Annex to the Resolution No. 67 of the Council
of Ministers of 16 July 2019 (Item 794)

POLITYKA
EKOLOGICZNA
PAŃSTWA
2030

The 2030 National Environmental Policy
– the Development Strategy in the Area of the Environment and Water Management

Warsaw 2019

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List of Abbreviations:

7EAP	A General Union Environment Action Programme to 2020 "Living well, within the limits of our planet"
AKPOŚK	Updated National Municipal Wastewater Treatment Programme
aPGW	Updated River Basin Management Plan
aPWŚK	Updated National Water Environment Programme
ARiMR	Agency for Restructuring and Modernisation of Agriculture
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic , North East Atlantic, Irish and North Seas
BAT	Best Available Techniques
BEiŚ	Strategy "Energy Security and Environment – perspective to 2020"
CAFÉ	Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
CE	Circular economy
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CKPŚ	Coordination Centre for Environmental Projects
CLRTAP	Convention on Long-range Transboundary Air Pollution
CO_2	Carbon dioxide
CO	Carbon oxide
	Chancellery of the Prime Minister of Poland
EC	European Commission
EMF	Electromagnetic field
EPP	Environmental Protection Programme
ESD	Effort Sharing Decision, Decision No 406/2009/EC of the European Parliament and of the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020
ESR	Effort Sharing Regulation, Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/201, replacing the ESD
ETV	Environmental Technology Verification System/EU ETV Pilot Programme
EU	European Union
EUCO	European Council
EU ETS	EU Emissions Trading System
EUROBATS	Agreement on the Conservation of Populations of European Bats
FBI	Farmland Bird Index, an indicator of the abundance of common bird species associated with farmland
GDOŚ	General Directorate for Environmental Protection
GIOŚ	Chief Inspectorate for Environmental Protection
GDP	Gross Domestic Product
GES	Good environmental status (of marine waters), the main objective of Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)
GHG	Greenhouse gas
GMO	Genetically Modified Organism

GUS	Statistics Poland
HCs	hydrocarbons
IED	Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
IOŚ-PIB	Institute of Environmental Protection – National Research Institute
IMGW-PIB	Institute of Meteorology and Water Management – National Research Institute
KKPR	Coordinating Committee for Development Policy
KOBIZE	National Centre for Emissions Management
KPGO 2022	National Waste Management Plan 2022
KPOP	National Air Protection Programme
KPRM	Chancellery of the Prime Minister of Poland
KWR	Classification of development expenditures of the general government sector
LULUCF	Land Use, Land-Use Change and Forestry sector
MCP	Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants
M.P.	Monitor Polski (Official Gazette of the Republic of Poland)
MRiRW	Ministry of Agriculture and Rural Development
MSFD	Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)
MSY	Maximum Sustainable Yield
MŚ	Ministry of the Environment
NCBiR	National Centre for Research and Development
NEC	Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC
NFOŚiGW	National Fund for Environmental Protection and Water Management
Non-ETS	Sectors not included in EU ETS
NOx	Nitrogen oxides
OECD	Organisation for Economic Cooperation and Development
PAA	National Atomic Energy Agency
PEP2030	2030 National Environmental Policy – the Development Strategy in the Area of the Environment and Water Management
PEP2040	Energy Policy of Poland until 2040
PGL LP	Polish Forests - State Forest Holding
PGW WP	Polish Waters - State Water Holding
PIG-PIB	Polish Geological Institute – National Research Institute
PM	Particulate matter
$PM_{2.5}$	Particulate matter of less than 2.5 micrometers in diameter
PM_{10}	Particulate matter of less than 10 micrometers in diameter
PMŚ	State Environmental Monitoring System
POIŚ 2014-2020	Operational Programme Infrastructure and Environment 2014-2020
PONE	Low-Emission Reduction Programme
POŚ	Environmental Protection Programme
PPO	Public Procurement Office
PPSS	Drought Management Plan
RDOŚ	Regional Directorate for Environmental Protection
RES	Renewable energy sources

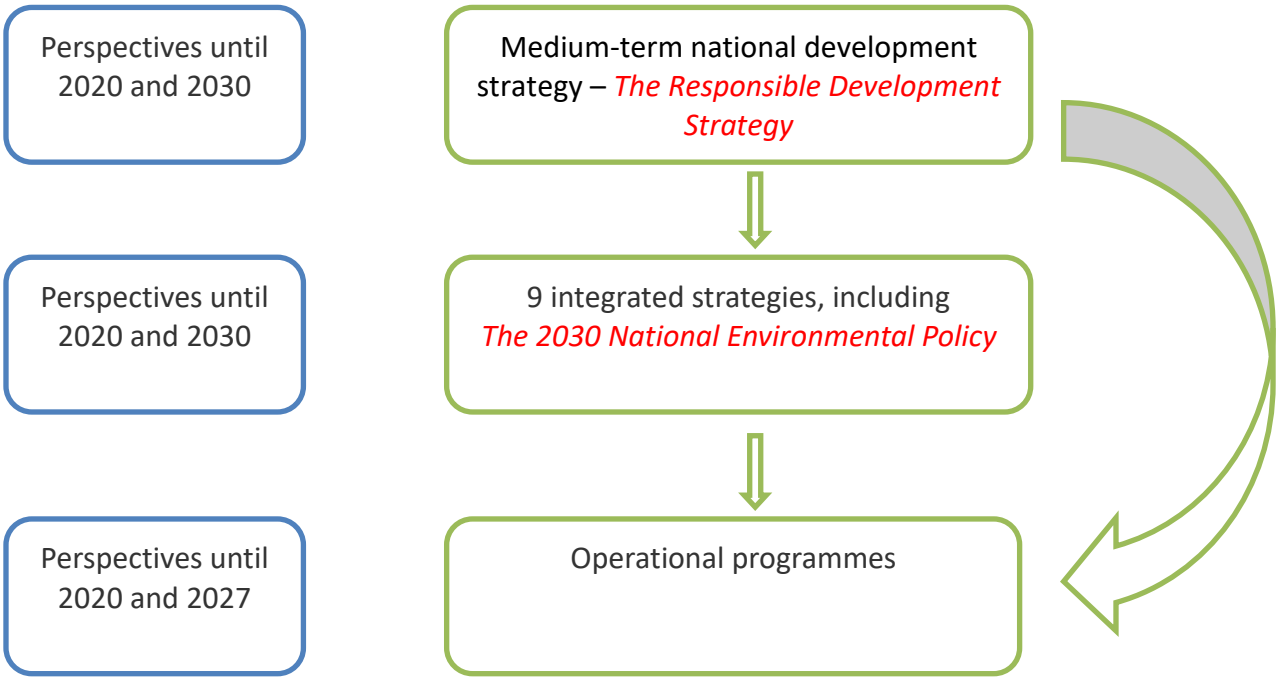
RP	Republic of Poland
RZGW	Regional Water Management Board
SDGs	Sustainable Development Goals
SOPO	Landslide Protection System
SOR	Responsible Development Strategy until 2020 (with an Outlook until 2030)
SP	Productivity Strategy
SPA2020	Strategic Adaptation Plan for Sectors Vulnerable to Climate Change until 2020
SRKL	Human Capital Development Strategy
SRKS	Social Capital Development Strategy
SRT	Sustainable Transport Development Strategy until 2030
SOx	Sulphur oxides
SSP	Strategy for Efficient and Modern State
SZRWRiR	Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries until 2030
UN	United Nations
UNO	United Nations Organisation
UOP	Nature Protection Act
UZP	Public Procurement Office
WIOŚ	Voivodship Inspectorate for Environmental Protection
WPGO	Voivodship Waste Management Plan
WB	Water body
WFD	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water Policy (Water Framework Directive)
WHO	World Health Organisation

1. Introduction

The 2030 National Environmental Policy (PEP2030) in the national development management system

On 14 February 2017, the Council of Ministers adopted a medium-term national development strategy – *The Responsible Development Strategy until 2020 (with an Outlook until 2030) (SOR)*[1]. The objectives, directions of interventions, actions and strategic projects indicated in the SOR should be reflected in all the strategic documents. Thus, the SOR provides the basis for the preparation of new sectoral strategies, including the environmental strategy. The work on the environmental strategy was coordinated by the Ministry of the Environment with support from the members of an interministerial team. The document was entitled *the 2030 National Environmental Policy – the Development Strategy in the Area of the Environment and Water Management (PEP2030)*[2].

PEP2030 was prepared in accordance with the provisions of the Act on the Principles of the Pursuit of Development Policy[3] and constitutes a strategy within the meaning of that Act. It is one of the bases for the pursuit of environmental policy in Poland[4] and also one of the nine strategies[5] which are the foundations of the national development management.



Block diagram: The position of PEP2030 in the national development management system.

[1] The Resolution No. 8 of the Council of Ministers of 14 February 2017 on the Adoption of *the Responsible Development Strategy until 2020 (with an Outlook until 2030),* Monitor Polski (Official Gazette of the Republic of Poland), Item 260.

[2] This document and its appendixes use the abbreviated title *the 2030 National Environmental Policy* or the abbreviation PEP2030.

[3] The Act of 6 December of 2006 on the Principles of the Pursuit of Development Policy (OJ L of 2019, Item 1295), Article 4(1).

[4] The Act of 27 April 2001 on Environmental Protection Law (OJ L of 2018, Item 799, as amended), Article 14(1).

[5] In addition to t*he 2030 National Environmental Policy*, the integrated strategies include: *the Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries until 2030, Energy Policy of Poland until 2040, The Sustainable Transport Development Strategy until 2030, The Productivity Strategy, The National Strategy for Regional Development, The Strategy for Efficient and Modern State, The Social Capital Development Strategy* and *The Human Capital Development Strategy*.

In the system of the strategic documents, PEP2030 specifies further and operationalises the provisions of the SOR. Thus, the main objective of PEP2030, i.e. *Developing the environmental potential for citizens and undertakings,* was taken directly from the SOR. The specific objectives of PEP2030 were laid down in response to the most important trends identified in the diagnosis in the area of the environment in a manner enabling the harmonisation of the issues related to environmental protection with the economic and social needs.

The specific objectives of PEP2030 concern health, economy and climate. The achievement of the environmental objectives will be supported by horizontal objectives, as well as those related to environmental education and the functional effectiveness of instruments of environmental protection (see Chapter *Objectives of PEP2030*).

Specific objectives will be monitored with a set of indicators (see Chapter *Performance indicators of the objectives of PEP2030*) and implemented through directions of interventions (see Chapter *Directions of interventions of PEP2030*):

- Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters,
- Elimination of sources of air pollutant emissions or a substantial reduction of their impacts,
- Protection of the land surface, including soils,
- Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection,
- Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity,
- Supporting multifunctional, sustained and sustainable forest management,
- Waste management towards a circular economy,
- Managing geological resources by developing and implementing a Raw Materials Policy,
- Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT),
- Climate change mitigation,
- Adaptation to climate change and the management of the risk of natural disasters,
- Environmental education, including the shaping of sustainable consumption patterns,
- Improving the environmental control and management systems as well as streamlining the financing system.

PEP2030 startegic projects include (see Appendix 3):

- Clean air,
- Landscape audits,
- Developing and implementing a coherent and comprehensive Raw Materials Policy,
- GreenEvo – Technology Accelerator,
- Carbon Forests,
- Wooden buildings,
- Adaptation to climate change,
- A comprehensive programme for the adaptation of forests and forestry to climate change until 2020,
- Water for agriculture.

Architecture of PEP2030

The architecture of PEP2030 was proposed at the stage of preparing the initial assumptions for the document. A survey was carried out at the institutions involved in the execution and monitoring of

the implementation of strategic documents to assess the structure of the strategies and programmes in effect, including the *Strategy "Energy Security and Environment – perspective to 2020"*[6]. On this basis as well as using the solutions worked out by the interministerial team for PEP2030, it was decided that the main objective of PEP2030 would be taken directly from the SOR and operationalised with specific objectives. In accordance with the assumptions, the specific objectives of PEP2030 were defined taking into account:

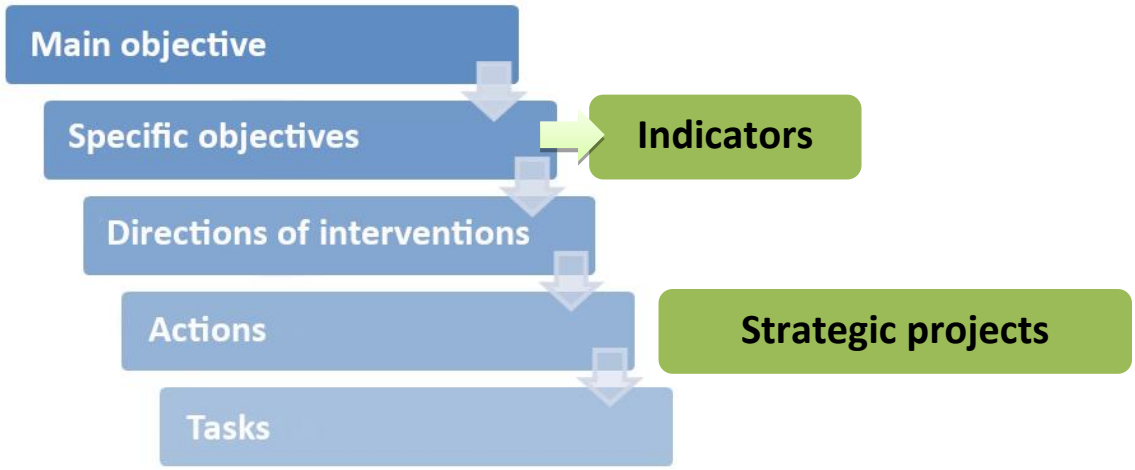
- the most important development challenges identified in the SOR,
- prognoses of trends,
- an in-depth diagnosis performed for each of the thematic areas of PEP2030.

The specific objectives will be monitored using a set of indicators and implemented through:

- strategic projects,
- a number of tasks constituting a concrete execution of the actions indicated in the SOR,
- other actions identified in the course of the work on the PEP2030 (e.g. those related to Poland's commitments in the perspective until 2030).

The actions and tasks were subordinated to directions of interventions which cover all the thematic areas of environmental policy.

In addition to specific environmental objectives, PEP2030 also distinguishes horizontal objectives which will support the implementation of specific objectives.



Schematic diagram: Architecture of PEP2030.

2. Priorities of the *2030 National Environmental Policy* (PEP2030)

A modern national policy requires the building of an innovative economy complying with the principles of sustainable development. Sustainable development means stable economic growth coupled with the rational management of environmental resources and respect for human rights. In PEP2030, the highest priority is given to citizens' needs through its thematic focus on the Poles' quality of life, health and prosperity, while it ensures, at the same time, environmental protection and the preservation of biodiversity and other forms of living and inanimate matter.

[6] The Resolution No. 58 of the Council of Ministers of 15 April 2014 on the adoption of *the Strategy "Energy Security and Environment – perspective to 2020",* Monitor Polski (Official Gazette of the Republic of Poland), Item 469.

Thus, the purpose of environmental policy is to ensure national environmental safety. This should be reflected in the relevant structure of state governance at the national, regional and local levels and in such a division of competences and tasks which would enable the objectives at each level to be set on the basis of the identification of needs and the measures for their achievement to be selected with consideration given to the environmental and economic efficiency criteria. Special importance for the achievement of the objectives of environmental policy is attributed to territorial self-government units. Their competence includes the rational planning of spatial development, which contributes to protecting the population against air pollution and noise, droughts and floods, and the damage they cause, as well as to protecting nature against excessive pressures.

The commitment to improve the quality of life causes a continuous need for development. However, this is possible only due to the sustainable use of natural resources, including the sustainable use of living marine resources. Citizens have the right to use natural resources and, at the same time, public authorities are obliged to ensure permanent access to these resources for the future generations. None of these forms of human activity should (as far as possible in given socio-economic conditions) cause a permanent deterioration of the state of natural resources. Should it occur, compensation, remediation or revitalisation and restoration measures should be taken with respect to the relevant elements of the environment the state of which has deteriorated. The development process will be monitored using relevant indicators which will enable the assessment of such aspects as: the improvement of the quality of water and air, the limitation of the impact on climate change and the favourable conservation status of native species and habitats and ecosystem services.

Particularly intensive actions will be taken to improve air quality by reducing low emissions which are the main cause of smog generation. At the government level, they will involve the preparation of relevant regulations and instruments to provide financial support to investment projects and to coordinate their implementation in regions.

PEP2030 should also support the implementation of Poland's objectives and commitments at the international level, including at the EU and UN levels, particularly, in the context of the EU's 2030 climate and energy policy targets, the *International Convention for the Prevention of Pollution from Ships (MARPOL), the Helsinki Convention (HELCOM)* and three Rio Conventions: the *Convention on Climate Change,* the *Convention on Biological Diversity* and the *Convention to Combat Desertification.*

In order to achieve the reduction targets set in the EU regulations, i.e. the reduction of the emissions of greenhouse gases (GHGs) by at least 40% compared with their level in 1990, appropriate actions will have to be taken in the sectors covered by the EU Emissions Trading System (EU ETS), where the reduction required at the EU level by 2030 is to reach 43% compared with the level in 2005 (there are no national targets), and in the other, so-called non-ETS sectors, where the reduction at the EU level by 2030 is to reach 30% compared with 2005, while Poland's target is –7% compared with 2005, along with the possibility of using flexibility under the ESR Regulation, which amounts to 1.2 percentage points for Poland[7].

The basis for the global climate policy is the *Paris Agreement*, which Poland has also ratified. Its main objective is the launch of common efforts in order to prevent climate change, while, at the same time, taking into account the issue of sustainable development and the eradication of poverty. It is important to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial

[7] Pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/201 (Text with EEA relevance) (OJ L 156, 19.06.2018, p. 26; so-called ESR– Effort Sharing Regulation).

levels, recognizing that this would significantly reduce the risks and consequences of climate change. At the same time, the States should increase their ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production. The *Paris Agreement* also provides for making financial flows consistent with a pathway towards low greenhouse gas emissions and climate-neutral development.

Poland attributes enormous significance to the long-term goal of the *Agreement* which is achieving a balance between anthropogenic greenhouse gas emissions and their removal by biosystems, by peaking greenhouse gas emissions as soon as possible and their quick reduction afterwards. In this context, Poland believes that it is necessary to better use biosystems as natural carbon sinks, as this would not only ensure an opportunity for the sustainable and real halting of the increase and the subsequent reduction of the CO_2 concentration in the atmosphere, but also foster synergies in the implementation of many Sustainable Development Goals (SDGs).

The implementation of the *Paris Agreement*, which provides that the reduction of GHG emissions should take into account the economic specificity of a given country, boosts sustainable development. Therefore, actions will be taken to effectively reduce the GHG concentrations in the atmosphere, including actions in those sectors of the economy that are responsible for GHG emissions (primarily, energy generation, transport and agriculture), involving, among others, the introduction of innovative technologies and the use of available energy sources, including the development of geothermal energy, as well as the implementation of the concept of Carbon Forests, which is a Polish proposal for reducing the concentration of greenhouse gases in the atmosphere. At the same time, a number of adaptation actions will be taken in order to reduce the vulnerability of the economy to the impacts of climate change.

In addition to achieving the climate neutrality targeted by the *Paris Agreement,* the implementation of multi-functional, sustained and sustainable forest management will contribute to the protection of biodiversity and job creation, particularly, in non-urbanised areas. Support will be provided to green investment projects, including the afforestation of private post-agricultural land and effective methods for biomass combustion at households. The promoted solutions will include those highlighting the role of wood as a fully natural, renewable construction material with comprehensive uses, including the storage of CO_2.

One of the priorities of PEP2030 will be the protection of Poland's natural heritage, among others, by taking actions to improve the state of biodiversity and a fuller coupling of its protection with the social and economic development of the country, including the improvement of the nature conservation system, the preservation and restoration of natural habitats and the populations of endangered species, as well as the maintenance and rebuilding of the functions of ecosystems which provide services to humans.

Efforts should be taken to strengthen the nature conservation system, including the improvement of the management of the Natura 2000 network. There is a need to continue the process of planning conservation tasks or elaborating conservation plans for forms of nature conservation which require them. Moreover, the system of environmental impact assessments should be improved.

The elimination of the causes of the loss of biodiversity resources resulting from social and economic activities requires consistent policy and more effective integration of biodiversity into the mainstream activities of the state, among others, into all the sectors – in particular, such as: agriculture, forestry, fisheries, water management and maritime economy – which, directly and indirectly affect the state of biodiversity resources, as well as into the sector responsible for combating crimes against the environment and wild nature. Such integration should manifest itself

in a significant enhancement of the value and availability of resources for nature conservation in the sectoral funds.

In the context of the development of both urbanised and non-urbanised areas, huge opportunities are offered by a departure from the linear economy model in favour of the implementation of a circular economy (CE). The CE primarily means ensuring that materials and raw materials are used in the economy as long as possible. A circular economy assumes cooperation; therefore, business models and frameworks for the operations of undertakings should change, while consumers and the legal and institutional environment should be prepared for these changes. The CE also assumes the implementation of full waste recovery at the local level. In the case of urbanised and suburban areas, a circular economy offers opportunities for better use and recovery of available materials and energy resources, the limitation of the quantities of waste landfilled, with particular consideration given to minimisation and management of plastics as a material from the packaging waste stream, the management of construction and demolition waste to strengthen sustainable urban building, the production of biogas and agricultural biogas, and the use of raw materials recovered from other waste available in these areas, including e.g. the recovery of phosphorus from sewage sludge and cascade systems for waste use. The CE is also of substantial importance in wastewater management (in the context of the management of sewage sludge and the use of treated wastewater as technological process water or for maintaining urban greenery) and in the energy sector, as well as in the management of rainwater and melt water (water recycling, the reduction of the so-called water footprint).

In the context of the development of non-urbanised areas, a circular economy can contribute to partial self-sufficiency of these areas, particularly, in terms of energy, by using renewable energy sources.

Priority will be given to the issues of the implementation of the rational *Raw Materials Policy* and the related reform of geological services.

In this context, there is a need for a rational approach to Natura 2000 sites and the use of their potential for socio-economic development. The Natura 2000 network can, and even should, stimulate sustainable development of local communities, as it enables development based on the local conditions and natural values; in addition, without blocking investment projects which have no significant adverse effect on the objects of conservation on individual sites. The Natura 2000 network should be maintained and developed, while its protection should be ensured by further work on the plans of conservation tasks for individual sites. A good example of the coupling of nature conservation objectives and economic development is the sustainable forest management implemented in forests covered by the Natura 2000 network the effectiveness of which is guaranteed by the combination of forest management plans with the conservation plans for Natura 2000 sites.

The implementation of a modern water resource and flood risk management system is an extremely important element from the point of view of sustainable development. Therefore, through basin-based management the Polish Waters - State Water Holding (PGW WP) will perform tasks in the scope of: the exercise of the ownership rights to public waters which are the property of the State Treasury, the preservation and improvement of the status of waters and the prevention of its deterioration, the improvement of flood safety, including the continuation of work to prepare draft planning documents needed to implement the Floods Directive[8] and the Act on Water Law[9], the prevention of drought effects and supporting Communes in water supply to meet the needs of the

[8] Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk (OJ L 288, 06.11.2007, p. 27).
[9] The Act of 20 July 2017 on Water Law (OJ L of 2018, Item 2268, as amended).

population and the economy. Special efforts are needed to carry out tasks to protect all the categories of waters – rivers, lakes, transitional, coastal and marine waters and groundwater – and to control pollution. For this purpose, Polish Waters will prepare planning documents required to implement the Water Framework Directive (WFD)[10] and the Marine Strategy Framework Directive (MSFD)[11] , in particular, programmes of measures to maintain or achieve good status of waters, including marine waters.

