

NATIONAL REPORT BY POLAND

MAY 2020

Enhanced Black Carbon and Methane
Emissions Reductions

Arctic Council Framework for Action

Ministry of Climate

Poland's National Report
to the Arctic Council
2020

on black carbon and methane emissions

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Poland's National Report 2020 on black carbon and methane emissions has been prepared by the Ministry of Climate and the National Centre for Emissions Management (KOBiZE) in the Institute of Environmental Protection – National Research Institute (IOŚ-PIB).



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1 Introduction

Poland, as an Arctic Council Observer State, follows the recommendation included in the document: *Enhanced Black Carbon and Methane Emissions Reductions. An Arctic Council Framework for Action*, and takes this opportunity to report progress on emission reduction efforts on a biennial basis.

Poland's National Report 2020 contains estimates of black carbon and methane emissions for the years from 1990 to 2018, methane emission projections and a description of policies and projects that have impact on emission trends. The data are fully consistent with the latest National Inventory Report 2020 (NIR 2020) and Informative Inventory Report (IIR 2020). These reports were submitted in March and April 2020 to the European Environment Agency (EEA), the UN ECE Convention on Long-range Transboundary Air Pollution (CLRTAP) and the Secretariat of the UN Framework Convention on Climate Change. IIR 2020 is available on the [CEIP website](#). NIR 2020 is available on the [UNFCCC website](#). Both reports contain more comprehensive information on the emission estimates, including inventory methods and data sources.

As an EU Member State, Poland implements policies and measures to keep its reduction commitments regarding the emissions of greenhouse gases (GHG) and other pollutants. Specifically, Poland has taken obligations to reduce PM_{2.5} emissions from 2020 by 16% and from 2030 by 58% compared with 2005. This reduction obligation is set by the EU Directive on *National Emission Ceilings* (NEC Directive). This commitment will also hugely influence the BC emissions, as BC emission is closely related to a fraction of PM_{2.5} released. As regards to methane, Poland is obliged to reduce its yearly GHG emissions in non-ETS¹ sectors by at least 7% up to 2030 compared with 2005.

Poland undertakes a wide range of actions to meet its emission reduction obligations. Measures presented in this Report are limited to those relating – directly or indirectly - to methane and black carbon only. They are presented in an order responding to the recommendations of EGBCM. For the full picture, please refer to the latest Fourth Biennial Report (BR4) of Poland available on [UNFCCC website](#). Policies and measures presented in BR4 have impact not only on GHG emissions, but also on the air pollutants, like particulate matter and black carbon.

2 Black carbon emissions

2.1 Short summary of main findings on the historical trends in BC emissions

Black carbon (BC) is a component of fine particulate matter (PM_{2.5}). Therefore in the Polish inventory emissions of this pollutant are calculated in most cases as a fraction of PM_{2.5} emissions. The exceptions

¹ Non-ETS sectors include sectors not included in the EU ETS: energy except CO₂ and a small part of N₂O from large industry, industrial processes, agriculture, waste and LULUCF. Non-ETS sector covers approximately half of GHG emissions in Poland.

include emissions from road transport, which are estimated in COPERT 5² program and emissions from field burning and open burning of waste, which are calculated based on activities and BC emission factors.

The main sources of BC emissions in Poland are:

- 48% - stationary combustion in residential sector and other small scale combustion sources,
- 37% - transport (mainly road transport).

These two sectors are responsible for 85% of BC emission in 2018. Full sectoral breakdown of 2018 emission has been displayed in Figure 1.

BC emissions have been fluctuating over the last 28 years (Figure 2). Since 2010, when they reached a local peak of 18 kt, BC emissions have decreased by 10%. Compared with 1990 emissions in a number of sectors fell substantially:

- Energy industries by 48%,
- Industrial processes by 47%,
- Fugitive emissions by 30%,
- Field burning of agricultural residues by 70%.

These sectors are – however – responsible for only 7% of the overall emission in 2018, so they could not offset the increases in 1990-2018 in two major sectors: small combustion sources and transport, which grew by 19% and 17% respectively and caused the increase of total BC emission of 9.6% in that period. The increases result from activity growth in both sectors (increase of fuel use).

Fuel use in road transport has grown dramatically: consumption of gasoline grew by 41% compared with 1990 and diesel oil by as much as 401%. Compared with 2013 fuel use grew by 25% and 61% respectively.

Small scale stationary combustion shows positive trends in terms of solid fuel use, which decreased in the period 1990-2018 by 24% (in commercial/institutional combustion by as much as 71%) and since 2013 by 9%. In 2018 solid fuels accounted for 40% of the energy use in this sector, whereas in 1990 for 64%. On the other hand, the use of liquid fuels has risen since 1990 by 106%, gaseous fuels by 51% and biomass by 260%, causing the overall growth in emission from this sector in this period. Compared with 2013 the use of all fuels fell in 2018, except of liquid fuels which grew by 14%. The off-road transport is responsible for the slight rise of emission in 2013-2018 (of 1.3%).

In the waste sector, the majority of emission results from open burning of agricultural waste (96% in 2018). It grew from 0.49 kt in 1990 to 0.59 kt in 2018 (by 21%).

The BC emission inventories are presented in Annex 1.

Emission projections for BC will be available in the second half of 2020 and will be delivered to EGBCM as soon as they are ready.

² COPERT is a vehicle emissions calculator widely used by emission inventory compilers in EU countries. It uses vehicle population, mileage, speed and other data such as ambient temperature and calculates emissions and energy consumption for a specific country or region. <https://copert.emisia.com/>

2.2 Black carbon emissions in figures

Sectoral shares in BC emissions in 2018 and emission trends in years 1990-2018 are depicted on Figures 1 and 2.

