slower reduction in emissions compared to other sectors, as the delay in

implementing measures in this sector is the largest. In addition, the implementation of measures requires greater efforts. This is followed by transformations with approximately one-third share, followed by industry with approximately 12%, other sectors, where the share is reduced the most, i.e. from 9% to 5% in the projection with additional measures, and industrial processes representing between 6 and 8% according to the projection.



Figure 9: The development of CO₂ emissions without sinks up to and including 2017 and projections up to 2040 (EARS, IJS-CEU, KIS)

5.3.3 Methane

According to the projections with measures and with additional measures, methane emissions are reducing. By 2030 they are reduced by 15% according to the projection with measures and by 22% according to the projection with additional measures. By 2040, they reduce by 21% or 32% respectively. The main contributor to the reduction in emissions is the waste sector, where emissions are reduced by 14.8kt CH₄ according to both projections. In the projection with additional measures, agriculture significantly contributes to the reduction in emissions since it is the biggest source of methane emissions, while according to the projection with measures the emissions from agriculture increase. Two important sources of methane emissions are combustion of wood, where emissions are reduced due to the reduction in wood consumption, and fugitive emissions, where the emissions are also reducing due to the phasing-out of coal.

According to the projection without measures, emissions are significantly higher than in other two projections, indicating a reverse trend. In 2030, they are 113.7kt CH₄ and, in 2040, 115.9 kt CH₄.

In total emissions, methane represents 12% in 2017. In projections with measures, the share is slowly decreasing and is 11% in 2030, and 10% in 2040. In projections with

additional measures, the share after 2030, when it is 13%, is increasing rapidly, i.e. 21% in 2040.



Figure 10: CH₄ emissions trend without sinks up to and including 2017, and emissions trend according to the projection with measures, with additional measures and without measures up to 2040 (source: EARS, IJS-CEU, KIS)

5.3.4 Nitrous Oxide

N₂O emissions are the only emissions with no pronounced reduction. According to the projection with measures, emissions increase compared to 2017. In 2030, they are up by 13% and in 2040 by 15%. According to the projection with additional measures, they increase up to 2025, and then start reducing. In 2030, they are higher by 6.5%, and by 2.6% in 2040, compared to 2017. The main source with about 70%, except in the projection with additional measures in 2040 with 76%, is agriculture. They are followed by emissions from transport, where they reduce the most due to electrification of the vehicle fleet. The share is 9%, except in the projection with additional measures in 2030 (8%), and even 4% in 2040. The waste sector and other sectors contribute more than 5% to emissions, while emissions are also generated in combustion processes in other sectors (transformations and industry).

The projection without measures indicates a high growth in emissions. In 2030, they are 22% higher than in 2017, and 29% higher in 2040.

Nitrous Oxide contributes 4% to total emissions in 2017. By 2030, the share according to the projection with measures increases to 5% and remains at this level in 2040, while according to the projection with additional measures it is 6% in 2030 and 11% in 2040.





5.3.5 F-gases

According to the projection, F-gas emissions will be significantly reduced by 2040. The projections with measures and additional measures are the same until 2035, since all measures taken into account are already adopted (measures laid down by EU regulation covering products and installations containing F-gases, and the directive governing the field of air conditioners in vehicles). In 2040 difference is due to stopping of production of primary aluminium in projections with additional measures, contributing to lower PFC emissions. In 2030, amounting to 181kt CO₂ eq., emissions are 54% lower compared to 2017, and in 2040, they are 83 % lower in projection with measures and 87% lower in projection with additional measures.

The highest share of emissions is due to HFC. In 2017, it was 91%, but it will be reduced to 83% in 2030 and to 52 % in projection with measures and 67% in projection with additional measures in 2040. In 2017, PFC emissions represent 4%, by 2030 their share increases to 9%, and falls to 0% in 2040 due to the closure of primary aluminium production. SF6 accounts for 4% in 2015, 9% by 2030 and 33% by 2040, as this is the only F-gas where emissions are not diminishing.

In 2017, F-gases represent 2% of total GHG emissions, but their share decreases to 1% by 2030. In 2040, they represent 0.4% in the projection with measures and 0.8% in the projection with additional measures.



Figure 12: F-gas emissions trend up to and including 2017, and emissions trend according to projections until 2040 (source: EARS, IJS-CEU)

5.3.6 Emissions by Sector

TRANSFORMATIONS AND FUGITIVE EMISSIONS

Energy industries (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), where natural gas is gradually replaced also by synthetic gas, and an increase in the use of renewable energy sources (RES). The share of RES is also increased in the district heating systems. Synthetic gas and combustible RES are assumed to be CO₂ neutral.