Ecoinnovations play a particularly important role in stimulating the process of transition to a circular economy, the prevention of climate change and biodiversity loss, the protection of air quality or the sustainable use of water resources and ensuring their good quality. At the same time, they contribute to enhancing competitiveness and economic development as well as to strengthening the resilience of the economy to environmental pressures, improving the efficiency of using natural resources and reducing the adverse human impact on the environment. A change of the production and consumption patterns to more resource and energy efficient adaptation actions and the transformation of waste into products with a high added value will require new technologies, processes and services.

In light of the above, the priority tasks will include the promotion of, and support for, the implementation of innovative environmental technologies as well as the building of a consistent, systemic approach assisting the development and implementation of innovations in Poland, among others, in order to ensure synergies in the operation of institutions responsible for innovations and synergies between the support instruments implemented by the them.

In order to ensure the implementation of the objectives of PEP2030, a greater emphasis needs to be placed on the improvement of the environmental control and management system and the refining of the financing system. Priority will be given to the combating of crimes against the environment, while, at the same time, developing the environmental competences of the public, understood as the provision of knowledge, the development of skills and the shaping of attitudes in order to disseminate the patterns of sustainable consumption and production, including such ones as voluntary environmental management systems (EMAS, ISO 14001) and eco-labelling.

The "polluter pays" principle plays a basic role in PEP2030. In practice, this principle means that he who has caused damage to the environment or the risk of damage should incur the costs of remedying the damage or elimination of the risk of damage. The principle applies to all the areas of environmental protection. Another rule the application of which has a positive effect on the use of public resources, including natural resources, is that the "polluter pays". This concept is increasingly often applied in relation to the protection of those environmental resources that are not renewable or renewable in a long period of time as a well as in a linkage to the global development trend of the so-called sharing economy[12].

Public procurement contracts represent a significant part of the Gross Domestic Product (GDP). In 2017, the value of public procurement contracts in Poland amounted to PLN 163.2 billion, i.e. 8.23% of the GDP. Moreover, it should be emphasised that these data cover only the contracts which are subject to the procedures defined in the Act on Public Procurement Law[13] and fail to account for expenditures made on the basis of exemptions from the regime of that Act. The above data illustrate

[10] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327, 22.12.2000, p. 1, as amended; Polish translation: Chapter 15 Volume 005 P. 275, as amended).

[11] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (OJ L 164, 25.06.2008, p. 19, as amended).

[12] At the same time, the sharing economy corresponds with the idea of sustainable development.

[13] The Act of 29 January 2004 on Public Procurement Law (OJ L of 2018, Item 1986, as amended).

not only the purchasing power of the public administration but also indicate the significant capacity of the administration to shape specific trends on the market of goods, services and construction works.

The widest possible use of the potential offered by public procurement to achieve environmental objectives requires not only the greater awareness of the employers and institutions controlling how public funds are spent in the scope of environment-friendly solutions available in the Act on Public Procurement Law[14], but also the launch of relevant actions to provide information on the existing environmental problems, their significance and the need to consider them at the stage of purchasing decision-making.

3. Summary of the diagnosis[15]

The environment, including its condition, diversity and abundance of resources, is the key element which ensures man's safe functioning in the social, economic and cultural dimensions. The environment shapes the living conditions of humans and living nature; it also supplies water, food, energy and many other natural resources. The quality and values of the individual components of the environment strongly affect the human health and living. An efficient use of the environment, coupled at the same time with the preservation of the natural equilibrium, determine the capacity of the state to carry out its tasks, including the satisfaction of the basic needs of existence of society.

Starting in 1990, as a result of structural changes in the economy, the implementation of the national environmental policy and its implementing programmes, including environment-friendly investment projects, and the strengthening of legal regulations, the air, water and soil pollution has decreased in Poland. The effective management of industrial emissions, in particular, those from the energy sector, has significantly reduced their share in the exceedances of air quality standards in Poland and enabled a substantial reduction of greenhouse gas emissions. However, effective climate protection requires a further reduction of emissions using continuously improved technical and natural methods.

Over the last dozen years or so the emissions of harmful compounds have been substantially reduced in Poland. It is necessary to continue actions aimed at the sustainable and more productive use of resources in a manner ensuring that the growing levels of the Poles' consumption and affluence do not cause burdens on the environment, including primarily exceedances of air quality standards, higher quantities of arising waste, an unacceptable pollution level of surface waters, including marine waters, a decrease of biodiversity, the exposure of the population and animals to noise or overfishing.

A special challenge is posed by the issues related to chaotic spatial development, caused by inadequate control of investment processes, particularly, in respect of housing construction. The diminishing share of the surface of greenery areas and the uncontrolled urbanisation and building up of aeration corridors and wedges as well as river valleys in urban centres, cutting off open spaces from the inner city, cause a deterioration of the climate conditions and the quality of life and enhance the flood risk. The task of the aeration corridors and wedges is to ventilate cities. They are expected to supply fresh air from green areas to the city centres, including heat islands. This requires open spaces extending from the peripheries into the city. They can be natural – such as rivers or green areas, which, at the same time, clean the city air – or artificial (such as railway tracks or wide roads). In light of this, it is necessary to adopt regulations limiting the building up of aeration

[14] The Act of 29 January 2004 on Public Procurement Law (OJ L of 2018, Item 1986, as amended).

[15] The assessment of the state of the environment contained in the diagnosis, which provided the basis for further analyses, was carried out based on data from the state environmental monitoring system run by the Inspectorate for Environmental Protection.

corridors and wedges, ecological corridors and river valleys, in particular in urban centres. The preferred form of noise abatement in areas which function as aeration corridors and wedges should be the planting of densely leaved plants.

The most important challenges in this scope include the elimination of so-called low emissions which are generated by the use of solid fuels (including low-quality coal) and waste in the domestic and municipal sector, primarily to heat buildings, the use of expired and technologically mismatched furnaces and small local boiler-houses, as well as the low energy performance of buildings. In urbanised areas and along commuting routes, the transport emissions have a significant effect on air quality. At present, at the EU level, regulations on the emission standards for cars are being adopted, while at the national level actions are taken to promote electrical means of transport.

In addition to land-based transport, air transport, too, has an adverse effect on air quality. As a result of the process of combustion of hydrocarbon fuels, harmful and toxic products are emitted into the atmosphere, in the form of: carbon dioxide – CO_2, carbon oxide – CO, oxides of sulphur – SO_x, oxides of nitrogen – NO_x, hydrocarbons – HCs, particulate matter – PM and many other toxic substances which affect both the natural environment and human health and life. For this reason one of the objectives of EU transport policy is to increase the share of less emissive and more resource efficient modes of transport, among others, rail or water transport, in freight transport over distances of more than 300 km. Actions to limit the impact of transport on the environment are comprehensively described in the *Sustainable Transport Development Strategy until 2030*.

In the context of actions to improve air quality and mitigate climate change, a special role is played by the EU policy which aims at systematically reducing greenhouse gas emissions. In Poland's case, this is a particularly difficult task given the high emissivity of its economy, caused by the dominance of coal in electricity and heat generation. Despite these difficulties, Poland has successively reduced its greenhouse gas emissions, fulfilling its international commitments (under the *United Nations Framework Convention on Climate Change* and the *Paris Agreement*) and its obligations under EU law (the climate and energy package).

Poland and the other EU Member States have signed and ratified the *Paris Agreement* (2015). The EU will achieve the objectives of the *Paris Agreement* jointly with the *Nationally Determined Contribution*, to be implemented through the provisions of the 2030 climate and energy policy. The man goals of this policy include the reduction of greenhouse gas emissions by at least 40% (20% by 2020) compared with the level in 1990, ensuring at least a 32% share of renewable energy in the total energy consumption in the EU and the improvement of energy efficiency by at least 32.5%. The main tool for the implementation of EU policy in this field is the EU Emissions Trading System (EU ETS). The EU ETS system covers industrial installations, in particular, those in energy-intensive sectors, as well as the energy generation sector and airlines. Regulations have also been adopted on the monitoring of emissions from maritime transport. This was established by the 2003 Directive 2003[16] and as a result of its amendment in 2009[17] a single EU wide reduction target by 2020 was adopted at 21% relative to the emissions in 2005. This target is implemented through a linear decrease of the number of available emission allowances for installations. In accordance with the amendment to the Directive of March 2018[18], the emission reduction in the EU ETS system is to

[16] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, pr. 32, as amended; Polish translation: Chapter 15 Volume 007 P. 631, as amended).

[17] Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (OJ L *140, 5.6.2009, p. 6*3).

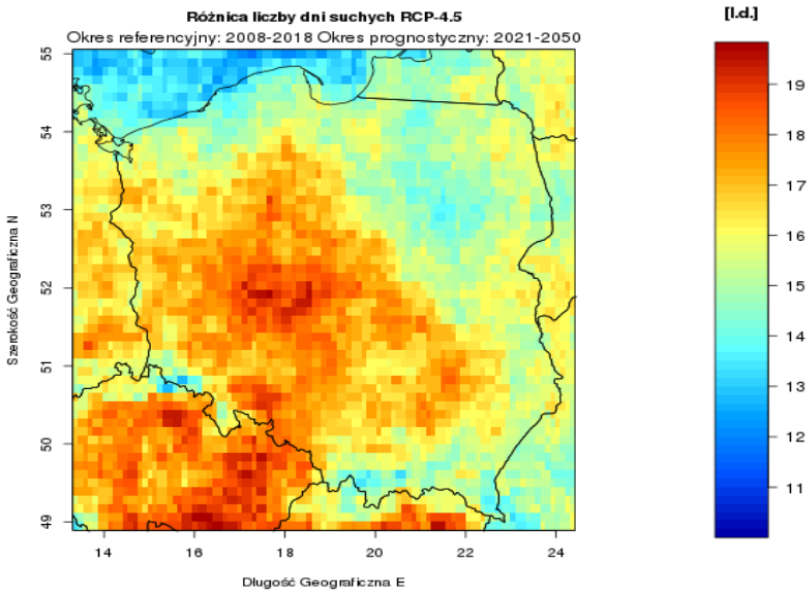
[18] Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 (OJ L 76, 19.3.2018, p. 3).

reach by 2030 a level of 43% relative to 2005. The achievement of this target will require an annual decrease of the available emission allowances.

The second pillar of EU climate policy is the reduction of emissions from sectors which are not covered by the EU ETS system (so-called non-ETS), such as: transport, buildings, agriculture, the municipal and domestic sector or waste management. The emissions from these sectors represent more than half of the total greenhouse emissions in the EU; it is similar for Poland (50.2%)[19]. The issues related to non-ETS emissions are subject to the ESR. In accordance with this Regulation, the reduction target for Poland is –7% relative to the emissions from the non-ETS sectors in 2005. Starting in 2021, the EU will also launch mitigation actions in the land use, land-use change and forestry (LULUCF) sector. They were defined in the Regulation on the LULUCF[20].

The climate scenarios for Poland indicate that the most common weather events in the next decade will be heat waves, with a tendency to become longer. Short but very intensive rainfalls can be just as harmful, as they can cause local floods and inundations, i.e. events which occur with a large frequency but at a small scale. The problem of floods and inundations affects all the sectors of the economy, primarily the infrastructure existing in particularly vulnerable areas. Small-scale events of this type occur every year and cause losses at an average level of 0.08–0.1% GDP[21]. The effects of climate change can also be seen in the more intensified occurrence of drought in Poland's territory. A change in the precipitation structure can be observed in the growing season, involving more frequent summer and spring droughts. The predicted climate change and the related higher frequency and intensity of droughts in agriculture will increase the demand for water for irrigation. Prognostic calculations of the levels of water shortage in soils for selected plants indicate a continuous process of soil over drying and a growing risk of drought.

Predicted difference in the number of dry days in a year between the periods of 2008–2018 and 2021–2050.



Map legend: Różnica liczby dni suchych RCP 4-5 - Difference in the number of dry days under RCP 4-5; Okres referencyjny - Reference period; Okres progostyczny - Prognostic period; l.d. = No of days; Szerokość geograficzna - Latitude; Długość geograficzna – Longitude.

[19] According to the initial GHG emissions inventory for 2016.
[20] Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (Text with EEA relevance) (OJ L 156, 19.6.2018, p. 1*).*
[21] SAP2020, pp. 13-14.

Source: Based on the study by Joanna Strużewska, Department of Atmospheric and Climate Modelling, Institute of Environmental Protection - National Research Institute.

Cities are particularly vulnerable areas with a concentration of the most urgent contemporary challenges, starting with water shortages and bad air quality, through economic disturbances, and ending with a lack of social stability. At present, the population of Polish cities is estimated at about 23.3 million persons, which represents more than 60% of the population of the country; thus, the scale of the problem is huge. The performed climate analyses and the scenarios prepared on their basis unequivocally indicate a growing problem of the adverse impacts of climate change on urbanised areas. Among other things, due to their high population density and their closed and sealed character, cities are vulnerable, in particular, to the intensification of the urban heat island, showers and torrential rains causing inundations and a water deficit. As part of the project of the Ministry of the Environment *The preparation of plans of adaptation to climate change in cities with more than 100,000 inhabitants*, in 44 cities participating in the project four sectors most vulnerable to the climate phenomena threatening cities were selected. In all of them, water management was indicated. This results from the fact that the sewage system cannot cope even now with the currently occurring heavy rains. Therefore, it is not enough to adapt it to the current conditions, but also consideration has to be given to the growing intensity of precipitation related to climate change in the next decades.

In 41 cities, it was recognised that the health and safety of their inhabitants were most vulnerable to the adverse effects of extreme climate events, among others, due to the risk of intensification of diseases of the circulatory or respiratory systems. In 36 cities, it was recognised that increased intensity of threats – rainfalls, extreme temperatures, storms or floods – can disturb the operation of transport. In 14 cities, the energy sector was indicated as the one sensitive to climate change. The disturbances of the operation of this sector arising as a result of climate threats can affect the functioning of a city as a whole. Snowfall and freezing rain can cause breakdowns of low voltage networks and blackouts lasting even several days. Power losses caused by high temperatures in the summer can be of even greater importance. On hot days, the efficiency of coal-fired units falls due to the too high temperature of the water used to cool the turbine condensers and its insufficient quantity due to the falling water levels in rivers. This happened in August 2015 when it was necessary to introduce restrictions on the supply and use of electricity because of hot temperatures and increased consumption for air-conditioning purposes.

In addition to the climate policy related to the reduction of GHG emissions, water management is another area of climate policy. Water resources in Poland are very variable in time and differentiated spatially. In three fourths of the territory of the country, there are periodical water shortages (most frequently and to the greatest extent they affect the areas of Wielkopolskie, Mazowieckie and Kujawsko-Pomorskie). The total water balance of Poland depends on the precipitation levels in river basins, their distribution in time and the capabilities of natural and artificial retention, including the ability to use rainwater. In this context, there is the problem of too low retention in local catchments, which is caused, among others, by a growing area of sealed surfaces arising as a result of the process of urbanisation, the development of transport infrastructure, changes in agricultural production and also an excessive acceleration of water runoff from land amelioration facilities in river catchments and valleys, which mostly perform drainage functions. Nevertheless, quantitatively stable surface water abstraction satisfies most domestic and economic needs.

Insufficient investments in water management have resulted in an unsatisfactory condition of water management infrastructure, e.g. artificial reservoirs, and the low effectiveness of the national flood protection system. The results of the monitoring of the state of surface waters in 2010–2015 indicate that the overwhelming majority of bodies of surface water do not reach good status. Bad water

status limits the use of waters from rivers, watercourses and reservoirs for agricultural purposes (irrigation), industrial purposes (production) and recreation purposes (bathing sites, water sports). In contrast, the chemical status of groundwater is found to be good. However, there is excessive exploitation of the resources of groundwater reservoirs situated near the largest cities in Poland.

The greatest pressures on surface waters are generated by the municipal economy, agriculture and industry (in particular, the extractive, energy generation and agri-food industries). Gradually, equal access of the population to sewage and water supply systems is provided. The share of the population using wastewater treatment plants also grows. Nevertheless 15% of households in rural areas still continue to use private water intakes with variable quality, while in rural areas with low population density and developing tourist infrastructure there is a lack of local sewage systems and wastewater treatment plants.

The policy of the EU Member States aims at achieving at least good environmental status (GES) of marine waters and good status or potential of all water bodies, pursuant, respectively, to the MSFD and the WFD. Poland implements the provisions of the WFD and other Directives related to the WFD by carrying out measures to improve the status or potential of water bodies as defined in planning documents (the river basin management plans and the *National Municipal Wastewater Treatment Programme*). Moreover, in accordance with the provisions of the Floods Directive[22], measures are planned and implemented to reduce flood risk as defined in relevant documents (the flood risk management plans).

The Baltic Sea is also an important element of Poland's environment. The activities carried out by the Baltic Sea states have a significant effect on the whole marine ecosystem of the Baltic Sea, and, as a result, the bad environmental status of the Baltic Sea is a problem which all the Baltic Sea states, including Poland, strive to resolve. In addition to the WFD, the MSFD also plays a key role in improving the environmental status of marine waters. The 2016 assessment of the environmental status of the marine areas of the Baltic Sea indicated inadequate environmental status of the southern Baltic Sea; however, an analysis of trends shows the process of improving environmental status of the Baltic Sea. Still, the response of the sea is extremely slow. The Danish straits are the only point where marine waters can mix; therefore, the exchange of waters in the Baltic Sea is very slow. In addition, the progressing climate change or natural disasters are not favourable for the improvement of the marine environment.

The status of waters in the Polish marine areas has a large effect on Poland's tourism potential. Tourism is an important sector of the Polish economy, while the tourism industry is one of the key development drivers in the coastal regions. Strong assets of the Polish coastal areas include ports and harbours situated in localities with key importance for resting (e.g. Gdańsk, Gdynia, Hel, Jastarnia, Łeba, Ustka and Świnoujście). Due to a long (770 km including the Szczecin and Vistula Lagoons) and beautiful coastline and the historic and cultural heritage in place, the coastal tourism thrives. The marine space is used, among others, for such activities as: yachting, windsurfing, kitesurfing, diving to wrecks and recreational fishing. In Poland, the ferry industry develops very well due to diversified recreational cruises.

The Baltic Sea is also an area where fishermen carry out their economic activity. The Common Fisheries Policy requires the restoration and preservation of the populations of the species fished over levels enabling the so-called maximum sustainable yield to be achieved by ending overfishing by 2015, where possible, and by 2020, at the latest.

[22] Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (OJ L 288, 6.11.2007, p. 27).

Poland's biodiversity is highly valued. The good condition of nature is mainly demonstrated by its differentiation at the levels of ecosystems and the species of fauna and flora. Poland is characterised by very high biodiversity, manifested, among others, by a large number of species of fauna and flora and natural habitats occurring in the Polish territory. These results, among others, from the relatively good preservation of unique landscapes owing to the dispersal of farmland, the persistence of extensive agriculture and the dominance of state ownership in the forest management structure. The total number of registered species is about 60 000, including about 16 000 species of plants and about 35 000 species of animals. Due to the specific situation of Poland, it is rich in species with their range limits in its territory. In Poland's territory, there are 485 plant communities, 12% of which are frequently encountered ones, whereas 22% are those that occur rarely and have only been registered at few sites.

Agricultural areas are characterised by a rich checkerboard of habitats arising from traditional forms of cultivation. About 30% of farmland has high natural values, functioning as a refuge for endangered species of flora and fauna. Due to the fragmented agriculture, local varieties of crops and local livestock breeds have been preserved until the contemporary times.

The richness of natural resources is also demonstrated by the presence of large predators, i.e. wolf, lynx and bear. In Poland, there is the largest European bison population in the world. The natural riches in our country are regionally diversified. There are regions (e.g. the north-eastern part of the country) with well-preserved nature, with an abundance of species which are strongly endangered or extinct in the other parts of Europe.

However, in spite of the positive examples and successes of nature conservation, a general deterioration of natural values can be seen in the country. In Poland, there are regions, e.g. urbanised ones or those with intensive agriculture, where nature degrades, and the species composition becomes poorer. Unfavourable changes in the abundance and composition of species of flora and fauna most frequently result from incorrect spatial management: the quick, uncontrolled city development, the settlements spreading within areas with natural values or in their direct vicinity, the crossing of ecological corridors by transport infrastructure, the unification and impoverishment of landscapes. Changes in agriculture are also significant – both the intensification of crops towards large-area farming and the abandonment of traditional agricultural uses lead to the decline of ecosystems and species related to traditional agriculture and the loss of traditional agricultural landscapes which are the habitats of many organisms. The state of preservation of natural habitats and the habitats of species on Natura 2000 sites is not satisfactory. Their conservation is one of the most important current objectives of environmental protection.

Biodiversity conservation means systemic actions to ensure the permanent preservation of all the elements of biodiversity.

Since Poland acceded to the European Union the regulations on the European network of protected sites, the so-called Natura 2000, have been in effect in the country. It is a system of conservation sites which focuses on specific species of flora and fauna, on their habitats and on natural habitats as such. An important element of the network is the spatial connectivity between sites. At present, the Polish Natura 2000 network consists of 849 Special Areas of Conservation designated to protect habitats and 145 Special Protection Areas designated to protect birds[23], which occupy about 20% of Poland's terrestrial territory. It should also be emphasised that the Natura 2000 sites have been designated in the coastal water zones and river valleys.

[23] Statistics Poland (GUS), *Ochrona środowiska 2018 (Environmental Protection 2028 – in Polish)*, Warszawa, 2018, p. 115.

Forestland has the large share in the surface area of the Natura 2000 sites: 52% (including: coniferous forests 24%, mixed forests 15% and broadleaved forests 13%), as well as agricultural land: 22% (including: meadows and pastures 13% and farmland 9%). Habitats and refuges of most species protected within the Natura 2000 network are related to forestland and agricultural land, in particular, permanent grassland.

Natura 2000 sites occupy 38% of the surface area of State Forests, with a view to preserving specific types of natural habitats and species recognised to be valuable and endangered on the scale of Europe as a whole. Forests affect the extent of natural retention in catchments, retaining rainwater. They are an important element stabilising the global and local climate since Polish forests can absorb about 34 million tonnes[24] of carbon dioxide annually. In construction, wood has the lowest carbon footprint compared with other materials – wood production does not need high-energy fossil fuels, as is the case with brick, cement or plastics. In the course of their growth, trees absorb carbon dioxide from the atmosphere, while its storage in wooden structures directly contributes to climate protection. Each cubic metre of wood used in construction has absorbed 0.8 tonne of carbon dioxide emissions.

More than 19% of Polish forests are private. In the period from 1990 to 2017, the share of private forests grew by 2.3 percentage points. At present, about 95.7% of the surface area of private forests is covered by approved management documentation which enables their owners to implement forest management. Efforts should be taken to ensure that as much as possible, possibly all, of the surface area of private forests is covered by approved management documentation (current simplified forest management plans or inventories of the state of forests).

The land surface provides the space and resources necessary for the functioning of ecosystems, the human existence and the development of the economy. It is indispensable for the implementation of various production processes (e.g. crop cultivation, extraction of raw materials), as well as for the distribution of different socio-economic activities carried out by man (e.g. the construction of road, industrial, service and housing infrastructure). Soil is the basic production resource in agriculture; hence, the good condition of Polish soils ensures the potential for high-quality food production. However, there is relatively little land which is highly suitable for agricultural production: the land of Classes I–III represents about 25% of the total agricultural land. The soil cover in Poland forms a checkerboard system, with the dominance of medium-quality soils (Classes IVa and IVb) – 35.2% as well as poor and very poor soils (V and VI) – 37.3%, while the most fertile soils represent barely 3.7%. The natural soil-forming process is extremely slow and the creation of about 1 cm of the humus layer of soil takes about 100 to 400 years. For this reason, soil is considered to be a resource which is a non-renewable one in practice and which should be subject to special protection for the future generations.

