

Ministry for Innovation and Technology

Hungary's Fourth Biennial Report

Under the United Nations FrameworkConvention on Climate Change

> Climate Policy Department, Ministry for Innovation and Development

> > 2019.

Table of Contents

1	Info	rmation on greenhouse gas emission and trends	2
	1.1	Greenhouse gas emission and trends in Hungary	2
	1.2 contril	Greenhouse gas emission and trends in the European Union and the Hungarian oution	5
2	Qua	ntified Economy-wide Emission Reduction Targets (QEWER)	6
	2.1	The EU's target under the Convention	6
	2.2	The 2020 climate and energy package	7
	2.3	Monitoring on progress to 2020 targets	8
	2.4	Use of international market-based mechanisms	9
	2.5	Other EU emission reduction targets	9
3	Miti	gation actions and their effects	9
	3.1	Policies and measures and their effects	9
	3.2	Changes in domestic institutional arrangement 2	3
	3.3 measu	Information on the assessment of the economic and social consequences of response re	4
	3.4 mecha	Estimates of emission reductions and removals and the use of units from the market-based nisms and land use, land-use change and forestry activities	յ 5
4	Proj	ections	6
	4.1	Scenario results 2	6
	4.2	Methodology and changes in methodologies	3
5	Prov	vision of financial, technological and capacity-building	5
6	Prov	vision of financial resources	7

1 Information on greenhouse gas emission and trends

In the United Nations Framework Convention on Climate Changes, Hungary undertook to keep its CO2 emissions in 2000 at or below the 1990 level. In the first commitment period of the Kyoto Protocol, our country committed to reduce the average greenhouse gas emission by 6% of the base year level during the five years of the first commitment period (2008 to 2012). It will be shown in the next Sections that Hungary has complied with these commitments.

In the second commitment period of the Kyoto Protocol Hungary takes part as Member State of the European Union without individual commitment: Hungary's emission reduction target is part of the joint target of the European Union (more information in chapter 2.). Therefore information on GHG emission and trends of the European Union is also presented in Section 2.

1.1 Greenhouse gas emission and trends in Hungary

This section summarizes information on Hungary's historical greenhouse gas (GHG) emissions since the base year of Hungary under the Kyoto Protocol – which is the average of years between 1985 and 1987. The GHG emission data presented in this Biennial Report are consistent with the GHG emissions reported in 2019 under the Convention to the UNFCCC secretariat and correspond to the totals in the CRF tables under the Convention.

Emissions in 2017 were compared to emissions in base year, in 1990 and in 2005. The European Union (EU)'s climate strategy for 2020 established the target of a 20% reduction of greenhouse gas emissions (GHG) compared to the level of 1990. The overall emissions reduction target is separated into an EU-wide target for large industrial installations, covered by the European Emissions Trading Scheme (EU ETS) and one target for so called non-ETS emissions, covering households, buildings, transport, agriculture, services and smaller industrial installations. Non-ETS emissions are broken down into binding national targets for all of the 28 Member States (MS) by the Effort Sharing Decision. 2005 is used as reference year as it is the first year where a split of ETS and non-ETS emissions to 2005 levels, the other sectors 10% reductions in comparison to 2005. Together this will accomplish a cut of 20% of overall emissions compared to 1990 levels.

In 2017, total emissions of greenhouse gases in Hungary were 63.8 million tonnes carbon dioxide equivalents (CO2-eq) excluding the LULUCF sector. Taking into account also the mostly carbon absorbing processes in the LULUCF sector, the net emissions of Hungary were 58.3 million tonnes CO2-eq in 2017. Being about 6 tonnes, the Hungarian per capita emissions are below the European average.

	BY	1990	1995	2000	2005	2010
Total emissions without						
LULUCF	109314.00	93655.93	75319.56	73207.97	75359.66	64949.13
Total emissions with LULUCF	107557.39	91137.17	69848.15	72801.17	70008.18	60936.95
Int. bunkers (aviation)	452.93	500.91	554.12	713.52	816.99	716.88
	2013	2014	2015	2016	2017	
Total emissions without						
LULUCF	56795.77	57415.82	60767.14	61139.78	63787.58	
Total emissions with LULUCF	53420.65	52551.96	55409.31	56837.27	58348.61	
Int. bunkers (aviation)	507.11	535.27	547.80	604.15	701.19	

Table 1-1. Trends in emissions of greenhouse gases in Hungary (kt CO2-eq)

Now, our emissions are 42% lower than in the average of years 1985-87. This significant reduction was partly a consequence of the regime change in Hungary (1989-90) which brought in its train radical decline in the output of the national economy. The production decreased in almost every economic sector including also the GHG relevant sectors like energy, industry and agriculture. Then, between 2005 and 2013, after a period of about 14 years of relatively stagnant emission level (1992-2005), GHG emissions fell again quite significantly by 25 per cent. The global financial and economic crisis exerted a major impact on the output of the Hungarian economy, consequently on the level of GHG emissions as well resulting in a quite significant drop of 8% between 2008 and 2009. Then, after a smaller increase in 2010, emissions decreased further in the following four years. In contrast, the decline in economic output stopped in the first quarter of 2010, and Hungary not only reached the pre-crisis level of GDP again in 2014 but exceeded it even in 2015.



Figure 1-1 Comparison of trends in GDP and GHG emissions (without LULUCF)

After 2013, emissions started growing again. Up to 2017, the overall increase reached 12%. Between 2016 and 2017, the growth rate was 4%, to which all sectors contributed to a greater or lesser extent. Despite the increase in the last four years, current emissions (without LULUCF) still remained by 15% below the emission level of 2005 and 32% below the emission level of 1990.

It is worth to mention that ETS covered 32% of the GHG emissions (total emissions without LULUCF for GHG inventory and without emissions from 1A3a Civil aviation, total emissions from installations under Article 3h of Directive 2003/87/EC) in Hungary in 2017.

Trend of emissions by GHGs

The most important greenhouse gas is carbon dioxide accounting for 78% of total GHG emissions. The main source of CO_2 emissions is burning of fossil fuels for energy purposes, including transport. CO_2 emissions have decreased by 42% since the middle of the 80's and 32% since 1990. Methane represents 12% in the GHG inventory. Methane is generated mainly at waste disposal sites and in animal farms, but the fugitive emissions of natural gas are also important sources. CH_4 emissions are by 39% lower than in the 1985-87 base year and 35% lower than in 1990. Nitrous oxide contributes 7% to the total GHG emissions. Its main sources are agricultural soils, and manure management. N_2O emissions are 57% lower compared to 1985-87 base year and 43% lower compared to 1990. The total emissions of fluorinated gases amount to 3%.

	BY (1985- 87)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017		
emissions in kt CO ₂ -eq without LULUCF													
CO2	85570	73445	61627	58560	60510	52138	43780	43925	46677	47430	49646		
CH ₄	12447	11633	8687	8778	8185	7877	7541	7428	7407	7389	7539		
N₂O	10920	8192	4694	5292	5514	3642	4127	4287	4366	4546	4687		
HFC	NO	NO	37	211	776	1203	1253	1694	2202	1648	1801		
PFC	371	376	223	283	281	2	2	1	1	1	1		
SF ₆	6	11	52	84	94	87	94	80	114	126	114		
TOTAL	109314	93656	75320	73208	75360	64949	56796	57416	60767	61140	63788		

emissions in % of total emissions without LULUCF

CO2	78%	78%	82%	80%	80%	80%	77%	77%	77%	78%	78%
CH₄	11%	12%	12%	12%	11%	12%	13%	13%	12%	12%	12%
N ₂ O	10%	9%	6%	7%	7%	6%	7%	7%	7%	7%	7%
HFC			0.05%	0.3%	1.0%	1.9%	2.2%	3.0%	3.6%	2.7%	2.8%
PFC	0.3%	0.4%	0.3%	0.4%	0.4%	0.003%	0.004%	0.002%	0.002%	0.002%	0.002%
SF ₆	0.01%	0.01%	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%	0.2%	0.2%	0.2%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 1-2. Trend of emissions by GHGs, excluding LULUCF (kt CO₂-eq)

Trend of emissions and removals by sector

By far, the biggest emitting sector was the energy sector contributing 72% to the total GHG emission in 2017. Industrial processes and product use was the second and agriculture was the third largest sector with 11% each, and the waste sector contributed 5%. Compared to the base year, emissions were significantly reduced in the energy (-42%), agriculture (-41%), and industrial processes and product use (-53%) sectors. In contrast, emissions in the waste sector have increased slightly since 1985 (+3%). The land use, land-use change and forestry (LULUCF) sector shows fluctuating behavior. Looking at the more recent trends since 2005, emissions have significantly decreased in the energy and industrial processes sectors by 18% and 21%, respectively. The agriculture sector seems to have recovered and could show an increase of 16% since 2005. The previous growing trend turned back in the waste sector (-19%).

	BY (1985- 1987)	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017
Energy	78984	68182	57137	54665	55962	48770	41313	40876	43338	44452	46150
Industrial Processes	15175	11810	8275	8240	9136	6431	5468	6459	7287	6446	7204
Agriculture	11869	9880	5892	6067	6068	5637	6308	6472	6672	6881	7056
LULUCF	-1757	-2519	-5471	-407	-5351	-4012	-3375	-4864	-5358	-4303	-5439
Waste	3286	3784	4016	4235	4194	4111	3707	3608	3470	3360	3377
TOTAL	107557	91137	69848	72801	70008	60937	53421	52552	55409	56837	58349

 Table 1-3. Trend of emissions and removals by sector (including LULUCF, Gg CO2-eq)

Uncertainty

The reliability of the data for individual source categories was estimated on the basis of the 2006 IPCC Guidelines but information from the industry and expert estimates was also used. On the basis

of Table 3.3 and Table 4.1 of the 2006 IPCC Guidelines we have determined the total uncertainty according to the Tier 1 method. Accordingly, the combined uncertainty as % of total national emissions (in the year 2017) is 11.3% (excluding LULUCF) and the uncertainty introduced in trend in national emissions is 2.6%.