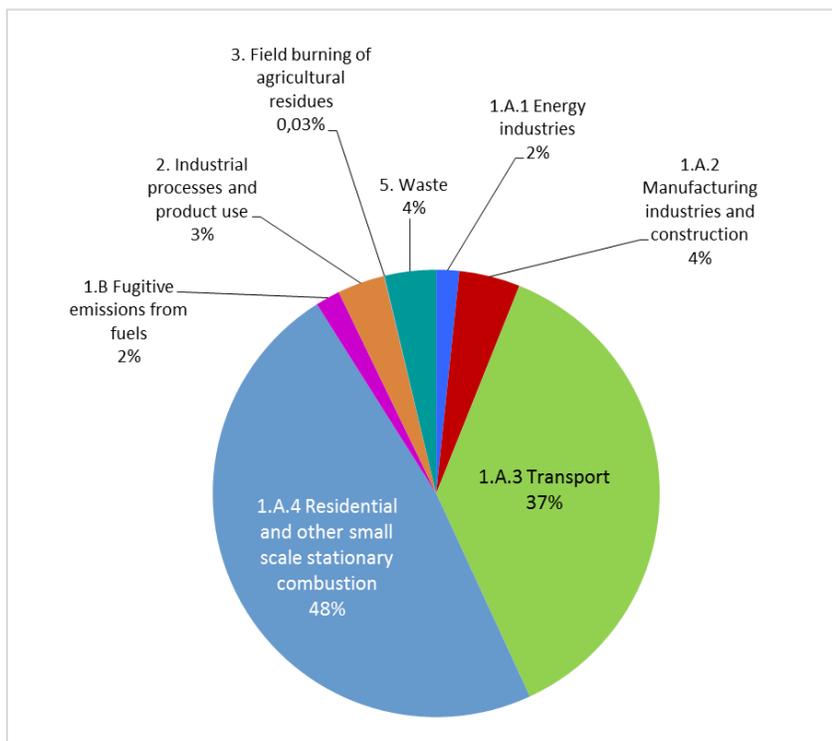


Figure 1. Sectoral shares in BC emissions in Poland in 2018

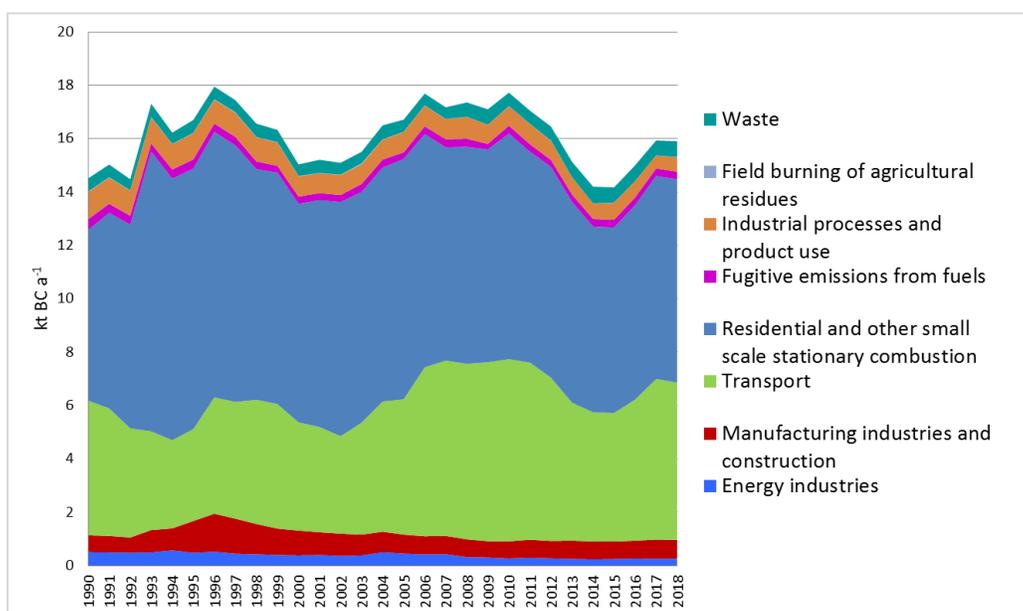


Figure 2. 1990-2018 BC emissions in Poland by sectors

3 Methane emissions and future projections

3.1 Short summary of main findings on the historical and future trends in methane emissions

The CH₄ emission amounted to 1 950 kt in 2018 i.e. 49 million tonnes of CO₂ equivalent. CH₄ share in total GHG emissions in 2018 amounted to 12%.

Three main CH₄ emission sources include the following categories (with percentage share in total methane emissions):

- 39.3% - Fugitive emissions from fuels,
- 29.9% - Agriculture,
- 23.0% - Waste.

Altogether they account for 92% the national methane emission in 2018 in Poland (Figure 3).

Fugitive emissions from fuels originate from

- coal and lignite mines (33.8% of total CH₄ emission),
- oil and natural gas system (5.5% of total CH₄ emission).

The emissions from enteric fermentation dominated in Agriculture and amounted to 27% of total methane emission in 2018. In the Waste sector, the main sources of emissions were solid waste disposal (18% of total methane emissions) and waste water treatment and discharge (5%).

CH₄ emissions have been constantly decreasing over last 28 years (Figure 4). They decreased by 30% in the period 1990-2018 and by 5% since 2010.

The changes were triggered by the following most significant sectoral emission changes:

- the decrease in emission from Enteric Fermentation by 40.5%,
- the decrease in Fugitive Emission by 23.6%,
- the decrease in emission from Waste sector by 45.9%.

Methane projections

It is projected that CH₄ emissions will further gradually decrease up to 2040 reaching emission reduction of 42.6% compared with 1990, with emission 1.9 Mt CH₄ in 2020 and 1.6 Mt CH₄ in 2040 (Figure 5).

The most significant CH₄ emission source categories in Poland will still be: Energy, Agriculture and Waste. As relates to Energy sector the majority of CH₄ emission is related to fugitive emissions from fuels. Here projected CH₄ emissions triggered by mining, handling and transformation of solid fuels significantly decrease, while those related to exploration and processing of oil and natural gas increase.

Future CH₄ emissions in CH₄ in Agriculture generally increase due to the growing share of litter-free cattle and pig waste management systems. At the same time certain decrease in CH₄ missions from enteric fermentation is foreseen.

In the Waste sector further gradual decline in CH₄ emissions is projected, depending on technological development of waste disposal sites, progress in recycling and in waste incineration.

Methane emission inventories and projections are presented in Annex 2.

3.2 Methane historical and projected emissions in figures

Sectoral shares in methane emissions in 2018, emission trends in years 1990-2018 and projected emissions are depicted on Figures 3-5.