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

After a marked reduction in emissions in 2014, emissions no longer increase to a level above 5,400kt CO₂ eq., which is due to the closure of certain coal units and constructing a new more efficient coal unit. According to the projection with measures, coal for production is being phased-out very gradually, and thus the reduction in emissions is very slow. Also, additional electricity demand is covered mainly by new gas units. As a result, energy industries and fugitive emissions in 2030 are 7% lower than in 2017, and in 2040 12% lower. A completely different situation is indicated in the projection with additional electricity demand is mainly covered by renewable energy sources, in particular solar power plants. Since all the requirements cannot be covered by RES, in particular in winter time, additional gas units are

needed (they are replacing natural gas with synthetic gas), or a new nuclear power plant⁴⁷. This has a significant impact on the reduction in emissions, i.e. they are 40% lower in 2030, and 73% in 2040 compared to 2017. Electricity production is to be increased according to both projections; according to the projection with measures by 22% by 2040 compared to 2017, and according to the projection with additional measures by 54%.

The greatest share of emissions in the sector is incorporated into the GHG emissions trading system. In 2017, the share amounted to 90%. According to both projections the share represents 91% in 2030, and 92% in 2040 according to the projection with measures, and 79% according to the projection with additional measures.

In total emissions in 2017, the share of this sector is 31%. According to both projections, the share is reduced, i.e. according to projection with measures to 29% in 2030 and 2040, and according to the projection with additional measures to 25% and 21% in 2030 and 2040 respectively.





INDUSTRY AND CONSTRUCTION

Emissions from fuel combustion in industry and construction (1.A.2) will increase according to the projection with measures by 2040, but in 2040 they will not exceed the value from 2010, even though the added value will increase significantly. The smaller increase in emissions will be achieved by changing the structure of fuels – increasing the share of RES and increasing the share of synthetic gas. Energy Efficiency measures have an impact on the fact that the growth in energy use is significantly lower than the growth in the added value. In 2040, energy use is 15% higher. Emissions are 2% lower in 2030 compared to 2017, and 5% higher in 2040.

According to the projection with additional measures, more intensive implementation of measures is assumed, which has an impact on the minimum energy use growth (in 2040 only 2% higher than in 2017), and significantly higher share of RES, electricity and synthetic gas than in the projection with measures, which is reflected in a more pronounced reduction in emissions. Emissions are 25% lower in 2030 and 46% lower in 2040, compared to 2017.



Figure 14: GHG emissions from fuel combustion in industry and construction – emissions trend in the 1986–2017 period and projections with measures, with additional measures and without measures by 2040 (left), and the distribution of emissions into ETS and non-ETS (right) (source: EARS and IJS-CEU)

In industry, as in transformations, ETS emissions are prevailing, but less pronounced. In 2005, ETS emissions were 56%, 63% in 2017 and the share is reduced to 60% or 61% by 2030 in projection with measures or with additional measures. By 2040 according to the projection with measures it is increased to 62% and according to the projection with additional measures it is reduced to 59%.

In 2017, combustion of fuels in industry and construction contributed 10% to the total emissions. In 2030, the sector holds the same share according to both projections, and in 2040 the shares represent 11% according to the projection with measures and 13% according to the projection with additional measures.

TRANSPORT

Transport has been the main source of emissions in Slovenia since 2014 when it took over the long-held top position occupied by emissions from the transformation sector. Transport is the sector where more than 10% of the annual growth has been recorded in the past. In the future, less intensive growth or a significant reduction in emissions is expected. However, the fact remains that the projections for this sector are the most uncertain. Further growth of transport on Slovenian roads is expected by 2040. The projection with measures foresees the domestic vehicle passenger transport to increase by 35% in the 2017-2040 period, and freight transport by 79%, while according to the projections with additional measures the passenger transport increases by 24% and freight transport by 58%. In addition to domestic vehicles, Slovenia is also heavily exposed to the transport of foreign vehicles. In passenger transport, the growth is lower than for domestic vehicles, while in freight transport the growth of 95% and 69% is significantly higher than the growth of domestic vehicle transport. The construction of railway infrastructure will result in freight transport rail increasing, which will suffice for a minimum increase in the share of rail transport. The promotion of public passenger transport along with the construction of railway infrastructure, in particular intensively according to the projection with additional measures, has an impact on the increase in share of railway passenger transport to 3% or 5%, and maintains the current share or slight increase in bus transport. Energy use due to significant improvement in vehicle efficiency, changes in the structure of vehicle fleet, in particular electrification, and partially due to changes in behaviour and transport mode, increases significantly less than transport activity or it actually decreases. In the projection with measures, energy use is 14% higher in 2040 than in 2017, while in the projection with additional measures it is 36% lower. In addition, the use of biofuels also contributes to lower emissions; the share of biofuels increases from 1.3% in 2017 to 6.5% in 2020 according to both projections. According to the projection with measures, it remains at a similar level after 2020, while the projection with additional measures foresees it amounting to 11% in 2030 and 15% in 2040.

The implementation of measures described above maintains transport emissions just above the emissions levels recorded in 2008, according to the projection with measures. In 2008, emissions amounted to 6,158kt CO₂ eq., while according to the projection with measures, the highest emissions levels are achieved in 2030, amounting to 6,355kt CO₂ eq., i.e. 15% lower compared to 2017. By 2040, emissions are reduced to 5,994kt CO₂ eq. In the projection with additional measures, emissions are rapidly falling from 2025 onwards. In 2030, emissions are 10% lower than in 2017, and 66% in 2040. All emissions from transport are included in non-ETS emissions.