GHG	% uncertainty excluding LULUCF
CO ₂	2.5
CH ₄	27.2
N ₂ O	144.9
F-gases	12.9

The uncertainty values have been determined for 2017 by gas as well:

Completeness

GHG inventory data are provided for the base year (the average of the three years 1985–1987) and the years 1985–2017. All relevant gases, sectors and categories are included. The inventory is complete in terms of geographic coverage.

1.2 Greenhouse gas emission and trends in the European Union and the Hungarian contribution

The European Union (EU) is on track to meet its 2020 climate and energy targets. Official data for 2017 show that greenhouse gas (GHG) emissions have already decreased beyond the 20 % reduction target.

In 2017, greenhouse gas emissions across Europe had already fallen to 21.7 % below 1990 levels. Preliminary data reported by Member States show that there was a 2.0 % decrease from 2017 to 2018, bringing collective reductions down to 23.2 % below 1990, well under the 2020 target.

While the EU target of reducing its greenhouse gas emissions by 20 % compared with 1990 levels by 2020 appears to be within reach and EU legislation to meet the 2030 GHG target has been adopted, aggregated projections from Member States are not yet in line with the minimum required 40 % reduction target. Together, Member States project that current policies and measures can deliver a 30 % reduction by 2030, while the reported additional policies and measures they intend to launch in the coming years can deliver a 36 % reduction by 2030. While this presents a more positive outlook compared with last year's projections, meeting the 2030 target will demand further efforts. Hungary has a very low, 1.4% contribution to the EU GHG emissions (with LULUCF, under KP). Emission trends for the EU and for Hungary, as well, are summarized in the following figure.



Figure 1-2. Emission trends for the EU (blue line) and for Hungary (orange columns) and the 2020 (green line) and 2030 (red line) targets

2 Quantified Economy-wide Emission Reduction Targets (QEWER)

2.1 The EU's target under the Convention

Hungary's emission reduction target under the Convention is part of the joint target of the European Union.

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 (humaninduced) 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 EU had also committed to raising this target to a 30% emission reduction by 2020 compared with 1990 levels, provided that other developed countries also commit to achieving comparable emission reductions, and that developing countries contribute adequately, according to their responsibilities and respective capabilities. This offer was reiterated in the submission to the UNFCCC by the EU-28 and Iceland on 30 April 2014.

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). In addition, the 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 current rules under the Kyoto Protocol, for example, including international aviation, and adding an annual compliance cycle for emissions under the Effort Sharing Decision (ESD; see section 2.2.1 of the EU's 3rd Biennial Report) 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% target under the UNFCCC:

- The EU Convention pledge does not include emissions/removals from Land Use, Land Use Change and Forestry, but it is estimated to be a net sink over the relevant period. EU inventories also 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 Protocol.
- 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 international aviation to the extent it is included in the EU ETS 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 (see section 2.2.2.3): in the ETS, the use of international credits is capped (up to 50% of the reduction required from EU ETS sectors by 2020). Quality standards also apply to the use of international credits in the EU ETS, including a ban on credits from LULUCF projects and certain industrial gas projects. In the ESD sectors, the annual use of international credits is 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.
- 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. In accordance with the CMP Decision to revise the GWPs to those from the IPCC Fourth Assessment Report (AR4) revised GWPs from AR4 were adopted for the EU ETS. The revised GWPs were taken into account for the revision of the ESD target. For the implementation until 2020, GWPs from AR4 will be used consistently with the UNFCCC reporting guidelines for GHG inventories.

2.2 The 2020 climate and energy package

In 2009 the EU established internal rules under its "2020 climate and energy package"60 - these 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, which 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);
- a 10% reduction target compared to 2005 for ESD sectors, shared between the 28 Member States (MS) through individual national GHG targets.

Under the revised EU ETS Directive (Directive 2009/29/EC), a single ETS cap covers the 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). For more information on ETS and on the recent changes please see section 3.2 of the EU's 3rd Biennial Report.

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 No 406/2009/EC). The ESD covers emissions from all sources outside the EU ETS, except for emissions from domestic and international aviation (which were included in the EU ETS from 1 January 2012), international maritime 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, trucks), 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 60% of total GHG emissions in the EU in 2017.

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 3-2). 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 reduction targets 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 per capita. In addition, different levels of development in the EU-28 are taken into account by the provision of several flexibility options. 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 the use of international credits (credits from Joint Implementation and the Clean Development Mechanism). MS exceeding their annual AEA, even after taking into account the flexibility provisions and the use of JI/CDM credits, will face inter alia a penalty – a deduction from their emission allocation of the following year (excess emissions, multiplied by 1.08).

Under the ESD Hungary can increase its emissions by 10% compared to the 2005 level. Hungary is well below the 2020 own ESD emission target according to the latest inventory. The target for 2017 was 50 064 kt CO_2 -eq and 52 831 kt CO_2 -eq. in 2020 meanwhile the 2017 ESD emission was 41 883 kt CO_2 -eq; between 2013 and 2017 Hungary saved 54 886 kt CO_2 -eq emissions compared to the allowed amount.

2.3 Monitoring on progress to 2020 targets

For the monitoring of GHG emissions at the EU and the Member State level, the Monitoring Mechanism Regulation has been adopted. Also for the effective operation of the EU ETS, robust, transparent, consistent and accurate monitoring and reporting of greenhouse gas emissions are essential, therefore an annual procedure of monitoring, reporting and verification (MRV) at the installation level is implemented. For a description of the requirements contained therein, please refer to the EU's second Biennial Report. Installation and aircraft operators have to monitor, report and verify their annual emissions in accordance with two EU Regulations, the Monitoring and Reporting Regulation (MRR) and the Accreditation and Verification Regulation (AVR). For a description of the requirements contained Report.

Monitoring, reporting and verification of the ESD targets mainly takes place through the submission of the national GHG inventories by MS. Chapter III of the Commission Implementing Regulation 749/2014 sets out strict criteria by which MS national GHG inventories GHG emissions are reviewed annually at the EU-level. Based on this review, the European Commission issues an implementing

decision on MS ESD emissions in the given year, which might lead to MS inter alia facing penalties as described above.

2.4 Use of international market-based mechanisms

The ESD allows Member States to make use of flexibility provisions for meeting their annual targets, with certain limitations. In the ESD sectors, the annual use of carbon credits is limited to up to 3% of each Member State's ESD emissions in 2005. Member States that do not use their 3% limit for the use of international credits in any specific year can transfer the unused part of their limit to another Member State or bank it for their own use until 2020.

2.5 Other EU emission reduction targets

In addition to the EU target under the Convention, the EU also committed to a legally binding quantified emission limitation reduction commitment for the second commitment period of the Kyoto Protocol (2013 - 2020).

3 Mitigation actions and their effects

Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

3.1 Policies and measures and their effects

In this section, planned, adopted and implemented policies and measures (PAMs) are presented which contribute to the reduction of GHG emissions on a sectoral basis.

Multisectoral instruments

National Climate Change Strategy II.

The second National Climate Change Strategy (NCCS II.) relating to 2018-2030, with an outlook to the period until 2050 has adopted by the Hungarian Parliament on 30th of October in 2018 with the adoption of 23/2018. (X. 31.) Parliamentary decree. The NCCS II. emphasizes that the hungarian decarbonization should be somewhere between 52 % and 85 % to 2050 (compared to 1990), which supports the cost-efficient and sustainable development. The NCCS II. inlcudes three main chapter: the National Decarbonization Roadmap, the National Adaptation Strategy and the Partnership for the climate – awareness raising plan. The NCCS II. defines long-, mid- and short-term goals and action lines in these three category. Based on the prescriptions of the Act LX of 2007 on the implementation framework of the UN Framework Convention on Climate Change and the Kyoto Protocol thereof the Government shall review the Climate Strategy in every five years.

Climate Change Action Plan I.

According to paragraph 3.3. of the 23/2018. (X. 31.) Parliamentary decree the Government shall elaborate the Climate Change Action Plan within 6 months after adoption of the NCCS, then in every 3 years. Based on this paragraph, the Climate Change Action Plan (CCAP) includes decarbonization, adaptation and awareness raising subprograms with the following elements: a) overview of measures in line with the NCCS II.; b) identification of indicators monitoring the progression of the NCCS II.; c) plan for monitoring and evaluation of the NCCS II., monitoring and evaluation system. The Ministry for Innovation and Technology has prepared the draft of the first Climate Change Action Plan for the period until 2020. The administrative consultation was finished in September, actually

the preparatory meetings of the Government are negotiating the draft of CCAP I. The first Climate Change Action Plan includes partly ongoing actions, programs and partly planned actions, projects for short-term. Many of the planned actions, projects are preoperational, support the later decisions as they are directed to preparation of expert suggestions in the different sectors. The CCAP I. Defines measure in the mitigation, in the adaptation, in the awareness raising sector and

Long-term strategy

The MIT has prepared the draft of the 2050 decarbonization strategy, so-called: Clean Growth Strategy, which is under administrative consultation. This long-term strategy is aiming to achieve the 100 % decarbonization until 2050.

National Energy- and Climate Plan

Hungary has sent the first version of its National Energy- and Climate Plan to the European Union's Commission. Based on the received comments from the Commission the Ministry for Innovation and Technology has prepared the updated version of the National Energy- and Climate Plan, which is under administrative consultation. The NECP set 40 % GHG reduction goal until 2030.

National Energy Strategy 2030

The National Energy Strategy (NES) published in 2012 is the overarching policy document of the energy sector. The goal of the strategy is to increase security of energy supply, competitiveness, the sustainability of the sector. Hungary intends to achieve these through five tools: first, via increasing energy efficiency; second, via increasing the share of renewable energy sources; third, via the long-term use of nuclear energy; fourth, via regional cooperation particularly with the neighbouring countries; finally, through the renewal of the government's energy institution system.

Actually the Ministry for Innovation and Technology is preparing the updated version of the NES, which is under administrative consultation. The slogan of the NES II. is the "Clean, Smart and Affordable Energy". NES II. has the following four main goals, which is supported by 16 programs:

- it places the Hungarian consumer to the focus of the NES,
- it strengthens the security of the power supply,
- it implements the climate-friendly reforming of the power sector,
- it utilizes the economic development opportunities in the energetic innovation and climate change.