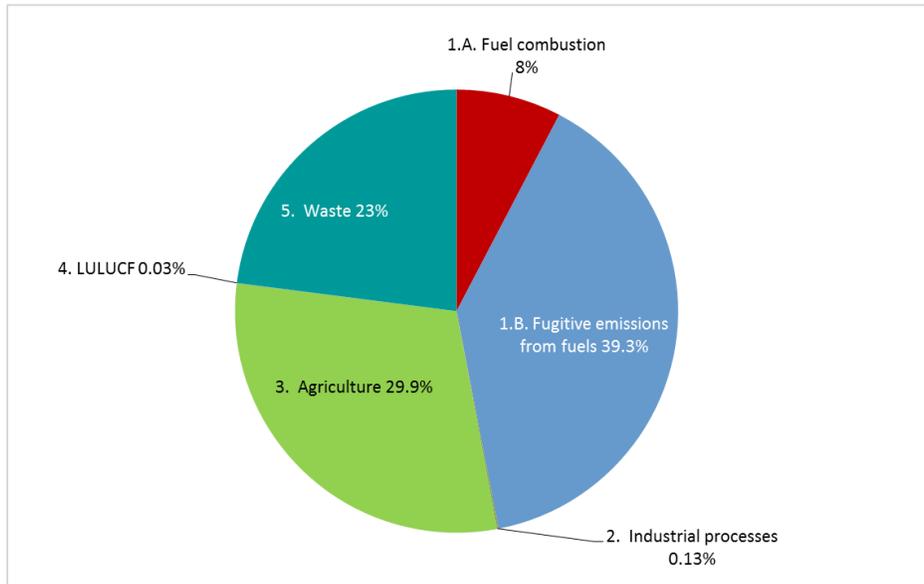


Figure 3. Sectoral shares in methane emissions in Poland in 2018

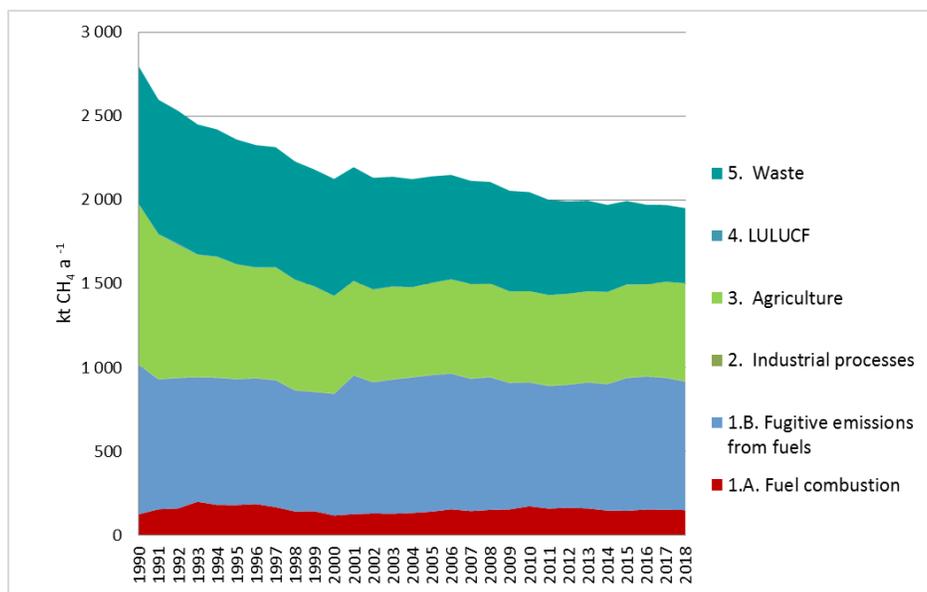


Figure 4. 1990-2018 methane emissions in Poland by sectors

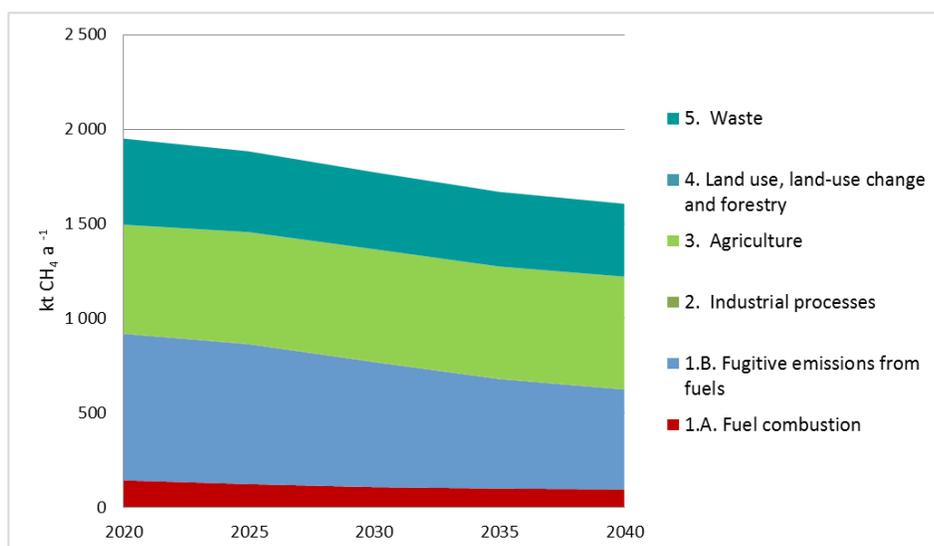


Figure 5. Projected methane emissions since 2020 (according to WAM³ scenario in BR4 POL 2019⁴)

4 National strategies and action plans

4.1 Governance system

Minister of Climate is in Poland responsible for climate and air quality policies and measures. He creates the overall vision as well as conducts implementation activities. Minister of Climate performs these tasks with the support of the Ministry of Climate as well as two external institutions:

- The National Fund for Environmental Protection and Water Management (NFOŚiGW) with the regional net of Voivodeship Funds for Environmental Protection and Water Management (WFOŚiGW). These institutions operate the system for financing environmental programmes supporting the implementation of, among others, climate and air quality policy.
- The National Centre for Emissions Management (KOBiZE) located in the Institute of Environmental Protection – National Research Institute (IOŚ-PIB), which performs tasks in the area of emission monitoring and reporting. It prepares emission inventories and projections as well as draft reports that Poland submits to EC/EEA, LRTAP, UNFCCC and other national and external recipients. KOBiZE is the institution responsible to send early warning in case there is a risk that Poland does not fulfill its emission reduction commitments. KOBiZE acts also as the national EU ETS⁵ administrator.

³ With Additional Measures scenario.

⁴ Fourth Biennial Report of the Republic of Poland to the UNFCCC: <https://unfccc.int/sites/default/files/resource/BR4%20POLAND.pdf>

⁵ European Union Emission Trading System.

There are, however, also other Ministers involved in creating and conducting policies and measures that positively influence climate or air quality. Depending on the sector, other Ministers cooperate with Minister of Climate if the actions affect respective sectors (like transport, buildings, energy system, agriculture, regional policy etc.).

The national and sectoral strategies and policies undergo mandatory consultations with all the ministries, relevant institutions, private sector and the society before they are adopted by the Council of Ministers. This system ensures that all necessary stakeholders are aware and have a say in shaping new policies.

4.2 National strategies

- **Strategy for Responsible Development**, adopted by the Council of Ministers on 14 February 2017. The Strategy defines a new model for the development of the country in its economic, social and spatial dimensions until 2020 and with an outlook until 2030. The specific objectives, which it sets out, include e.g. support for measures to reduce the emissions of greenhouse gases and air pollutants as well measures related to energy efficiency.
- **2030 National Environmental Policy (NEP)** adopted by the Council of Ministers on 16 July 2019. NEP specifies and operationalizes the Strategy for Responsible Development. It strengthens actions to build an innovative economy while complying with the principles of sustainable development. The implementation of the environmental objectives is to be supported by horizontal objectives related to environmental education and to the effective functioning of environmental protection instruments. The 2030 National Environmental Policy will provide the basis for investing European funds under the financial perspective 2021–2027. The Strategy also supports the implementation of Poland's international objectives and commitments, including those at the EU and UN levels, particularly in the context of EU 2030 climate and energy policy objectives and the Sustainable Development Goals.
- **National Reform Programme (NRP)** for the implementation of the Europe 2020 Strategy – its update for 2017/2018 was adopted by the Council of Ministers on 25 April 2017. NRP is the main programme which serves to implement the Europe 2020 Strategy at the level of the EU Member States. Taking into account the social and economic circumstances, the NRP sets out the targets which Poland should achieve in 2020. In the annually updated NRP, Poland presents, among others: the medium-term macroeconomic scenario, the national plan for the implementation of the objectives of the Europe 2020 Strategy and the planned measures to implement the recommendations of the EU Council.
- **Energy Security and Environment Strategy - the 2020 Perspective**, adopted by the Council of Ministers on 15 April 2014. The document specifies the provisions of the Medium-Term National Development Strategy 2020 in the fields of energy and the environment and provides guidelines for the Energy Policy of Poland. The main goal of this Strategy is to ensure a high quality of life for the present and future generations, taking environmental protection into account, and to create the conditions for the sustainable development of a modern energy sector capable of ensuring Poland's energy security and a competitive and efficient economy.