More than 90% of the territory of the country is used for agriculture and forestry. Land use changes over last ten years have been slight. The surface area of urbanised and built up areas increases, while the phenomenon of suburbanisation can be seen to unfold around large urban centres. More than 96% of arable land is suitable for the production of safe food since it is characterised by natural or slightly higher contents of heavy metals. No substantial changes can be seen in the quality of soils which could significantly affect their suitability for food production. The surface area of degraded and devastated land represents about 0.2% of the territory of the country. Land is gradually subjected to reclamation and redevelopment; however, this process is too slow, and it is not correctly correlated with the investment process.

[24] *Poland CRF 2018 – United Nations Climate Change*, Table 4.A, Sectoral background data for land use, land-use change and forestry.

Poland's geological resources consist of the resources of documented deposits in the prognostic and prospective areas of many valuable raw materials, certain critical raw materials, chemical and rock raw materials, peats and thermal waters which can provide the basis for the development of local energy generation, as well as brines and curative waters which are mostly used in health resorts.

Minerals (excluding peat) are non-renewable resources; therefore, it is so important to protect them against an irreversible loss caused by the mismanagement of deposits. There is also a significant problem of the use of areas situated directly over mineral deposits. In particular, this is the case with deposits situated in areas of accelerated urbanization, in areas subject to the conservation of other natural and landscape resources or ones of importance in light of the other strategic interests of the state.

Affecting the intensity of production and the levels and patterns of individual consumption, the economic development is the main factor determining the quantity of waste generated. An analysis of the rate of changes in the quantity of waste generated with respect to changes in the GDP since 2000 shows a positive trend – a constant waste generation level with more than a 50% GDP growth. With some generalisation, this can be considered a result of the actions taken to rationalise the waste management in Poland. Although the growing trend in the quantity of waste generated is not proportional to the GDP growth, all possible actions should be launched, and every effort should be taken to reduce the quantity of waste generated. The introduction of changes in waste management supports the successive reduction of the weight of waste deposited at landfills and their secondary use as raw materials (according to the GUS, in 2017, 42% of collected municipal waste was deposited at landfills). In 2017, the quantity of selectively collected municipal waste grew more than three times compared with 2010; however, this indicator represented only about 27% of the weight of total collected waste. When calculated per capita for Poland, this is 85 kg of 312 kg of waste generated. Similarly, there is too low utilisation of municipal and industrial waste (including the waste from the treatment of sewage sludge) as a potential energy source, in spite of the application of the correct waste hierarchy by industrial plants. There is also a too low level of recovery and secondary use of industrial waste which is a valuable source of raw materials and opportunities for the development of the economy in Poland.

Incorrect waste management contributes to climate change and air pollution, and directly affects many ecosystems and species. Landfills, considered the last resort in the waste hierarchy, release methane, a very powerful greenhouse gas which contributes to climate change. Methane is formed due to the presence of microorganisms and biodegradable waste in landfills, such as food, paper and garden waste. Depending on their construction, landfills can also contaminate soil and waters. After waste is collected, it is transported and treated. During transport carbon dioxide — the most prevalent greenhouse gas — and other air pollutants, including particulate matter, are released into the atmosphere. Part of the waste can be incinerated or recycled. Energy generated in the incineration process can be used to produce heat or electricity, which can thus replace the energy produced using coal or other fuels. Energy recovery from waste can help reduce greenhouse gas emissions. Recycling can help even more effectively to reduce the emissions of greenhouse gases and other substances. When recycled materials replace new materials, fewer new materials need to be extracted or produced[25]. The more advanced the implementation of the waste hierarchy is, the less adverse effect on the climate and environment is caused by the waste management sector. In this context, it is important to introduce the model of a circular economy which will contribute to diminishing greenhouse gas emissions and climate protection.

[25] European Environment Agency, *Waste: a problem or a resource?*, 2014, https://www.eea.europa.eu/ (accessed on 17.06.2019).

The level of implementation of the concept of a circular economy (CE), including all the life cycle stages and affecting both the social and economic spheres, is still too low in Poland. The EU policy in this scope places an increasingly large emphasis on the efficient management of waste already from the stage of the acquisition of a raw material, through design, production and consumption, up to the collection and management of waste. In this context, it is important to open to other areas of socio-economic life and to go beyond traditionally conceived environmental management tools which should support the development of new business models, the development of the services sector and the substitution for the now used raw materials or production and consumption modes. Moreover, attention should be paid to necessary lifestyle changes and the need to enhance the knowledge of the CE both of the public, entrepreneurs and the public finance sector. The CE related issues were comprehensively addressed in the *Productivity Strategy* and the *Roadmap of the Transition to a Circular Economy.*

In 2015, the Roadmap was prepared after public consultations, identifying Poland's priorities in the context of building the CE. They include:

- innovativeness, the strengthening of the cooperation between industry and the science sector and, as a result, the implementation of innovative solutions in the economy,
- the creation of the market for secondary raw materials on which their flow would be facilitated,
- the provision of high-quality secondary raw materials as a result of sustainable production and consumption,
- the development of the services sector.

The European Commission has adopted a new package on a circular economy. It is expected to assist European undertakings and consumers in the transition to a circular economy where resources are used in a more sustainable manner. The proposed actions will contribute to "closing the loop" of the lifecycle of products due to their enhanced recycling and reuse and they will bring benefits to both the environment and the economy. The implementation of these plans will make it possible to achieve the maximum value and the maximum use of all the raw materials, products and waste, and this will foster energy savings and greenhouse gas emission reductions. These proposals cover the whole lifecycle of products: from production and consumption to waste management and the market for secondary raw materials. This process will financially be supported from the European Structural and Investment Funds, including EUR 5.5 billion allocated to investments in waste management. Moreover, support in an amount of EUR 650 million will be provided as part of Horizon 2020 (the EU financial programme for research and innovation) and investments in a circular economy launched at the national level.

The level of eco-innovation at Polish undertakings is still insufficient. In the 2017 EU Eco-Innovation Index, Poland took the 26th position[26]. The dynamic economic growth of Poland does not go hand in hand with resource efficient management, since, in accordance with the EU trends, resource efficiency and innovation are considered to be some of the major drivers of undertakings' competitiveness. In 2015, the national raw materials consumption in Poland amounted to 16.9 tonnes per capita compared with the EU average of 14.6 tonnes per capita. The growing outlays on research and development of innovative environmental technologies do not translate into the uptake of these technologies by the market. According to the data of the Ecoinnovation Observatory, in 2016 barely 10% Polish undertakings implemented innovations which brought environmental benefits for them, while the EU average was 53%. In turn, 12% of undertakings placed on the market innovations which brought environmental benefits for end-uses (compared with the EU average of 50%). So poor data result from the absence of a system of incentives encouraging the

[26] European Commission, *EU Eco-Innovation Index 2017. EIO Brief*, April 2018.

implementation of eco-innovations, an excessively high levels of technological and investment risks and the undertakings' low awareness of the benefits from the application of new environmental technologies. A major problem is also the absence of a unified, systemic approach to the development, implementation and promotion of eco-innovations in Poland as an important element of the overall innovation system. There are no synergies in the activities of institutions responsible for innovations and no synergies in the support instruments which they use. As a result of this, investors and financing institutions apply the same criteria to eco-innovations as to other investment projects, often without taking into account the added value of the reduced environmental loads. This value plays a marginal role in investment decisions. The opportunities offered by green public procurement are insufficiently used, significantly limiting the stimulation of the market for eco-innovative technologies. Due to Poland's low eco-innovation level, it is impossible to monitor environmental technologies developed and offered, along with their economic and environmental effects. This hampers undertakings' access to reliable offers of new environmental technologies and diminishes the interest of the capital market in investments in promising eco-innovations with a high implementation potential. At the same time, the EU policies in this field aim at increasing the business opportunities for undertakings, in particular, those of the SME sector, which are ensured by the transition to a green economy by enhancing their energy efficiency, supporting green entrepreneurship, using the potential of more environment-friendly value chains and facilitating green SMEs' access to the market[27] as well as innovative environmental technologies supporting the transition to the model of a circular economy[28].

The expenditures on environmental protection in 2017 were PLN 29 billion. They represented 1.5% of the Gross Domestic Product (GDP). It can be seen that these expenditures steadily fell relative to the GDP – from 4.4% in 2000. The structure of the expenditures on environmental protection is dominated by those incurred by households[29].

Poland faces the challenge of providing an appropriate system for financing environmental projects, with consideration given to the implementation of innovative solutions, in a manner ensuring that the actions carried out by the private and public sectors, both at the local and central levels, are coordinated and mutually complementary and that they will bring tangible benefits for the environment (an environmental added value). Thus, it is important not only to identify sources of financing for environmental protection but also to build a model which would enable even more effective coordination of actions taken by different stakeholders, the promotion of eco-innovative solutions, a quick exchange of information and the launch of joint, integrated projects. For this purpose, market-based instruments and mechanisms will also be used. Moreover, it is also necessary to consider different forms of cooperation to carry out environment-friendly projects, with special consideration given to the public-private partnership. One of the ideas which would enable the achievement of these objectives is, among others, the development of the concept of energy clusters or energy cooperatives stimulating stakeholder cooperation and communication at the local level.

The negative factors indicated in the diagnosis, such as poor air quality, scarce water resources, the effects of progressing climate change, the shortage of tools to create the spatial order which would prevent, among others, construction on floodplains, substantially enhance the current development costs and cause losses due to the absence of investments and the allocation of development sources for the restoration of the desirable quality of the air, soils and water and for the treatment of

[27] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions *Green Action Plan for SMEs. Enabling SMEs to turn environmental challenges into business opportunities,* COM/2014/0440 final.

[28] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions *Closing the loop - an EU action plan for the circular economy,* COM(2015) 614 final.

[29] Statistics Poland (GUS), *Ochrona środowiska 2018 (Environmental Protection 2028 – in Polish)*, Warszawa, 2018, p. 179.

diseases dependent on environmental factors. The launch of appropriate actions in a long term will make it possible to avoid much higher macroeconomic costs of failure to take action.

The appropriate environmental policy measures should be based on universal principles and environmental concepts. Many adverse effects in the environment can be prevented or their undesirable impacts can be minimised if the "precautionary principle" is applied well in advance. This principle should guide all the entities influencing the state of the environment and the stakeholders of the environmental procedures. The "precautionary principle" applies in situations where there is no certainty about the impacts of a certain action on nature, while the "prevention principle" ensures that the expected pollution is not allowed to arise. There are the following elements of the "prevention principle":

- the prevention of pollution and other adverse impacts,
- recycling,
- an integrated approach to the limitation and elimination of pollutants and threats based on the recommendations of EU Directives,
- the application of the best available techniques (BAT),
- environment-friendly management systems for production processes (e.g. cleaner production programmes) and services based on standards (e.g. the ISO 14000 series and EMAS).

4. Prognosis of socio-economic trends in environmental terms

The natural environment is one of the areas which affect the achievement of the objectives of the SOR, which is the key document for Poland's medium-term socio-economic policy. The new model of the development of the country – the responsible development – provides, among others, for the satisfaction of the needs of the present generation without diminishing the chances of the future generations, which is consistent with the principle of sustainable development. The responsible development requires knowledge, an innovative approach to problem solving and the efficient management of non-renewable resources. The implementation of these principles will also contribute to creating new development levers and improving the competitiveness of the Polish economy; it will also make it possible to avoid the diagnosed development traps.

The SOR provides, among others, for a selective approach – the concentration of actions on strategic objectives and the implementation of tasks responding to current challenges. The environmental conditions are of large importance for the socio-economic development; therefore, they are considered essential for the actions carried out by the state.

The SOR has identified a number of challenges to the development of the country. To a large extent, they directly concern the issues related to the environment and its resources. Partly, they provide the grounds for taking intensified actions in particular areas, since the state of the environment is a factor which affects the materialisation of the development scenarios described in the SOR.

The following trends are considered to be most important in the area of the environment:

- the growing consequences of climate change,
- the growing competition for natural resources,
- the growing pressures on ecosystems,
- the increasingly significant adverse impact of the environment on human health,

- the depletion of the existing sources of financing for environmental protection.

The growing consequences of climate change[30]

In the nearest years, the effects of climate change in Poland may become much more felt. The most important predicted impacts for the area of Central and Eastern Europe include: the more frequent extreme temperatures, the greater precipitation intensity which may cause foods in each season of the year, the higher frequency and intensity of hurricanes, the more frequent occurrence of droughts and the related losses in the agricultural and forestry production, limited access to water intended for human consumption and an enhanced risk of forest fires. The more frequent occurrence of temperatures varying about 0°Celsius in the winter is also predicted, which may lead to greater damage to roads and squares.

The results of prognoses show that until 2030 climate change will exert a twofold, positive and negative, impact on both the environment, the economy and society.

An increase in the average air temperature will have positive effects, including, among others, the extension of the growing season and the possibilities of cultivating new plant species, the shortening of the heating season and the extension of the tourism season. On the other hand, negative impacts on the environment caused by the extension of the growing season have also been identified. Recent years saw an unfavourable tendency, consisting in that the acceleration of the beginning of the growing season is greater than the acceleration of the end of the ground frost season. As a result of this, ground frost comes in less favourable phases of plant development – at the time of blossoming and even that of fruit setting, i.e. when plants are most sensitive to low temperatures. This effect is clearly negative for plants, also including protected ones.

However, the predicted negative consequences of climate change dominate. Climate change will significantly determine the status of biodiversity, since it affects the ranges of species, including those of invasive alien species, their reproductive cycles, growing periods and interactions with the environment. Under the impact of this change biodiversity undergoes gradual transformation. Climate change causes unfavourable alterations of the hydrological conditions. Although the annual precipitation totals do not change substantially, still they become less uniform in character, resulting in longer periods without precipitation which are interrupted by heavy downpours (torrential rains). E.g. Łódzkie Voivodship[31] will be threatened by strong desertification and, in parallel, by floods in the valleys of the largest rivers in the region, i.e. the Warta, the Pilica and the Bzura. The water deficit area will cover a substantial part of the voivodship. It will be aggravated by the presence of a zone of low precipitation and a zone of a high-water deficit in the growing season in the northern part of the region as well a zone of strong desertification in the north-eastern part of the region. It is estimated that in 90% of the territory of Łódzkie Voivodship there is already the threat of precipitation below 400 mm annually.

[30] Prepared on the basis of the World Bank report *Poland: Toward a Strategic, Effective, and Accountable State Systematic Country Diagnostic* (31 July 2017) and analyses of the Ministry of the Environment carried out for the purposes of the preparation of the *Strategic Adaptation Plan for Sectors and Areas Vulnerable to Climate Change until 2020*.

[31] On the basis of the findings of a survey on the assessment of threats which has been carried out by the Ministry of the Environment at the Marshalls' Offices.

The groundwater level will fall, adversely affecting biodiversity and natural resources, in particular, water reservoirs and wetlands. It will be possible to see changes in the winter season when the residence period and thickness of snow cover will diminish and the evaporation process will intensify, reducing the national water resources. Changes in the ranges of plants and animals will also be important as they can affect the condition of tree-stands and crops.

The problem of drought can be seen, in particular, in Kujawy, the Dobrzyń Lake District and the Chełmno Lake District. In parallel, there is a flood hazard in the Vistula River Valley, related, among others to unfavourable changes in the hydrological conditions on the Vistula downstream of the Włocławek dam (the lowering of the bottom level, strong erosion) and upstream of the dam (shallowing and sediment accumulation, making the operation of icebreakers difficult). It is also important to note the risk of collapse of the Włocławek dam, which can cause contamination of the environment with sediments accumulated in the reservoir bowl.

Climate change will increase the frequency of extreme weather events and disasters which will have significant impacts on vulnerable areas and the national economy. Heavy rains bringing the risk of floods, inundations or landslides will be of fundamental importance – mainly in mountain and upland areas, but also on the slopes of river valleys and on cliffs along the seashore.

The predictions of changes in precipitation levels in the future, made for the purposes of a project on urban plans for adaptation to climate change[32] for 44 cities in Poland, indicate that although the predicted increase of the total number of days with precipitation is slight, the number of days with extreme precipitation exceeding 10 mm/day grows, mainly in cities in the eastern and southern parts of the country. This phenomenon will intensify in the successive decades.

Strong winds will be increasingly frequent, and they may be even accompanied by incidental tornadoes and atmospheric electrical discharges which can have a significant effect e.g. on agriculture, forestry and construction as well as energy and transport infrastructure.

E.g. Lubuskie and Pomorskie voivodships[33] noted a large threat of the occurrence of strong winds and torrential rains. The problem was identified as an urgent one, in particular, in urbanised areas. The consequences of the occurrence of extreme weather events and natural disasters (such as the storm which went through a substantial part of Pomorskie Voivodship in August 2017) are of long-term character and in the areas affected by a disaster they cause a decline of socio-economic activities which are traditional in these areas, such as tourism and timber industry. It will take many years to restore the state from before the storm in these areas.

Torrential rains also pose a large threat all over Poland[34]. In the 21st century, inundations caused by torrential rains have become increasingly harmful, in particular, in urbanised areas. In the questionnaire-based survey, this problem was pointed out by the representatives of Mazowieckie Voivodship, indicating that this threat occurred especially in agglomerations and large cities in this region.

[32] The website of the project: http://44mpa.pl/

[33] On the basis of the findings of a survey on the assessment of threats which has been carried out by the Ministry of the Environment at the Marshalls' Offices.

[34] On the basis of the findings of a survey on the assessment of threats which has been carried out by the Ministry of the Environment at the Marshalls' Offices.

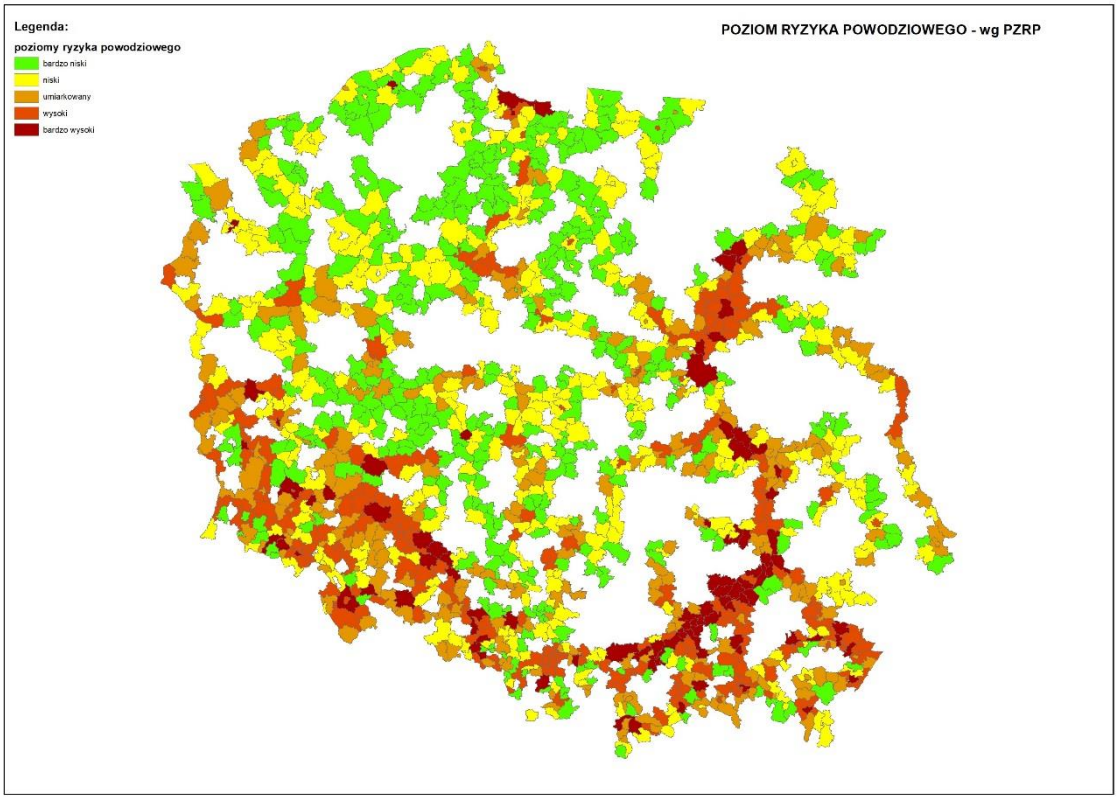
The direct adverse effects of climate change also include the intensification of eutrophication of inland, transitional, costal and marine waters, a greater threat to human life and health posed by thermal stress and air pollution, an increased demand for electricity in the summer season and the lower cooling capacity at thermal power plants, which results, for example, in a fall in their generation capacity and overloading of the electricity grid.

A very high risk of eutrophication of inland waters was noted by the representatives of Pomorskie, Warmińsko-Mazurskie and Zachodniopomorskie voivodships[35]. In particular, it is necessary to emphasize the problem of eutrophication of the Baltic Sea, resulting e.g. in the closing of marine bathing sites due to the toxicity of certain species of blue-green algae occurring in phytoplankton blooms in the summer. In 2018, 11 out of 146 seashore bathing sites in Zachodniopomorskie Voivodship and 55 bathing sites in Pomorskie Voivodship were closed due to the blooms of blue-green algae. The bathing site at Chałupy was closed for the longest period of time – for 15 days – due to the blooms of blue-green algae[36]. The sanitary authorities paid special attention to the blooms of blue-green algae because of the toxins which they released and which could be dangerous to the bathers' heath, as they could cause irritation of the skin, itching and watering of the eyes, ailments of the alimentary tract and even neurological disorders[37]. The emergence, duration and intensity of the blooms depend on both the phosphorus concentration, the water temperature and the weather conditions.

Therefore, one of the main challenges to sustainable development in Poland is the adaptation to climate change by improving the resilience of the particular sectors of the economy. Climate change will have a significant effect primarily on the national water management. Poland has relatively scarce water resources and the efficiency of their use is low. In certain regions, periodic water supply problems can already be found. At the same time, in all the parts of the country, the flood risk grows, among others, as a result of the insufficient retention capacity of natural and artificial reservoirs, an increased share of impermeable surfaces, especially in cities, water runoff from small catchments due to the incorrectly carried out regulation and maintenance of rivers, the reduction of natural floodplains and the general lack of damming-up facilities in the systems of land amelioration ditches.

In accordance with a flood hazard analysis performed as part of flood risk management plans (FRMPs), the areas characterised by a very high flood risk are mainly situated in southern Poland and along the Vistula Lagoon and the Gulf of Gdańsk. In turn, areas with a high flood risk are those along the middle and lower sections of the Vistula and Oder Rivers as well as along the tributaries of the middle Vistula – the Bug, Narew and Kamienna Rivers.

[35] On the basis of the findings of a survey on the assessment of threats which has been carried out by the Ministry of the Environment at the Marshalls' Offices.
[36] The Chief Sanitary Inspectorate, the Bathing Service: https://sk.gis.gov.pl/ [accessed on 21.09.2018].
[37] The Chief Sanitary Inspectorate, the Bathing Service: https://sk.gis.gov.pl, p. 15 [accessed on 21.09.2018].



Map legend (Legenda): poziomy ryzyka powodziowego – flood risk levels; bardzo niski – very low; niski – low; umiarkowany – moderate; wysoki – high; bardzo wysoki – very high; POZIOM RYZYKA POWODZIOWEGO – wg PZRP – Flood risk level acc. to the PZRP – Flood Risk Management Plan.

Source: Flood Risk Management Plan.

The exposure of investment areas and large cities to floods was pointed out by the representatives of Opolskie Voivodship[38] due to its situation in river valleys, in particular, in the valleys of the Oder and Nysa Kłodzka Rivers. In the voivodship, there are also agricultural areas with a high potential where the threat of drought and the fall of the groundwater level can substantially halt the socio-economic development in the future.