National Renewable Energy Action Plan

The Renewable Energy Action Plan (NREAP) (the official title is: Hungary's Action Plan for the Utilisation of Renewable Energies 2010-2020) reconfirms Hungary's overall target for the share of renewable energies and identifies the key areas of intervention, stating individual quantitative targets. It sets more ambitious targets than originally set by the European Union in order to support the overall economic objectives (job creation, improving competitiveness, reducing energy import dependency) through boosting "green" economy. While the RED Directive (2009/28/EC) of the EU sets the renewable target for Hungary a minimum of 13% of the total gross final energy consumption, the objective defined by the NREAP is 14.65%.

Energy and Climate Awareness Raising Action Plan

The Energy and Climate Awareness Raising Action Plan – adopted by 1602/2015 Government Decision in 2015 – aims fostering awareness of energy and climate. Therefore, the Plan identifies governmental "soft" measures within a short time – the majority by 2020 – which are capable for contributing to change attitudes about both climate change and energy efficiency on the following five main areas: (1) energy efficiency and energy conservation; (2) renewable energy use; (3) transport energy saving and emission reduction; (4) a resource-efficient and low-carbon-intensity of economic and social structures; (5) accommodation.

National Energy Efficiency Action Plan (NEEAP)

The 3rd National Energy Efficiency Action Plan (NEEAP) - published in 2015 - describes the planned energy efficiency measures for each economic sector, the state of implementation of practical applications and measures related to Directive 2012/27/EU on Energy Efficiency and other programmes supporting better energy efficiency. Measures related to better energy efficiency of buildings - including new buildings with low energy consumption levels, and reconstruction of existing buildings - have the most significant effects on fulfilling the energy efficiency targets. The main objective of the 3rd NEEAP is to achieve a significant reduction in primary energy consumption in all sectors of the economy, which means a remarkable reduction in building, residential and transport sector, as well. The Action Plan also includes the National Building Energy Performance Strategy, the Energy and Climate AwarenessRaising Action Plan, and the planned Transportation Energy Efficiency and District Heating Development Action Plans.

Environment and Energy Efficiency Operational Program (EEEOP)

EEEOP is one of the operational programmes during the 2014-2020 period accepted by the European Commission. The programme aims to support sustainable growth and contributes to achieving the Europe 2020 targets for smart, sustainable and inclusive growth. It should improve flood protection, provide better waste and wastewater management services and good quality drinking water to more residents, help protect natural habitats and species of community importance, and it should improve energy efficiency and the use of renewable energy sources. Priority axis 2 includes supporting waste water treatment capacity building projects. Priority axis 3 includes supporting investment in separate waste collection and in municipal waste treatment facilities. Priority axis 5 supports investments in renewable energy supply, energy efficiency, enhancing district heating and heat energy supply systems.

<u>Territorial and Settlement Development Operative Programme (TSDOP)</u>

TSDOP is one of the operational programmes during the 2014-2020 period accepted by the European Commission. The programme aims to support regional, decentralised economic development and an increase in employment based on local resources. Priority axis 3 and 6 of TSDOP supports the following investments: 1. Investments related to sustainable public mobility 2. Energy efficiency improvements of buildings and use of renewable energy. The beneficiaries are local governments.

Comprehensive energy modernization programme for "Kádár cube" buildings

Energy modernization program for approx. 100 m2 residential buildings ("Kádár cubes") built in the 70s.

Competitive Central - Hungary Operational Programme (CCHOP)

CCHOP is one of the operational programmes during the 2014-2020 period accepted by the European Commission. The comprehensive objective of the programme is to ensure the development of the Central-Hungary Region and to further improve its competitiveness, whilst simultaneously decreasing the socio-economic disparities within the region. Priority axis 5 of CCHOP supports the following investments in the Central Hungarian Region: 1. Energy efficiency improvements and renewable energy use of companies 2. Modernisation of energy systems, district heating and other heat supply systems, increasing the share of renewables in the residential sector 3. Sustainable mobility.

Rural Development Programme

Rural Development Programme is one of the operational programmes during the 2014-2020 period accepted by the European Commission. The priority axis 5 of the Rural Development Program supports projects related to increasing the energy efficiency in the agricultural sector and promoting carbon sequestration by afforestation. Projects supported by the Programme: improvement of

energy efficiency in the horticulture sector, construction of small sized energy-efficient silos and grain dryers, improvement of effectiveness of energy consumption in the livestock sector, promotion of resource efficiency in processing sector, promotion of afforestation, investments in wood production, forestry technologies, forestry processing and market sale.

Energy – excluding Transport

Operational grant for the production of renewable energies

The METAR (Hungarian support scheme for renewable electricity) system was introduced with a lower rate of return on the 1st of January 2017 without the support categories of the so called brown premium and demonstration project, because of the system had to be notified to the European Commission in advance in order to fully operate. The European Commission has found the METÁR to be in line with EU state aid rules on the 11th July 2017 and this way all support schemes would come into force after the publication of the relevant acts. The premium will be determined – in line with the guideline of the EU – and beneficiaries selected in a competitive bidding process. Just the minor energy producers (with a capacity of less than 1 MW, except of wind power plants) gain exemption under this rule. The tenders will be presented – according to the request of the Ministry of National Development – by the Hungarian Energy and Public Utility Regulatory Authority and the minor producers can request the grant form it too.

Developing measures to increase the flexibility of the electricity system

The dynamically growing renewable energy capacity should be integrated into the electricity system with the lowest possible cost increase as well as the entry of new power plants and the expiration of certain power plants' operating time should not risk security of supply of domestic consumers. As part of this: a. It is necessary to examine whether it is possible to ensure the available necessary production capacities for the safe supply of domestic electricity under the expected market trends and the regulatory framework or further introduction of incentives is needed to guarantee the security of supply, b. Regulatory frameworks should be developed to encourage technological solutions that increase the flexibility of electricity transmission and distribution system management in order to minimize the overall social costs of climate-friendly transformation of the energy sector, c. Demand-side influence on consumers and innovative technologies in particular the policy programs supporting the application of battery electricity storage should be developed.

<u>Program to increase the energy independence of consumers along with promoting prosumer energy</u> <u>production</u>

Hungary reinterprets energy independence on the level of consumers, thus intends to promote small-scale decentralised energy production. This includes small-scale decentralised renewable energy production in electricity, heating and cooling and transport purposes to an increasing extent

Capacity maintenance of the Paks Nuclear Power Plant

In accordance with the National Energy Strategy, it is assumed that two new units - of approximately 1,200 MWe each - will be put into operation by 2026 (1st) and by 2027 (2nd). The main objective of building the two new nuclear units is the replacement of the Paks Nuclear Power Plant currently in operation. The replacement of its capacity will be the basis for a long-term low-carbon electricity generation in Hungary.

National Building Energy Performance Strategy

The National Building Energy Performance Strategy, which was published in 2015, is a part of the National Energy Efficiency Action Plan. The strategy sets out the main targets and directions for modernising the domestic building stock and achieving a significant decrease in the energy demand of buildings until 2020, with projections until 2030. It also defines a conceptual framework for the

building energy action plans and the specific programmes and actions to be implemented at a later stage. Detailed analysis of the domestic building stock can also be found within the Strategy. The list of government buildings that are covered by the renewal obligation in Article 5 of Directive 2012/27/EU and in the relevant national legislation (Act LVII of 1995 on Energy Efficiency, Section 8), and buildings with almost zero energy requirements (2010/31/EU Directive, Article 9) are both parts of the Strategy. As part of the 4th National Energy Efficiency Action Plan, the National Building Energy Strategy was also revised in 2017.

New requirements on energy performance of buildings

For new buildings of authorities: from 1 January 2018; for every other new buildings: from 1 January 2021 – from the mentioned deadlines new buildings have to meet nearly zeroenergy building requirements: maximum 100 kWh/m2 specific annual energy demand for residential, maximum 90 kWh/m2 for commercial and office buildings and maximum 80 kWh/m2 for educational buildings. Furthermore, 25% of annual energy needs should be provided from renewable energy sources.

From 1 January 2018, buildings after renovation have to meet the following requirements: maximum 110-140 kWh/m2 for residential buildings, maximum 132-160 kWh/m2 for commercial and office buildings and maximum 90-150 kWh/m2 for educational buildings. New requirements are defined in terms of the heat transfer of the outer delimiters (U-value), the building engineering systems and the energy certificates of buildings.

Energy saving programme for public buildings

From 2017 all public institutions must register their energy consumption and report it to the offices of the National Energy Efficiency Advisory Network and, at the same time, they must prepare energy saving plans and report annually on their implementation. An awarenessraising campaign is also needed to be launched targeting the employees of public institutions.

Establishment of the National Energy Efficiency Advisory Network

The National Energy Efficiency Advisory Network was established in 2017 and consists of 76 offices within the institutional framework of County Government Offices and District Offices. Their tasks, among others, are: to collect and monitor energy consumption data of municipal and state owned public buildings; to provide assistance in awareness-raising activities targeting the users of municipal public buildings; to support the preparation and development of energy saving action plans of municipalities and public institutions; to contribute to the conclusion of energy supply contracts and to provide free energy consultation and advice for SMEs.

Funding for energy modernization of residential buildings - Warmth of Home Programme

The aim of the programme – since 2008 - is to achieve further reduction of households' energy costs from domestic budgetary resources by replacing outdated household machines, boilers, doors and windows. The majority of domestic resources available for improving the energy efficiency of residential buildings come from the revenues of CO2 emission allowances. Between 2008 and 2013 revenues from Kyoto units were utilised within the Green Investment Scheme (GIS) budget heading. From 2013 a part of the revenues from the European Union's Emission Trading Scheme (EU ETS) will be used within the Green Economy Financing Scheme (GEFS) budget heading. The sources of these budget headings are available for the promotion of non-refundable subsidies for residential energy efficiency.

The main target areas of the programme are: the increase of energy efficiency, the increase of energy savings, the reduction of GHG emissions and the reduction of energy dependency. In addition, emission reduction has direct environmental benefits: the mentioned improvements result in heat, energy and cost savings for buildings, heating systems and businesses; and the increase of renewable heat and power generation, which reduces dust and PM10 pollution.