4.3 National action plans

- **Operational Programme Infrastructure and Environment (OPIE) 2014-2020.** OPIE is the largest programme financed by the European Funds in Poland. The aim of the Programme is to support a resource efficient and environment friendly economy conducive to territorial and social cohesion. Under the financial perspectives 2007-2013 and 2014-2020, OPIE implements projects which result in GHG and other pollutants emission reductions, energy efficiency improvements, the promotion of renewable energy or the adaptation to the adverse impacts of climate change.
- **National Air Pollution Control Programme (NAPCP),** adopted by the Council of Ministers on 29 April 2019. Directive 2016/2284 of 14 December 2016 sets out the Member States' commitments to reduce the emissions of the pollutants: sulphur dioxide (SO₂), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC), ammonia (NH₃) and particulate matter (PM_{2.5}). The Directive sets also the requirement for the preparation, adoption and implementation of national air pollution control programmes. Poland's commitments to reduce its emissions cover two periods: from 2020 to 2029 and from 2030 onwards. NAPCP indicates the measures and scenarios to meet the emission targets laid down in the Directive.
- **National Energy and Climate Plan for 2021-2030 (NECP),** submitted to the European Commission on 30 December 2019. NECP was prepared to meet the obligation under Regulation (EU) 2018/1999. NECP presents the assumptions and objectives as well as policies and measures designed to implement the five dimensions of the Energy Union: energy security, the internal energy market, energy efficiency, decarbonisation and research, innovation and competitiveness. Among other, it includes the assumptions for the implementation of Poland's GHG reduction target (-7%) in non-ETS sectors by 2030 as a part of the EU-wide commitment to reduce GHG emission by 40% by 2030.

5 International work

The Republic of Poland contributes to the efforts of the international community on black carbon and methane emissions. As an EU Member State, Poland implements policies and measures to keep its reduction commitments regarding the emissions of different pollutants. Poland has adopted national regulations in accordance with EU law. Activities undertaken at the international level are fully consistent with the European Union's climate policy and are aimed at improving the quality of the environment and the climate.

6 Sector based plans and projects

6.1. Mobile and stationary sources

6.1.1. Specific national strategies and programmes

- **Sustainable Transport Development Strategy until 2030**, adopted by the Council of Ministers on 24 September 2019. The strategy focuses – among others – on increasing the efficiency of transport and on limiting the negative impact of transport on the environment.
- **National Railway Programme until 2023**, updated on 17 September 2019. The overarching objective of the Programme is to strengthen the role of railway transport in the integrated transport system of the country by creating a coherent and a modern railway network. Among others, this includes the mitigation of negative impacts on the environment.
- **Clean Transport Package**, adopted by the Council of Ministers on 16 March 2017. The Clean Energy Package consists of three pillars:
 - the Electromobility Development Plan for Poland,
 - the National Framework for Alternative Fuel Infrastructure Development Policy,
 - the Low-Emission Transport Fund.

6.1.2. Existing regulatory instruments

- Act of 11 January 2018 on Electromobility and Alternative Fuels. The Act sets out the rules for the development and functioning of the infrastructure for the use of alternative fuels.
- Act of 25 August 2006 on the Fuel Quality Monitoring and Control System. The Act lays down the rules for the organisation and operation of a system for monitoring and controlling the quality of fuels intended for use in vehicles, including agricultural tractors, off-road machinery, recreation-related floating vessels, combustion plants and inland navigation vessels, selected fleets and by farmers for their own use.
- Regulation of the Minister of Economy of 30 April 2014 on the detailed requirements for internal-combustion engines in the scope of the reduction of the emissions of gaseous pollutants and particulate matter from these engines.

6.1.3. Follow up of EGBMC recommendation (1.a-1.e)

EGBCM recommendations in the transport sector have been introduced by:

- Improvement of energy efficiency and emission factors of vehicles - Euro standards (1.a)
- Eliminating the use of vehicles with non-functional or removed diesel particulate filters (DPF), due to the modification of testing procedures for periodic inspection of road vehicles with diesel engines (1.b)
- Promotion of electromobility, clean transport, collective forms of transport (1.c)
- Implementation of innovative technologies and solutions in inland navigation and introducing emission standards and energy efficiency requirements for ships (1.d)

Recommendation 1.e (Reduce emissions from stationary diesel engines) does not apply to Poland.

6.1.4. Best practices and projects (Toolbox)

- **Improvement of energy efficiency and emission factors of vehicles.** The energy efficiency and emission factors of road vehicles are improved by the standards directly applicable in Poland (the so-called Euro standards) for pollutant emissions from light (passenger and light-duty) vehicles

and heavy-duty vehicles and by the standards for CO₂ emissions from new light and heavy-duty vehicles registered in the EU. These standards successively become more stringent across the EU.

Moreover, the system for technical inspections of motor vehicles and their trailers also contributes to maintaining the correct energy and emission efficiency of means of transport, eliminating malfunctioning and end-of life vehicles which worsen the energy efficiency and emission factors of this mode of transport. The tolls which are also collected for road use by vehicles with the allowable gross weight exceeding 3.5 tonnes in specific sections of the networks of motorways, expressways and national roads also depend on the category of Euro emission standards. There are also charges for the use of the environment which are diversified depending on the type of vehicle and fuel.

Since 2011 there has been an obligation to apply additional energy and emission criteria for public entities' purchases of road vehicles and operators' purchases of vehicles to provide public passenger transport services, as well as the obligation to provide information on fuel consumption and CO₂ emissions in vehicles offered for sale or lease.

- **Promotion of electromobility and clean transport.** The basic assumption of the Electromobility Development Plan for Poland is to achieve the target of 1 million electric vehicles in Poland by 2025. In addition, the implementation of projects to electrify public transport is considered to be of key importance for reducing pollutant emissions and improving air quality in cities. It is expected that the share of zero-emission buses (including trolleybuses) will grow to at least 5% in 2021 and 20% in 2025. The development of other vehicle types – those powered by natural gas in the form of CNG (54,000 in 2025) and LNG (3,000 in 2025) – is also assumed.

In parallel to the system of incentives, requirements were introduced for the minimum share of electric vehicles in the fleets used by the supreme and central state administration authorities and territorial self-government units with their number of inhabitants exceeding 50,000. Moreover, the abovementioned self-government units must ensure the minimum shares of electric vehicles in the provision of city transport services and of those powered by natural gas used to carry out the other public tasks.

- **Shaping of environmentally aware behaviour of drivers and users of transport services.** Environmentally aware behaviour of drivers and users of transport services is shaped, among others, by disseminating the technique of environmentally friendly driving as part of driving courses and public campaigns, e.g. those carried out on the occasion of the European Mobility Week or Car-Free Day. Many environmentally friendly projects addressed to drivers and passengers are launched as civic initiatives, e.g. involving offers of ad hoc joint travels under the car-pooling formula (e.g. the initiatives “Bla Bla Car” or “Otodojazd.pl”) or a preferential approach to joint use of a bicycle or a public car (car-sharing).
- **Promotion of collective transport in cities.** Sustainable mobility primarily consists in making an attractive offer to the inhabitants of a city and its functional area in the scope of public transport in terms of fares and their flexibility, the duration and comfort of travels, the reliability of a means

of transport, the completeness and timeliness of passenger information, the convenient character of transfers and linkages between different modes of transport.