In terms of total emissions, transport represents 32% in 2017, 38% in 2030 according to both projections, and 37% in 2040 according to the projection with measures, and 28% according to the projection with additional measures.



Figure 15: GHG emissions from transport (left) and from the other sectors (right) in the 1986–2017 period and according to the projections with measures, with additional measures and without measures by 2040 (source: EARS and IJS-CEU)

OTHER SECTORS

GHG emissions generated in other sectors which includes energy use in households, services and agriculture, decrease significantly. In fact, the projection anticipates a 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. The remainder of natural gas is replaced by synthetic gas in the projection with additional measures. In spite of an increase in the surface of residential buildings (by 6% in the 2017–2040 period) and non-residential buildings (by 29% in the 2017–2040 period), these measures have an effect on the reduction of emissions. In agriculture, diesel fuel, which has no suitable alternative, is replaced by synthetic liquid fuels, which are CO₂ neutral, and with biofuels.

Compared to 2017, emissions are 46% lower in 2030 according to the projection with measures and 57% lower according to the projection with additional measures. They decrease additionally by 2040, being thus 62% or 79% lower compared to 2017.

With regard to total emissions, other sectors represented 8% in 2017, while the sector share is reduced to 5% by 2030, and to 3% by 2040 according to projection with measures and to 4% according to the projection with additional measures.

INDUSTRIAL PROCESSES

Following a reduction in emissions in 2008 due to the economic crisis and closure of certain plants not fulfilling the requirements of environmental permits, emissions

were increasing until 2017. In 2020, emissions remain at the same level as in 2017, and then start to decrease. The projection with measures and the projection with additional measures are different for the production of cement, namely the projection with additional measures by 2040 foresees the employment of installation for carbon capture and utilisation (CCU) and the introduction of cement production with lower CO₂ emissions, whereas the projection with measures does not foresee that and for the metal productions where projection with additional measures envisages the abandonment of primary aluminium production by 2040, while the respective production is maintained in the projection with measures. Cement production is the main source of emissions in this sector. Emissions from this process are increasing by 2035 in both projections. In 2040, they are further increased according to the projection with measures, while they reduce significantly according to the projection with additional measures due to the employment of installations for carbon capture and utilisation (CCU). The second largest source of emissions in 2017 are emissions of F-gases. These reduce rapidly due to the replacement of the currently used substances with substances that have a minimum greenhouse effect. Metal production is the third largest source of emissions. In the projection with measures, emissions remain at a similar level to today's, and in the projection with additional measures they are reduced significantly in 2040. In 2030, total emissions amount to 1,073kt CO₂ eq., which is 11% less than in 2017, while emissions are 12% lower according to the projection with additional measures. In 2040, emissions are down by 17% or 61% compared to 2017.

The larger share of emissions in the industrial process sector is included in the ETS (57% in 2017, 69% in 2030, 77% or 50% in 2040). The sector contributes to the total emissions 7% in 2017, 6% in 2030 and 2040 according to the projections with measures and 8% in 2030 and 7% in 2040 according to the projection with additional measures.



Figure 16: GHG emissions due to industrial processes – emissions trend in the 1986–2017 period and projections with measures, with additional measures and without measures by

2040 (left) and the distribution of emissions into ETS and non-ETS (right) (source: EARS and IJS-CEU)

AGRICULTURE

By 2020, the emissions in agriculture increase according to both projections compared to 2017. According to the projection with measures, average annual growth in the 2020–2030 period is 0.3%, while it is further reduced to 0.2% in the following decade. Compared to 2017, emissions in 2030 are 4% higher, and in 2040 6% higher; additional measures contribute to the reduction in emissions from agriculture after 2020. According to the projection with additional measures, emissions are 2% lower in 2030, and 9% lower in 2040. In 2017, agriculture accounts for 10% of total emissions. According to the projection with measures, the share is stabilised at 11%, while according to the projection with additional measures it increases to 13% by 2030, and to 24% by 2040.

The projections with measures foresee the preservation of the number of livestock at the level from previous years. The exception is pig farming, where the volume of farming has decreased significantly after 2007. In this sector, the weight gain is projected to return to approximately 70% of the increment which has already been achieved in a decade before the reduction. In crop production, the increase in the yield by 2050 is projected to be approximately 40% compared to the average from the 2013–2017 period. The amount of nitrogen in the yield of agricultural plants (including grassland) is expected to increase by approximately 8% by 2030.

The projections with additional measures foresaw the increase in the efficiency of breeding. This allows for similar quantities of milk and beef being produced with a smaller number of animals and smaller greenhouse gas emissions. It has been announced that in the context of the consistent implementation of the measure "Increase in the efficiency of domestic animal production" the total number of bovine animals will be reduced by 15% and the number of dairy cows by 11% by 2030. Within the scope of the measure "Promoting breeding with low emissions", an increased volume in livestock manure processing on biogas installations is foreseen (in pig farming from 12 to 20% and in cattle farming from 0.4% to 8% by 2030). In cattle farming, an increase in livestock grazing is foreseen (in dairy cows from 6 to 8%, in suckler cows from 26 to 31% and in young bovine animals from 12 to 15%). Within the framework of the Rational fertilising of crops with nitrogen measure, an increased volume of urea retention (50%), an increase in the immediate tilling of manure on fields to 30%, in terms of slurry manure an increase of the use of techniques of fertilising with low emission to 100% on fields and to 50% in grassland were foreseen. Model calculations indicate that, due to measures to improve the efficient use of nitrogen, the use of mineral fertilisers will increase for less than 2% despite a significant increase of nitrogen in agricultural products.