The Warmth of Home Programme focuses on creating a complex, short and long term package of measures that increases household energy efficiency and energy savings, thus contributing to lower energy costs. The programme was relaunched during the autumn of 2017 with an allocation of 31 billion forints, and until nowadays it has enabled the energy modernization of more than 164,000 households with a funding of approximately 23 billion forints.6 The subprograms will be announced continuously, and new subprograms are also expected to be announced.

The programme is part of the Government's overheads reduction policy, as with the replacement of outdated household appliances Hungarian families can save up to 20 thousand forints, and with the modernization of residential buildings up to 150-180 thousand forints on their annual energy expenditures. The majority of the governmental household replacement programmes – which achieve the consumers' level – targets social policy, family support and regional development considerations as well: certain grants were dedicated to large families and pensioners, and certain financial quota was defined for the inhabitants of each regions in order to provide geographical balance and equal opportunities.

As a result of the above mentioned energy efficiency investments, Hungary's carbon dioxide emissions are reduced by more than 79,000 tons/year and the country's energy savings are increased by 0,7 PJ/year.

Funding for energy modernization of residential buildings – interest - free loan programme

There are many free loans available in the operational programs for energy modernization of family houses and condominiums and for the use of renewable energy sources. The financial sources of the credit line are the Economic Development and Innovation Operative Programme (GINOP) and the Competitive Central Hungary Operative Programme (VEKOP) of the EU. The credits are, inter alia, available for insulating residential properties, modernizing heating or hot water systems, and installing solar-panelled, solar-powered and heat pump systems. The amount of the loan, in case of natural persons, may vary from 500 thousand to 10 million forints, while in case of condominiums and housing associations from 500 thousand to 7 million forints for each apartment, with a maturity of 20 years. The expected contribution of the applicants is min. 10% of the eligible costs. The loan can also be used as an own contribution for other non-refundable constructions. According to the expectations, the loan programme will enable to renovate tens of thousands of apartments and family houses.

Tax advantage for companies after energy efficiency investments

In 2017 a new tax advantage was introduced, which can be requested by companies after their investments that increase energy efficiency.

Mandatory energy audit

According to Directive 2012/27/EU on Energy Efficiency, since 2015 it has been obligatory for non-SME enterprises to have an energy audit every 4 years (or to operate an energy management system).

Mandatory employment of an energy rapporteur

Since 1 January, 2017 for enterprises and other institutions with high energy consumption, (where the annual energy consumption is higher than 400 000 kWh electricity or 100 000 m3 natural gas or 3 400 GJ heat energy), it is compulsory to employ an independent energy expert. The main task of the energy expert is to promote the introduction of energy efficient approaches and behaviours within the operation and decision-making of the organization.

Economic Development and In novation Operational Programme (EDIOP)

EDIOP is one of the operational programmes during the 2014-2020 period accepted by the European Commission. Priority axis 4 of EDIOP supports energy efficiency improvement of buildings and economic activities and also investments related to renewable energy. The beneficiaries are SMEs. The EDIOP priority axis 8 supports investments in energy efficiency and renewable energy projects by companies and households.

Transport

National Transport Infrastructure Development Strategy

The National Transport Infrastructure Development Strategy is the main policy document in the transport sector. It depicts the current status of the transport sector in Hungary and determines targets while proposing measures to achieve these targets. Among other targets the strategy aims to mitigate the environmental impacts of transport in Hungary through modal shift to public transportation, energy efficiency improvement, demand management and use of renewables. The implementation period of the plan is between 2014 and 2030/2050.

National Framework Plan for the Development of Alternative Fuels Infrastructure

The National Framework Plan for the Development of Alternative Fuels Infrastructure (adopted by 1782/2016. Government Decision in 2016) identifies national targets on the deployment of alternative fuel infrastructure (CNG/LNG, biofuels, electricity, hydrogen and in the transport sector) by 2020, 2025 and 2030 and summarizes the legal and financial incentives allocated for the deployment and R&D concerning these type of fuels.

Ányos Jedlik Plan for the promotion of e - mobility

Ányos Jedlik Plan is the main policy document for the promotion of e-mobility in Hungary. The Plan, which was published in 2015, defines targets for the number of electric cars and charging points. It also supports local municipalities to install public electric charging points; and enterprises and private persons to buy electric cars. In order to promote electric cars, it also introduces tax advantages (exemption from certain taxes such as registration tax or annual turnover tax). It also represents indirect support (such as the exemption from paying parking fees), and regulations to promote the installation of electric charging points and to sell electricity at charging points.

Financial support for enterprises and private persons to buy electric cars

This is a sub-programme of the Ányos Jedlik Plan that provides support to private persons and companies to buy electric cars and trucks under 3.5 tonnes. The maximum contribution rate is 21% of the price and maximum 1.5 million forints/vehicle. The sub-programme was launched in 2016.

Financial support for the establishment of electric charging stations

This sub-programme of the Ányos Jedlik Plan supports the establishment of electric charging stations by local governments.

Supporting the purchase of the electric vehicles

Supporting the purchase of the electric vehicles (exploring the motivation and circumstances of buying an electric car; getting to know the future car buying willingness Reduction of carbon-dioxide emissions, according to the success of the GZR-D-Ö-2016 project it continues The framework for the "Electric Vehicle Purchase Support" tender launched by Ministry for National Economy was 2.3 billion HUF, and so far 1669 electric cars were supported. With the new 3 billion HUF envelope specified in the new ITM launched simplified tender, support for the purchase of about 2,000 cars can be realized (so far 414 applications, 183 decisions). GZR-D-Ö-2016: code number: tender for electric car purchase support. ITM: Ministry for Innovation and Technology

Tax allowances after environmentally friendly vehicles

Fully electric, partially electric plug-in cars and zero-emission cars are exempt from motor vehicle tax, company car tax and registration tax. Moreover for buses, lorries and trucks the rate of the motor vehicle tax is dependent on the environmental classification of the vehicle. Trucks also receive tax allowance for using combined transportation. The rate of company car tax and registration tax also depends on the environmental classification of the vehicle.

Application of usage - based road toll on heavy duty vehicles.

A road toll was introduced for heavy duty vehicles in 2013. The road toll depends on vehicle weight (characterised by number of axes) and on environmental performance of the vehicle (Euro norm). It gives an incentive for better organisation of freight delivery and for better use of payload capacity.

CNG Clean Fuel Box Project

The project is a wide-scale pilot market deployment of an innovative CNG refuelling network that will be implemented in Hungary along two transport Core Network Corridors (Mediterranean and Orient/East-Med). The objective of the project is to develop CNG availability and use at national level. This will be achieved through the deployment of the Clean Fuel Box (CFB) refuelling network solution. This is a CNG self-service station network, which is able to refill CNG vehicles, independently of the gas distribution network, based on a 24/7 service. The project includes a market study of the CFB system and the market launch of this innovative technology through real-life trial including a network of 39 CFB stations, the delivery of five LNG truck feeders and the introduction of 50 CNG vehicles to test the functioning of the network and to support the emerging demand. The CFB network will be monitored by a central operator service with smart information technology. The implementation started in 2016 and will be finished in 2018.

PAN - LNG project

The aim of the project is to prepare the establishment of the liquefied natural gas (LNG) infrastructure, building the first filling stations and establishing the supply system. To deliver on its objectives, the project includes studies, works and pilot deployment for: - five LNG/LCNG filling stations to deliver LNG as a replacement for diesel for heavy duty vehicles (HDV) and; - a Small Scale pilot liquefaction plant, to develop the most advanced long term solution for the LNG supply, based on fossil gas wells and on biogas sources.

The PAN-LNG-4-DANUBE's overall objective is to foster LNG use in inland navigation sector across the Danube, through two pilots: one pilot for the innovative LNG bunkering and refuelling station for vessels and trucks in the Freeport of Csepel, and one pilot to retrofit and operate a freight vessel with LNG propulsion. The Action, including a study and the reallife pilot deployment, is implemented in the Core Port of Csepel-Freeport, the biggest inland port in Hungary and a crossroad for flows and transhipment of freight between inland waterway, rail and road transport. The project is to be implemented between 2015 and 2019.

Improvement of the bicycle transportation network

The government aims to increase the length of bicycle roads by an additional 1000 kms until 2020, in order to increase the share of daily bicycle users up to 27% of the total population, and to increase the share of recreational bicycle users by 30.000 persons/year. A group of measures are meant to achieve these targets, such as the development of bicycle infrastructure, the support to the establishment of cycling facilities (e.g. bicycle racks, B+R parking), the establishment of cyclist public transport systems and the awareness-raising campaigns. These measures are planned to be introduced between 2010 and 2020.

Improvement of the railway vehicle fleet

Modern electric suburban train acquisition, which is planned to enter into service between 2015 and 2020. Within the framework of this improvement 40 suburban trains are going to be purchased by 2020. The purchases of trains are financed from the Integrated Transport Development Operative Programme (IKOP) of the EU.

Replacement of vehicle of public transport service companies

The replacement of public transport service companies vehicles has decreased in recent years. The average age of Hungarian public bus fleet was 14,46 years at the end 2015. Between 2016-2020 1813 buses are required to be replaced, and after 2020 additional 6000 bus replacement becomes necessary.

Education and broad application of eco - driving (environmentally conscious driving)

Learning environmentally-conscious Eco-driving techniques is a framework that includes the development of educational materials, the certification of learning equipment and facilities,

the organization and implementation of awareness-raising campaigns, the implementation of pilot projects with voluntary participants and periodic compulsory driving education for transport safety, in order to increase environmental performance of cars. Currently, this is only a planned measure, which is not yet adopted and its implementation may start only after 2018.

Integrated Transport Development Operational Program (ITOP)

ITOP is one of the operational programmes during the 2014-2020 period accepted by the European Commission. It serves the improvement of energy efficiency in the transport sector through the direct strengthening of public transport and other means of transport which are less harmful to the environment. Transport on road, railway and rivers are included, both freight and passenger transport. However, this strategy was not designed to serve climate purposes only but it plays an essential part in the development of the Hungarian TEN-T infrastructure (both road and railway), shortening travel times and decreasing the emission of air pollutants (PM10, NOx).

Agriculture

Protection against soil erosion

Soil plays an important role in carbon capture, so loss of soil is a major threat, as soil formation is a very slow process. That is why great emphasis should be put on the fight against erosion, which also has a bearing on climate change. Erodibility is determined by the grain size, humus content, structure, moisture state and water absorption of the soil. (The greater the water absorption capacity of a soil, the less eroded.) The erosion work of the rain is greatly increased by the slope of the hill, which increases the destroying energy of the water.