The changing climate will also have a crucial effect on the production conditions in the sectors of agriculture and forestry. A water shortage is one of the examples of an adverse impact of climate change on the sectors of agriculture and forestry. Periodic problems also include inundations caused by intensive precipitation and ground frost. Moreover, the extension of the growing season as a result of a higher average temperatures increases the risk of the presence of crop pests and a change of their range. Threats also include animal diseases and the lower productivity of livestock. This can have a significant effect on the efficiency of agricultural production and, at a larger scale, also on the national food security level. The extension of the growing season also increases the risk of pests affecting the forestry production and, in a longer term, also causes a change of the ranges of the individual tree species.

[38] On the basis of the findings of a survey on the assessment of threats which has been carried out by the Ministry of the Environment at the Marshalls' Offices.

Given that the manufacturing economy is based on agriculture and forestry, the occurrence of catastrophic climate phenomena will cause particularly adverse consequences for the development of Warmińsko-Mazurskie, Lubelskie, Wielkopolskie and Mazowieckie voivodships.

The transport and construction sectors will also require the launch of adaptation actions.

In light of its spatial character, transport is one of the sectors of the economy which are the most vulnerable to climate change. The effects of climate change, such as heavy showers, winds, inundations and landslides, snow and hail falls, storms, low and high temperatures or limited visibility clearly affect all the transport modes: road, rail, air and shipping modes. Modes of transport, the related infrastructure and the users' social comfort are vulnerable to climate change. Analyses show that most of negative climate factors affect the individual transport modes, still it is road and rail transport infrastructure that is the most sensitive to the climate conditions. These transport modes are particularly susceptible to the impact of snow, rain, strong wind and frost[39].

The above situation will encourage the preparation and development of new standards for designing of transport infrastructure and modernisation of the existing one. Changes in technical standards will also be inevitable in the construction sector, particularly those on the design of buildings (mainly in respect of the energy efficiency of foundations and bearing elements) and drainage systems.

The overwhelming majority of landslides occur in the southern part of Poland, in the area of the Outer (flysch) Carpathians, built almost exclusively from Cretaceous and Paleogenic sand and shale formations (Małopolskie and Podkarpackie voivodships)[40]. The threat is posed, in particular, by the geological structure, morphology, the hydrogeological and hydrological conditions, excessive precipitation and human activities. Landslides cause degradation of the areas affected by them and damage to the built structures ad infrastructure erected in their area (the road network, the sewage system, telecommunications and power lines, gas pipelines). In agricultural areas, crops are damaged and sometimes there is a need to restore the agricultural function of a given area. In forest areas, landslides cause damage to stands. A large hazard of landslides, particularly in rural and mountain areas, was identified in Podkarpackie and Śląskie voivodships, too.

The predicted increase of the intensity and frequency of sea storms and the greater wave heights in the Baltic Sea will intensify coastal erosion and enhance groundwater salinity in lower lying areas. The changes of the character of the coastline caused by human-induced transformations also affect the erosion and accumulation processes. The assessment of these processes as part of the monitoring of the seacoast is of large importance for the choice of the protection methods. Projects to protect the seacoast should be carried out taking into account the need to preserve the natural process of the coastal dynamics. The progressing coastal erosion increases the flood hazard from the sea. The most threatened areas include the Hel Peninsula and the Middle Pomerania. Over more than 70% of their length, the Polish shores of the southern Baltic Sea undergo erosion processes[41].

[39] Prepared on the basis of SAP2020, KLIMADA, materials of the Ministry of the Environment placed on the website klimada.mos.gov.pl.

[40] The Landslide Protection System (LPS) Programme managed by the Polish Geological Institute – National Research Institute (PGI-NRI).

[41] Pruszak Z., *Brzeg Morski. Procesy fizyczne obszaru płytko- i nadwodnego (The Physical Processes in the Shallow and Coastal Areas – in Polish)*, Publishing House of the Institute of Hydro-Engineering of the Polish Academy of Sciences, Gdańsk, 2014.

Climate change also makes winters milder and this may be expected to reduce the ice cover providing the natural protection against storm waves and to diminish the resilience of the shore to washing out. The monitoring of the coastal zones will also be important.

The expected climate warming will cause the migration of species, including invasive alien ones, mostly from Southern Europe, North Africa and Asia, along with the simultaneous withdrawal of those species that are not used to higher temperatures and drought in the summer and do not tolerate severe frost well. The impact of climate change on the species composition and condition of tree-stands will also be important. Throughout the country trees can be seen to become weaker. Trees will be more susceptible to damage caused by the wind. It is well-advised to launch further actions to ensure sustainable forest management, an adequate amount of water in forests and a possible reconstruction of the species composition of forests. The very great threat of the weakening of tree-stands was pointed out by the representatives of Pomorskie Voivodship[42] (in particular, in Kashubia and Tuchola Woods) or Śląskie Voivodship.

The mountain ecosystems are probably most vulnerable to the impact of climate factors. It is estimated that 60% of species in these areas in Poland are at risk of extinction due to climate change.

In addition to adaptation actions, Poland should take efforts to mitigate climate change and reduce the carbon dioxide concentration in the air. The shift towards the reduction of greenhouse gas emissions will require strong and coordinated actions in the different sectors of the economy, while the pursued climate policy will continue to encourage the use of clean technologies. Poland has a large potential to reduce the GHG concentrations in the air, among other things, by improving the efficiency of fuel use, using the potential of forests, using the forest and agricultural biomass to produce renewable energies at dedicated installations, taking into account the hydro-power potential and Polish geothermal resources, preserving and restoring wetlands, developing wooden buildings as CO_2 reservoirs and sequestering carbon in soil.

In accordance with the national projections of greenhouse gas emissions prepared in 2017 for the purposes of the *Seventh National Communication and the Third Biennial Report for the Conference of the Parties of the United Nations Framework Convention on Climate Change*, it is estimated that in 2030 Poland's total emissions will be lower by 23% than those in 1990 and lower by 37% than those in 1988. The results of the national greenhouse gas emission inventory for the non-ETS sectors for the period from 2013 to 2015 as well as emission projections indicate that Poland will achieve the target laid down in Decision No 406/2009/EC of the European Parliament and of the Council[43] (+14%) with a surplus for the whole period from 2013 to 2020. However, already in 2021 to 2030 Poland can have a problem with achieving its non-ETS reduction target at the level of –7%, as its contribution to the fulfilment of the EU wide non-ETS reduction target of 30% relative to the emissions in 2005. Therefore, legislative actions should be intensified and coordinated and the reductions in these sectors of the economy should be supported.

[42] On the basis of the findings of a survey on the assessment of threats which has been carried out by the Ministry of the Environment at the Marshalls' Offices.

[43] Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020 (OJ L 140, 05.06.2009, p. 136).

Climate change should be perceived as a risk which needs to be taken into account when creating regulatory mechanisms and investment plans, just as consideration is given to risks of a macroeconomic or a geopolitical character.

It is also important to bear in mind that anthropogenic climate change resulting in climate anomalies in their extreme version and long-term changes will reduce at the global scale access to food, drinking water and energy, thus increasing the competition for natural resources and the migration of populations from endangered areas (e.g. island states) to safer regions. The disturbance of the ecosystem productivity caused by economic development is strengthened by climate change.

The growing competition for natural resources

The most important challenges in the field of environmental protection include the sustainable, economical and rational management of the natural resources of the environment. It is important to take efforts to ensure access to these resources for the next generations, particularly in light of the progressing urbanisation which, creating incentives for economic development, will increase the pressures on the resources of food, water and energy.

In the past decade, Poland made a substantial progress in the efficient use of energy and water, nevertheless it is still characterised by lower indicators of their use compared with the Western European standards. The Polish economy is still one of the least efficient in the European Union in terms of resource and energy savings, although e.g. the efficiency of its use of water has greatly improved relative to the early 21st century. With its water resources of about 1 600 m^3/per capita/year, Poland is one of the countries of the Organisation for Economic Cooperation and Development (OECD) which have the scarcest freshwater resources[44].

The risk of a water deficit was regarded as a very high one in Łódzkie Voivodship, particularly in zones with very large development needs and low retention capacity, where unfavourable changes in the hydrogeological conditions in the form of the depression cone of an open-cast mine cause the drying up of wells, degradation of the vegetal cover, biodiversity loss, the waning of rivers and watercourses and losses in the agricultural sector.

Limited access to water of appropriate quality, raw materials and energy in the future can, on the one hand, pose a threat in the context of security and quality of life and for the development of sectors based on these resources. On the other hand, it is an incentive encouraging the development of innovative environmental technologies, the overcoming of the trap of a mediocre product and the implementation of the model of a circular economy. The actions for a circular economy are also strictly related to the main EU priorities, such as: employment, economic growth and industrial innovation.

Although in the nearest years Poland can expect an improvement in its actions for eco-innovation, a holistic transition to more efficient use of resources in the economy will require long-term investments. The introduction of eco-innovations should be perceived as an economic and social opportunity, making it possible to overcome the middle-income trap, rather than as a cost – in

[44] On the basis of the World Bank report *Poland: Toward a Strategic, Effective, and Accountable State Systematic Country Diagnostic* (31 July 2017).

particular, in the private sector for which public authorities should ensure further relevant incentives and support[45].

The transition to the model of a circular economy[46] will be supported at all the stages of the value chain – from design through production, consumption, repair and remanufacturing to waste management and acquisition of secondary raw materials which are returned to the economy. The basic aim of a circular economy is to ensure that a product is manufactured and used as effectively as possible and that the waste arising from it is managed in an appropriate manner in economic and environmental terms. It is important for waste – if it arises – to be regarded as potential secondary raw materials.

The above approach will mean, among others, the achievement of long-term targets for the limitation of the landfill of waste and the intensification of actions to ensure levels of the preparation for reuse and recycling of priority waste streams, such as municipal waste and packaging waste. On the basis of these targets, the EU, including Poland, will gradually work towards the introduction of the best practices and encourage further investments in waste management, contributing to achieving the objectives of a circular economy.

Primary raw materials, including renewable materials, will still continue to play an important role in production processes. In this context, the environmental and social effects of production will be increasingly important, in both the EU and third countries. For this reason, the sustainable acquisition of raw materials will be supported at the global scale, e.g. by means of a political dialogue, cooperation, trade policy and development policy. It seems inevitable that the importance of distributed energy generation will grow, with users grouped around small local energy sources, which would be complemented by a growing share of energy produced by users themselves, i.e.so-called prosumer energy generation.

The need to create a sustainable, low-carbon, resource-efficient and competitive economy will provide a strong stimulus for the development of eco-innovation. To this end, it will be necessary to overcome many barriers, consisting in insufficient research activities, a poor linkage between industry and science, difficult access to capital, the absence of a reliable market offer, an uncertain return on investment and the lack of economic or tax incentives in daily life[47].

Consumers are also of key importance in the process of transition to the model of a circular economy. The shaping of new consumption patterns will require the presence of technologies and advanced education tools, the dissemination of the concept of a voluntary systemic approach to the management of environmental impacts by organizations holding EMAS or ISO 14001 certificates and the use of economic instruments, such as taxes, so that product prices better reflect environmental costs. Support will also be given to innovative forms of consumption, such as the use of the same products or infrastructure (the sharing economy), the consumption of services rather than products and the use of information technologies or digital platforms.

[45] On the basis of the *EU Environmental Implementation Review*: *Highlights.*
[46] On the basis of the Communication from the Commission *Closing the loop - an EU action plan for the circular economy,* COM(2015) 614 final.
[47] On the basis of the report on the Environment Performance Review of Poland, OECD 2015.

The array of economic instruments also includes product and deposit charges which can encourage customers to choose goods and services of less environmental annoyance. These charges should be a source of revenues of specialised funds whose resources will enable support for the transformation of production and consumption.

The issue of food waste will also gain in importance. The production, distribution and storage of food involve the use of natural resources and environmental impacts. The discarding of food generates a pressure on the environment and causes financial losses for consumers and the economy. Food waste has also an important social aspect: there is a need to facilitate the transfer of food which is good for consumption but cannot be placed on the market for logistics or marketing reasons to those in need. In September 2015, the United Nations General Assembly adopted as part of the SDGS the objectives of halving per capita global food waste at the retail and consumer level and reducing food losses in production and supply chains, including post-harvest losses. The EU and its Member States undertook to achieve these objectives[48].

The growing pressures on ecosystems

Biodiversity is the wealth of the ecosystems, species and genes surrounding us which represents a value in itself and also has a significant effect on human living comfort (e.g. food, flood protection, air quality, noise protection, recreation space). However, biodiversity diminishes at a very fast pace. The extinction of species has reached a critical condition since it is already about 1 000 times faster than in ordinary periods of the Earth's history and it is predicted to speed up even more[49]. Almost one fourth of wild species in Poland is at risk of extinction and most ecosystems have degraded to such an extent that they have lost their precious values. This degradation means huge social and economic losses. The phenomena which are the main drivers of biodiversity loss (e.g. the transformation of habitats, the excessive exploitation of natural resources, the introduction and expansion of invasive alien species and climate change) increase, weakening the favourable effects of actions to halt this process[50]. The threat of degradation of valuable natural resources was pointed out in Opolskie, Lubelskie and Świętokrzyskie voivodships, while the pressures exerted by the extractive industry, infrastructure and urbanisation were noted in Dolnośląskie Voivodship.

The EU vision until 2050 provides for the conservation and restoration of biodiversity and the valuation of ecosystem services in light of their effect on human welfare and economic growth. This increases the significance of agriculture and forestry for maintaining and strengthening biodiversity and the conservation status of the protected natural habitats of terrestrial ecosystems as well as that of fisheries for ensuring the sustainable use of aquatic ecosystems. Actions will also be taken to combat invasive alien species. The wealth of biodiversity is Poland's potential, which – if correctly used – can improve competitiveness at the regional and local levels. In practice, this will mean the launch of actions to enhance the effectiveness of the protection of the natural environment, taking into account the interests of the local communities and the need to increase financial outlays. The socio-economic development requires the national and responsible management of the physical

[48] On the basis of the Communication from the Commission *Closing the loop - an EU action plan for the circular economy,* COM(2015) 614 final.
[49] See the Millennium Ecosystem Assessment, 2005, *Ecosystems and Human Well-being: Biodiversity Synthesis,* World Resources Institute, Washington, DC.
[50] The EU Biodiversity Strategy to 2020.

space, while taking into account the needs of food production, industry, urbanization, infrastructure and areas with natural values, as well as the condition of ecosystems and their services. In light of this, actions will be taken to better inventory the resources of habitats and species. This will improve the quality and efficiency of both the system for the management of natural resources and the system of environmental impact assessments, as well as other tools for development planning at the national, regional and local levels.

The issue of the maintenance and reconstruction of the functions of ecosystems will apply to the whole territory of the country and be based on the assessment of the condition of ecosystems and their services. This requires the development of a system for the valuation of ecosystem services and the integration of these values into the development strategy, the planning system and the national accounting and reporting systems. As a result of this, biodiversity will regain the rank of the driver of the social and economic development and, in consequence, its perception by the public will change. The integration of the values of ecosystem services into the national decision-making processes will make it possible to correctly assess the extent of the possible biodiversity loss, to apply compromise solutions and to improve the coordination of actions among the individual sectors and administration levels.

An important problem is also the pollution of the Baltic Sea ecosystem with waste. Much waste which finds its way into the marine waters has an adverse impact, mostly due to its accumulation as a result of the very slow process of its degradation. The waste in the sea originates from different sources; however, the greatest pressures are exerted by terrestrial sources. Most of waste found in the marine environment is related to the modern "take away" lifestyle (plastic packaging, coffee cup lids and mixing sticks, plastic cups and straws). Plastics play an important role in our economy and daily life, but the manner in which they are produced, used and discarded is harmful to the environment. Plastic materials raise particular concerns because of threats to the environment and slow degradation. About 70% of marine waste in the Baltic Sea is plastics. Although they do not decompose they fall apart into increasingly small particles. Large impacts are also exerted by hygienic articles, cosmetics and cleaning supplies containing plastic microparticles (washing powders, peeling lotions etc.), which can be carried over large distances by sewage systems and river runoff. The smallest microwaste, in particular, plastic microwaste, is invisible to the human eye, but reaches the food chain of animals and through it, humans.

There is also the problem of waste left by tourists on beaches and blown away from local landfills. Although terrestrial sources dominate the generation of waste in the sea, marine sources, such as the fisheries, recreation and marine shipping sectors, also contribute to this problem.

The increasingly significant adverse impact of the environment on human health[51]

The good-quality natural environment significantly contributes to improving man's physical, mental and social well-being. However, the interaction between the environment and human health is very complex and difficult to assess. Different demographical and socio-economic trends, coupled with sustained inequalities in this respect, increase the sensitivity of the population to many factors,

[51] Prepared on the basis of the 2015 EEA report *The European environment – State and outlook 2015 – synthesis report* and the World Bank report *Poland: Toward a Strategic, Effective, and Accountable State. Systematic Country Diagnostic* (31 July 2017).

including those related to the environment and climate. The effects of environmental pollution are substantially felt in Europe. The World Health Organisation (WHO) estimates that the stress factors related to the environment are responsible for 15–20% of all the deaths in 53 European countries.

The best-known factors affecting health are related to air pollution, poor water quality and insufficient sanitary conditions. Relatively new problems in the area of environmental protection include noise, electromagnetic fields, chemical hazards and major-accidents hazards. Climate change, the depletion of the stratospheric ozone layer and soil degradation can also affect human health. The presence of these impacts is related to long-term environmental and socio-economic trends, changes in lifestyles and consumption and the quick introduction of new chemical substances and technologies.

The countries of the European Union, including Poland, have established strategic objectives the achievement of which is expected to ensure a good quality of life for the present and future generations. Promoting good health and reducing social inequalities are the central themes of the EU policy in the field of health and also an integral part of smart and inclusive growth in Europe. *A General Union Environment Action Programme to 2020 "Living well, within the limits of our planet"* (7EAP) lays down the directions of the actions of the institutions of the EU and Member States. Its nine priorities include three priority areas where more action is needed to protect nature and strengthen ecological resilience, boost resource-efficient, low-carbon growth, and reduce threats to human health and wellbeing.

The new strategy of the World Health Organisation for Europe recognises well-being as a possible focus of the reorientation of social policy in the 21st century, including its environmental dimension. At the European level, the WHO implements its Health and Environment Process. The central issues are the threats posed by the state of the environment and climate and their impacts on the human health condition, particularly that of children[52].

The impact of the environment on human health and well-being can be seen particularly in cities. Almost 73% of the European population lives in cities and it is expected that it will reach 82% in 2050[53]. The development of cities in Europe increases pressures on the environment and health, among others, with air pollutant emissions from transport, an unfavourable structure of urbanised space, fragmentation and unification of landscapes. According to the OECD, by 2050 the air pollution level in cities is expected to become the main environmental cause of mortality in the world. In addition, the data available on long-term average exposure indicate that 65% of Europeans living in large urban areas are exposed to a high noise level and 20% to night-time noise which often causes adverse health effects[54].

In cities, there are many pressures which affect large populations, including the particularly vulnerable groups, such as children and the elderly. Thermal conditions are one of the significant aspects. It is predicted for the largest cities in Poland that the number of hot days (with the

[52] In accordance with the report of the European Environment Agency *the European environment – state and outlook 2010* (SOER 2010).

[53] *General Assembly resolution 66/288: The future we want*, A / RES/66/28, 11 September 2012, United Nations and *World Urbanization Prospects — The 2011 Revision — Highlights*, New York.

[54] Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 "Living well, within the limits of our planet" (OJ L 354, 28.12.2013, p. 171).

maximum temperature exceeding 30°C) will grow, most significantly in the north of the country. This direction of temperature change in the summer months can cause a deterioration of the living comfort of the particularly vulnerable groups. The conditions in the cold season will also change. The number of days with ground frost will decrease by 20 days on average, while it will slightly increase in the north of the country. The number of freezing days will also fall across the country. The largest reduction will come in the northeast of the country.

The above situation indicates the need to launch special adaptation actions. On the other hand, the development of dense urban building and a more efficient approach to the resources of the urban environment provide opportunities for mitigating pressures on the environment and improving man's quality of living. Moreover, well-planned urban areas which ensure good access to natural green areas, including riverside areas, and enable the creation of green[55] and blue[56] infrastructure can bring benefits for human health and well-being and also mitigate the effects of climate change felt by city dwellers.

The urbanisation related pressures affect, in particular, the areas around and inside large cities, open areas and areas with natural and landscape values.

The further implementation of the policy on the sustainable planning and design of urban space, including the prevention of urban sprawl, will be of key importance for supporting the sustainable development of cities. Smart planning and governance mechanisms can affect mobility related behaviour, pushing it towards more sustainable modes of transport and reduced demand for transport. They can also improve the energy performance of buildings, reducing pressures on the environment and, at same time, improving man's quality of living.

Air pollution causes significant financial and economic consequences. It is damaging in terms of both the social costs of mortality and morbidity, and direct losses of household budgets. The adverse effects of air pollution are not limited to human health only. Many other factors need to be considered: those related to the surroundings (e.g. the condition of buildings, built structures and infrastructure), the condition of fauna and flora (having further consequences for the productivity of agricultural and forest resources) and larger ecosystems.

Despite a systematic improvement of air quality in Poland, excessive concentrations of particulate matter and benzo(a)pyrene in the winter season still remain a significant problem. In accordance with the results of the assessment of air quality in 2017, performed by the Inspectorate for Environmental Protection, exceedances were found in all the 46 zones in the country, including

[55] Green infrastructure is a tool for providing ecological, economic and social benefits through nature-based solutions. It is a network of nature, semi-natural areas and green space that delivers ecosystem services, which underpin human well-being and quality of life. For example, green infrastructure can be used to reduce the amount of storm water runoff entering sewer systems and ultimately lakes, rivers and streams, through the natural retention and absorption capabilities of vegetation and soils. Benefits of green infrastructure in such a case could include increased carbon sequestration, improved air quality, urban heat island mitigation, additional wildlife habitat and recreational space. Green areas also contribute to the cultural and historical landscape, giving identity to places, as well as to the scenery of urban and peri-urban areas where people live and work. Source: European Environment Agency, issue no. 2015/3 of the Newsletter, 15 September 2015. Benefits of greenery, mostly for health, were collected in the draft Resolution of the European Union on the European Year of Greener Cities 2020.

[56] Blue infrastructure relates to water management. It includes rainwater retention, rainwater drainage and renaturalisation of watercourses and water reservoirs. Source: The Future Cities Adaptation Compass – guidance for developing climate-proof city regions, http://www.future-cities.eu/project/adaptation-compass/.

34 zones with exceedances of the limit value of particulate matter PM10, 19 zones with exceedances of the limit value of particulate matter PM2.5 and 43 zones with exceedances of the target value of benzo(a)pyrene, as well as 4 zones with exceedances of the limit value of nitrogen dioxide, 1 zone with exceedances of the limit value of sulphur dioxide, 3 zones with exceedances of the target value of arsenic and 6 zones with exceedances of the target value of ozone set to protect human health. The average concentrations of pollutants which are harmful to health in Poland are some of the highest in the EU and the OECD.

The air quality in Poland mainly depends on the level and spatial distribution of emissions from stationary and mobile sources, as well as on transboundary fluxes and physic-chemical transformations taking place in the atmosphere. These processes affect the development of the so-called background pollution, which results from the state of a dynamic equilibrium at larger distances, and also determine the ranges of increased concentrations in the area of the direct impact of sources. The unfavourable weather conditions (a windless state - calm, low temperature, fog, no precipitation, inversion) are important particularly in the case of low emissions, e.g. from household furnaces, local boiler-houses and road transport.