WASTE

Emissions from waste and waste waters have been decreasing fast since 2004, amounting to 557kt CO₂ eq. in 2017. Projections with measures and with additional measures are identical. In 2020, emissions amount to 465kt CO₂ eq., in 2030, 262kt CO₂ eq., which is 53% less than in 2017. In 2040 emissions are 66% lower than in 2017. Waste contributes 3% to total emissions in 2017. By 2030, the share is reduced to 2%, and according to the projection with measures by 2040 to 1%. According to the projection with measures to 3% in 2040.

The reduction is the result of the reduction in landfilled biodegradable waste. This 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. Since 2016, biodegradable waste cannot be disposed on landfills. The emissions from wastewater treatment are also reduced significantly due to the increase in connection to the sewage network, upgrading of treatment plants and replacing septic tanks with small biological waste water treatment plants.



Figure 17: GHG emissions from agriculture (left) and from waste (right) in the 1986–2017 period and according to the projections with measures, with additional measures and without measures by 2040 (source: EARS, IJS-CEU, KIS)

5.3.7 International bunkers

In accordance with instructions, fuels for navigation and international aviation are not included in the projections presented above. In 2017, the emissions from international bunkers represented 3.3% of emissions in the Republic of Slovenia. Emissions from international aviation represented 0.4% or 74kt CO₂ eq., and emissions from international navigation represented 2.9% or 505kt CO₂ eq. According to projections, emissions from both categories will increase in the long run. International aviation emissions will be 78% higher in 2030 compared to 2017, while in 2040, they will be 120% higher, while emissions from international navigation will be 32% higher in 2030 and 68% higher in 2040. In international navigation, a reduction in emissions in 2020 compared to 2017 is envisaged as a result of the economic slowdown in 2019.

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 transshipment projection in Luka Koper port from the Transport Development Strategy of the Republic of Slovenia.

Table 7: Projections of emissions from the sales of fuels to international aviation and international navigation (source: IJS-CEU)

		2017	2020	2025	2030	2035	2040
International aviation	[kt CO ₂ eq.]	74	103	118	133	148	163
International navigation	[kt CO ₂ eq.]	505	439	552	668	786	846

5.3.8 Projections of CO₂ Sinks

CO₂ sinks resulting from forest management in Slovenia are an important factor in reducing emissions and mitigating climate change. In 2017, sinks resulting from forest management amounted to -1,155kt CO₂, which is 7% of GHG emissions in Slovenia. According to emissions and sinks from other subsectors in the sector "Land use, land use change and forestry", sector is a net emissions sink of -1,524kt CO₂ eq. Over the last three years, sinks due natural disasters have fallen sharply.

By 2020, according to the projections with measures, sinks again increase to 4,668kt CO₂ eq, and by 2030 to 5,721kt CO₂ eq. After 2030, sinks begin to decrease. In the projection with additional measures, sinks are at a higher level than in the projection with measures and amount to 6,421kt CO₂ eq in 2030. After 2030, the reduction is significantly lower due to the implementation of additional measures that preserve the sinks.

The main assumptions in terms of the total volume of felling resulting from thinning, final felling (reforestation) or salvage harvesting have the major impact on the fluctuation of sinks. It is assumed that the volume of felling under the scenario with measures will in average amount to 6 million m³ per year by 2030. According to the scenario with additional measures which takes into account more stringent emission reduction targets by 2030, an average felling is assumed to be approximately 4.3 million m³ per year in the respective period. After 2030, it is expected that the actual felling volume will increase by approximately 20% according to both scenarios. The current projections do not include changes in the surface of forests, tree stands and the trend of the intensity of natural disturbances.



Actual emissions ---- Projection with measures ---- Projection with additional measures

Figure 18: The development of sinks by 2017 and according to projections with measures and with additional measures by 2040 (source: EARS, GIS)

5.4 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 the ETS (TEŠ, TE-TOL, TEB, all new large units), 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 2017. For the combustion of fuels in industry, the ETS share has been determined on the basis of ETS share per individual branch and fuel in 2017 while the ETS share in industrial processes has been determined according to processes.