The Decree 50/2008 of the Ministry of Agriculture and Rural Development has been modified in 2013 to implement regulations in Common Agricultural Policy (CAP). The Decree contains regulations on "Good agricultural and environmental condition". It bans cultivating certain cultures with high erosion risk on steep slopes (more than 12%). It prescribes practices for maintaining cover on agricultural land after harvest.

The Act No. CXXIX of 2007 on the protection of arable land contains general rules on soil erosion control and preserving soil organic matter content. Providing a set of measures from which farmers can choose to apply according to the characteristics of their land to control soil erosion if appropriate for example contour ploughing, cover crops, preserving soil structure, avoiding overgrazing, covering intersections in orchards. Another set of measures helps preventing loss of soil organic matter, for

example appropriate nutrient management, reduced tillage, protecting of layer with high organic matter content, utilising in plant residues on the plot.

<u>Good Agricultural Practice to protect waters against pollution caused by nitrates from agricultural</u> <u>sources</u>

Hungary, as member state of the EU had to implement Directive 91/676/EC. Therefore, the rules of Good Agricultural Practice were set out in the Ministerial Decree 59/2008. The rules concern – among others – environmental friendly manure and slurry management including storage and land application. According to Good Agricultural Practice the maximum application rate of nitrogen from slurry and manure is 170 kg/ha. It is also forbidden to take manure and slurry to the field between 31st of October and the 15th of February. There are certain regulations concerning storing, treating of manure or slurry on the animal farm and on the field as well.

Greening payment

Since 2015, farmers entitled to payment under the single area payment scheme shall observe, on all their eligible hectares, the agricultural practices beneficial for the climate and the environment. In return, they receive the so-called greening payment. The agricultural practices beneficial for the climate and the environment are the following:

- crop diversification for improved soil quality,
- maintaining existing permanent grassland for carbon sequestration and protection of environmentally sensitive grasslands
- having a certain amount of ecological focus area (EFA) on or adjacent to the arable land of the farm for safeguarding and improving biodiversity on farms.

Rural development measures to develop animal husbandry farms

Due to these measures, farms have a chance to build new and modern manure-silos or slurry tanks or purchasing new manure or slurry sprayer facilities using modern technology of measuring and spraying and controlling. The technology applied by the farms shall meet the requirements of the Best Available Technology (BAT). The capacity of the manure silos or slurry tanks shall be planned for storing at least for 6 months. The isolation of the ground and wall has to be absolute 100%. These measures enable farmers to apply the rules of Good Agricultural Practice and to decrease the NH3, NO2, CH4 emissions.

Limiting nitrogen surplus during fertilizer and manure application

Decree of Ministry of Agriculture 59/2008 contains regulations on "Good Agricultural Practices" on setting application limits for fertilizer and manure.

Afforestation of agricultural land

To increase the carbon sequestration and storing capacity of forests through increasing the forest area and the growing stock Increasing the afforested areas in Hungary is one of the key priorities of the country in order to mitigate the negative effects of the climate change and to provided protection against wind and water erosion and of course to meet the increasing demand of the timber which could be an environmental friendly raw material and of course an energy source. Afforestation can be done in both agricultural and non-agricultural land. Forests created through traditional afforestation will later become properties under forestry utilisation, and according to the Act XXXVII of 2009 on Forests, Protection of Forests and Forestry (so called forestry law), forest holders must renew their forest from their own resources after the first final felling, and also continue to manage it in the long term future pursuant to the rules concerning sustainable forest management

Establishment of fast growing tree plantations on agriculture land

To increase the carbon sequestration and storing capacity of forests through increasing the tree cover and the growing stock In the case of a plantation for industrial purposes, the created woodland will not be a forest, and it is not required to be registered as an area under forestry utilisation and, following the first felling of the trees of the woodland, the land could be used again for agricultural activities. For the establishment of these plantations, the forest authority will make special efforts to ensure that high quality wood raw material is produced only in truly appropriate areas. This means that farmers diversify their activities while at the same time, instead of using the land as cropland, they carry out a less intensive form of land utilisation.

Establishment of agroforestry systems on agriculture land

To increase the carbon sequestration and storing capacity of forests through increasing the forest area and the growing stock The agro-forestry system combined with grassland management (mowing or extensive livestock farming) or arable crops can be set up on at least 0.3 ha of agricultural land. Only less than 50% of the tree species planted shall be fruit trees. Criteria of establishing shelterbelts: they may be established in at least one hectare of continuous area used as arable land or grassland (meadow or pasture). Establishing shelterbelts means the creation of a stock (or stocks) in an agricultural area that is between 15 and 20 metres wide and consists of continuous trees with an at least 1 metre wide strip of shrubs at both edges of the wooded area, or in the case of establishing shelterbelts in groups, a stock (or stocks) with an area of at least 0.1 ha created from trees and at the edges from at least 1 metre wide strips of shrubs.

Forestry

National Forest Strategy 2016 - 2030

The National Forest Strategy's main goal is to continue the track on reaching goals for 2050 of the earlier National Forest Program 2006-2015, which was presented in the previous national communication. One of its main goals is to reach 27% forest coverage in Hungary by 2050, which creates a need of around yearly 15 thousand ha afforestation. The Strategy is referring to climate change mitigation by promoting wood as renewable raw material and forest biomass for energy. Also put emphasis on the protection of forests and on adaptation to climate change as well as on monitoring forest condition including adverse effects of climate change, prepare measures to mitigate climate change related damages, promote close to nature forest management. These measures aims to maintain or even increase carbon sequestration in forests and in wood products, through them it directly affects CO2 emission reduction targets.

Waste

Waste Law

The Act on Waste (Act No. CLXXXV in 2012) and its implementing regulations implement the Waste Framework Directive (2008/98/EC) of the European Union. It entered into force on 1st of January, 2013. It sets out several basic principles on waste management; it introduces a landfill tax, compulsory separate household waste collection for household paper, plastic and metal, and contains a prescription on the creation of a National Waste Prevention Programme. The landfilling tax is levied on almost all kinds of waste landfilled. The tax was increased to 6000 HUF per tonne in 2016 from 3000 HUF. Revenues from this tax are allocated for waste management purposes.

National Waste Management Plan

The National Waste Management Plan (hereinafter referred to as NWMP) contains the main waste management objectives for the 2014-2020 period. The NWMP has been approved by Government

Resolution No. 2055/2013 (XII. 31.). The NWMP defines the general and specific actions for each waste flow and, in addition to the objectives, also identifies the areas of intervention in waste management, the future tasks, measures and the funds required for their implementation. The targets of NWMP are set in accordance with the EU waste targets. Sustainable development is one of the basic elements of the NWMP and the main principle is to follow the waste hierarchy. Waste legislation and policy of the EU Member States shall apply the waste hierarchy as a priority: prevention, re-use, preparing for re-use, recycling, other kinds of recovery, and finally as a last resort, disposal. The NWMP includes the National Prevention Programme (NPP). The NPP covers the sectors of agriculture, construction and infrastructure, manufacturing, sale, retail, transport, households and public services. The waste types cover food or organic waste, construction and demolition waste, hazardous waste, household and municipal waste, packaging waste, WEEE/batteries and many others. The NPP defines the intervention areas in five sets of measures (prevention of construction and demolition waste generation; reuse; green public procurement; environmentally friendly production and business operation; awareness raising) that need to be addressed as priorities in the 2014-2020 period.

The National Waste Management Public Services Plan

The National Waste Management Public Services Plan (hereinafter referred to as: NWMPSP) came into force with the declaration of Government Resolution No.1250/2016. (V. 27.). The NWMPSP describes the current status of public waste management service in Hungary, the related regulations, and also lists the tasks of the public service providers. It also includes the various EU requirements related to public waste management, the fulfilment of the objectives related to this task and further directions of development. These are the following: reducing the amount of landfill, increasing the amount of recovered waste materials, building glass and plastic waste recycling plants as necessary, prioritizing the use of non-recyclable waste for energy production and developing infrastructure for biodegradable waste (composting). The ongoing review of the NWMPSP also reviews the requirements for public service providers and the targets set for 2020.

Environmental Product Fee

Hungary's environmental product fee was introduced in 2011, and it is perceived as an effective environmental management tool, which has favourable effects on domestic waste management processes. The regulatory advantage of this tool is its ability to stimulate the manufacture and marketing of environmentally favourable products and to restrict environmentally undesirable products. It is levied on batteries, packaging, other petroleum products, electronic equipment, tires, promotional flyers, other plastic products, other chemical products and office paper. The generated revenue provides funding for the state in order to achieve EU targets related to recovery, and it supports the development of domestic waste recovery. Government Decree no. 343/2011 (XII. 29.) and Act LXXXV. of 2011 regulates the environmental product fee.

<u>Jenő Kvassay Plan</u>

The Jenő Kvassay Plan, which was published in 2017, describes action until 2030 that aims to improve water management, including public utility sewage systems, the sewerage of settlements and regions and to increase the recovery rate of water in the settlement water management

National Implementation Programme on Waste Water Collection and Treatment

The program was accepted by the Hungarian Government in 2002. The aim was to implement Directive 91/271/EEC on urban wastewater treatment in Hungary: the treatment of wastewater collected in the public utility sewage systems and the sewage treatment of settlements and regions. The quantified targets set by the program should be updated every two years.

Sewage Sludge Treatment and Recovery Strategy

The timeline of the Strategy covers the medium term (5 years, 2018-2023) improvement of the Hungarian municipal sewage sludge management, with an outlook till 2027. The Strategy includes the detailed situation analysis and assessment of the Hungarian sewage sludge management (creating the basis of the Strategy), the setting of quantitative objectives regarding the improvement of sewage sludge management (target system of the Strategy), the exact definition of the instruments and areas where intervention is needed (instruments of the Strategy), the HR, professional, financial and organizational conditions of the necessary interventions, the implementation of the Strategy as well as its monitoring system (the follow-up of output, outcome and impact indicators) and the basic principles of the assessment. The aim is to continue agricultural fertilization with sewage sludge recovery. The creation of compost and marketable products is recommended instead of the direct distribution of sewage sludge on agricultural areas. In case of the stagnation and decline of agricultural recovery, recovery from combustion needs to be put forward.