City inhabitants are exposed, in particular, to the effects of poor air quality. Due to the relief of the terrain, the dominating heating mode and the population density, the limit values of particulate matter are most often exceeded in cities and agglomerations situated in central and southern Poland (in the Upper Silesia, Kraków, Rybnik-Jastrzębie, Łódź and Warszawa agglomerations).The problem of air pollution also affects the residents of rural areas since households use individual heating systems with insufficient parameters of pollutant emissions.

Analyses indicate that the domestic and municipal sector, transport and to a slight extent industry are primarily responsible for this situation. The contributions from the different sectors vary across the country and depend on the degree of industrialisation of a given zone.

The domestic and municipal sector uses obsolete installations and equipment failing to meet emission standards in combustion processes, poor-quality solid fuels are often used, e.g. coal mud, post-flotation concentrates, coal fines, bad-quality coal or lignite, and waste is burned. These incorrect practices result from the inadequate awareness of the public of the impact of its activities on the air quality and the related health effects. Poor-quality fuels are often used for financial reasons related to so-called energy poverty affecting residents with the lowest incomes. Due to the incorrect spatial development in cities, natural corridors and aeration wedges are blocked in the city centres.

A short-term exposure to high concentrations of particulate matter PM_{10} (from several hours to several days) can cause the emergence of disease symptoms, especially in the particularly vulnerable social groups (the elderly, small children, pregnant women or ill persons). A long-term exposure to excessive concentrations of particulate matter increases the risk of diseases of the respiratory or circulatory systems in the whole exposed population[57].

[57] Chief Inspectorate for Environmental Protection, Juda-Rezler K., Toczko B. (Eds.), *Pyły drobne w atmosferze. Kompendium wiedzy o zanieczyszczeniu powietrza pyłem zawieszonym w Polsce (Find Dust in the Atmosphere. A Compendium of*

The number of motorised vehicles, both passenger cars and commercial vehicles, systematically grows in Poland. In the period from 2005 to 2015, their number was enhanced by about 10.6 million cars, including more than a million of commercial vehicles. In 2015, according to GUS data[58], in Poland there were 27 409 motorised vehicles (as of 31.12), 75.6% of which were passenger cars. According to the Central Register of Vehicles, the average age of passenger cars is 17.5 years, while that of commercial vehicles is almost 16 years[59]. However, the fast increase of the number of motorised vehicles was accompanied by the process of implementing increasingly stringent car exhaust emission standards and the development of road infrastructure (e.g. the construction of ring roads around cities, expressways). As a result of these actions, despite a substantial increase of the number of cars, the carbon oxide emissions from road transport in 2016 fell by more than 37% compared with 2005, while the emissions of oxides of nitrogen diminished by about 1%. At the same time, the total particulate matter emissions from road transport in that period, including mainly emissions from engines and those from the abrasion of tires and brakes, grew by about 12%[60].

On the basis of an analysis of the obligations to reduce the emissions of air pollutants and taking into account the commitment to achieve EU standards, innovation should be expected to grow in the Polish economy, particularly, in the area of electromobility, in both the individual and collective dimensions. Rail and water modes of transport will also gain in importance. The number of users of municipal heating systems will increase an effect of the expansion of heating networks. The energy efficiency of existing and new buildings will considerably improve. The development of renewable energy sources, including RES microinstallations, is also predicted. The sustainable development of local heating networks and RES microinstallations will be possible, among others, due to the support for the development of local initiatives launched via energy clusters or energy cooperatives.

Water quality is of key importance for the quality of human life and the correct functioning of both aquatic and terrestrial ecosystems. A challenge to the achievement and maintenance of good water status is the reduction of the impact of pressures from different sectors of the economy and man. One of the key problems is the excessive load of nutrients – nitrogen and phosphorus – in waters. They originate primarily from runoffs from areas used for agricultural purposes (arable land, pastures, areas of intensive livestock rearing) and dispersed rural and recreation buildings, the deposition of total nitrogen and phosphorus from the atmosphere, and pollutants from wastewater and households unconnected to collective sewage systems.

An excessive input of nutrients (nitrogen and phosphorus) into the aquatic environment causes eutrophication, which results in blooms of algae and cyanobacteria at a sustained high-water temperature. Blooms restrict access of sunlight to deeper water layers, impeding the development of plants living in deeper parts of water and using sunlight in the photosynthesis process. Eutrophication contributes to the emergence of oxygen deserts (dead zones) and low-oxygen areas where life wanes, in both water reservoirs and rivers. Reduced oxygenation and differentiation of species, each of which specialises in the recovery of other substances from water, diminish the self-cleaning capacity of waters. This effect, which reduces the useful water resources, speeds up the

Knowledge of Air Pollution with Particulate Matter in Poland – in Polish), Environmental Monitoring Library, Warszawa 2016.

[58] Data from the Polish Association of the Automotive Industry.

[59] *The fleet of cars registered in Poland*, Polish Association of the Automotive Industry.

[60] *Poland's Informative Inventory Report 2018*, http://www.kobize.pl [accessed 17.06.2019].

unification of hydromorphological elements as a result of the regulation of rivers. In a longer term, all these changes threaten the quality of the aquatic environment. This affects ecosystem services, such as the provision of sources of water intended for consumption (the contamination of groundwater with nitrogen and phosphorus compounds), fisheries and recreation. Waters in Europe are much cleaner now than 25 years ago as a result of investments in sewage systems aimed at reducing pollutants coming from municipal wastewater. Many challenges still remain. It is estimated[61] that more than 40% of rivers and coastal water bodies are exposed to diffuse pollution from agriculture and 20-25% of these waters are affected by pollution from point sources, e.g. industrial plants, sewage systems and wastewater treatment plants. In turn, in accordance of data from the Chief Inspectorate for Environmental Protection[62], the status of the Polish marine waters in 2016 was recognised to be poor under the MSFD in terms of eutrophication. Moreover, pursuant to the Act on Water Law[63], the Nitrogen Programme[64] was prepared and published for the whole territory of the country. Its implementation will contribute to reducing the pollution of waters with nitrogen from agricultural sources.

The combat against inadequate wastewater treatment and the release of nitrogen compounds into the environment by agriculture is particularly important for reducing the release of nutrients[65]. The reduction of the total release of nutrients into waters requires comprehensive solutions, covering entire hydrological systems, since nutrients present in surface waters and groundwater affect transitional and coastal waters. All the measures to reduce the input of nutrients must take into account the delayed response time of the environment, since actions on inland waters reduce the pressures on the marine, transitional and coastal environments only after a certain period of time.

In Poland, flowing surface waters are a source of drinking water for many localities. Therefore, human health and the levels of costs which need to be incurred for its treatment depend on the quality of these waters. Surface waters are also used to irrigate farmland and orchards. The pollutants which they carry can be captured by soils and taken up by plants cultivated on them. The pollutants from flowing waters can penetrate into the human body in the meat of fish caught in the environment or those from fish farms.

The creation of healthy aquatic ecosystems requires a systemic vision, since the condition of these ecosystems strictly depends on how terrestrial and aquatic resources are managed and on the pressures from such sectors as industry, agriculture, energy, transport and the municipal sector. There are many ways in which water management can be improved. They include the implementation of water policy objectives in other areas, such as agricultural policy, spatial policy, cohesion policy, structural funds and sectoral policies.

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[61] Prepared on the basis of the 2015 EEA report *The European environment – State and outlook 2015 – synthesis report* and the World Bank report *Poland: Toward a Strategic, Effective, and Accountable State. Systematic Country Diagnostic. Report No. 117802-PL* (31 July 2017).

[62] Inspectorate for Environmental Protection, *Ocena stanu środowiska polskich obszarów morskich Bałtyku na podstawie danych monitoringowych z roku 2016 na tle dziesięciolecia 2006–2015 (An Assessment of the State of the Environment of the Polish Marine Waters of the Baltic Sea on the Basis of 2016 Monitoring Data against the Decade of 2006 to 2015 – in Polish)*, Warszawa, 2017.

[63] The Act of 20 July 2017 on Water Law (OJ L of 2018, Item 2268, as amended).

[64] A programme of measures to reduce nitrogen runoff from agricultural sources.

[65] Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 "Living well, within the limits of our planet".

Investment actions will be continued in wastewater management, focusing on the removal of nitrogen and phosphorus compounds and bacterial contaminants. Due to the extended sanitary sewage network and the growing public awareness, the quantity of untreated wastewater released into waters or to land will be reduced. Changes in agriculture (fertilisation, land amelioration) towards the use of so-called good agricultural practices will be of importance for the quality of waters in Poland. Moreover, the correct implementation of measures under the Nitrogen Directive[66] (primarily through the programme of measures throughout the country), under the *HELCOM* Convention (through the Baltic Sea Action Plan), as well as the promotion, introduction and implementation of agricultural practices friendly to the marine environment at farms will be of large importance for reducing the pollution of waters with nitrates from agricultural sources and preventing their further pollution. The quality of flowing waters in Poland also depends on transboundary pollution, particularly from the East; therefore, support will continue to be provided to projects intended to improve the quality of waters flowing into Poland's territory.

The depletion of the existing sources of financing for environmental protection

One of the external challenges identified in the SOR which Poland faces in a short term is the change predicted in the operational model of the European budget, including the reduction of the budget for the implementation of cohesion policy and the decrease of the amounts allocated so far to the particular countries and regions. At the same time, in light of the national system of proceeds from environmental fees and fines, it can be predicted that these proceeds will also fall as the particular sectors achieve a high level of environmental protection. There will be a challenge of maintaining the continued capacity of generating payments to finance environmental protection and water management in amounts exceeding the proceeds from environmental fees and fines by maintaining and improving the worked-out mechanisms of returnable financing of environmental protection and also by seeking new financial instruments. In addition, it will still be necessary to finance expensive investment projects aimed at meeting the EU standards and maintaining the existing facilities.

Thus, there is the risk of a gradual depletion of the existing sources of financing for environmental protection, along with the need to provide, at the same time, further financial support to it, including in the form of non-returnable assistance in the case of actions related to projects intended to ensure access to key ecosystem services. Moreover, it should be expected that gradually more and more expenditures on environmental protection will be incurred by both consumers (households) and producers (enterprises), in accordance with the "polluter pays" principle. The amounts incurred should be based on estimated external costs.

At the same time, it should be pointed out that if the logic of programming the European funds after 2020 is based on the linkages of particular policies to environmental objectives this may provide an opportunity for better understanding of Polish development priorities and integrating them into the EU development objectives.

Other factors which will contribute to reducing access to sources of financing for environmental protection include the following:

[66] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (OJ L 375, 31.12.1991,p. 1, as amended; Polish translation: Chapter 15 Volume 002 P. 69, as amended).

- the limit of the 75% of the average EU GDP is exceeded by successive voivodships (this has happened in the case of Mazowieckie Voivodship and now concerns Wielkopolskie and Dolnośląskie voivodships, thus, resulting in the limitation of the allocation of EU resources);
- the EU prefers loans and other returnable instruments to grants in the next EU financial perspective,
- the debt of self-governmental units can make it difficult or even impossible to use EU resources requiring matching funds.

Opportunities for mobilising resources for environmental protection should also be sought in overcoming the "trap of institutional weakness" by focusing on the improved performance of instruments for environmental protection, including, in particular, the environmental and governance system. This will involve efforts to combat the grey area in waste management and the illegal extraction of minerals, as well as the strengthening of the Inspectorate for Environmental Protection in the scope of both inspections and monitoring of the environment, including the provision of the Inspectorate with relevant resources for carrying out inspection tasks relating to the implementation of the Nitrogen Directive[67]. The full implementation of reform of water management will be of key importance for the execution of environmental investments. In light of the limited availability of resources for the implementation of the objectives of PEP2030, it will be important to ensure the consistency of the public expenditures in other areas with the objectives of PEP2030 (sustainability proofing) and to implement the principle that public resources should not be used to support actions and projects inconsistent with the objectives of PEP2030.

5. Objectives of PEP2030

In the system of the strategic documents, the PEP2030 specifies further and operationalises the provisions of the SOR. Thus, the main objective of the PEP2030, i.e. *Developing the environmental potential for citizens and undertakings,* was taken directly from the SOR. The specific objectives of the PEP2030 were laid down in response to the most important trends identified in the diagnosis in the area of the environment in a manner enabling the harmonisation of the issues related to environmental protection with the economic and social needs.

The achievement of the environmental objectives will be supported by horizontal objectives.

[67] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources.

The most important trends in the area of environmental protection

The increasingly significant adverse impact of the environment on human health

The growing competition for natural resources

The growing pressures on ecosystems

The growing effects of climate change

The depletion of the existing sources of financing for environmental protection

Main objective: ***Developing the environmental potential for citizens and undertakings (SOR)***

Specific objective I: ***Environment and health.*** *Improving the quality of the environment and environmental safety*

Specific objective II: ***Environment and economy.*** *Sustainable management of environmental resources*

Specific objective III: ***Environment and climate***. *Climate change mitigation and adaptation to them along with managing the risk of natural disasters*

Horizontal objectives: ***Environment and education***. *Developing the environmental competences of the public (knowledge, skills and attitudes)*
Environment and administration. *Improving the functioning efficiency of environmental protection instruments*

6. Performance indicators for the objectives of PEP2030

The effectiveness of the implementation of PEP2030 will be monitored with a set of indicators based on data from reliable sources, in particular, the State Environmental Monitoring System, Statistics Poland (GUS) and the General Inspectorate for Environmental Protection. The indicators enable the quantification of the selected objectives by determining the existing and target values of the particular parameters of the environment.

Main objective. Developing the environmental potential for citizens and undertakings (SOR)				
Indicator	Unit of measure	Baseline value[68]	Intermediate value (2020)	Target value (2030)
Environmental Performance Index[69] (Yale University, Columbia University, World Economic Forum)	Point	64.11 (2018)	>65	>70
Objective: Environment and health. Improving the quality of the environment and environmental safety				
The ratio between the number of bodies of surface water in good status and the total number of bodies of water[70] a) rivers and dam reservoirs, b) lakes (PMŚ)	%	a) 20% good status, 80% bad status, b) 37% good status, 63% bad status, (2015)	Improved status[71]	Improved status relative to the intermediate value[72]
The ratio between the number of bodies of groundwater in good chemical	%	91.9 (2016)	Improved status[73]	Improved status relative to the

[68] The value of the indicator for the last year available.

[69] *Environmental Performance Index*, https://epi.envirocenter.yale.edu/. The Environmental Performance Index consists of a number of metrics of environmental health (e.g. air quality, water quality, the impact of the environment on human health) and ecosystem health and vitality (e.g. wastewater treatment, nitrate pollution, change in forest cover, fisheries, species protection, greenhouse gas emission level). The maximum value of the index is 100 and means high environmental performance.

[70] The full name of the indicator: the ratio between the number of bodies of surface water in good status monitored as part of surveillance monitoring over last 6 years and the total number of bodies of surface water monitored as part of surveillance monitoring over last 6 years in a given category of waters: a) for the assessed water bodies of rivers and dam reservoirs; b) for the assessed water bodies of lakes.

[71] The increase, relative to the values in the base year, of the percentage values defining the ratio between the number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) in good status, monitored as part of surveillance monitoring over last 6 years, and the total number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) monitored as part of surveillance monitoring over last 6 years, with a simultaneous decrease of the percentage values defining the ratio between the number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) in bad status monitored as part of surveillance monitoring over last 6 years and the total number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) monitored as part of surveillance monitoring over last 6 years. In light of proposed changes, with respect to the base year, in the manner of assessment of the status of surface waters and the review of the WFD carried out by the European Commission, it is impossible to give a precise percentage value of the indicator.

[72] The increase, relative to the intermediate values (2020), of the percentage values defining the ratio between the number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) in good status monitored as part of surveillance monitoring over last 6 years and the total number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) monitored as part of surveillance monitoring over last 6 years, with a simultaneous decrease of the percentage values defining the ratio between the number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) in bad status monitored as part of surveillance monitoring over last 6 years and the total number of bodies of surface water in a given category (rivers and dam reservoirs or lakes) monitored as part of surveillance monitoring over last 6 years. In light of proposed changes, with respect to the base year, in the manner of assessment of the status of surface waters and the review of the WFD carried out by the European Commission, it is impossible to give a precise percentage value of the indicator.

[73] The increase, relative to the values in the base year, of the percentage values defining the ratio between the number of bodies of groundwater in good chemical status and the total number of bodies of water surveyed as part of surveillance monitoring.

status and the total number of bodies of surveyed as part of surveillance monitoring (PMŚ)				intermediate value[74]
The population using sewage systems as percentage of the total population[75] (GUS)	%	70.5[76] (2017)	73.0	85.0
Wastewater treatment plant users as percentage of the population (GUS)	%	73.6[77] (2017)	75.0	86.0
Air quality index[78] (PMŚ)	%	76.09 (2016)	21.7	0
Value of the National Target for Exposure to PM 2.5 (PMŚ)	µg/m^3	18	18	18
Number of agglomerations and cities with more than 100,000 inhabitants where the average exposure value does not exceed the concentration ceiling for exposure to PM 2.5 at a level of 20 µg/m^3 (PMŚ)	Number	11	20	30
Degraded areas as percentage of the total surface of the country (GUS)	%	0.02 (2017)	≤0.02	≤0.02
Objective: Environment and economy. Sustainable management of environmental resources				
National forest cover (GUS)	%	29.6 (2017)	30	31
Progress towards sustainable forest management[79] (GUS)	%	95.7 (2017)	96	99
Percentage of Natura 2000 sites having management planning instruments[80] (GDOŚ)	%	50.76 (2016)	75	100
Farmland Bird Index (FBI) 2000 = 100% (PMŚ)	%	79.98 (2017)	90	90

[74] The increase, relative to the intermediate values (2020), of the percentage values defining the ratio between the number of bodies of groundwater in good chemical status and the total number of bodies of water surveyed as part of surveillance monitoring.

[75] The indicator does not apply to individual wastewater treatment installations.

[76] In cities: 90.2%, in rural areas: 40.8%. Source: Local Data Bank, Statistics Poland. Housing and municipal economy → Network systems → Installation users as percentage of the total population.

[77] The Voivodships where the value of the indicator is less than 70% include Lubelskie, Łódzkie, Małopolskie, Podlaskie and Świętokrzyskie. The value of the indicator for cities is 94.5% and for rural areas it is 42%. Local Data Bank, Statistics Poland. State and protection of the environment → Municipal wastewater treatment → Wastewater treatment plant users as percentage of the total population.

[78] Air quality index = (the number of zones with exceedances of the limit value for PM10/46 zones where measurements are made) · 100%.

[79] The indicator defines the surface area of forests which have approved management documentation as percentage of the total surface area of forestland. In order to calculate the indicator, it is assumed that 100% of forests managed by State Forests and national parks have approved forest managed plans.

[80] The indicator is expressed by the ratio between the number of Natura 2000 sites for which conservation measures plans and conservation plans have been established and the total number of Natura 2000 sites designated in Poland's territory.

Levels of recycling and preparing for re-use and recycling of paper, metals, plastics and glass from municipal waste[81] (MŚ)	% by weight	28 (2016)	50	-
Levels of preparing for re-use and recycling of municipal waste[82] (MŚ)	% by weight	-	-	60
Number of Polish environmental technologies verified within the Environmental Technology Verification System (MŚ)	Number	2 (2018)	5	10
Objective: Environment and climate. Climate change mitigation and adaptation to them along with managing the risk of natural disasters				
Capacity of small retention facilities (Ministry of Maritime Economy and Inland Navigation)	dam^3	826 034.2 (2016)	832 000	844 836
Percentage of residents of Polish cities covered by urban adaptation plans (MŚ)	%	0 (2015)	30	60
Surface area of parks, green areas and housing estate-based greenery in cities (GUS)	ha	49 954.8 (2017)	Diminished reduction rate	Increased relative to the baseline value of the indicator
Surface area of parks, green areas and housing estate-based greenery in cities as percentage of their total surface area (GUS)	%	2.3[83] (2017)	Not less than 2.0 in each Voivodship	More than 2.3 in each Voivodship
Change rate of greenhouse gas emissions (1990=100) (KOBiZE)		84.9 (2016)	82.9[84]	77.1[85]
Length of the shoreline protected in a year against erosion and flood from the sea (Ministry of Maritime Economy and Inland Navigation)	km	7,6 (2016)	Not less than 7.0	Not less than 8.0

[81] Given the fact that the European Union has adopted amendments to 6 Directives relating to waste management as part of the so-called Waste Package and then the need to transpose these regulations, this indicator will be replaced by another one, i.e. the levels of preparing for re-use and recycling of municipal waste.

[82] Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (OJ L 150, 14.06.2018, p. 109) adopted new targets to be achieved by 2025, i.e. levels of preparing for re-use and recycling of municipal waste. In light of this, there will not be the baseline value and the value for 2020.

[83] The national average (the Voivodships where the surface area of parks, green areas and housing estate-based greenery in cities is 2% or less of their total surface area: Opolskie, Podkarpackie, Podlaskie, Świętokrzyskie and Zachodniopomorskie).

[84] On the basis of the emission projections contained in the *Seventh National Communication* and *the Third Biennial Report* (NC7-BR3 2017).

[85] On the basis of the emission projections contained in the *Seventh National Communication* and *the Third Biennial Report* (NC7-BR3 2017).

7. Directions of interventions of PEP2030

The directions of interventions include all the thematic areas of environmental policy. They represent clusters of actions and strategic projects contributing to the achievement of the specific objectives of PEP2030.

Specific objectives	**Directions of intervention**
Environment and health. Improving the quality of the environment and environmental safety	Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters
	Elimination of sources of air pollutant emissions or a substantial reduction of their impacts
	Protection of the land surface, including soils
	Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection
Environment and economy. Sustainable management of environmental resources	Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity
	Supporting multifunctional, sustained and sustainable forest management
	Waste management towards a circular economy
	Managing geological resources by developing and implementing a Raw Materials Policy
	Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT)
Environment and climate. Climate change mitigation and adaptation to them along with managing the risk of natural disasters	Climate change mitigation
	Adaptation to climate change and the management of the risk of natural disasters
Horizontal objectives	**Directions of interventions**
Environment and education. Developing the environmental competences of the public (knowledge, skills and attitudes)	Environmental education, including the shaping of sustainable consumption patterns
Environment and administration. Improving the functioning efficiency of environmental protection instruments	Improving the environmental control and management systems as well as streamlining the financing system

1 Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters

Given the need to achieve good water status, the predicted climate change and the growing human impact on the environment, the quality and availability of the resources of surface waters and groundwater will be some of the most important factors affecting the socio-economic development of the country. At the same time, water management must comply with the principle of recovery of the costs of water services, taking into account the "polluter pays" principle.

The intervention in this area will primarily consist in the implementation of a uniform basin-based water management structure, which will be responsible for all the water related actions, above all for flood and drought protection, as well as for the supply of water of adequate quality and wastewater collection. The following will be continued: support for the implementation of projects to improve the quality of surface waters and groundwater, in compliance with the requirements of the EU Directives, and the construction and modernisation of wastewater treatment plants on the basis of the updated *National Municipal Wastewater Treatment Programme* in agglomerations.

A large emphasis will be placed on the preparation and updating of strategic/planning documents on water management and the monitoring to be carried out for the purposes of both acquiring the knowledge necessary for sustainable water management and preparing updated river basin management plans for the water cycle 2022–2027.

The updated river basin management plans will include measures for the particular bodies of surface water and groundwater and protected areas which should be implemented to improve or maintain good status of waters. The units responsible for their implementation and the deadlines for their implementation will also be specified. The documents will also lay down the investment projects of importance/strategic status for the country which, despite their impact on the status of waters, should be implemented in light of the public priority and sustainable development.