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

Table 8: Actual ETS emission in 2005, 2008, 2017, using post 2012 scope, and emission projections by 2040 after projections with measures and additional measures (source: EARS, IJS-CEU, KIS)

		2005	2008	2017	2020	2030	2040	2020	2030	2040
								Projectio	on with add	itional
		Act	ual emissio	ons	Projectio	on with me	asures		measures	
1. Energy	[kt CO ₂]	7,779	7,865	5,878	5,472	5,513	5,424	5,266	3,686	1,675
A. Fuel combustion	[kt CO ₂]	7,696	7,777	5,804	5,413	5,462	5,386	5,209	3,647	1,637
1. Energy industries	[kt CO ₂]	6,301	6,405	4,741	4,482	4,474	4,298	4,317	2,879	1,102
2. Manufacturing industries and		1 205	1 272	1 063	021	088	1 099	802	769	535
Construction		1,595	1,372	1,005	951	900	1,000	092	700	222
B. Fugitive emissions	[kt CO ₂]	82	88	74	60	51	38	57	38	38
2. Industrial processes and product use	[kt CO ₂ eq.]	973	889	692	710	740	765	710	733	239
TOTAL	[kt CO ₂ eq.]	8,752	8,753	6,570	6,183	6,253	6,189	5,976	4,419	1,914

Table 9: Share of ETS emissions in total GHG emissions by sector

		2005	2008	2017	2020	2030	2040	2020	2030	2040
								Projectio	on with add	itional
		Act	ual emissio	ons	Projectio	on with me	asures		measures	
1. Transformations	[%]	98%	99%	96%	97%	98%	98%	97%	98%	96%
2. Industry and Construction	[%]	56%	59%	63%	56%	60%	62%	56%	61%	59%
B. Fugitive emissions	[%]	16%	17%	18%	15%	14%	12%	15%	14%	13%
2. Industrial processes and product use	[%]	68%	66%	57%	59%	69%	77%	59%	69%	50%
TOTAL	[%]	43%	41%	38%	36%	37%	39%	36%	34%	28%

According to the projection with measures, the emissions from ETS sources are being maintained at a level around 6,200 kt CO_2 eq., while according to the projection with additional measures the emissions are significantly reduced, so that in 2030 they are 33% lower than in 2017, and 71% lower in 2040. Emissions are the most reduced in transformations, which also represent by far the largest share of emissions in the ETS. In 2030, the emissions are 6% lower based on the projection with measures and 39% lower based on the projection with additional measures. Emissions from other sources are reduced by 3% and 16% in 2030 compared to 2017 according to the projections with measures and with additional measures. Total ETS emissions were 5% or 33% lower in 2030 compared to 2017 according to both projections, and compared to 2005, 29% and 50% lower, respectively.

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 at sectoral descriptions and in the table above. Practically all emissions of the transformation sector are covered in the ETS; only smaller units in district heating are not covered by the system. In industry and construction, the emissions of ETS sources represent 56% in 2005, and this share is increased to 63% by 2017, and then it stays around 60%. This means that the energy intensive industry in Slovenia is preserved. In terms of fugitive emissions, emissions from flue gas desulfurisation are included in the ETS system. In industrial processes, the share of ETS in sector emissions is changing the most. It increases according to the projection with measures, as F-gases emissions reduce significantly, while the emissions in ETS are not reduced to the same extent, while in the projection with additional measures, the share is significantly reduced in 2040 because of the carbon capture in cement production.



Figure 19: Actual ETS emissions and projections with measures and with additional measures by 2040 (source: EARS, IJS-CEU, KIS)

5.5 Non-ETS in 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 by Commission acts⁴⁸ and is shown in the table below.

	e ,	5					-		
		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

Table 10: Target trajectory for non-ETS emissions in the 2013–2020 period (source: EC)

The Commission has set a target for Slovenia to reduce emissions by 15% by 2030 compared to 2005. This objective applies if all emissions in EU are reduced by 40%. If the Commission decides to set a more ambitious goal, the target for Slovenia will also be more stringent. Annual emissions have not yet been established.

The emission projections from sources not included in the ETS have been calculated as the difference of total emissions and ETS emissions.

According to the projection with measures, non-ETS emissions from 2017, when they amounted to 10,833 kt CO₂ eq., increase by 2020 to 10,946kt CO₂ eq., and then they start to reduce and amount to 10,621kt CO₂ eq. in 2030, and 9,829kt CO₂ eq. in 2040. According to the projection with additional measures, emissions by 2020 will be reduced to 10,727kt CO₂ eq., by 2030 they are reduced by 19% compared to 2020, and by 2040 by 44%, i.e. to 4,868kt CO₂ eq., compared to 2030.

According to both projections, emissions in 2020 are lower than the target trajectory, emissions in 2030 decrease by 10% compared to 2005 according to the projection with measures, and decrease by 26% according to the projection with additional measures. The target reduction in 2030 is therefore achieved in the projection with additional measures.