Lowering the share of landfilling in municipal solid waste treatment

45% is considered as a realistically achievable target for the share of landfilling in municipal solid waste management.

List of "Planned status"

The following policies and measures are under preparation:

- The climate-friendly transformation of the energy sector, through cutting back on high emission electricity generation modes and promotion of solar energy
- Promoting the establishment of household scale power plants combined with smart metering and electricity storage
- Providing a system-wide reserve requirement in accordance with the demands of increasing solar cell capacity
- Promoting network and IT developments to reach a lower level of system-wide reserve
- Promoting residential heating systems modernisation and the use of modern biomass-based fuels fo facilitate sustainable firewood use
- Phase-out of coal use for residential heating
- Encouraging the construction of new biomass and geothermal district heating production capacities with high-intensity non-refundable grants
- Establishment of infrastructural conditions for the interconnection of insular district heating systems in order to increase capacity utilization and heat output of renewable energy based district heating production installations
- Promoting the utilization of non-recyclable waste for the purpose of district heating generation
- Introduction of an energy efficiency obligation pilot scheme

- Increasing the budget of residential energy efficiency programs for households by reviewing the allocation of funds targeting climate protection and by involving new resources
- Increasing the utilization efficiency of financial resources of residential energy efficiency programs and the utilization of credits combined with grant
- Promoting further growth in housing construction by fiscal means to accelerate the exchange of building stock
- Implementation of an innovative and efficient district heating program
- Promoting heat pumps
- Development of a program to continue energy modernisation of public buildings and public services
- Improving the system of industrial energy efficiency promotion system
- Decreasing car use with transport management tools
- Tighter control of environmental rules compliance of cars
- Development of railway and public transportation infrastructure and fleet modernisation
- Continuing the extension of urban track transportation infrastructure
- Revision and tightening of second-hand vehicles import rules based on environmental considerations
- Ensuring that the first generation biofuel blending ratio reaches or nears the maximum allowed in the European Union, 7% of transport energy use, while complying with sustainability criteria
- Increased promotion of electric vehicles
- Investments aiming to enhance energy efficiency (support granted by unique gov. decision)
- Investments aiming to enhance energy efficiency under the Modern Cities Programme
- Improving energy efficiency in the transport sector by government policies and TOP grants
- Development of a comprehensive program in order to enhance the cost-efficiency of industrial energy efficiency support system, encouraging industrial companies without adequate amount of profit

3.2 Changes in domestic institutional arrangement

The structure of the Hungarian Government changed partly in May of 2018. The name of the Ministry of National Development has changed to Ministry for Innovation and Technology (hereinafter referred as MIT). The minister of innovation and technology is responsible for the climate- and energy policy inter alia. The 94/2018. (V. 22.) Governmental Decree on the scope of duties and sphere of action of the members of the Government transferred the tasks connected to the European Emission Allowances from the Ministry for National Economy to the MIT. Hence one unit, the Unit for Emissions and Quota-trading moved with its people to the MIT. The major change was that the right of trading with emission units transferred from the minister for national economy to the minister for innovation and technology. In this new Ministry, in the MIT the control of energy policy, nuclear energy and climate policy transferred to the state-secretary for energy and climate policy, which is a new position. In this new governmental structure a Deputy Secretary of State has created only for the climate policy.

Under the Deputy Secretary of State for climate policy there are the Department of Decarbonization, the Department of Climate Policy and the National Climate Protection Authority. The Department of Decarbonization is in charge of energy efficiency, renewable energy, energy efficiency in the building sector and free allocation of European Emission Allowances to the establishments. The Department of Climate Policy deals with the national, international and community-level tasks related to climate policy. This team is preparing the national climate change strategies, the national climate change action plans, the long-term decarbonization strategy. This team is responsible for the law making in relation to the climate policy. This department coordinates the climate-related projects also. The National Climate Protection Authority (NCPA) performs national tasks related to the fluorinated gases. NCPA is a department of the MIT. The NCPA controls the companies who are trade with, use, reuse, or regenerate the fluorinated gases. The NCPA has a database which registers the private persons and the companies who are dealing with fluorinated GHGs. The NCAP organises the national trainings related to the flourinated gases. The NCAP performs the registry administrator's tasks too.

Directive 2003/87/EC is transposed by Law 2012/217 which defines the National Emission Trading Registry (2§ 7.) as the registry system defined by Article 4 of Regulation 389/2013/EU, and the National Administrator (2§ 25.) as defined by Article 3 (22) of Regulation 389/2013/EU. Governmental decree 410/2012 is an implementing regulation of Law 2012/217. Decree 410/2012 nominates NCPA as the National Administrator of the Hungarian Emission Trading Registry, serving as the EU-ETS and the KP registry.

There is a national governmental body which deals with climate-adaptation issues, this organ is the National Adaptation Center of the Hungarian Mining and Geological Service. They takes part in the preparation of national climate strategies, they have projects, researches related to adaptation. This institute operates the National Adaptation Geo-information System, which is a multipurpose geo-information system that can facilitate the policy-making, strategy-building and decision-making process related to the impact assessment of climate change and founding necessary adaptation measures in Hungary.

The other governmental body which play an important role in the monitoring and reporting tasks is the Unit of National Emissions Inventories, which is responsible for inventory compilation within the Hungarian Meteorological Service. This haven't changed since the last submission. As Hungary is a Member State of the EU, the monitoring and evaluation of progress towards the GHG targets is driven by the 525/2013/EU regulation on monitoring mechanism¹ (referred as MMR), adopted in 2013. Two EU regulations amended this regulation, the 2018/841/EU and the 2018/842/EU regulation. Moreover the 2018/1999/EU regulation² repeals the MMR from 1st of January 2021 except for some of its articles.

3.3 Information on the assessment of the economic and social consequences of response measure

Information on how Hungary as a Party included in Annex I of the Convention is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments mentioned in Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

Firstly, being an EU Member State, the Hungarian climate policy is largely determined by EU legislation. Therefore the information provided by the European Union on the subject matter in its respective reports is relevant in case of Hungary.

In accordance with Article 3, paragraph 1 of the Kyoto Protocol Hungary is committed to limit its anthropogenic carbon dioxide equivalent emissions of greenhouse gases listed in Annex A of the Protocol to such level that they are in line with Hungary's reduction targets while aiming at further emission reduction. Hungary is guided by the principle that ambitious national reduction targets shall be supported by a climate policy ensuring that adverse impacts on developing countries, such as carbon leakage are avoided. Hungary fully supports the endeavors, measures and implements regulations of the European Union targeting the avoidance of such impacts and fostering sustainable development, while in the same time also a specific policy framework has been put into practice.

The policy framework is laid down in Hungary's second National Climate Change Strategy (NCCS-II) for the period 2018-2030, with an outlook to 2050. The NCSS-II – as a review of the first climate change strategy – was adopted by the 23/2018 Parliamentary resolution on 30 October 2018. Similarly to other multisectoral, horizontal strategies, NCCS-II is a strategy paper to facilitate sectoral planning. It sets out an individual set of goals and specific action lines, but does not "overwrite" any of the sectoral development efforts. According to the topics of mitigation–adaptation–awareness-raising, NCCS-II includes the Hungarian Decarbonisation Roadmap laying down the (HDR) goals, priorities and action lines to reduce GHG emission. NCCS-II also covers the assessment of the expected effects of climate change in Hungary and its natural, social and economic consequences. It also includes National Adaptation Strategy (NAS) which is based on the climate vulnerability assessment of ecosystems and industries. The duties of Hungarian decarbonisation and climate change adaptation are supplemented by the Climate Awareness Raising Programme ("Partnership for

¹ Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC

² Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council

Climate" Awareness-Raising Plan). The NCCS II. defines long-, mid- and short-term goals and action lines in the field of mitigation, adaptation and awareness raising.

The concrete measures, actions for short-term is included in the first National Climate Change Action Plan. The MIT made prepared the strategic environmental survey of both documents and the National Energy Strategy II for examination of the potential effects of the planned measures. These strategic environmental survey includes the detailed effects of the planned measures.

When the MIT presents the final version of the National Energy Strategy, the long-term strategy, the NCCS II. to the Cabinet and Government, the proposal has always include an impact assessment sheet, which shows the economic-, the social-, the budgetary- and the administrative effects.

The National Energy- and Climate Plan has a separate chapter, which deals with the economic and the social effects.

The above mentioned drafts are published on the official website of the MIT.

3.4 Estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use change and forestry activities

As Hungary is a Member State of the European Union, our target is set on the EU level, consequently we refer to 1990 as our base year in this report. LULUCF is not included in the EU target. Therefore, concerning the information required under points (a–c) of paragraph 9 of 2/CP.17, only point a) is relevant, which we have provided under the CTF table No. 4.

In the period 2018-2019, no AAU, CER, ERU, RMU units were sold or bought by Hungary. In case of canceled CER and ERU units the owners of these accounts have decided to cancel the units when the accounts were closed, Figure 6-4 summarizes the changes in different units.

			Add	itions			Subtractions					
	AAUs	ERUs	RMUs	CERs	tCERs	ICERs	AAUs	ERUs	RMUs	CERs	tCERs	ICERs
Total (Sum of sub-totals in												
table 2a and table 2b)	NO	NO	NO	NO	NO	NO	NO	3 000	NO	99	NO	NO

 Table 3-1 Summary table of use of units from the market-based mechanisms in 2018 and 2019

Concerning the intra-EU market-based mechanism under the Effort Sharing Decision (ESD –Decision No 406/2009/EC), which is operating since 2013, for the compliance years 2013-2016, no AEA units were sold or bought by Hungary. The compliance cycle for 2017 is not finished yet because the latest reviewed National Inventory is NIR 2017 (for the period BY-2015). Hungary is projected to have a significant surplus for all years of the compliance period (2013-2020). So far all surplus AEA units have been carried over - currently into the compliance account of 2017.