The actions to shape landscapes contributing to water retention and protection of marine waters will also gain in importance. On the basis of amended legal acts and strategic documents, measures will be taken to achieve good status of the marine environment by 2020, with regard to eleven quality indicators determining good status of the marine environment, in accordance with the requirements of the MSFD.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 2, 6, 11, 12, 13, 14 and 15.

Examples from Voivodships:

The preparation of the programme to build individual municipal wastewater treatment systems

Project objective: The correct management of water resources by saving them and preserving them in as good status as possible.

Expected effects: The project will contribute to the elimination of untight septic tanks and their replacement by individual municipal wastewater treatment systems and improve the quality of surface waters and groundwater and the health of inhabitants.

Project description: The settlement system in Świętokrzyskie Voivodship is characterised by very varied density, from a compact building structure to a very dispersed one. The programme to build individual municipal wastewater treatment systems will be one of the instruments to address wastewater management problems in Świętokrzyskie Voivodship. The programme will include the concept of the construction of individual wastewater treatment systems, the project selection criteria, along with a list of proposed investment projects broken down for the specific years, the manner of managing projects and the financial instruments for the implementation of these investment projects.

Project implementation: 2018-2030 ***Estimated cost:*** **PLN 351.5 million**

2 Elimination of sources of air pollutant emissions or a substantial reduction of their impacts

Air protection is very important for protecting the environment protection and ensuring human health. Air pollution contributes to shortening the average duration of human life and enhancing treatment costs. The most important challenges in this respect include the elimination of so-called low emissions, as well as the correct spatial planning and the protection of aeration corridors and wedges.

PEP2030 provides for the implementation of a package of measures to restore good air quality, also including the sources of low emissions, and the fulfilment of the recommendations for the Council of Ministers laid down in the *Clean Air Programme*. Correctly designed measures to improve air quality also require better cooperation at all the levels of state and self-government administrations. Therefore, the Communes will be provided with substantive support for the preparation of programmes to reduce low emissions (PONE) and for the multi-criteria management of emissions. In order to ensure wider access to current information on air quality and to monitor the effectiveness of measures, the network for measuring air quality will be expanded. It will also be important to support the connection of new users to heating networks, if technically feasible. Particular emphasis

will be placed on the modernisation of existing heating networks and the development of new ones. Moreover, an important complementary action will consist in supporting the use of electricity for heating purposes.

Work will also be carried out to further reduce emissions from road transport. The complementary actions in this area are laid down in *Sustainable Transport Development Strategy until 2030*.

In the area of air protection, work will also be carried out to regulate the issue of odour annoyance.

The actions proposed in PEP2030 complement the fulfilment of Poland's international commitments under the *Convention of Long-Range Transboundary Air Pollution* (*LRTAP)*, Directives of the European Union (CAFE, IED, MCP, NEC) and the BAT conclusions for large combustion plants.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 3, 6, 11, 12, 13, 14 and 15.

Examples from Voivodships:

The implementation of the Air Protection Programme for Małopolskie Voivodship

Project objective: The improvement of air quality in the area of Małopolskie Voivodship. The achievement of the limit values of pollutants in the air.

Expected effects: Raised awareness of the inhabitants of the Małopolskie Voivodship of the ways of reducing emissions, eradicating energy poverty, eliminating low efficiency heating equipment and eliminating the adverse effects of waste burning.

Project description: The Air Protection Programme for Małopolskie Voivodship aims at achieving the limit values of pollutants in the air: PM_{10}, $PM_{2.5}$, benzo(a)pyrene, nitrogen dioxide and ozone. The current Air Protection Programme was adopted by Resolution No XXXII/451/17 of the Assembly of Małopolskie Voivodship of 23 January 2017 amending Resolution No XXXIX/612/09 of the Assembly of Małopolskie Voivodship of 21 December 2009 on the Air Protection Programme for Małopolskie Voivodship, as amended by Resolution No VI/70/11 of 28 February 2011 and Resolution No XLII/662/13 of 30 September 2013 (OJ L of Małopolskie Voivodship of 2017, Item 811). As part of the implementation of the Air Protection Programme for Małopolskie Voivodship, the project LIFE-IP MALOPOLSKA was established, called "The Implementation of the Air Protection Programme for Małopolskie Voivodship – Małopolska in Healthy Atmosphere", involving 62 partners, including 55 Communes, and coordinated by Małopolskie Voivodship. The main actions of the project are based on educational activities, i.e., among others, the creation of a network of eco-advisers in Communes, consulting on the methods for reducing pollutant emissions or the establishment of the Competence Centre at the regional level. The implementation of the project includes assistance in mobilising co-financing for the replacement of old solid fuel-fired boilers, thermal modernisation of buildings, the construction of systems of heating networks or the assembly of installations of renewable energy installations.

Estimated cost: **5 PLN billion**
Project implementation: 2015–2023 (including PLN 70 million for the implementation of the LIFE-IP project)

Examples from Voivodships:

A package of investments projects for air protection in the area of Mazowieckie Voivodship

Project objective: The improvement of the living conditions of the local communities by implementing actions to achieve the limit and target values in the air.

Expected effects: The reduction of low emissions generated by the heating of buildings.

Project description: In order to achieve air quality standards, the Assembly of Mazowieckie Voivodship has adopted resolutions on air protection programmes and a resolution on the restrictions and prohibitions for the operation of installations where fuel combustion takes place, the so-called Anti-Smog Resolution. Analyses carried out under those resolutions have demonstrated that the main cause of exceedances are low surface emissions related to the heating of residential buildings and public utility buildings.

In order to improve air quality, many municipalities treat investment projects to reduce surface emissions as priority tasks. Due to this, the inhabitants of areas exposed to exceedances will be able to breathe the air which meets the required standards. Projects are or will be proposed by municipalities themselves or by enterprises carrying out tasks in the area of air protection in the areas of the municipalities of Mazowieckie Voivodship.

Project implementation: 2017–2027 ***Estimated cost:*** **PLN 11 billion**

3 Protection of the land surface, including soils

Among the many identified threats to soils, the issue of soil contamination and the problems of loss of organic matter and erosion are of high priority from the point of view of environmental protection in Poland.

Soil is the basic production resource in agriculture; therefore, a good condition of Polish soils provides the potential for high-quality food production. The protection of the productivity of agricultural and forest soils will primarily consist in preventing the exclusion of soils from agricultural and forestry uses, the prevention of soil erosion and loss of organic matter in soils. The protection of soils against erosion should consist e.g. in the maintenance of midfield clusters of trees and shrubs or the use of a correct direction of tillage, perpendicularly to the water runoff direction.

The contamination of soil and earth with substances having an adverse impact on human health and the state of the environment results from the implementation of different types of economic activity. It also affects the functions performed on the land surface, including the manner of land development.

PEP2030 proposes actions to identify contaminated soils and to support their remediation. It will consist in carrying out actions in contaminated areas to eliminate or reduce the quantities of harmful substances, their control and the limitation of their spread.

From the point of view of soil protection, the principle of precedence of space reuse in investment processes is also important, as it serves, among others, to limit sealing of the surface which prevents the penetration of precipitation water and air. Soil sealing is caused by changes of the hitherto functions of soils. Key significance for soil protection should be attributed to the principles of spatial planning which enables reuse of post-industrial areas.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 3, 6, 12 and 15.

4 Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection

The development of road infrastructure and the growing number of its users increase noise annoyance. Noise is a stress factor and poses a severe threat to human health. It also affects animal welfare.

As a result of the implementation of actions proposed in PEP2030, the current problems related to the determination of the optimum acoustic environmental quality standards from the point of view the interest of the environment and sustainable development will be diagnosed. If such a need is demonstrated by the results of the diagnosis, the limit values of environmental noise will be changed.

The emissions of artificially generated electromagnetic fields (EMFs) in the environment remain at a very low level, representing barely several percent of the limit value. However, given the continuously growing number of EMF sources, mainly base stations of cellular telephony systems, and emerging concerns of the public about their potential health impact, the EMF levels in the environment will continue to be monitored.

Moreover, the proposed actions and tasks will ensure access to the current results of research on the potential effects of electromagnetic fields and instruments applied to ensure protection. This, in turn, will make it possible to define the actions necessary to ensure an adequate level of protection against the potential effects of electromagnetic fields. The qualifications of the staff responsible for the protection of the environment against noise and electromagnetic fields will be improved.

An important element of environmental safety is also ensuring nuclear safety and radiological protection, in particular, in the context of plans to build nuclear power plants, meaning the absence of the threat of the adverse effects of ionising radiation to the environment and society. The tasks

implemented in this area will aim at strengthening the effectiveness of state authorities in the exercise of supervision over safe use of ionising radiation and the preparation and construction of a new storage site for low- and intermediate-level radioactive waste.

In light of the fact that the use of products of advanced biotechnology in many areas of everyday life can pose a danger to human life and to the natural environment, the task of the state administration is primarily to regulate the conditions for carrying out activities involving genetically modified organisms.

The actions under the Marine Water Monitoring Programme will be continued and supported, since the underground noise level in the Baltic Sea can potentially have adverse impacts on the mammals and fish living in it.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 3, 12, 14 and 15.

5 Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity

Poland is characterised by valuable natural resources, including large biodiversity. Nevertheless, action needs to be taken against factors and phenomena which have an adverse impact on the condition of biodiversity. These include, in particular: transformation and degradation of habitats, land-use change, excessive exploitation of natural resources, environmental pollution or the spread of invasive alien species. Biodiversity is a heritage and its preservation constitute the condition for ensuring access of the future generations to natural riches. Disturbance of the stability of ecosystems can lead to multi-dimensional adverse impacts on the economy and society.

The effective protection of biodiversity and landscape resources requires an objective assessment and verification of protected areas. The actions proposed for implementation as part of PEP2030 will primarily aim at halting biodiversity loss, the protection of habitats and valuable landscapes, and the combating of related crimes. Support will be provided to projects to preserve biodiversity and to develop green and blue infrastructure, as well as to projects for in-situ or ex-situ conservation of endangered species and natural habitats. The conservation of marine nature will be ensured as part of the Natura 2000 network, covering marine areas, species-specific conservation and conservation under international agreements.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 6, 11, 14 and 15.

Examples from Voivodships:

The conservation of biological, landscape and geological diversity in Świętokrzyskie Voivodship

Project objective: The preservation or restoration of a favourable status of habitats and species, the combating of threats to biological and geological diversity, as well as the management of natural and landscape resources in both protected areas and those used for economic purposes.

Expected effects: The deepening and provision of knowledge of the natural resources and landscape values of Świętokrzyskie Voivodship.

Project description: Świętokrzyskie Voivodship has the largest share in terms of surface of legally protected areas in Poland. These areas represent a valuable regional potential for tourism and recreation; however, they need efforts to preserve their natural values. The most important nature conservation problem is now degradation of natural and semi-natural habitats, which may be partly caused by the predicted climate warming, i.e. migrations of species, including invasive alien ones, drying up and shrinking wetlands, the growing number of extreme events – floods and droughts, as well as change in the water regime affecting the growing period.

Project implementation: until 2030 ***Estimated cost:*** **PLN 6 million**

Examples from Voivodships:

Renaturalisation of the inland delta of the Nida River

Project objective: The improvement of the water conditions in the inland delta of the Nida River which will contribute to restoring the unique natural values within the meaning of the Habitats[86] and Birds[87] Directives.

Expected effects: The restoration of a favourable status of meadow habitats, including the creation of the optimum habitat conditions for selected birds, as well as the restoration or restitution of the populations of selected species subject to strict species-specific conservation.

Project description: The area of the inland delta of the Nida River has been chosen as the project implementation site in light of a significant threat posed to the habitats situated here by drying up and regulation of the middle section of the Nida valley, as a result of incorrectly carried out land amelioration works. The abandonment of the use of inland delta of the Nida River for agricultural and grazing purposes triggered succession processes and caused an unfavourable change to the

[86] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.07.1992, p. 7, as amended; OJ L Polish translation, Chapter 15 Volume 002 P. 102, as amended).
[87] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.01.2010, p. 7, as amended).

composition of habitats, leading, at the same time, to the withdrawal of plant species typical of the habitats. The drying up of the area and the waning of local reservoirs cause the loss of bird breeding habitats. In turn, excessive water stagnation and swamp formation lead to distortions of riparian forests and their transformation into alder forests. The maintenance of habitat variability requires the launch of active conservation measures, consisting in the restoration of the natural water regime as well as the restoration and maintenance of previous uses, such as grazing and mowing.

Project implementation: 2017–2024 ***Estimated cost:*** **EUR 5 million**

6 Supporting multifunctional, sustained and sustainable forest management

The implementation of multi-functional, sustained and sustainable forest management enables the preservation of an equilibrium between the functions provided by forests: nature conservation related, social and economic ones. At the same time, it creates the conditions for the preservation of natural riches, along with their use to meet social and economic needs. Forests are also a place where the hunting economy is implemented.

Forests represent a large potential for climate change mitigation, which can be enhanced by carrying out further measures in the forest sector. Such measures also contribute to enhancing biodiversity. As part of the actions proposed for implementation in the *National Environmental Policy*, it is envisaged that a system will be set up to increase carbon sequestration. The system of additional actions related to sustainable forest management provides, among others, for the preparation of multiannual programmes to change the species composition of tree-stands and programmes to shape their multi-storey structure.

The implementation of forest management tasks will contribute to making use of the production capacity of forests to systematically increase wood supply, while, at the same time, complying with the principles of the protection of natural wealth and making forests open to the public.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 6, 13 and 15.

7 Waste management towards a circular economy

The actions to fully implement the waste hierarchy in Poland correspond with the concept of a circular economy. In accordance with its assumptions, first of all, it is necessary to ensure the implementation of actions which are at the highest levels of the waste hierarchy, i.e. prevent its generation and create the indispensable infrastructure for separate waste collection at source so as to ensure their preparing for reuse or effective recycling. These actions will support climate protection by reducing greenhouse gas emissions from the waste management sector, above all from waste landfills.

The fundamental instrument implementing PEP2030 in this area is the *National Waste Management Plan 2022 (*KPGO 2022). It has been prepared to achieve waste management targets, implement the waste hierarchy and the principles of self-sufficiency and proximity, as well as to create and maintain an integrated and adequate network of waste management installations. KPGO 2022 sets out the directions of actions to prevent waste generation and to shape the waste management system. These directions are reflected in Voivodship water management plans prepared at the regional level (including investment plans).

First of all, support will be provided to investment projects related to waste recycling and treatment and the use of secondary raw materials, projects to implement circular waste management at the local level and research and development work on innovative environmental technologies related to the use of secondary raw materials and waste management, implemented, among others, by entities making up the system of science and higher education and their consortia with industry.

In order to adopt the waste package, its provisions will be transposed into the Polish legal order, including an update of KPGO 2022.

Among others, the purpose of the support will be to eliminate gaps in the system of waste collection, transport, treatment and disposal, in particular, plastic waste, so as to prevent its penetration from land into waters, including marine waters. The prevention of pollution of waters, including marine waters, with plastic waste, will also be supported by the modernisation of municipal wastewater treatment plants with a view to fully implementing in them the approach of a circular economy.

Support will also be provided to educational actions aimed at reducing the quantities of plastics penetrating into marine waters and actions to modernise port-based waste receiving equipment in order to ensure that waste generated on board ships or collected at sea (e.g. old fishing nets) is taken to land and properly managed (segregation, recycling, disposal).

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 6, 11, 12 and 14.

8 Managing geological resources by developing and implementing a Raw Materials Policy

In light of the existing knowledge and experience related to raw materials and the current situation on the markets, it can be said that the present raw materials management system makes it difficult to manage them effectively. The actions necessary to systematise and improve the tools now in place, and above all to integrate measures, go beyond the competence of one area of state administration and, as a result, require strict cooperation among all the Ministries.

The construction of an efficient and effective system for governance and management of all the types of mineral raw materials, including secondary materials, in the whole value chain and of the resources in Poland's possession requires the development of consistent national policy, i.e. a *Raw Materials Policy*, analysing all the aspects of the interdisciplinary sector of the economy, which the raw materials economy is, and indicating the most important problems and needs in this respect. The *Raw Materials Policy* will also make it possible to work out effective tools for sustainable management of resources of raw materials at the national level, taking into account the interests of industry. This will increase the stability of supply of raw materials used by industry on the national market and also make it possible to increase the volume of exports.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 7 and 12.

9 Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT)

The economic trends in highly developed countries indicate that the building of a competitive advantage based on the results of research and development work and scientific and technological progress can guarantee sustained sustainable development. The high innovativeness of environmental technologies improves the competitiveness of economies and minimises the adverse impact of human activities on the environment. At the same time, Poland's low position in the European eco-innovation ranking indicates the presence of barriers to the implementation of innovations in this country.

In its area related to the implementation of eco-innovations, PEP2030 proposes actions to promote Polish environmental technologies domestically and abroad, also in the context of the process of internalisation of innovative enterprises. The Environmental Technology Verification (ETV) system, intended to provide independent and reliable information on innovative environmental technologies by verifying whether verification statements presented by the authors and producers of technologies are complete, reliable and based on the credible results of testing, will be implemented and promoted among entrepreneurs and the public administration authorities. As a result of this, a new product is distinct on the market and gains a competitive advantage, and, thus, the chances of its implementation increase. Support will also be provided to research and development work in the

area of innovative environmental technologies, carried out e.g. by the entities making up the system of science and higher education and their consortia with industry. Efforts will be taken to ensure wider use of the ETV system by the public finance sector in green public procurement.

At the same time, environmental policy provides for substantive support for entrepreneurs in the implementation of investment projects to align their installations with the BAT Conclusions.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 7, 9 and 12.

10 Climate change mitigation

The effects of climate change which have occurred over recent decades, in particular, the growing average annual temperature and the frequency and intensity of extreme weather events, have become stronger. As a result, they pose a threat to social and economic development and natural resources. It is, therefore, necessary, to take further actions to reduce greenhouse gas emissions (mitigation) and also, in parallel, actions to adapt to the predicted effects of climate change (adaptation).

In the scope of actions to reduce GHG emissions, as priorities PEP2030 sets out the implementation of:

- the EU climate policy goals until 2030,
- the provisions of the *Paris Agreement*.

The EU undertook to reduce GHG emissions by 40% relative to their level in 1990, with a breakdown into the sectors covered by the EU emissions trading system (EU ETS) and the other, so-called non-ETS sectors (with the target of –7% relative to 2005 laid down for Poland in the ESR). In light of this, it is necessary to define an approach to the reduction of greenhouse gas emissions – in particular, those from the non-ETS sectors – which will assess the possible reduction potential of the individual sectors and identify specific actions and their effect on the reduction of GHG emissions until 2030.

As part of the implementation of the *Paris Agreement*, which provides that the reduction of GHG emissions should take into account the economic specificity of a given country, actions will be taken to effectively reduce the GHG concentrations in the atmosphere, taking into account the actions in the sectors of the economy which are responsible for GHG emissions. In light of this, actions will be launched, among others, to introduce innovative technologies, to use available energy sources, including geothermal energy, or to implement the concept of Carbon Forests. Support will be provided, among others, to investments to enhance energy generation from renewable sources. Consideration should also be given to the development of energy storage technologies, using different forms of energy carriers, including storage of electricity, storage of energy in gaseous form, liquid and solid fuels, and the development of hybrid RES installations. Efforts should be taken to ensure the systematic alignment of the level of support with the energy generation and storage costs and with the real needs in the scope of energy acquisition. Support should also take into account the

reduction of external costs. Moreover, Poland has a large potential for reducing the CO_2 concentration in the atmosphere, among others, by intensifying actions to store carbon in wooden products and developing energy-efficient wooden building industry.

The actions taken to achieve the EU climate policy goals and the *Paris Agreement* will be consistent and often the same, since they will be guided by the same reduction target.

Work will also be carried out to draft a policy on the reduction of greenhouse gas emissions from the non-ETS sectors until 2030; this will involve the need to achieve the reduction target under the ESR. The key actions in this scope will include an analysis to estimate the potential for the reduction of greenhouse gas emissions in the particular non-ETS sectors until 2030 and the identification of actions which can be taken in these sectors and the effects of these actions, i.e. their quantified contributions to the reduction of greenhouse gas emissions.

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 2, 11, 13, 14 and 15.

11 Adaptation to climate change and the management of the risk of natural disasters

Another component of climate policy is adaptation to climate change, i.e. the launch of initiatives and the use of measures to reduce the susceptibility of natural and human systems to the arising or expected effects of climate change. Adaptation actions will consist in the preparation and implementation of strategic/planning documents on water management, support for the preparation and implementation of plans of adaptation to climate change for urbanised areas, the construction of necessary flood protection infrastructure and small retention facilities (where it is justified in economic, environmental and social terms), renaturalisation of rivers and their valleys, renaturalisation of wetlands and the investment projects to protect the seashore, coupled with renaturalisation of selected parts of the seashore (wherever it is justified in economic, environmental and social terms) and the development of green and blue infrastructure in urbanised areas. The actions will also deal with rainwater management in urbanised areas by different forms and retention and developing greenery infrastructure and limiting the occupation of land and soil sealing. Special attention should also be paid to land development and the conditions for building up of areas which are vulnerable to floods, inundations and the erosion of the seacoast. The technical zone along the seashore is included in the areas of particularly flood hazard. Bearing these factors in mind, the actions need to focus on the protection of particularly sensitive areas, including the dune belt and landslide areas, against excessive and unjustified investment pressures.

Adaptation actions will also be implemented in rural areas. Their purpose will be, in particular, to enhance the resilience of the agricultural landscape to climate change and the protection of agricultural production. Midfield clusters of trees and shrubs (especially, those of a unique character in natural or cultural terms) will be protected and developed, and new roadside plantings will be carried out, dominated by native shrubs with abundant foliage, particularly, in regions which are

most vulnerable to drought and desertification, with a low share of forest cover. These actions will require cooperation between road managers and farmers.

There is no doubt that climate change has also a territorial dimension. A special climate change-related threat to the coastal zone, and in particular to port cities and costal localities, is posed by flood from the sea. The enhanced protection against flood from the Baltic Sea and marine erosion will require the implementation of proposed protection actions and seashore monitoring. Among others, these actions will consist in artificial shore replenishment, the construction of stormwater protection embankments, seawalls, groynes and breakwaters or underwater ridges. An important element of the seashore protection will be the implementation of artificial shore replenishment to restore the natural protection system, consisting of shoals, beaches and dunes. These actions are carried out as part of the *Seashore Protection Programme*[88].

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 2, 11, 13, 14 and 15.

12 Environmental education, including the shaping of sustainable consumption patterns

Effective environmental protection requires the involvement of all the citizens. The raising of the environmental awareness of the public and the shaping of the environmental attitudes of the public by promoting the principles of sustained and sustainable development are some of the most important factors which have a positive effect on the current and future state of natural resources (among others, air, water, soil and biodiversity) and on the quality of the ambient environment (among others, in relations to the areas of waste management, energy efficiency, adaptation to progressing climate change and ecosystem processes).

The shaping and raising of the environmental awareness of the inhabitants of Poland are of key importance for the implementation of environmental protection standards. The achievement of environmental quality objectives strictly depends on the level of environmental competences of the public (i.e. its knowledge of the environment, practical skills and environment-friendly motivation to change its attitudes and everyday behaviour).

Environmental education is an important element of the education (from the earliest years of life) aimed at developing society which accepts the interdisciplinary principles of sustained and sustainable development of the country, is able to assess the state of environmental safety and to take action to improve it, as well as one aware of the need to consciously take care of the common cultural and natural heritage.

[88] The Act of 28 March 2003 Establishing the Multiannual Programme "The Seashore Protection Programme" (OJ L of 2016, Item 678).