The promotion of collective transport includes many measures, including, among others, the widespread traffic preferences in cities in the form of separate bus lanes, financial support for the replacement and modernisation of public transport stock, promotion of rail transport in cities, the integration of connections, travel information and tickets of different public transport operators, as well as the construction of Park&Ride infrastructure.

- **Promotion of zero-emission public transport.** The Zero-Emission Public Transport Programme is one of the flagship programmes of the National Centre for Research and Development which is expected to result in environmentally friendly public transport for 26 Polish cities.
- **Reduction of particulate emissions, mainly soot, from internal combustion engines of road vehicles,** by eliminating the use of vehicles with non-functional or removed diesel particulate filters (DPF), due to the modification of testing procedures for periodic inspection of road vehicles with compression-ignition engines (Diesel). The initiative consisted of:
 - methods for detecting the malfunction or incompleteness of the DPF system,
 - modification of vehicle emission inspection procedures at vehicle inspection stations (SKP)
 - legislation implementing extended control of road vehicles.
- **Implementation of innovative technologies and solutions in inland navigation.** Engines used in inland navigation must meet emission requirements. Moreover, measures are taken to use water vessels powered by alternative fuels. The implementation is financially supported by the Inland Navigation Fund.
- **Emission standards and energy efficiency requirements for ships.** Both measures have been implemented by EU and Polish law.
- **Clean air program.** The implementation of measures to improve air quality cannot take place without effective financial mechanisms in this respect. In September 2018 the Minister of the Environment developed and announced Priority Program entitled "Clean air". The program is supporting the thermomodernization of single-family buildings and replacement of old and inefficient heat sources for solid fuel - with modern heat sources that meet the highest standards. The budget of the program for years 2018-2029 is approximately PLN 103 billion. The Ministry of Climate estimates that under the Program it will be possible to replace approx. 3 million inefficient heat sources, which in turn may have an ecological effect in the form of reducing the emission of the following pollutants. In order to increase the effectiveness of this program, the principles of its implementation have been modified. There were also started other financial programs which are dedicated to municipal heating companies and natural persons in order to reduce emissions of air pollutants.

6.2 Oil and gas (2.a-2.d)

6.2.1. Specific national strategies

Energy Policy of Poland until 2030 - the long-term strategy for development of the energy sector in Poland, including measures to fulfil international environmental commitments. At present there are works on the new policy document: Energy Policy of Poland until 2040.

6.2.2. Existing regulatory instruments

- Regulation of the Minister of the Economy of 21 November 2005 on the technical conditions to be met by terminals and stations of liquid fuels, long-distance pipelines for transfer of crude oil and its products, and their location. It sets the requirements for reducing losses during the storage and transmission of liquid fuels.
- Act of 25 August 2006 on the Fuel Quality Monitoring and Control System introduces the obligatory high level insulation of fuel distribution systems.

6.2.3. Follow up of EGBMC recommendation (2.a-2.d)

EGBCM recommendations in the oil and gas sector have been introduced by:

- Improved coal bed methane capture from coal mines, economic use of methane (2.b),
- Increased voluntary cooperation between Polish oil and gas as well as mining companies to use coal bed methane for energy generation purposes (2.c)
- Voluntary methane emission reduction projects: cooperation of mining companies with scientific institutes (2.c)

6.2.4. Best practices and projects (Toolbox)

- The cooperation between companies under the **Geo-Methane Programme** is an example of a good practice and a successful project. It has been presented in point 6.1.5 as a story.
- **Reduction of methane emissions from fuel production and distribution processes.** Legal regulations have been issued on the insulation of the of the distribution systems of liquid fuels, imposing the obligation to equip liquid fuel depots with installations for hermetic storage, filling and emptying Class I petroleum products, to limit the annual losses of these petroleum products at the storage installation of liquid fuel depots to less than 0.01% of their capacity, which means that the issue has been resolved.
- **Economic use of methane** - an investment project in progress since 2018. It is scheduled for five years and encompasses the Budryk and Knurów-Szczygłowice mines. The project involves the construction of 13 generators with total capacity of 48 MWe, allowing to further reduce annual methane emissions by approx. 86.4 million m³. Reducing methane emissions at JSW S.A.'s mines is being achieved by capturing and using as much gas from mine drainage as possible to generate electric and thermal energy in high-efficiency cogeneration systems both internally and by selling the methane to external companies. A cogeneration unit (two engines with capacity of approx. 4.0 MWe each) was put into service at the Budryk mine in 2016, which led to a reduction of methane emissions into the air by approx. 13 million m³/year. In 2015-2019, by using methane in cogeneration engines operated by JSW S.A. and by external entities that purchase the captured methane from JSW S.A., methane emissions were reduced in total by approx. 460 million m³.

- **Voluntary methane emission reduction projects: cooperation of mining companies with scientific institutes.** Work has begun on formulating and implementing JSW Group's Environmental Strategy – proposed scenarios for operating in the Anthropocene. For this purpose, cooperation has been established with scientific centres from Silesia. One of the strategic areas of ecological activities is the impact of underground coal mining on climate as a result of methane being freed from deposits, along with the impact of the existing systems for supplying energy and cooling to the mines. The 2020 Research Agenda adopted by JSW places particular emphasis on the issue of methane emissions. Seven out of the 26 research issues concern reduction and use of methane from coal seams. These include the commencement of research work on the possibilities for increasing the capture of methane in mines, acquiring CNG from mine gases, oxidation of methane from ventilation air.

6.2.5 Story box

Polish mining and energy companies, including Polish Oil and Gas (PGNiG), Polish Mining Group (PGG), Jastrzębie Coal Company (JSW) and Tauron Group have entered into cooperation to use coalbed methane (under the Geo-Methane Programme). As part of the Programme, they cooperate to develop innovative coalbed methane production technologies.

In Polish mines, for many years methane has been removed from coal beds to control the methane hazard and to ensure the safety of miners and mining works. The extracted methane is used as an energy source in heating and cogeneration installations for combined heat and power production in gas engines.

Together with the Polish Geological Institute – National Research Institute (PIG-PIB), Polish Oil and Gas extracts methane from coal deposits in Gilowice in Śląskie Voivodeship. During the trial production since February 2017 almost 900,000 m³ of natural gas with high methane content has been extracted. The extractible methane resources in coal beds in the Upper Silesian Coal Basin are estimated at about 190 billion m³.

Due to the cooperation of Polish mining and energy companies, prospecting and exploration works can be carried out in the mining areas where coal extraction is planned. It is expected that as much as 1-1.5 billion m³ of gas can be extracted annually. At present, the natural gas extraction in Poland varies between 4 and 4.5 billion m³.

6.3 Residential combustion (3a -3c)

6.3.1. Specific national strategies

- **The National Plan to Increase the Number of Low-Energy Buildings** defines the concept of such buildings and their specific characteristics. It also sets out the actions taken by the public administration to promote buildings with low energy consumption, including the design, construction and reconstruction of buildings in a manner ensuring their energy efficiency, and to increase the share of energy from renewable sources in new and existing buildings.