⁴⁸ 2013/162/EU, 2013/634/EU, 2017/1471/EU



Figure 20: Non-ETS emissions development in the 2005–2017 period and emissions trend according to the projection with measures and with additional measures from 2020 to 2040 compared to target trajectory 2013–2020 and the 2030 target (source: EARS, IJS-CEU, KIS)

By far the greatest share of emissions in the non-ETS sector is generated by transport, which represented 51% of all non-ETS emissions in 2017 while its share amounted to 38% in 2005. According to the projection with measures, its share increases to 60% in 2030 and to 61% in 2040. In the projection with additional measures, its share increases to 57% by 2030, and then decreases strongly to 39% due to the significant reduction in emissions. In terms of the importance in 2017, the sectors agriculture and other sectors follow, although with different trends by 2040. According to the projections with measures, agriculture, in addition to transport, is the only sector where emissions are increased by 2040, so the share is increased to 19%. The increase in the share is much higher in the projection with additional measures, although emissions are reduced; however, the reduction in other sectors is much higher. In 2030, the share is 20%, and in 2040, 32%. In 2030, other sectors share, which represented 13% in 2017, is only 7%, and in 2040 it is 6% according to both projections. In terms of the share, this sector is overtaken by non-ETS emissions from industry and construction, accounting for 7% or 8% in 2030.



Figure 21: Non-ETS emission structure in 2005 and 2017 and according to the projections for 2020, 2030 and 2040 (source: IJS-CEU, KIS)

Table 11: Emissions from sources which are not included in EU-ETS (non-ETS) in 2005, 2008, 2017 and projection with measures and with additiona
measures by 2040

GHG [kt CO2 eq.]	Actu	Actual emissions)jection with measures		Projection with additional measures			With measures	With additional measures	
Sector \ Year	2005	2008	2017	2020	2030	2040	2020	2030	2040	2030/2005	2030/2005
Transformations and fugitive emissions	591	533	509	455	431	366	440	302	300	-27%	-49%
Industry and Construction	1,090	946	616	735	662	671	710	486	373	-39%	-55%
Transport	4,416	6,141	5,541	5,779	6,355	5,994	5,699	4,962	1,898	44%	12%
Other sectors	2,661	2,365	1,456	1,267	784	548	1,186	620	305	-71%	-77%
Industrial Processes	452	451	516	497	333	234	497	333	234	-26%	-26%
Agriculture	1,709	1,686	1,688	1,747	1,796	1,826	1,730	1,695	1,567	5%	-1%
Waste	848	697	557	465	262	189	465	262	189	-69%	-69%
TOTAL	11,767	12,819	10,883	10,946	10,621	9,829	10,727	8,660	4,868	-10%	-26%
Target trajectory and TARGET 2020			12,203	12,307			12,307				
Distance to the TARGET (emissions/target-1)				-11%			-13%				

5.6 The Total Effect of Measures

The overall impact of the implemented and adopted measures was determined by comparing the projection with measures and the projection without measures, and the overall impact of additional measures by comparing the projection with additional measures and the projection with measures.

The overall effect of adopted and implemented measures for 2020 amounts 3,505kt CO_2 eq. and the total effect of additional measures is 426kt CO_2 eq. The high impact of the adopted and taken measures is the result that the base year for the projection without measures is not the year 2017 (with the exception of the other sectors and agriculture), but one of years before 2017. As expected, the effect increases on a yearly basis, so that in 2030 it amounts to 5,136kt CO₂ eq. for adopted and implemented measures, and 3,795kt CO₂ eq. for additional measures. In 2040, the effect is 7,526kt CO2 eq. or 9,236kt CO2 eq. so that the impact of the additional measures exceeds the impact of the adopted and implemented measures. By far the greatest effect is accounted for by CO₂, followed by CH₄. More interesting is the effect of measures across sectors. The biggest impact of the measures is seen in the transport sector due to improved efficiency of vehicles, increase in the use of lowcarbon fuels, and changes in the structure of modes of transport; however, the impact is increased mainly after 2030. It is followed by the energy industries sector resulting from overhauling of thermal power plants and increasing the RES share in electricity generation. The impact in waste is very large, as the projection without measures foresees the complete non-implementation of measures. The impact of measures in other sectors is also significant, despite the fact that the base year is 2017. With an earlier base year, the impact would be significantly higher, as there was already a significant reduction in emissions in 2017 with regard to 2005 (by 45%). In industrial processes, the major part of the reduction in HFC emissions is taken into account in adopted and implemented measures and other measures are taken into account in the additional measures. The smallest effect of measures among large sectors is seen in agriculture, which confirms how difficult it is to reduce emissions in this sector. As in other sectors, 2017 as base year, also has great impact on small effect of measures.

Effect of the implemented and adopted measures		2020	2025	2030	2035	2040
CO ₂	[kt CO ₂ eq.]	2,592	3,079	3,498	4,004	5,556
CH ₄	[kt CO ₂ eq.]	646	873	1,057	1,133	1,232
N ₂ O	[kt CO ₂ eq.]	48	57	68	78	94
F-gases	[kt CO ₂ eq.]	220	385	513	588	644
TOTAL	[kt CO ₂ eq.]	3,505	4,394	5,136	5,803	7,526
Impact of additional						
measures						
CO ₂	[kt CO ₂ eq.]	394	1,101	3,603	6,796	8,902
CH ₄	[kt CO ₂ eq.]	26	71	148	218	229
N ₂ O	[kt CO ₂ eq.]	6	22	44	66	90
F-gases	[kt CO ₂ eq.]	0	0	0	0	16
TOTAL	[kt CO ₂ eq.]	426	1,194	3,795	7,081	9,236