Environmental education is also a basic condition for a change of public practices towards the model of sustainable consumption. Therefore, there is an important need for reflections on and the moderation of the public discussion on the possibilities of changing lifestyles towards more sustainable ones.

The implementation of comprehensive environmental education includes informal, formal and non-formal education in thematic areas covered by the strategy and support for the implementation of projects related to environmental education. Each of the abovementioned components of environmental education should be implemented using advanced methods and teaching tools, as well as in a dialogue and cooperation with the stakeholders of these actions, including, among others, with scientific institutions, nongovernmental organisations and representatives of local communities.

At the same time, given the horizontal character of the issue and the need to involve many entities and stakeholders in educational activities, PEP2030 provides for the preparation of a strategic action plan for environmental education. This plan will present the implementing framework for the activities of environmental education which will incorporate the contents of all the thematic fields of environmental protection addressed in PEP2030.

Environmental education must be supported by access to reliable sources of the knowledge of the state of the environment.

Actions to provide reliable and up-to-date information on the environment and its state will be implemented, in particular, by carrying out research, observations and assessments of the state of components of the environment as well as the continued building and development of spatial databases.

The use of public procurement to achieve environmental objectives requires not only the adoption of relevant tools in the Act on Public Procurement Law[89], but also the launch of appropriate promotion measures to raise the awareness of purchasers and the representatives of inspection institutions in respect of the existing environmental problems and their significance, as well as the need for and the manner of taking these issues into account as part of tender procedures.

The National Action Plan for Sustainable Public Procurement for 2017–2020 is already the fourth document to provide the basis for the implementation of promotion and education actions in favour of the representatives of purchasing institutions and inspection institutions, serving to popularise the possibilities of taking into account, among others, the environmental aspects in public procurement pursuant to the applicable provisions of the Act on Public Procurement Law[90]. The National Action Plan is an independent document which defines the basic activities of the Public Procurement Office in the areas of sustainable public procurement. Among others, this document specifies the actions proposed for implementation in the period from 2017 to 2020, indicators, quantitative targets to be achieved by 2020, monitoring methods and sources of financing for the proposed actions.

[89] The Act of 29 January 2004 on Public Procurement Law (OJ L of 2018, Item 1986, as amended).
[90] The Act of 29 January 2004 on Public Procurement Law (OJ L of 2018, Item 1986, as amended).

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 2, 4, 6, 11, 12, 13 and 14.

13 Improving the environmental control and management systems as well as streamlining the financing system

The concept of co-governance is important for the correct management of environmental protection. Its implementation enhances the feeling of responsibility on the part of not only the administration but also economic entities, public organisations and single persons for the continuous improvement of the natural elements of the quality of life in Poland. A social dialogue should provide the basis already when new legal regulations are drafted, thus facilitating their later implementation and stimulating positive changes in the behaviour of the public.

Moreover, the application of the regulations on environmental protection depends on the effective control of the activities of the entities obliged to comply with them and, in case of failure to comply with the law, their effective enforcement. At the same time, the obligations to implement, control and enforce the provisions of environmental law have been imposed on both the central and territorial government administration authorities and the authorities at practically all the levels of the administrative division of the country (self-government authorities at the levels of Communes, Counties and Voivodships, including both those of a legislative and executive character). In light of the above, it is necessary to strengthen the existing state control authorities in the area of the environment and to enhance their effectiveness in enforcing the law, including the combating of the grey area. Addressing these challenges, PEP2030 envisages tasks related to the implementation of reform of the Inspectorate for Environmental Protection.

The effective enforcement of the regulations on environmental protection gains in importance, particularly, in light of predictions concerning the national system of revenues from environmental fees and fines. Theses revenues will fall due to the achievements of the individual sectors in the implementation of clean technologies. The risk of the gradual depletion of the existing sources of financing for environmental protection, along with the simultaneous need for the further financing of investment projects in this area, makes it necessary to continuously improve the financing system.

In the context of the constantly occurring environmental challenges and the need to implement increasingly demanding legal standards in the area of the environment into the Polish legal system, there is a need to strengthen the Polish system for financing environmental protection.

Bearing in mind the scarcity of available resources and the scope of the investment activities which must be undertaken, it is necessary to devise tools which would make it possible to:

- carry out a current assessment of the efficiency and effectiveness of the aid provided (using the same indicators for the achievement of the environmental effect), irrespective of which entity participates in the implementation of a project,

- the current identification of all the significant environmental projects implemented with public resources, irrespective of which sources are used and which entity implements a project,
- the current coordination of investment priorities in the area of environmental protection,
- the inclusion of the innovation criterion in the system for the assessment for applications for the award of financing for environmental projects with an investment character,
- the facilitation of the implementation of integrated projects.

In order to improve the system for the management of environmental protection, it is also important to strengthen the expert and analytical support for the Minister responsible for the environment, the Minister responsible for water management, the Minister responsible for fisheries and the Minister responsible for the maritime economy. PEP2030 provides for tasks to improve the functioning of instruments of environmental protection, also understood as the provision of data of adequate quality which are needed to create evidence-based policy[91].

The actions carried out as part of the direction of intervention contribute to the implementation of SDGs 6, 11, 12, 13, 14 and 15.

[91] E.g. the provision of the authorities controlling and monitoring the agricultural activity and the areas where it is carried out with additional tools useful for the more efficient, faster and more precise identification of the actual situation, i.e. access to satellite data and the processing of these data.

8. PEP2030 actions and tasks

Time horizon	Action name/Strategic project	Task name	Area	Entity in charge[92]
Detailed objective: Environment and health. Improving the quality of environment and ecological safety (I)				
Direction of intervention: Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters (I.1)				
until 2020	1. Creation and development of a homogeneous structure for water management in a catchment area-based system, responsible for all actions related to water, including primarily those related to protection against floods and droughts (SOR)	1. Issuance of executive regulations to implement efficient catchment area management in water management	legislation	minister responsible for water management
		2. Organisation of units forming PGW WP	other	PGW WP
until 2025		3. Evaluation of water management reform and introduction of necessary corrections	analysis	minister responsible for water management
until 2020	2. Creation of legal and financial mechanisms favouring rational use of water resources and implementation of water-saving technologies (SOR)	1. Supporting the performance of actions related to rational management of water resources	financing	system of environmental protection funds
until 2020	3. Construction and modernisation of wastewater treatment plants based on an updated National Municipal Wastewater Treatment Programme (AKPOŚK) (SOR)	1. Monitoring progress in the implementation of AKPOŚK	analysis	minister responsible for water management PGW WP
		2. Supporting projects related to water and sewage management, implemented in urban agglomerations of at least 10,000 PE, as part of action 2.3. POIŚ	financing	NFOŚiGW
		3. Supporting projects related to water and sewage management, implemented in more developed regions in urban agglomerations of 2 000 PE to 10 000 PE, as part of	financing	NFOŚiGW

[92] If several entities in charge are listed, the first mentioned entity is the task coordinator, meaning the leading entity. The remaining ones are entities cooperating during implementation of the task.

		action 2.3. POIŚ		
		4. Supporting the execution of undertakings intended to improve the quality of surface and groundwater according to the requirements of directives governing the treatment of municipal wastewater	financing	system of environmental protection funds
		5. Supporting actions related to improving the condition of surface and groundwater in Poland via water and sewage investments outside the country (in the catchment area of the Bug River)	financing	NFOŚiGW
until 2021		6. Implementation of AKPOŚK	investments	local governments[93]
until 2030	4. Continuing the construction and modernisation of wastewater treatment plants based on an updated National Municipal Wastewater Treatment Programme	1. Supporting the execution of undertakings intended to improve the quality of surface and groundwater according to the requirements of directives governing the treatment of municipal wastewater	financing	system of environmental protection funds
		2. Supporting actions related to improving the condition of surface and groundwater in Poland via water and sewage investments outside the country (in the catchment area of the Bug River)	financing	NFOŚiGW
		3. Supporting modernisation of municipal wastewater treatment plants in terms of full implementation of the circular economy approach	financing	NFOŚiGW
until 2020 / continuously	5. Implementation of the 2nd update of water management plans in catchment areas and an update of the national water-environment programme along with execution of work for the needs of another update of the plans in 2021 (SOR)	1. Performing the studies and assessment of water condition as part of National Environmental Monitoring, including a collective assessment of the status of uniform surface water parts for the needs of preparing a water management plan for the 2022–2027 water cycle	analysis	GIOŚ
		2. Review and verification of methodologies for demarcating heavily modified and artificial water parts with preliminary and final demarcation	analysis	PGW WP
		3. Identification of pressures in water regions and catchment areas	analysis	PGW WP
		4. Analysis of significant human impact with an assessment of its influence on water status and an evaluation of the risk of not fulfilling environmental objectives	analysis	PGW WP

[93] Local governments pursuant to article 7 item 1 point 3 of the Municipal Government Act of 8 March 1990 (OJ L of 2019, item 506, as amended).

		5. Review of important problems of water management in catchment areas along with the performance of public consultation	analysis	PGW WP
		6. Review of registers of protected areas[94]	analysis	PGW WP GIOŚ GDOŚ RDOŚ
		7. Establishing environmental objectives and preparing a register of lists of protected areas[95]	analysis	PGW WP GIOŚ GDOŚ RDOŚ
		8. Assessing progress in the implementation of work programmes	analysis	minister responsible for water management PGW WP
		9. Development of a national surface water rehabilitation programme	programming	PGW WP
		10. Analysing the reimbursement of expenses for water services along with a development forecast for water regions and catchment areas along with an analysis of the reimbursement of environmental and resource-based costs in water regions and catchment areas	analysis	PGW WP
		11. 2nd update of water management plans in catchment areas	programming	minister responsible for water management PGW WP
until 2020		12. Supporting projects related to the preparation and updating of strategic/planning documents in terms of water management as part of action 2.1. POIŚ	financing	NFOŚiGW
until 2020		13. Enhancement of water monitoring in terms of procedures assuring and controlling the quality of measurements and assessments of surface water status, as well as research, measurement and computer infrastructure	investments/ analysis	GIOŚ
until 2020		14. Supporting projects as part of action 2.1. of POIŚ	financing	NFOŚiGW

[94] Indicated in article 317 item 4 point 1–5 of the Water Law Act of 20 July 2017 (OJ L of 2018 item 2268, as amended).
[95] Indicated in article 317 item 4 point 1–5 of the Water Law Act of 20 July 2017 (OJ L of 2018 item 2268, as amended).

		involving enhancement of water monitoring in terms of procedures assuring and controlling the quality of measurements and assessments of surface water status, as well as research, measurement and computer infrastructure		
until 2020		15. Development of a surface water monitoring programme for the 2022–2027 water cycle	programming	GIOŚ
until 2021		16. Execution of actions listed in aPWŚK	investments/other	in compliance with z aPWŚK
until 2021		17. Monitoring of actions listed in aPGW/aPWŚK	analysis	minister responsible for water management
until 2030 / continuously	6. Implementation of the 2nd update of water management plans in catchment areas and an update of the national water-environment programme along with execution of work for the needs of another (3rd) update of these documents in 2027 (SOR)	1. Performing the studies and assessment of water condition as part of National Environmental Monitoring, including a collective assessment of the status of uniform surface water parts for the needs of preparing a water management plan for the 3rd water cycle (after 2027)	analysis	GIOŚ
		2. Review and verification of methodologies for demarcating heavily modified and artificial water parts with preliminary and final demarcation	other	PGW WP
		3. Identification of pressures in water regions and catchment areas	analysis	PGW WP
		4. Analysis of significant human impact with an assessment of its influence on water status and an evaluation of the risk of not fulfilling environmental objectives	analysis	PGW WP
		5. Review of important problems of water management in catchment areas along with the performance of public consultation	analysis	PGW WP
		6. Review of lists of areas intended for protection of habitats or species, for which maintaining or improving the condition of waters is an important factor in their protection	analysis	PGW WP
		7. Establishment of environmental objectives preparation of	analysis	PGW WP

		a register of lists of areas intended for protection of habitats or species, for which maintaining or improving the condition of waters is an important factor in their protection		
		8. Assessing progress in the implementation of work programmes	analysis	minister responsible for water management PGW WP
		9. Analysing the reimbursement of expenses for water services along with a development forecast for water regions and catchment areas along with an analysis of the reimbursement of environmental and resource-based costs in water regions and catchment areas	analysis	PGW WP
		10. 3rd update of water management plans in catchment areas	programming	minister responsible for water management PGW WP
		11. Development of a surface water monitoring programme for a water cycle after the year 2027	programming	GIOŚ
		12. Execution of actions indicated by aPGW	investments/other	in compliance with aPGW
		13. Monitoring of actions listed in aPGW	analysis	minister responsible for water management
until 2020	7. Environmental management of local water resources, also involving the shaping of landscapes favouring the retention of water (SOR)	1. Supporting the execution of tasks pursuing the achievement of good water condition under action 2.1. POIŚ	financing	NFOŚiGW
until 2020	8. Informational-educational actions for promoting environmentally friendly ways of storing and using fertilisers, including the execution of actions aimed at rational management of fertilisers (SOR)	1. Development of a set of recommendations for good agricultural practice for voluntary use	programming	minister responsible for agriculture
continuous		2. Promotion of a set of recommendations for good agricultural practice for voluntary use	other	minister responsible for agriculture minister responsible for water management
until 2030		3. Execution of a programme of actions aimed at decreasing the contamination of waters with nitrates originating from agricultural sources and preventing further contamination	investments	minister responsible for water management minister responsible for agriculture

until 2020	9. Protection of marine waters	1. Updating the initial assessment of the environment status of marine water environment with a set of characteristics for good environmental status of marine water	programming	minister responsible for water management minister responsible for marine economy minister responsible for fishery minister responsible for construction, planning and spatial development and housing GIOŚ
		2. Updating the monitoring programme for marine water	programming	minister responsible for water management GIOŚ
		3. Updating the set of environmental targets and associated indicators for marine waters	programming	minister responsible for water management PGW WP
until 2030		4. Preparing an Update of the national programme of measures for marine waters	programming	minister responsible for water management PGW WP
continuous		5. Studying and assessing the status of marine environment as part of National Environmental Monitoring	analysis	GIOŚ
until 2020	10. Preparing a map of water resources available for use by the population, industry, agriculture and other branches of economy along with rules of their updates based on balances of surface and groundwater resources (SOR)	1. Supporting projects related to the preparation and updating of strategic/planning documents in terms of water management as part of action 2.1. POIŚ	financing	NFOŚiGW
until 2030		2. Preparing a map of water resources available for use by the population, industry, agriculture and other branches of economy	analysis	minister responsible for water management PIG-PIB
		3. Developing rules of updating the map of available water resources based on balances of surface and groundwater resources	analysis	minister responsible for water management PIG-PIB
until 2030	11. Providing protection of society and economy against an unjustified increase in water prices	1. Improvement in the functioning of the tariff approval mechanism – introduction of a regulatory body	other	PGW WP
Direction of intervention: Eliminating the sources of emission of pollutants into the air or a significant reduction of their impact (I.2)				

until 2020	12. Giving priority to the actions of NFOŚiGW and WFOŚiGW supporting projects serving air quality improvement (SOR)	The action is executed as part of the *Clean air strategic project*	financing	NFOŚiGW
until 2020	13. Creation of a legal framework introducing quality requirements for solid fuels based on the type and size of fuel burning installations, highlighting the installations used in the residential -municipal sector, as well as technical requirements for small solid fuel boilers (SOR)	The action is executed as part of the *Clean air strategic project*	legislation	minister responsible for economy minister responsible for energy minister responsible for environment
until 2020	14. Dynamising projects for the elimination of low emission from heating systems (SOR)	The action is executed as part of the *Clean air strategic project*	programming/ financing	minister responsible for environment NFOŚiGW
until 2020	15. Providing under the construction law control of the application of the Energy Law act[96] in terms of the obligation to connect heating installations in new buildings to district heating networks	The action is executed as part of the *Clean air strategic project*	legislation/ programming	minister responsible for construction, planning and spatial development and housing
until 2020	16. Substantive support of municipal governments, including the development of guidelines for the preparation of Low Emission Reduction Programmes (PONE), involving multiple criteria of programmed actions and an inventory of emission sources (SOR)	The action is executed as part of the *Clean air strategic project*	analysis	minister responsible for environment

[96] The Energy Law Act of 10 April 1997 (OJ L of 2019 item 755, as amended).

until 2020	17. Development and financial support of National Environmental Monitoring in terms of air quality measurements (SOR)	1. Supporting projects related to implementing the methods of observation and purchase of equipment in order to improve the environmental monitoring system as part of action 2.1. POIŚ	financing	minister responsible for environment NFOŚiGW
		2. Financial support of National Environmental Monitoring	financing	NFOŚiGW
		3. Development of National Environmental Monitoring in terms of air quality measurements	investments/other	GIOŚ
continuous		4. Studying and assessing the quality of air as part of National Environmental Monitoring	analysis	GIOŚ
until 2030	18. Adjustment of legal framework for further limitation of the emission of pollutants into the air, including the low emission phenomenon (SOR)	1. Changing regulations related to: a) conveying information on air contaminations, b) assessing the levels of substances in the air, c) air protection programmes and short-term action plans	legislation	minister responsible for environment
until 2030	19. Supporting local governments in terms of multi-dimensional management of areal (heating systems) and linear emissions (transport) and the location of investments with discrete emitters (SOR)	1. Development of materials (guidebooks and guidelines) involving air quality improvement	analysis/other	minister responsible for environment
		2. Organisation of media and information campaigns related to environmental behaviours favouring air quality improvement and the impact of low emission on health and environment	other	minister responsible for environment minister responsible for transport
until 2030	20. Further limitation of emissions from road transport (SOR)	1. Supporting the development of low-emission and zero-emission transport	financing	system of environmental protection funds
until 2020	21. Development of odour policy	1. Preparation of regulations for preventing odour nuisance	analysis/legislation	minister responsible for environment
until 2020	22. Reducing the emission of pollutants into the air	1. Implementation of commitments resulting from derogatory mechanisms[97]	other	minister responsible for environment
until 2020		2. Implementation of the directive on the limitation of emissions of certain pollutants into the air from medium combustion plants (MCP)[98]	legislation	minister responsible for environment

[97] Derogatory mechanisms established pursuant to Directive 2010/75/UE of the European Parliament and of the Council dated 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334 dated 17 December 2010, p. 17), including the *National Transitional Plan*, heating derogation and limited derogation from the 17,500-hour working time (the so-called natural derogation).

[98] Directive (UE) 2015/2193 of the European Parliament and of the Council dated 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants (OJ L 313 dated 28 November 2015, p. 1).

from 2020 until 2029		3. Implementation of the directive on the reduction of national emissions of certain atmospheric pollutants (NEC)[99]	legislation	minister responsible for environment minister responsible for economy minister responsible for transport minister responsible for energy minister responsible for agriculture
until 2020		4. Supporting entrepreneurs in the execution of pro-environmental investments	financing	system of environmental protection funds
until 2020		5. Creation of a Poland-wide advisory assistance system for the public and residential sector and enterprises in terms of energy efficiency and RES	Other	NFOŚiGW
until 2021		6. Execution of tasks resulting from joint development ventures/development projects of PGL LP called "Thermal modernization of PGL LP buildings (including the use of RES in buildings)" and "Renewable energy sources as a primary supply of electric energy for the buildings and means of transport in PGL LP"	financing/ investments/ other	PGL LP
until 2030	Execution of the strategic project: *Clean air*		legislation/ financing/analysis/ other	minister responsible for environment minister responsible for economy minister responsible for transport minister responsible for energy system of environmental protection funds

[99] Directive (UE) 2016/2284 of the European Parliament and of the Council dated 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending directive 2003/35/WE and repealing directive 2001/81/WE (OJ L 344 dated 17 December 2016, p. 1).

Direction of intervention: Protection of land surface, including soils (I.3)				
until 2020	23. Executing the programme of identification of contaminated soils (SOR)	1. Supporting projects involving the inventory of degraded lands and polluted lands as part of action 2.5. POIŚ	financing	minister responsible for environment NFOŚiGW
		2. Supporting the execution of projects related to land surface protection	financing	system of environmental protection funds
until 2030		3. Identifying and keeping a register of historical land surface contaminations	analysis	minister responsible for environment (in terms of supervision) heads of counties[100] GDOŚ RDOŚ
until 2020	24. Supporting remediation of identified contaminated soils (SOR)	1. Supporting the execution of projects involving polluted or degraded lands as part of action 2.5. POIŚ	financing	minister responsible for environment NFOŚiGW
		2. Supporting the execution of projects related to land surface protection	financing	system of environmental protection funds
until 2030		3. Supporting research, development, implementation and testing of innovative soil remediation technologies, including large-scale demonstration projects	financing	system of environmental protection funds minister responsible for science NCBiR
until 2030		4. Establishing task schedules related to historical earth surface contaminations (studies, preparation of remediation plans, performance of remediation)	analysis	minister responsible for environment (in terms of supervision) GDOŚ RDOŚ
continuous	25. Protecting the productivity of agricultural areas (SOR)	1. Studying and assessing the quality of arable soils as part of National Environmental Monitoring	analysis	GIOŚ
until 2020		2. Supporting projects related to restoration of the productivity of agricultural areas	financing	system of environmental protection funds
until 2030		3. Preventing the erosion of soils and loss of organic matter	other	minister responsible for

[100] Heads of counties pursuant to article 101d of the Environmental Protection Law act dated 27 April 2001 (OJ L of 2018, item 799, as amended).

		content in soils via the implementation of Joint Agricultural Policy (planned for execution as part of SZRWRiR)		agriculture
until 2030	26. Protection against landslides	1. Execution of the SOPO project – Landslide Protection System	analysis/other	PIG-PIB minister responsible for environment (in terms of supervision)
Direction of intervention: Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection (I.4)				
continuous	27. Determination of rational acoustic standards of environmental quality (SOR)	1. Measuring and assessing the acoustic climate under National Environmental Monitoring in terms of protection against noise	analysis	GIOŚ
continuous		2. Analysing the timeliness of legislation and timeliness of execution of tasks in noise action plans	analysis	WIOŚ
until 2020		3. Analysis of applicable acoustic standards of environmental quality with consideration of standards valid in EU member states, extended to include the analysis of WHO requirements in this area	analysis	minister responsible for environment
until 2020		4. Changing regulations related to allowed noise levels in the environment[101]	legislation	minister responsible for environment
until 2020	28. Development and financial support of National Environmental Monitoring in terms of noise in the environment	1. Supporting projects related to the implementation of methods for measurements and calculations and purchasing equipment in order to improve the environmental monitoring system as part of action 2.1. POIŚ	financing	minister responsible for environment NFOŚiGW
until 2030		2. Financial support of National Environmental Monitoring	financing	system of environmental protection funds
until 2020	29. Appointing a team of experts performing constant surveillance of the results of basic scientific research on the influence of electromagnetic fields on the environment and preparing periodic reports involving this issue (SOR)	1. Participating in operations of the team and performing constant surveillance of the results of basic scientific research on the influence of electromagnetic fields on the environment and an analysis of applied instruments providing protection against electromagnetic fields	other	minister responsible for computerisation minister responsible for environment minister responsible for health

[101] The task will be executed, provided an analysis performed as part of the previous task will indicate the need to change acoustic standards of environmental quality.