- **Fourth National Energy Efficiency Action Plan for Poland** lays down the measures to improve energy efficiency in final energy consumption broken down into end-use sectors and the calculations of final energy savings achieved in the period from 2008 to 2015 and planned to be achieved in 2020. Many of the measures address improvement of energy efficiency in houses and dwellings.
- **National Housing Program (NHP)** was developed as a supplement to the Strategy for Responsible Development adopted in 2016. The time horizon of the program is 2030. Among others, NHP aims to ensure the improvement of housing conditions of the society and the technical condition of residential resources as well as to increase energy efficiency in this area. Its activities include, in particular, financial support for renovation and thermo-modernization investments, both from national and EU funds, implementation of instruments supporting revitalization processes of degraded areas and review of regulations regarding technical parameters affecting energy efficiency in residential buildings.

6.3.2. Existing regulatory instruments

- Act of 20 February 2015 on Renewable Energy Sources. The Act lays down the rules and conditions for carrying out operations in the scope of the production of electricity from renewable energy sources and agricultural biogas in RES installations and bioliquids, including definition and rules for energy clusters and prosumers.
- Act of 25 August 2006 on the Fuel Quality Monitoring and Control System. Among others, the Act lays down the rules for controlling the quality of solid fuels.
- The Act of 21 November 2008 on Support for Thermal Modernisation and Renovation. The Act lays down the rules for using the resources of the Thermal Modernisation and Renovation Fund to cover part of the costs of thermal modernisation and renovation projects.
- Act of 29 2014 on the Energy Performance of Buildings lays down the rules for drawing up energy performance certificates for buildings, the rules for inspections of the heating and air-conditioning systems in buildings and the rules for keeping the central register of energy performance certificates for buildings. It also sets out the manner of preparing the national action plan to enhance the number of low-energy buildings.

6.1.3. Follow up of EGBMC recommendation (3.a-3.c)

EGBCM recommendations for residential combustion sector have been introduced by:

- supporting deployment of energy-efficient and low-emission heating sources in households and other buildings by programmes like Clean Air, Stop Smog and other financial support measures (3.a-3.c)
- promoting increased energy efficiency in buildings by legal and financial measures (3.c)

6.1.4. Best practices and projects (Toolbox)

- **“Clean Air” Programme** with the budget of PLN 103 million (about EUR 23 million), offers financial support for the following measures:

- replacement of heat sources in single-family houses by low-emission sources, including, among others, gas-fired sources or solid fuel-fired boilers meeting the requirements of Class V and the Ecodesign, or by connection to the city district-heating system,
 - thermal modernisation of single-family houses,
 - installation of household-based renewable energy sources or mechanical ventilation systems with heat recovery.
- **STOP SMOG Programme** offers financial support for the replacement or elimination of heat sources and thermal modernisation in single-family residential buildings. The applicant in the Programme is a municipality which receives up to 70% of co-financing from the state budget in the form of a grant to cover investment project costs. The implementation of the Programme is now planned in the period from 2019 to 2024 and its total budget (the contributions from the state budget and self-governments) is PLN 1.2 billion.
 - **Thermal Modernisation and Renovation Fund** (at the BGK Bank) - financial assistance in form of a premium (bonus) for investors implementing thermal modernisation and renovation projects. The thermal modernisation premium is given in the case of an implementation of projects aimed at:
 - reducing energy consumption for heating in residential buildings, collective dwelling buildings and public buildings,
 - reducing the supply costs of the heat delivered to buildings,
 - reducing primary energy losses in local district heating networks and their local heat sources,
 - complete or partial replacement of energy sources by renewable sources or the use of high-efficiency cogeneration.
 - **Grants and returnable assistance to support the generation of electricity and heat from RES and to support energy efficiency.** The “My Power” Programme, with a budget of EUR 220 million, is an instrument dedicated to supporting the development of prosumer energy generation; specifically, the segment of photovoltaic (PV) microinstallations. Dedicated programs to support energy efficiency investments are run by the National Fund for Environmental Protection and Water Management and are also available under the Operational Programme Infrastructure and Environment (OPIE) 2014-2020, such as “Improvement of energy efficiency-Subsidies to bank credits taken to build energy-efficient houses” or “Promoting energy efficiency in residential buildings in Śląskie Voivodeship”. Preferential loans for investments in RES are also given by the Bank for Environmental Protection. The “Credit with Climate” offered by BOŚ includes financing for investment projects corresponding with the Climate Change Action Programme, as implemented under the European Fund for Strategic Investments (EFIS).

6.1.5 Story box

Małopolska region in Poland (with the biggest city Kraków) has struggled for many years with very poor air quality, especially in winter. Kraków, one of the biggest Polish cities, has had exceptionally difficult

situation with its location in a basin and historically high number of coal-heated households. In 2018 the residential sector was responsible for 88%⁶ of PM2.5 emission in Małopolska.

Since 2017 in Małopolska region there have been new regulations in force that put restrictions on the use of solid fuel fired stoves and boilers and forbid to use new coal or wood fired boiler or a wood burning fireplace with emission parameters worse than those set in the EU Ecodesign Regulations. In Małopolska by the end of 2022 all the old-type appliances must be replaced by those meeting standards. Since 1 September 2019 there has been a total ban on the use of solid fuels in households in Kraków.

With public financial support, in the years 2013-2017 over 27 000 solid fuel appliances were replaced in Małopolska region, 2/3 of which in Kraków. Renewable energy sources were installed in 12 thousand buildings. 3.5 thousand buildings have been thermo-modernised.

Due to policies carried out for many years, air quality in Małopolska has clearly improved since 2010 contributing to human health and the condition of the environment.

6.4 Solid waste (4a-4c)

6.4.1. Specific national strategies

- **National Waste Management Plan 2022**, adopted by the Council of Ministers on 1 July 2016. The Plan covers the full range of tasks necessary to achieve integrated waste management in the country in a manner ensuring environmental protection.
- **Roadmap for Transition to the Circular Economy**, adopted by the Council of Ministers on 10 September 2019. The documents set a number of measures to implement the idea of Circular Economy in Poland.

6.4.2. Existing regulatory instruments

- Act of 14 December 2012 on Waste. The Act sets out the principles of waste management in a manner which ensures the protection of human life and health and the protection of the environment in accordance with the principle of sustainable development. The Act establishes the waste hierarchy: 1) prevention; 2) preparing for re-use; 3) recycling; 4) other recovery; 5) disposal.
- Act of 13 September 1996 on the Keeping of Cleanliness and Order in Municipalities. The Act sets out the tasks of municipalities and the obligations of property owners related to the keeping of cleanliness and order, the conditions for the performance of operations consisting in the collection of municipal waste from property owners and its management and the conditions for granting permits to providers of services within the scope governed by the Act.

6.4.3. Follow up of EGBMC recommendation (4.a-4.c)

EGBCM recommendations for waste sector have been introduced by:

⁶ 2018 assessment of air quality in Małopolska Voivodeship, Chief Inspectorate of Environmental Protection, 2019, <http://powietrze.gios.gov.pl/pjp/publications/card/14060>

- emission-friendly principles of waste management (4.a)
- application of waste incineration and landfill gas treatment processes (4.b)

Recommendation 4.c (Promote best practices for waste management in northern and remote communities) does not apply to Poland.

6.4.4. Best practices and projects (Toolbox)

- **Pro-environmental principles of waste management** were introduced by the Act on Waste and the National Waste Management Plan and are aimed at reducing the quantities of waste by intensifying recycling, improving waste treatment technologies and limiting the landfill of waste. The most important measures to reduce methane emissions in the waste sector include:
 - increasing the level of recycling of municipal waste,
 - reducing the quantities of municipal waste deposited at waste landfills,
 - application of waste incineration processes,
 - landfill gas treatment,
 - raising the public awareness in relation to waste management.