Table 12: Total effect of adopted and implemented measures and additional measures by gas

Table 13: Total effect of measures by sector

Effect of the implemented		2020	2025	2020	2025	2040
and adopted measures		2020	2025	2050	2035	2040
Transformations	[kt CO ₂ eq.]	1,605	1,772	1,589	1,399	1,739
Industry	[kt CO ₂ eq.]	372	427	515	530	551
Transport	[kt CO ₂ eq.]	434	547	864	1,468	2,567
Other sectors	[kt CO ₂ eq.]	189	366	573	671	747
Fugitive emissions	[kt CO ₂ eq.]	64	63	94	79	154
Industrial Processes	[kt CO ₂ eq.]	220	385	513	588	644
Agriculture	[kt CO ₂ eq.]	68	68	69	69	70
Waste	[kt CO ₂ eq.]	553	766	919	999	1,054
TOTAL	[kt CO ₂ eq.]	3,505	4,394	5,136	5,803	7,526
Effect of additional						
measures						
Transformations	[kt CO ₂ eq.]	167	271	1,645	3,446	3,248
Industry	[kt CO ₂ eq.]	65	205	396	560	851
Transport	[kt CO ₂ eq.]	80	517	1,392	2,589	4,096
Other sectors	[kt CO ₂ eq.]	81	114	164	196	243
Fugitive emissions	[kt CO ₂ eq.]	15	27	90	81	14
Industrial Processes	[kt CO ₂ eq.]	0	0	7	11	526
Agriculture	[kt CO ₂ eq.]	17	60	101	198	258
Waste	[kt CO ₂ eq.]	0	0	0	0	0

5.7 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, since the share of foreign vehicles that buy fuel in Slovenia is decreasing. In addition to the above-mentioned, there were also lower emissions in agriculture, in particular due to smaller number of animals, and the waste sector, in particular due to faster implementation of measures than envisaged (faster reduction in deposited biodegradable waste). 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 (VI. NC and 2 BR projections), while according to the projection in the Seventh National Communication they are reduced by 9%. The emissions level of projection with measures presented in this report is absolutely comparable to the projections in the preceding report and the one before that, while the level of reduction between 2020 and 2030 is lower since emissions in 2020 are lower. Lower emissions in 2020 are the result of lower growth of emissions in the context of economic recovery. The projection with additional measures clearly stands out, reflecting more ambition with regard to the emission reduction targets in line with the Paris Agreement.



Figure 22: Comparison of projections of the Sixth National Communication (VI. NC), the second Biennial Report (BR 2) and the Seventh National Communication (VII. NC) with projections in this report (BR 4)

5.8 Uncertainty in Projections

Uncertainty in projections stems from the following: uncertainty in 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 the actual effect of instruments is hard to foresee 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 source of great uncertainty is the scenario of future development of the gross domestic product, which, in particular, has a major impact on energy use and thus emissions in industry (fuel combustion and processes) and transport. The scenario used in the projections was based on a scenario prepared by the European Commission for the recent energy projections and revised so that it is more coherent with short-term trends. Since short term projections are used for the purpose of planning the budget the scenario is conservative. This is demonstrated by a comparison of the average growth in added value in the 2015–2019 period with the estimated growth in the 2015–2020 period. The actual average annual growth was 3.6%, while the projections foresaw a 2.2% growth. It may be concluded that the projection of the added value underestimates the economic growth of Slovenia, whereby indications of economic cooling were present at the end of 2019, and also, 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 EEU and RES measures.

The results of emission projections for the energy sector 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 allowances, that have shown a very dynamic movement in the past, exert a considerable impact. Great uncertainty is also correlated with technological development, which is also related to the price of the measures. The projections foresee that natural gas will be replaced by synthetic gas, and it is envisaged that carbon capture will be installed at the coal power plant and at the cement plant, despite the fact that the development of technology is faced with large delays from the initial plans. Major technological developments are also foreseen in other sectors (electricity storage devices, photovoltaics, building insulation materials, etc.)

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, sales 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 little regard 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 new technologies in the transport – electric vehicles, autonomous vehicles, mobility as a services, etc.

The uncertainties of the estimates of emissions in agriculture are great. The main contribution to this are unreliable forecasts of the volume of agricultural production and breeding. The number of agricultural holdings is falling very rapidly and the existing agricultural holdings are becoming larger. In areas with favourable farming conditions with agricultural land, there will probably be no problems, but the question is whether Slovenia will succeed in preserving cultivation in areas with lessfavoured farming conditions through agricultural policy measures. This refers to the land that is suitable primarily for breeding grass eating animals. The latter will therefore influence the livestock numbers.

The main uncertainties relating to the projections of emissions and sinks are, in particular, the assumptions of the actual (regular) felling, the mixture of tree species in forest stands and frequency and extent of natural disasters or natural disturbances. Climate change may have both positive and negative effects on the projections of net emissions in forests. With the increase in CO₂ concentrations in the atmosphere, better growth in forest stands is expected on the one hand (taking appropriate silvicultural measures), and, on the other hand, larger total felling crop, resulting from more frequent and more extensive natural disturbances in forests.