4 Projections

4.1 Scenario results

Three projections scenarios were constructed for this report: with existing measures (WEM), with additional measures (WAM), without measures (WOM). Emissions in the WOM scenario are only different in the energy sector and emissions in the WAM scenario are different in the energy and land use, land-use change and forestry sector (LULUCF). The latest projected year is 2030. Energy sector projections are identical with the ones included in Hungary's draft National Energy and Climate Plan and their base year is 2016, while emissions outside the energy sector are updated and their base year is 2017 as the new data become available.

Under the with existing measures (WEM) scenario, total GHG emissions excluding LULUCF will decrease to 63.9 thousand kt, indicating a 31.8 % decrease in 2020 compared to 1990. Under the WEM scenario, total GHG emissions including LULUCF in 2020 will increase by 32.4% compared to 1990 level.



Figure 4-1. Projected total GHG emissions excluding LULUCF 2020–2030 (kt CO₂-eq)



Figure 4-2. Projected total GHG emissions including LULUCF 2020–2030 (kt CO₂-eq)

The largest fall of emission is expected in case of F-gases, 69.9%. CO_2 emission is practically stagnating in the WEM scenario while dropping by 13.9% in the WAM.



Figure 4-3. Projected emissions by gases

The largest drop of emissions is expected in the waste sector (23%). The energy sector will remain the most significant emitter, but its emissions will fall considerably in the WAM scenario. Emissions from agriculture are projected to rise by 9.9%. Decarbonisation of the transport sector will be a challenge its emissions in the WEM and WAM scenario are expected to rise by 39% and 19% respectively.

ETS and ESD emissions

Under the WEM scenario emissions under the emission trading system (EU ETS) will decrease by 23.1% and non-ETS emission will increase by 8.3% compared to 2017, while in the WAM scenario emission will change by -30.7% and -5% respectively. The LULUCF sector will remain a net sink.



Figure 4-4. Projected GHG emissions covered by EU-ETS excluding LULUCF 2020–2030 (kt CO₂-eq)



Figure 4-5. Projected GHG emissions covered by ESD excluding LULUCF 2020–2030 (kt CO₂-eq)

Energy

With exiting measures: Taking into account the impact of existing policy measures, the value of GHG emissions from the use of energy may fall to 45.8 million tCO_2 -eq by 2030 from 55.9 million tCO_2 -eq in 2005, indicating an 18 % decline. The emissions forecast for 2030 will exceed the level for 2015 by 5.8 %.

GHG emissions from the use of energy in the end-use sector may increase from 28.7 million tonnes CO_2 -eq in 2015 to 36.3 million tonnes CO_2 -eq by 2030 resulting from changes to energy consumption and the structure of energy sources under existing policy measures, indicating a 26 % increase.

The rise in emissions is attributable to two factors. Firstly, the quantity of fuel used in road transport is increasing at a dynamic rate as a result of the 4 % annual average increase of the GDP (and the resulting rise in incomes). Secondly, the 5 % annual average increase in industrial production also entails a rise in used energy quantities. GHG emissions forecast for 2030, however, exceed the value measured for 2005 only by 5 % in relation to end consumer sectors.

The combined effect of the construction of the new nuclear power plant units, the increase in renewable energy-based electricity generation capacities and policy measures supporting the reduction of electricity and heat demand may lead to an 8.7 million tCO_2 -eq decrease in GHG emissions in the energy industry by 2030, which is 56 % and 37 % lower than levels in 2005 and 2015, respectively

With additional measures: Upon implementation of all policy measures (including energy efficiency investments) assumed under the WAM scenario, the share of renewable energy consumption may rise to 20.0 % by 2030.

The new policy measures relating to electricity, transport and the heating and cooling sector may increase the overall ratio of the use of renewable energy to gross final energy consumption by 6.8 percentage points. GHG emissions from energy consumption, related to the end consumer sector, may increase from 28.7 million CO_2 -eq measured in 2015 to only 30.4 million CO_2 -eq in 2030 if the new policy measures defined in the subheadings of the renewable energy and energy efficiency dimension are implemented. The increase in emissions is mainly attributable to the transport sector (+3.5 million tonnes CO_2 -eq), while the GHG emissions of households will decrease by 2.5 million tonnes CO_2 -eq in the reviewed period, as a result of declining natural gas consumption for heating.

Under the WAM scenario, the GHG emissions of end consumers are 5.9 million tonnes CO2eq lower than under the WEM scenario, i.e. the additional, new measures support the decrease of GHG emissions by 5.9 million tonnes CO_2 -eq.

As a result of new policy measures, GHG emissions of end consumers may be 13 % lower in 2030 than in 2005.

Under the WAM scenario, the GHG emissions of the energy industry (generation of electricity and heat, petroleum processing, production of solid energy sources) will decrease to 7.3 million tonnes CO_2 -eq by 2030, from 13.8 million tonnes CO_2 -eq in 2015, i.e. emissions will be halved. The decrease is even greater (63 %) compared to the level in 2005.

The sharp decline in GHG emissions is mainly attributable to the full phasing out of coal used for electricity generation. Taking into account that coal-based power generation will fall to a minimal value by 2030 even under the WEM scenario, the new policy measures result in 1.4 million tonnes CO_2 -eq in overall additional savings of GHG emissions, attributable to the lower energy demand of end consumers, and the growing rate of natural gas substitution with renewable energy sources in district heating generation.

Specific GHG emissions from electricity and heat generation, i.e. carbon intensity, will sharply decrease as a result of the growing use of nuclear and renewable energy. The value of the indicator will decrease to 0.08 tCO₂-eq/MWh in 2030 from 0.27 tCO₂-eq/MWh in 2015, i.e. carbon intensity will decline by 70 % in energy production. The value projected for 2030 amounts to only one quarter of the level for 2005.

Industrial processes and product use

The main source in the IPPU sector in 2017 was Chemical industry, followed by Mineral industry and Metal industry - the latter two with almost equal contribution to the GHG emissions of the sector. The corresponding shares in 2030 are expected to be similar. As only a few percent of emissions are not covered by the EU ETS, it is worth to compare the projected emissions to the values reported in the 2005 emission inventory. However small increasing trend in emissions are expected in all sectors compared to the 2017 emissions, emissions will remain lower by 24 percent than in 2005.



Figure 4-6. Emission projections for the IPPU sector

Agriculture

The main sources of agricultural emissions in 2017 were agricultural soils (51%), enteric fermentation (30%) and manure management (16%). The corresponding shares in 2035 are expected to be 47%, 32% and 18%, respectively. From the BY to 2017 agricultural emissions show an overall decrease by 41%. In the projection years from 2018 to 2035, the emissions are expected to increase by 14%. The reduction in the historical years is the result of the drop in the agricultural production in the '90s. Measures in the form of technologies to reduce ammonia emissions from the manure stores and manure application are considered in the projections, but emissions are estimated to increase due to an expected increase in the number of animals.



Waste

<u>Solid waste disposal</u>: For the projections, basically the same methodologies were used as for the inventory. More specifically, the same Tier 2 methodology as implemented in the IPCC Waste Model was applied for methane emission calculation. As for activity data (i.e. amount of disposed waste), information received from the ministry responsible for waste management was taken into account. The main underlying assumption was that disposal of degradable organic waste (e.g. food and garden waste) would cease after 2023, and also textile waste would not be disposed in 2030. As a consequence, methane generation potential will decrease and so will the amount of recovered biogas. Projected amount of the main degradable waste types disposed together with the resulting methane emission is summarized in the figure below.

<u>Biological treatment of waste:</u> In the source category composting of both municipal solid waste and sewage sludge were considered. As Tier 1 method with default emission factors was applied, the trend was determined by changes in activity data. It was assumed that growth in composting will continue: we calculated with a 8.5-fold increase between 2005 and 2030 as regards composted MSW, and with an 11% increase after 2016 of composted sludge in line with the domestic sludge management strategy. Leakages from other biogas production were also considered here with the default methodology. Projection of biogas production seems to be quite uncertain for the moment. In this submission a 10% increase up to 2020 was assumed with slight decreases afterwards.

<u>Waste incineration without energy recovery</u>: It represents currently only 1% of the waste sector emissions. As we did not expect any significant changes in this field, we did not introduce any trend and kept the same values up to 2030 as calculated for the year 2017 in the inventory.

<u>Wastewater treatment and discharge</u>: Methane emissions in wastewater treatment and discharge are highly determined by the share of dwellings connected to the public sewerage network that is expected to increase to 91% by 2030 from the current share of 81%. Parallel to that, sewage sludge gas recovery would grow by 11%. As for N2O emissions, we do not expect significant change in per capita protein consumption. However, tertiary treatment would reach a share of 99% by 2030 (from the current 88%) which would increase the N-removal from the effluent, consequently decrease N2O emissions.



Figure 4-8. CH₄ emissions until 2030 from disposed waste

Projections for EU

Greenhouse gas emissions: on track for 2020

In 2017, greenhouse gas emissions across Europe had already fallen by 21.7 % below 1990 levels. Preliminary data recently reported by Member States show that a further 1.6 % achievement was secured in 2018, bringing the collective reductions down to 23.2%, well below the 2020 target. While the EU target of reducing its greenhouse gas emissions by 20 % compared with 1990 levels by 2020 appears to be within reach, aggregated projections from Member States do not yet add up to a level in line with the minimum 40% reduction target. Together, Member States project that their current policies and measures can deliver a total 30 % reduction by 2030, while the additional policies and measures that they intend to launch in coming years can deliver a 35 % reduction by 2030. While this presents a more positive outlook compared to last year's projections, securing the 2030 target will demand further efforts. More informations can be found in the latest annual 'Trends and projections' report prepared by the European Environment Agency (EEA Report No 15/2019).



Figure 4-9. Projectred emissions for the EU until 2050 (Source: EEA Report No 15/2019)

4.2 Methodology and changes in methodologies

Methodologies were changed in almost all sectors exept LULUCF where the same CASMOFOR model was used for the calculations. This change was the beginning of a harmonisation process between several environmental activities in the government, like energy, climate and air pollution policies. The following figure summarizes the changes in emissions between the 3rd and 4th biennial reports of Hungary.



Figure 4-10. Comparison of sectorial emissions according to the 3rd and 4th biennial reports of Hungary

Energy

With exiting measures: Projections in the energy sector are identical to the ones included in Hungary's draft National Energy and Climate Plan submitted in 2019. Additional information is available in section 4. and 5. of the Plan.