Waste incineration and landfill gas treatment processes are carried out in a manner, which ensures the highest possible environmental protection and efficiency of the processes.

The capacity of all the installations for the incineration of municipal waste and the waste arising from the treatment of municipal waste in a given Voivodeship should not exceed 30% of the quantity of municipal waste generated in that Voivodeship. In Poland, eight municipal waste incineration plants are now in operation (Warsaw, Konin, Białystok, Bydgoszcz, Cracow, Poznań, Szczecin and Rzeszów). Another four are planned.

Biogas can be generated at a landfill for even 30 years from the moment when waste is deposited. The composition and quantity of gas generated mainly depends on the quantity and quality of the organic fraction deposited at a landfill. Such factors as the deposition height, air temperature and atmospheric pressure are also of large importance. It is assumed that in practice one tone of waste can produce 200-250 m³ of landfill gas with the methane content of about 45-65%. Heat and power generation from methane arising in landfill gas aims not only at minimising emissions into the environment, but also at replacing the fossil fuel combustion processes. This technology is now used at more than 60 municipal waste landfills in Poland.

6.5 Agriculture and animal husbandry (5a-5c)

6.5.1. Specific national strategies

- **Strategy for the Sustainable Development of Rural Areas, Agriculture and Fisheries 2030**, adopted by the Council of Ministers on 15 October 2019. The main aim of the strategy is to set out the key directions of the development of rural areas, agriculture and fisheries until 2030. The update of the Strategy is intended to correctly address the scope of public interventions financed from national and EU funds for 2021- 2027.

- **Rural Development Programme (PROW) for 2014–2020.** The Programme sets out the objectives, priorities and principles of support for the development of rural areas with the resources of the European Agricultural Fund for Rural Development (EAFRD). The most important objective of the Programme is to enhance the competitiveness of agriculture, while taking into account environmental objectives. PROW is based on the implementation of six priorities, two of which directly concern the natural environment and climate protection, i.e. the protection of ecosystems and the sustainable management of natural resources.
- **Framework Action Plan for Organic Food and Farming for 2014–2020** adopted by the Minister of Agriculture and Rural Development on 5 June 2018. The Plan presents the measures which should be taken and implemented by the Ministry Agriculture and Rural Development and its subordinated and supervised units to develop organic farming and the organic food market.

6.5.2. Existing regulatory instruments

There is a number of Regulations of the Minister of Agriculture and Rural Development on the financial assistance for different types of projects implementing the Rural Development Programme. Supported types of projects include: modernisation of agricultural holdings, soil protection practices, organic farming, afforestation and creation of woodland.

6.5.3. Follow up of EGBMC recommendation (5.a – 5.c)

EGBMC recommendations for agriculture have been introduced by:

- Support for adaptation and mitigation measures in agricultural holdings, improvement of monogastric livestock systems and the reduction of methane emissions from animal waste, scientific research on adaptation measures and measures to reduce greenhouse gas emissions from agricultural holdings (5.b)
- Agri-environmental measures including promotion of sustainable agriculture and organic farming (5.c)
- Legal ban on field burning of meadows, pastures and fallows as well as straw and stubble (5.c)
- Good practice Code in Agriculture prohibits thermal treatment of any agricultural waste out of facilities serving as incinerators (5.c)

6.5.4. Best practices and projects (Toolbox)

- **Support for adaptation and mitigation measures in agricultural holdings.** The agriculture sector (with public support) can reduce its impact on climate by changing its animal production, improving its manure management, enhancing its use of energy from renewable sources and also improving the energy efficiency of the buildings of agricultural holdings.
- **Improvement of monogastric livestock systems and the reduction of methane emissions from animal waste.** Increased demand for poultry meat and the need to reduce the costs of pork production forced feed companies to add to their commercial offers complete industrial feeds based on the complete or partial supplementation with synthetic amino acids. The high digestibility of protein in these feeds caused the reduction of the greenhouse emissions from poultry and pig farming involving the storage of natural fertilisers. In addition, boiler farming

generally implemented multiphase nutrition to diminish the production costs and to enhance the competitiveness of national raw material. As the dairy sector develops and its technical equipment improves, to an increasing extent it separates slurry, which results in the reduction of the emissions of methane and nitrogen oxides from the storage of natural fertilisers.

- **Scientific research on adaptation measures and measures to reduce greenhouse gas emissions from agricultural holdings.** Many research projects are run in this area. A good example is a project focusing on innovative nutrition in sustainable poultry production. The development of comprehensive, innovative feed production technologies and the related technologies for rearing chickens and slaughter turkeys will result in diminishing the adverse impact of poultry production on the natural environment by reducing the emissions of nutrients and greenhouse gases into the environment, while, at the same time, maintaining a high level of the effectiveness of production and the quality of the product – poultry meat – and thus improving consumer safety and the competitiveness of domestic producers.
- **Agri-environmental measures.** In the Rural Development Programme there are many incentives aimed at promoting the sustainable management system, consisting in the rational use of natural resources. These actions enable to limit the adverse impact of agriculture on the environment and to prevent the loss of organic matter in soil. They include e.g. protection of waters against pollution by nitrates from agricultural sources, implementation of agricultural production in compliance with the methods of organic farming, as well as afforestation and creation of woodland. Research programmes are also implemented with a view to developing rational and low-emission agricultural production.

6.6 Management of wildfires (6a-6d)

6.6.1. Specific national strategies

- **National Information System on Wildfires** – the strategic instrument to monitor and prevent wildfires maintained and developed by the Forest Research Institute in cooperation with the State Forests.

6.6.2. Existing regulatory instruments

- Act of 28 September 1991 on Forests. It sets out the principles of the preservation, conservation and augmentation of forest resources and the principles of forest management in relation to other elements of the environment and the national economy.
- Regulation of 22 March 2006 of the Minister of Environment on the detailed rules of fire protection of forests.

6.6.3. Follow up of EGBMC recommendation (6.a-6.d)

EGBCM recommendations for management of wildfires have been introduced by:

- Educational activities under the project "Comprehensive project for the adaptation of forests and forestry to climate change -protection, prevention and reduction of the effects of threats related to forest fires (6.b)

- Comprehensive project of adaptation of forests and forestry to climate change - protection, prevention and mitigation of the risks associated with forest fires (6.c)

6.6.4. Best practices and projects (Toolbox)

- **Comprehensive adaptation of forests and forestry to climate change – prevention, counteracting and reduction of the effects of threats related to forest fires.** Activities under this project are focused on seeking to reduce the occurrence of fires in forests, as well as to efficiently and quickly locate sources of danger. The priority is to reduce the number of fires and reduce the area of forests covered by them, and as a result, to minimize losses to the environment and local residents. Among the most important investments were the construction of new fire stations and meteorological stations and modernization of some of those that already exist. In addition, State Forests plan to purchase patrol and fire-fighting cars as well as modern equipment for locating and detecting fires. (<https://www.ckps.lasy.gov.pl/en/o-projekcie3>).
- **Educational activities.** A board game "Forest Elements" was created and a tournament for students was organized under the project: *Comprehensive adaptation of forests and forestry to climate change – prevention, counteracting and reduction of the effects of threats related to forest fires*. The goal of the tournament was to motivate young people and the teaching environment to be interested in the problem of climate change in forests and forestry and their effects, as well as to expand knowledge in this area.