5.9 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.

[%]	2015	2020	2025	2030	2035	2040
Projection with measures (01)	100	98	104	108	106	101
Projection with additional measures (O2)	100	96	95	84	62	32
Reduced scope of additional measures (O3)	100	97	99	96	82	66
Projection with additional measures with a smaller share of biofuels (O4)	100	96	96	87	63	33
Projection with additional measures, additionally with the abolition of excise duties on lorries (O5)	100	89	80	66	48	26
Projection with additional measures with a lower share of biofuels and higher share of foreign vehicles purchasing fuel in Slovenia (O6)	100	104	104	95	70	39

Table 14: 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

The projection with measures has the highest emissions according to the compared scenarios for sensitivity analysis. The sensitivity analysis focused on the range of

different scenarios of projections with additional measures. In 2030, a similar reduction is achieved in scenario with reduced scope of implementing additional measures (O3) (4% lower emissions compared to 2017) at the same level of implementing additional measures as in the basic projection with additional measures but with the same share of biofuels as in 2020 and a high share of transit transport (O6) (5%). The lower share of biofuels alone (O4) does not have a major impact (13%), while a significant reduction in the sale of fuel to foreign vehicles (O5) would significantly reduce emissions (34%). The difference is reduced by 2040 due to the increased use of fuels, which have a smaller CO₂ print, with the exception of the scenario with a lower level of implementing additional measures, which envisages a slower introduction of alternative fuels (electricity, synthetic gas), which is reflected in significantly higher emissions.

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 2030 according to the scenario, which represents the upper sensitivity limit (O3), amount to 13.8Mt CO₂ eq., which is 21% less emissions than in 2017; however, emissions in 2030 according to the scenario, which represents the lower sensitivity limit (O5), amount to 12.0Mt CO₂ eq., which are 31% lower than emissions in 2017. In 2040, the emissions range is maintained at a similar level: emissions according to the scenario which represents the upper sensitivity limit to 8.8Mt CO₂ eq., and emissions according to the scenario which represents the lower sensitivity limit amount to 6.4Mt CO₂ eq.

[%]	2015	2020	2025	2030	2035	2040
Projection with measures	100	98	97	97	96	92
The projection with additional measures	100	96	90	75	56	39
Reduced scope of additional measures	100	96	92	79	62	50
Projections with additional measures with a smaller share of biofuels	100	96	91	76	56	39
Projections with additional measures, additionally with the abolition of excise duties on lorries	100	93	85	69	51	37
Projections with additional measures with a lower share of biofuels and higher share of foreign vehicles purchasing fuel in Slovenia	100	98	93	79	58	41

Table 15: 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

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. The reduction in emissions ranges from 14% to 30% in 2030 and from 37% to 59% in 2040.
Table 16: 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	2040
Projection with measures	100	101	99	98	95	90
The projection with additional measures	100	99	92	80	64	45
Reduced scope of additional measures	100	99	94	86	75	63
Projections with additional measures with a smaller share of biofuels	100	99	92	81	64	45
Projections with additional measures, additionally with the abolition of excise duties on lorries	100	94	84	70	57	41
Projections with additional measures with a lower share of biofuels and higher share of foreign vehicles purchasing fuel in Slovenia	100	103	97	85	68	48

5.10 Change in the projection methodology

For the projections of emissions, a broad range of models was used which are presented in detail in the Seventh National Communication, while the changes in models used to draw up the most recent projections are summarised below:

- The basic model for emission projections in the energy use sectors is a technologically oriented model REES-SLO2, developed in the MESAP environment in the form of a linear network model of processes and connections (a reference energy system). The model has already been used in previous projections of greenhouse gas emissions and for the purposes of strategic planning in the energy sector, reducing GHG emissions and also air pollutants.
- The model was considerably upgraded compared to previous projections. The time frame was extended until 2050, a new base year was used, and the set of technologies was extended. The most important work was done in the analysis of potentials for various measures, which enabled more quality projections. This is particularly important in the light of 2050, when it is necessary to exploit all potentials for achieving the necessary emission reduction.
- New projections also included new projections of external circumstances: GDP growth, fuel prices and prices of allowances and transport activity. Transport activity is calculated using the PRIMOS transport model, where the time frame was also extended.
- Other sectoral models for industrial processes, waste and agriculture were also upgraded to cover the period up to 2050, and new measures envisaged to achieve a more significant reduction in emissions were also included in models.

 A new model for preparing the LULUCF projections was developed and now enables the preparation of projections for this sector by 2050. A Canadian model⁴⁹ was used, implementing the Tier 3 approach according to IPCC guidelines ("Good Practice Guidance for reporting on carbon stocks and carbon stock changes resulting from Land Use, Land-use Change and Forestry").

The complete upgrade of models was carried out within the framework of the LIFE ClimatePath2050 project, which was co-financed by the EU and the Ministry of the Environment and Spatial Planning.

⁴⁹ https://www.nrcan.gc.ca/climate-change/impacts-adaptations/climate-change-impacts-forests/carbon-accounting/carbon-budget-model/13107