With additional measures: Upon implementation of all policy measures (including energy efficiency investments) assumed under the WAM scenario, the share of renewable energy consumption may rise to 20.0 % by 2030. The new policy measures relating to electricity, transport and the heating and cooling sector may increase the overall ratio of the use of renewable energy to gross final energy consumption by 6.8 percentage points.

Industrial processes and product use

Key driver in IPPU sector in Hungary is rather the compliance with air quality standards (BAT Ref. Documents), therefore GHG and air pollutant projection was harmonized, which means same activity data and same projection pathways. In category 2A4 solely GHG emission is reported, therefore projection pathways were calculated independently. Calculations are based at least on "Grade 2" methods in case of key categories /2A1 (CO₂); 2A4 (CO₂); 2B1 (CO₂); 2B2 (N₂O); 2B8 (CO₂); 2C1 (CO₂)/ and on "Grade 1" in case of all CH₄ emissions.

Activity data used for projection of IPPU emissions was based on projection results from relevant studies or models executed at EU level (e.g. Potencia Model), also exsisting production capacity and planned investments of new capacities were taken into account. Technological developments influence the emission factors, therefore emission factors were selected carefully for the projection: in most categories plant specific emission factors were used. In case of iron and steel production emission factor from the 2018 EU ETS database was calculated, because the effect on emissions in the inventory due to modernization has not yet appeared.

Product uses as substitutes of ODS: The EU F-Gas regulation (No 517/2014 repealing Regulation (EC) No 842/2006) will progressively reduce the emission of HFCs measured in CO2eq. From 2015 onward, the total sum of HFC quotas allocated to producers and importers cannot exceed the maximum quantity calculated for the calendar year. The maximum quantity is determined for the whole of the EU. We assumed that emissions of HFCs will decrease following the same trend drawn by the EU level cap.

Agriculture

Activity data used for projection of agricultural emissions was based on data provided by the Research Institute of Agricultural Economics (RIAE). Number of cattle, swine, layers, broilers and other poultries (as geese and ducks) was projected by the model of the RIAE, while the number of sheep, goats, buffaloes, mules, asses and rabbits were assumed to be the same as 2017.

Data on the amounts of synthetic fertilizer sold were also provided by the RIAE. This data collection is executed in the frame of the National Statistical Data Collection Program. Based on these data the N-content of the synthetic fertilizers used has increased significantly over the period 2005-2017. According to the preliminary data for 2018 the nitrogen fertilizer use has been decreased by 11 per cent which shows major decline compared to previous period. International forecasts such as Fertilizers Europe or GAINS show moderate increase on long run for Hungary which is not supported by fact. For this reason, nitrogen fertilizer application is expected to be kept at a constant level from 2017 onwards.

LULUCF

Forestry Sector

For the forestry sector, projections were developed using two methods:

- (1) for afforestations (A), the model CASMOFOR was used,
- (2) for all other forests (managed forests, MF), the CASMOFOR-NFI model was used.

The CASMOFOR model (www.scientia.hu/casmofor) is an accounting-type, IPCC "gain-loss" methodology compatible model that applies standard yield tables, silvicultural models and other basic parameters of the forest carbon cycle to estimate carbon stock changes for future years. Although a different methodology (i.e., the stock change method) is used in the GHG inventory, the two methodologies are compatible. The non-CO2 emissions are excluded from the estimation, which results in a slight overestimation of the net sink of afforestations, however, they are considered in the non-CO2 projections of the MF, thus, the balance can be considered accurate at the forestry level.

For the WEM projections, we have assumed that (a) existing (in 2019) A areas are going to remove carbon according to the estimates by CASMOFOR, (b) only small new A areas will be added until 2020 and even less after that, and (c) some additional plantations and agroforestry areas will be added until 2020 but not later. This latter two assumptions are consistent with the fact that afforestations

have practically stopped recently. For the WAM scenarios, we assumed that until the end of the currently implemented national forestry program, i.e., 2020, the same areas are going to be afforestated as with the WEM scenario, but a higher rate of afforestations will take place later, that the same amount of plantations and agroforesty will be established until 2020 than in the WEM scenario but more will be established after that relative to the WEM scenario.

For the MF area, CO2 projections were developed by using the CASMOFOR-NFI model (https://cdr.eionet.europa.eu/hu/eu/mmr/lulucf/envxbyrxa/). This model was recently developed to estimate the forest reference level of Hungary under the LULUCF Regulation, and is used here so that different projections are as much consistent with each other as possible. This model takes age-class distribution data for 2017 by 21 species or species groups from the National Forestry Database and develops future carbon stock changes by using age-related, species and yield class specific carbon stock change curves and assuming various harvest scenarios. The projected emissions exclude carbon stock changes in the non-biomass pools because of their relative irrelevance in the historical time series (see our national GHG inventory) and their high uncertainty especially in projections.

For the WEM projection for the MF, the future harvest rate was assumed to be between 7.5 and 8.9 million m3/year, whereas for the WAM projection we assumed that total harvests are fixed at a rate of 7.5 million m3/yr.

For the MF area, non-CO2 emissions have also been estimated for the projection period using simple linear extrapolation of the historical emissions from wildfires, and harvest-rate related emissions in the case of slash burning.

Non-forestry Sectors

For the non-forestry sectors, projected emissions and removals were estimated by using exactly the same system that is used for the GHG inventory. This system takes the area of the various "land remaining the same land" and "converted to" land use/change categories. Currently, no other changes in the system is assumed in the projections. For the land use and land use change scenarios, only a "WEM" type scenario could be developed.

5 Provision of financial, technological and capacity-building

FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

Hungary does not belong to the Annex II Parties of the UNFCCC and therefore it is fundamentally not obliged to provide financial resources to developing countries, and as a transition economy it is not subject to the acquirement thereof. However as an EU member state, Hungary together with the 10 new EU member states (NMS) is committed to contribute to the assistance provided to developing countries. On financial and technology support provided to developing countries, Hungary undergoes the reporting obligation under EU regulation in line with the UNFCCC transparency provisions, and according to the BR Common Tabular Format (decision 19/CP.18) requirements.

Provision of 'new and additional' resources

Hungary is dedicated to provide financial support to fulfil the commitment of developed countries to jointly mobilize 100 billion USD per year by 2020 from a wide variety of sources, including public and private sources, through bilateral and multilateral channels. This also includes alternative sources of finance, in the context of meaningful mitigation actions and transparency on implementation.

Striving to the mobilization effect of public financial resources Hungary works closely with actors of the national private sector. Planning of green growth activities partly in collaboration with the Global Green Growth Institute will multiply the impact of public financial resources and their effect on the green economy.

The Western Balkan Green Fund Project aims to establish a regional financial vehicle for the implementation of the Nationally Determined Contributions (NDCs) of the Western-Balkan countries. The Project is expected to further mobilize climate finance not only in Hungary but in neighbouring countries and in the Western Balkan region. During the first phase of this project a regional international development agency, the Western Balkan Green Center Nonprofit Ltd. was launched in 2019. The Center allocates 300-600 million HUF (or about 0.9-1.8 million EUR) annually for NDC implementation through bankable project preparation in the Western Balkank countries. During the second phase of the Project a regional fund, the Western Balkan Green Mulitdonor Fund will be established. The Multidonor Fund will be acting in a complementary manner with existing climate finance instruments to support projects via non-refundable grants, refundable concessional loans and guarantees through the network of local commercial banks. We are aiming to involve other potential donor partners to the Fund, primarily from the Central-Eastern European region.

Assistance to developing country Parties that are particularly vulnerable to climate change

Assistance to developing country Parties that are particularly vulnerable to climate change is ensured by continuously providing financial support through bilateral channels. The following examples show the diversity of Hungarian international climate finance projects across the globe:

- South-East Asian countries (Viet Nam, Malaysia, Thailand) received a support of 28 million HUF (or about 85 000 EUR) from Hungary for mitigation action through wastewater heat utilization;
- Montenegro received a support of 51 million HUF (or about 157 000 EUR) for the preparation of its mid-century long term decarbonisation strategy, and for the establishment of the GHG inventory reporting system of the country.
- Morocco received a support of 15 million HUF (or about 45 000 EUR) for using a Water Retainer soil conditioner to longer retain water in the soil and enhance the reforestation efforts as part of the Great Green Wall for the Sahara and the Sahel Initiative.
- Uganda received a support of 73 million HUF (220 000 EUR) for the sustainable irrigation practices, using renewable energies, for small and medium scale farming. The Global Green Growth Insitute is our partner in this project.

Further information is provided in the CTF tables.

6 Provision of financial resources

Provision of financial resources

Hungary pledged and provided 2 billion HUF (or about 6.4 million EUR) public climate finance to developing country parties through multilateral and bilateral channels at the COP21 in Paris. The full amount has already been allocated according to the government decision: in 2016, 1 billion was transferred to the Green Climate Fund during its Initial Resource Mobilisaion period, and 1 billion was allocated for bilateral climate finance projects. Further, in 2019 the Hungarian Government again decided to provide 600 million HUF (or about 1.8 million EUR) public finance annually for the period of 2019-2021 for international climate finance. In 2019, one third of the annual budget, 200 million HUF (or about 0.6 million EUR), was pledged to the Green Climate Fund for its 1st official replenishment period.

Hungary's public climate finance is expected to remain at a similar level in the coming years, as indicated in the CTF tables.

Activities related to transfer of technology

Bilateral support provided to developing countries through bilateral channels focuses on sharing Hungarian know-how, expertise and available technologies. Hungary is most active in adaptive water management. One example is the special Water Retainer soil conditioner, a Hungarian product, the use of which could be scaled up based on the success of the above mentioned pilot project in Morocco. The Ministry of Foreign Affairs and Trade of Hungary (MFA) in cooperation with HEPA Hungarian Export Development Agency Nonprofit Ltd.coorganized an expo of water technologies in conjunction with the third Budapest World Water Summit 2019 focusing on sustainable, innovative, environment-friendly solutions in the field of drinking water production, water treatment and water supply.

Hungary is also supporting the work of the UNFCCC Technology Mechanism including by delegating an expert as an Annex I member of the Technology Executive Committee.