7 Annexes

Annex 1: Black carbon emissions

Table 1 Black carbon emissions [kt] in Poland in selected years by sector

NFR code	Category name	1990	2010	2011	2012	2013	2014	2015	2016	2017	2018
1.A.1	Energy industries	0,50	0,27	0,30	0,27	0,25	0,24	0,25	0,27	0,26	0,26
1.A.2	Manufacturing industries and construction	0,63	0,64	0,67	0,65	0,68	0,67	0,65	0,67	0,72	0,70
1.A.3	Transport	5,05	6,82	6,64	6,12	5,18	4,84	4,82	5,29	6,02	5,89
1.A.3.b	<i>Road transport</i>	3,98	6,72	6,53	6,02	5,08	4,76	4,74	5,21	5,94	5,80
1.A.3.a + 1.A.3.d	<i>Shipping and aviation</i>	0,04	0,01	0,01	0,01	0,01	0,01	0,00	0,01	0,01	0,01
1.A.4	Residential and other small scale stationary combustion	6,39	8,46	7,90	7,89	7,52	6,96	6,95	7,28	7,60	7,62
1.A.4.cii	<i>Off-road vehicles</i>	1,31	1,85	1,86	1,87	1,83	1,77	1,76	1,86	2,23	2,35
1.B	Fugitive emissions from fuels	0,40	0,29	0,28	0,27	0,28	0,29	0,29	0,29	0,28	0,28
2.	Industrial processes and product use	1,02	0,73	0,75	0,71	0,64	0,57	0,63	0,61	0,49	0,55
3.F	Field burning of agricultural residues	0,02	0,00	0,01	0,02	0,00	0,01	0,01	0,00	0,00	0,01
5.	Waste	0,49	0,50	0,50	0,52	0,57	0,63	0,57	0,59	0,56	0,59
	Total	14,51	17,73	17,05	16,46	15,13	14,20	14,17	15,00	15,93	15,91

Annex 2: Methane historical and projected emissions

Table 2 Methane historical and projected emissions [kt] in Poland by sector (WAM scenario in BR4 POL 2019)

Source Category	2010	2011	2012	2013	2014	2015	2016	2017	2018	2020	2025	2030	2035	2040
1. Energy	910.8	889.3	896.9	910.1	900.3	936.9	945.6	937.6	916.1	918.4	863.4	769.0	679.2	623.6
<i>A. Fuel combustion</i>	172.5	158.7	163.6	159.4	147.0	145.6	152.8	152.1	149.7	144.4	124.2	108.6	101.0	96.3
<i>B. Fugitive emissions from fuels</i>	738.3	730.6	733.4	750.7	753.3	791.2	792.7	785.5	766.4	774.0	739.2	660.4	578.2	527.3
2. Industrial processes	2.5	2.8	2.4	2.5	2.5	2.6	2.0	2.6	2.5	3.0	3.0	3.1	3.2	3.2
3. Agriculture	542.1	540.4	539.8	542.2	547.7	554.9	548.1	571.1	583.5	573.2	588.7	593.0	591.3	593.0
4. LULUCF	0.4	0.5	1.1	0.3	0.5	1.0	0.4	0.2	0.7	1.1	1.2	1.2	1.2	1.2
5. Waste	590.8	567.2	550.6	540.3	519.4	497.8	475.1	458.2	448.0	454.8	426.8	406.7	394.3	385.0
Total (without LULUCF)	2 046.2	1 999.7	1 989.7	1 995.2	1 969.9	1 992.2	1 970.8	1 969.5	1 950.1	1 949.4	1 881.9	1 771.8	1 667.9	1 604.8
Total (with LULUCF)	2 046.6	2 000.1	1 990.8	1 995.4	1 970.4	1 993.3	1 971.2	1 969.7	1 950.8	1 950.5	1 883.1	1 773.0	1 669.1	1 605.9

Annex 3: Status of recommended actions

The details of the actions presented in tables A1-A6 have been provided in chapter 6 *Sector based plans and projects*.

Mobile and stationary diesel-powered sources

Table A1: Status of recommended actions related to the reduction of emissions from diesel engines

Recommendation 1a	Improvement of energy efficiency and emission factors of vehicles - Euro standards
Recommendation 1b	Eliminating the use of vehicles with non-functional or removed diesel particulate filters (DPF), due to the modification of testing procedures for periodic inspection of road vehicles with diesel engines
Recommendation 1c	Promotion of electromobility, clean transport and collective forms of transport
Recommendation 1d	Implementation of innovative technologies and solutions in inland navigation and introducing Emission standards and energy efficiency requirements for ships
Recommendation 1e	N/A

Oil and gas

Table A2: Status of the recommended actions to reduce emissions from on oil and gas production

Recommendation 2a	
Recommendation 2b	Improved coalbed methane capture from coal mines, economic use of methane
Recommendation 2c	<ul style="list-style-type: none">• Increased voluntary cooperation between Polish oil and gas as well as mining companies to use coalbed methane for energy generation purposes (GEO-METAN programme)• Voluntary methane emission reduction projects: cooperation of mining companies with scientific institutes

Residential combustion

Table A3: Status of the recommended actions to reduce emissions from residential combustion

Recommendation 3a	Supporting deployment of energy-efficient and low-emission heating sources in households and other buildings by programmes like Clean Air, Stop Smog and other financial support measures
Recommendation 3b	Supporting deployment of energy-efficient and low-emission heating sources in households and other buildings by programmes like Clean Air, Stop Smog and other financial support measures
Recommendation 3c	<ul style="list-style-type: none"> • Supporting deployment of energy-efficient and low-emission heating sources in households and other buildings by programmes like Clean Air, Stop Smog and other financial support measures • Promoting increased energy efficiency in buildings by legal and financial measures

Solid waste

Table A4. Status of the recommended actions to reduce emissions from waste sector

Recommendation 4a	Emission-friendly principles of waste management
Recommendation 4b	Application of waste incineration and landfill gas treatment processes
Recommendation 4c	N/A

Agriculture and animal husbandry

Table A5. Status of the recommended actions to reduce emissions from agriculture

Recommendation 5a	N/A
Recommendation 5b	Support for adaptation and mitigation measures in agricultural holdings, improvement of monogastric livestock systems and the reduction of methane emissions from animal waste, scientific research on adaptation measures and measures to reduce greenhouse gas emissions from agricultural holdings
Recommendation 5c	<ul style="list-style-type: none"> • Agri-environmental measures including promotion of sustainable agriculture and organic farming • Legal ban on field burning of meadows, pastures and fallows as well as straw and stubble. • Good practice Code in Agriculture prohibits thermal treatment of any agricultural waste out of facilities serving as incinerators.

Management of wildfires

Table A6. Status of the recommended actions to reduce emissions from wildfires

Recommendation 6a	
Recommendation 6b	Educational activities under the project "Comprehensive project for the adaptation of forests and forestry to climate change -protection, prevention and reduction of the effects of threats related to forest fires"
Recommendation 6c	Comprehensive project of adaptation of forests and forestry to climate change - protection, prevention and mitigation of the risks associated with forest fires
Recommendation 6d	