until 2020	30. Improving the transparency of administrative procedures related to the location and operation of installations emitting electromagnetic fields and infrasounds (SOR)	1. Analysis of procedures used so far in RP and other EU member states along with their optional correction and electronification of processes related to registering installations and delivering reports on the measurements of electromagnetic fields	analysis/legislation	minister responsible for computerisation minister responsible for environment
continuous	31. Providing adequate levels of protection against electromagnetic fields based on a continuous review of the results of scientific research (SOR)	1. Analysing the results of basic scientific research on the influence of electromagnetic fields on the environment and an analysis of applied instruments providing protection against electromagnetic fields	analysis	minister responsible for environment minister responsible for health minister responsible for computerisation
continuous	32. Providing data on the levels of electromagnetic fields in the environment	1. Measuring and assessing the levels of electromagnetic fields in the environment under National Environmental Monitoring in terms of protection against EMF	analysis	GIOŚ
		2. Introducing new methodology for measuring electromagnetic field in the environment, in particular for modern mobile communications networks	analysis/legislation	minister responsible for computerisation minister responsible for environment minister responsible for energy
until 2030	33. Training of personnel in terms of protecting the environment against noise and electromagnetic fields (SOR)	1. Improvement of qualifications via cyclical/periodic trainings/meetings	other	minister responsible for environment GIOŚ GDOŚ
until 2030	34. Providing access to data on electromagnetic fields	1. Introducing a homogeneous computer system enabling public access to technical specifications of installations and reports on measurements of electromagnetic field levels (SOR)	legislation	minister responsible for computerisation minister responsible for environment GIOŚ
		2. Increasing social awareness related to the influence of an electromagnetic field originating from base stations of mobile telecommunications on the environment by activating a government information portal about electromagnetic fields and conducting awareness campaigns	other	minister responsible for computerisation minister responsible for environment minister responsible for health

until 2035	35. Ensuring nuclear safety and radiological protection	1. Constructing a repository for short-lived low and intermediate level radioactive waste	investments	minister responsible for energy
continuous		2. Supervising safety of the environment and society by performing safety assessment, issuing licenses and administrative decisions as well as inspecting the construction, commissioning and decommissioning of nuclear facilities and other activities related to radiation exposure	other	PAA
continuous		3. Performing measurements in early warning stations for radioactive contamination of IMGW-PIB, monitoring the concentration of caesium Cs137 isotope in soil and monitoring radioactive contaminations of surface waters and bottom sediments, as well as the atmosphere as part of National Environmental Monitoring	analysis	GIOŚ IMGW-PIB
until 2030		4. Fulfilling international and national obligations related to reviewing and improving the quality of actions of the nuclear regulatory authority	other	PAA
		5. Modernising and extending systems of environmental monitoring and supporting the mission of the nuclear regulatory authority	investments/other	PAA
		6. Extending the human resources potential of the team of nuclear safety inspectors and analysts for the needs of current and future tasks of the nuclear regulatory authority	other	PAA
Objective: Environment and economy. Sustainable management of environmental resources (II)				
Direction of intervention: Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity (II.1)				
until 2020	36. Objective evaluation and verification of protected surfaces and their resources in order to improve the efficiency of protecting space of particular value in terms of nature and landscape (SOR)	1. Establishment of planning documents for Natura 2000 areas	legislation	minister responsible for environment RDOŚ
		2. Supporting projects related to the development of planning instruments for Natura 2000 areas and national parks as part of action 2.4. POIŚ	financing	minister responsible for environment NFOŚiGW
		3. Supporting the process of implementing management instruments in nature protection as part of action 2.4. POIŚ	financing	minister responsible for environment

				NFOŚiGW
until 2020	37. Mapping and estimating the value of ecosystem services (SOR)	1. Development of methodologies for evaluating the natural capital of the country	analysis	minister responsible for environment
		2. Development of national rules of incorporating valuation of ecosystem services into accounting and reporting systems	analysis	minister responsible for environment minister responsible for finance GUS
until 2020	38. Adjusting standards of the land planning and use system and introducing changes in the management of protected areas in order to reduce natural conflictual of protection of highly esteemed values (SOR)	1. Establishing and implementing surveillance over the execution of protective actions, including in the Natura 2000 areas	other	national parks RDOŚ
		2. Supporting projects involving protection and restoration of biological and landscape-based diversity	financing	NFOŚiGW
until 2025	39. Indicating and protecting the most valuable – priority – landscapes of Poland (SOR)	1. The action is executed as part of the strategic project: *Landscape audits*	legislation/ analysis/financing	voivodship authorities[102] minister responsible for environment NFOŚiGW
until 2019	40. Implementation of the *European Landscape Convention* (SOR)	1. Issuing regulations related to the preparation of landscape audits	legislation	minister responsible for environment
continuous		2. Operating a domestic European Landscape Convention Secretariat	other	GDOŚ
until 2020	41. Protection of biological diversity	1. Improving the protected species management system	other	minister responsible for environment GDOŚ
continuous		2. Protecting the species and habitats of the Baltic Sea and efficient management of Natura 2000 marine areas	legislation/ programming	minister responsible for environment

[102] Voivodship authorities pursuant to article 38b item 1 of the Act of 27 March 2003 on spatial planning and development (OJ L of 2018, item 1945, as amended).

				minister responsible for marine economy directors of maritime offices
continuous		3. Protection of migrating species via implementing and following the provisions of the *Bonn Convention* with particular emphasis on the provisions of ASCOBANS and EUROBATS agreements as well as the aquatic warbler protection agreement	programming/ other	minister responsible for environment
continuous		4. Protection of world whale population by active participation in meetings of the International Whaling Commission preceded by active participation in the process of establishing a common of the European Union	programming/ other	minister responsible for environment
until 2020		5. Preparation of reports on the execution of the bird directive[103] and the habitat directive[104]	analysis	minister responsible for environment GIOŚ GDOŚ
		6. Preparation of a report on preventive and remedial actions related to the introduction and spreading of invasive alien species	analysis	minister responsible for environment
		7. Developing the resources of the natural inventory bank	other	minister responsible for environment GDOŚ
continuous		8. Execution of provisions of the *Convention on Biological Diversity*	other	minister responsible for environment
continuous		9. Execution of provisions of the *Carpathian Convention* and its protocols	other	minister responsible for environment minister responsible for economy minister responsible for transport

[103] Directive 2009/147/WE of the European Parliament and of the Council dated 30 November 2009 r. on the conservation of wild birds.
[104] Council Directive 92/43/EWG of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

				minister responsible for energy minister responsible for agriculture minister responsible for rural development – in compliance with classification of government administration units
continuous		10. Activation of society for protection of biological diversity	other	minister responsible for environment GDOŚ national parks PGL LP
continuous		11. Execution, under National Environmental Monitoring, of natural monitoring involving plant and animal species as well as natural habitats, with particular emphasis on Natura 2000 Special Areas of Conservation, and birds, with particular emphasis on Natura 2000 Special Protection Areas	analysis	GIOŚ
until 2020		12. Execution of a pilot wolf and lynx monitoring programme in Poland (financed as part of action 2.4. of POIŚ 2014–2020)	other	GIOŚ
until 2020		13. Execution of pilot monitoring project for marine species and habitats	other	GIOŚ
until 2020		14. Supporting projects involving in-situ or ex-situ protection of endangered species and natural habitats as part of action 2.4. POIŚ	financing	minister responsible for environment NFOŚiGW CKPŚ
until 2020		15. Supporting projects involving the development of green and blue infrastructure as part of action 2.4. of POIŚ	financing	minister responsible for environment CKPŚ
until 2020		16. Supporting projects involving the performance of informational-educational actions related to environmental protection and efficient use of its	financing	minister responsible for environment NFOŚiGW

		resources as part of action 2.4. POIŚ		
until 2030		17. Supporting the implementation of projects related to maintaining and restoring biological diversity	financing	system of environmental protection funds
until 2020		18. Execution of tasks resulting from development projects of PGL LP "Active protection of the black grouse on lands managed by State Forest in Poland", "Protection of the osprey *Pandion Haliaeetus* in selected SPA Natura 2000 areas in Poland" and "Comprehensive project for the protection of the European bison by State Forests" and other joint projects of the organisational units of the LP, whose purpose is to retain biological diversity.	financing/ investments/ other	PGL LP
continuous		19. Supporting the operation of national parks	legislation/ analysis/ financing	minister responsible for environment
continuous		20. Increasing the total area of strict and passive protection in national parks and rationalising the demarcation of individual areas	legislation/ analysis/ financing	minister responsible for environment
continuous		21. Supplementation of the network of national parks and nature reserves in a manner which will ensure their representativeness for the diversity of natural resources in the country 22.	legislation/ analysis/ financing	minister responsible for environment GDOŚ RDOŚ
until 2023	Execution of the strategic project: *Landscape audits*		legislation/ analysis/ financing	voivodship authorities[105] minister responsible for environment NFOŚiGW
Direction of intervention: Supporting multifunctional, sustained and sustainable forest management (II.2)				
continuous	42. Maintaining and, depending on the availability of lands for forestation, increasing the overall forest cover of the country and the compactness	1. Acquisition of lands for forestation	other	PGL LP minister responsible for environment local governments[106]
continuous		2. Forestation of lands	other	PGL LP

[105] Voivodship authorities pursuant to article 38b item 1 of the Act of 27 March 2003 on spatial planning and development (OJ L of 2018, item 1945, as amended).
[106] Cooperation of local governments is voluntary in nature

	of forest complexes and areas undergoing forestation (SOR)			minister responsible for environment local governments[107] minister responsible for agriculture ARiMR
until 2020	43. Maintaining and, if possible, rationally increasing forest biomass (including energy wood) for the needs of satisfying local needs of energy self-sufficiency (SOR)	1. Including in *Regulations for timber sales* wood material intended for energy production in compliance with the definition of the "energy wood" assortment	analysis/ programming	PGL LP
continuous		2. Promoting the idea of using wood residues as a material meant for energy production in compliance with the rule of cascading use of wood	other	minister responsible for energy
until 2020		3. Introducing legislative changes facilitating the trade of wood biomass	legislation	minister responsible for environment PGL LP
continuous	44. Inclusion of forestry into further actions for protection of biological diversity	1. Assessing the value of non-productive functions of forest and its reflection in policies and programmes involving forests	analysis	PGL LP
		2. Protecting the population of rare indigenous tree and shrub species in forest ecosystems	programming/ investments	PGL LP all forest management units and their owners[108]
		3. Protecting forest bird populations in order to maintain, in an undeteriorated condition, the populations of forest species across the country (according to the *Forest Bird Index* for birds)	programming/ investments	PGL LP all forest management units and their owners[109]
until 2020		4. Improving methods for inventorying game animals	analysis	minister responsible for environment
continuous	45. Protecting the productivity of forest areas (SOR)	1. Increasing the share of various types of coarse woody debris in forest ecosystems	programming/ investments	PGL LP all forest management units and their owners[110]
		2. Reconstruction of tree stands leading to a full adjustment of tree stand species compositions to habitat conditions	programming	PGL LP all forest management units

[107] Cooperation of local governments is voluntary in nature

[108] Cooperation of all forest management units and their owners is voluntary in nature.

[109] Cooperation of all forest management units and their owners is voluntary in nature.

[110] Cooperation of all forest management units and their owners is voluntary in nature.

				and their owners[111]
until 2020		3. Supporting projects related to restoration of the productivity of forest areas	financing	system of environmental protection funds
continuous	46. Providing information on the health status of forests	1. Execution of forest monitoring under National Environmental Monitoring	analysis	GIOŚ
Direction of intervention: Waste management towards a circular economy (II.3)				
until 2030	47. Waste management according to the hierarchy of waste handling methods (SOR)	1. Supporting investments related to waste management as part of action 2.2. POIŚ	financing	minister responsible for environment NFOŚiGW
		2. Supporting the execution of investments related to the prevention of waste generation and proper waste management	financing	system of environmental protection funds
		3. Planning necessary waste management installations by the development of a WPGO along with investment plans	analysis/ programming/ investments	voivodship authorities[112]
until 2030		4. Updating the national waste management plan 2022	analysis/ programming	minister responsible for environment
until 2025		5. Evaluation of municipal waste management system and introduction of necessary corrections	analysis	minister responsible for environment
until 2020		6. Transposition of EU regulations under the so-called waste package	legislation	minister responsible for environment
until 2030	48. Development of waste recycling (SOR)	1. Supporting the execution of investments related to waste recycling	financing	system of environmental protection funds
until 2030	49. Aiming at maximising the use of waste as raw materials (SOR)	1. Supporting research-development and implementation work related to innovative environmental technologies and new business models involving the recovery and utilisation of secondary raw materials and waste management	financing	system of environmental protection funds
until 2030		2. Supporting the execution of investments related to the processing and use of recycled raw materials	financing	system of environmental protection funds
until 2030		3. Supporting projects related to the implementation of circular waste management at a municipal level	financing/other	minister responsible for environment

[111] Cooperation of all forest management units and their owners is voluntary in nature.

[112] Voivodship authorities pursuant to article 36 item 2 of the Waste Law Act of 14 December 2012 (OJ L of 2019, item 701, as amended).

				NFOŚiGW
until 2030		4. Development of guidelines stimulating the implementation of actions for circular economy in the sector of public finances (green public procurements)	other	UZP minister responsible for economy minister responsible for environment minister responsible for regional development local governments[113]
Direction of intervention: Managing geological resources by developing and implementing a Raw Materials Policy (II.4)				
until 2020	50. Delimitation of mineral deposits strategic for the economy and providing their long-term protection, rational use and access to them	The action is executed under the strategic project: *Development and implementation of a coherent and comprehensive Raw Materials Policy*	programming/ legislation	minister responsible for environment
until 2020	51. Supporting innovativeness in the extraction, processing and use of secondary market raw materials, from resources created by post-consumer and post-production waste and secondary deposits generated from it	The action is executed under the strategic project: *Development and implementation of a coherent and comprehensive Raw Materials Policy*	programming/ legislation/other	minister responsible for environment
until 2030	Execution of the strategic project *Development and implementation of a coherent and comprehensive Raw Materials Policy*		programming/ legislation/analysis/ other	minister responsible for environment
Direction of intervention: Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT) (II.5)				
until 2020	52. Promoting and supporting eco-innovation and eco-innovative enterprises	1. Identifying technological needs and key areas related to the development and implementation of eco-innovations in Poland	analysis	minister responsible for environment minister responsible for economy
until 2030		2. Substantive support of the sector of public finances in terms of applying public procurements involving environmental technologies and the use of pre-commercial	other	UZP minister responsible for economy

[113] Cooperation of local governments is voluntary in nature

		public procurements (innovative partnership) and public procurements for purchasing eco-innovations[114]		minister responsible for environment
until 2030		1. Substantive support of entrepreneurs in the execution of investments resulting in limitation of the impact of their activity on the environment due to eco-innovations	other	minister responsible for economy minister responsible for environment
until 2030		2. Financial support of entrepreneurs in the execution of investments using innovations for improving the efficiency of utilising resources	financial	minister responsible for regional development system of environmental protection funds minister responsible for public finances
until 2020		3. Supporting the creation of the concept of a municipal wastewater treatment plant as a unit fully implementing the approach of circular economy and the performance of research and development work in this area	financing	NFOŚiGW
until 2030		4. Supporting research-development and implementation work related to innovative environmental technologies	financing	system of environmental protection funds
until 2030		5. Supporting research-development and implementation work related to: a. recycling, b. rational management of natural resources with particular emphasis on renewable energy, c. limiting the emission of pollutants and development of products and processes with diminished negative environmental impact	financing	NCBiR
until 2020		6. Development of guidelines stimulating the implementation of actions for circular economy in the sector of public finances (green public procurements)	analysis/other	UZP minister responsible for economy minister responsible for environment
until 2030		7. Implementation of the Environmental Technology Verification Programme (ETV) in Poland	legislation/ financing/other	minister responsible for environment minister responsible for

[114] *Public Procurement of Innovation*.

				economy NFOŚiGW
until 2030	53. Supporting enterprises in the process of adjusting installations to the conclusions of BAT	1. Substantive support of entrepreneurs in the execution of investments related to the adjustment of installations to the conclusions of BAT	other	minister responsible for environment
until 2030	Execution of the strategic project: *GreenEvo – Technology Accelerator*		financing/other	minister responsible for environment NFOŚiGW
Objective: Environment and climate. Climate change mitigation and adaptation to them along with managing the risk of natural disasters (III)				
Direction of intervention: climate change mitigation (III.1)				
until 2030	54. Reducing the emission of greenhouse gases into the air	1. Supporting investments related to an increase in production of energy from renewable sources	financing	system of environmental protection funds Auction system of supporting renewable energy sources (pursuant to the Act on Renewable Energy Sources[115])
		2. Supporting investments related to expansion of a network enabling the connection of producers of energy from renewable sources	financing	system of environmental protection funds
		3. Supporting investments related to heating systems cooperating with renewable energy sources and heat storages	financing	system of environmental protection funds
		4. Supporting investments related to modernisation of CHP plants, heat plants and power plants, associated with reducing emission into the air	financing	system of environmental protection funds
		5. Supporting investments related to the development of low-emission and zero-emission transport	financing	system of environmental protection funds
		6. Supporting investments related to actions involving reduction of energy losses related to its transfer	financing	system of environmental protection funds
		7. Supporting investments related to developing energy clusters, energy operators and energy self-sufficient municipalities	financing	system of environmental protection funds
until 2020	55. Developing the policy of	1. Analysing the reductive potential of emission of	analysis	minister responsible for

[115] The Act on Renewable Energy Sources dated 20 February 2015 (OJ L of 2018, item 2389, as amended).

	reducing the emission of greenhouse gases from sectors not included in the emissions trading scheme (non-ETS)	greenhouse gases in the individual non-ETS sectors in the 2030 perspective along with identification of actions possible to be undertaken in these sectors and their effects, i.e. quantified impact on reducing the emission of greenhouse gases		environment GIOŚ
until 2020		2. Developing a strategy for achieving the reduction objective resulting from the ESR with consideration and indication of priority actions in each of the non-ETS sectors	programming	minister responsible for environment
until 2022		3. Developing a management strategy for the national limit[116]	programming	minister responsible for environment upon agreement with the Council of Ministers
until 2030		4. Supporting actions and investments identified in the analysis and indicated in the abovementioned strategy for reducing and limiting emissions from non-ETS sectors	financing	system of environmental protection funds
until 2030	56. Modification of sustainable forest management in order to increase the carbon sequestration capacity of forests (SOR)	The action is executed as part of the strategic project: *Carbon Forests*	other	PGL LP
until 2030	57. Development of methodological bases for managing the capturing of CO_2 in forestry as part of the execution of climate policy (SOR)	The action is executed as part of the strategic project: *Carbon Forests*	analysis	PGL LP
until 2030	Execution of the strategic project: *Carbon Forests*		analysis/ programming/ investments	PGL LP
until 2030	Execution of the strategic project: *Wooden buildings*		analysis/ programming/ financing/ investments	minister responsible for environment minister responsible for construction, planning and

[116] The limit which is mentioned in article 21d item 2 of the Act dated 17 July 2009 on the system for managing emissions of greenhouse gases and other Substances (OJ L of 2018, item 1271, as amended).

				spatial development and housing PGL LP NFOŚiGW
Direction of intervention: Adaptation to climate change and the management of the risk of natural disasters (III.2)				
until 2021	58. Implementing flood risk management plans (PZRP) for catchment areas, reviewing and updating them (SOR)	1. Execution of actions listed in PZRP	investments/other	in compliance with PZRP
		2. Preparing a progress report on the implementation of actions listed in PZRP	analysis/other	minister responsible for water management PGW WP
		3. Reviewing and updating a preliminary flood risk assessment	analysis	PGW WP minister responsible for water management minister responsible for marine economy
		4. Reviewing and updating flood risk maps and flood hazard maps	analysis	PGW WP minister responsible for water management directors of maritime offices
		5. Reviewing and updating flood risk management plans	programming	minister responsible for water management minister responsible for marine economy PGW WP
		6. Supporting projects related to the preparation and updating of strategic/planning documents in terms of water management as part of action 2.1. POIŚ	financing	NFOŚiGW
until 2030	59. Implementing an update of flood risk management plans (PZRP) and executing work for the needs of another (2nd) update in 2027.	1. Execution of actions listed in PZRP update	investments/other	in compliance with PZRP
		2. Preparing a progress report on the implementation of actions listed in PZRP	analysis/other	minister responsible for water management PGW WP
		3. 2nd review and update of the preliminary flood risk assessment	analysis	PGW WP minister responsible for water management minister responsible for marine economy
		4. 2nd review and update of flood hazard maps and flood	analysis	PGW WP

		risk maps		minister responsible for water management directors of maritime offices
		5. 2nd review and update of flood risk management plans	programming	PGW WP minister responsible for water management minister responsible for marine economy
until 2020	60. Development and implementation of a plan for counteracting the effects of droughts (SOR) and development of its updates	1. Development of a plan for counteracting the effects of droughts	programming	minister responsible for water management PGW WP
until 2030		2. Implementation of a plan for counteracting the effects of droughts	investments/other	in compliance with PPSS
until 2030		3. Development of an update to the plan for counteracting the effects of droughts	programming	minister responsible for water management PGW WP
until 2020	61. Preparation and implementation of the Retention Development Programme	1. Preparation of the Water Retention Development Programme	programming	minister responsible for water management PGW WP
until 2030		2. Implementation of the Water Retention Development Programme	investments/other	minister responsible for water management PGW WP
continuous	62. Development of flood control infrastructure based on investments with a high degree of effectiveness and economic rationality and proper spatial planning, including the construction of multi-purpose, functionally coherent tanks for low[117] and – in specific cases – high[118] retention (SOR)	1. Execution of flood control investments	investments	PGW WP
until 2020		2. Supporting projects related to the construction, rearrangement or repair of water equipment helping to reduce the effects of floods and droughts as part of action 2.1. POIŚ	financing	NFOŚiGW
until 2020		3. Supporting supraregional small retention systems as part of action 2.1. POIŚ	financing	NFOŚiGW
until 2020		4. Supporting investments related to the construction,	financing	NFOŚiGW

[117] With a capacity up to 5 million m^3.
[118] With a capacity above 5 million m^3.

		rearrangement and restoration of hydroengineering facilities (finishing the execution of tasks) initiated before 2018.		
until 2030	63. Protection against marine erosion and flood from the sea	1. Performing protective actions on the seashore and the zone of offshore waters (e.g. artificial shore nourishment, storm surge barriers, seawalls, groynes, breakwaters, offshore ridges)	investments	minister responsible for marine economy directors of maritime offices
until 2030		2. Sea shore monitoring including the coastal zone	analysis	minister responsible for marine economy directors of maritime offices
until 2020		3. Supporting projects related to the protection of seashores as part of action 2.1. POIŚ	investments	NFOŚiGW
until 2020	64. Sustainable and resistant to climate change management of rainwaters in urbanised areas via various forms of retention and the development of green infrastructure (SOR)	1. Analysis of legal acts in terms of the introduction of necessary changes enabling efficient adaptation to climate change and sustainable management of rainwaters in urbanised areas along with the performance of these changes	analysis/legislation	minister responsible for water management
until 2020		2. Supporting the execution of tasks related to rainwater management systems in urban areas as part of action 2.1. POIŚ	financing	NFOŚiGW
until 2030		3. Supporting investments related to the utilisation of rainwaters in urban areas	financing	system of environmental protection funds
until 2020	65. Developing green and blue infrastructure of urbanised areas in order to maintain spatial communication inside these areas and with open areas, as well as support the processes of adaptation to climate change (SOR)	1. The action is executed as part of the strategic project *Adaptation to climate change*	analysis/financing	minister responsible for environment
until 2020	66. Limiting occupation of land and soil sealing	1. Supporting projects involving development of green areas in cities and their functional areas as part of action 2.5. POIŚ	financing	minister responsible for environment NFOŚiGW
		2. Supporting the execution of projects related to land surface protection	financing	system of environmental protection funds

until 2020	67. Counteracting environmental hazards	1. Supporting investments related to adaptation to climate change executed by territorial government units	financing	system of environmental protection funds
		2. Supporting investments related to the construction of systems warning against and responding to environmental hazards and natural disasters	financing	system of environmental protection funds
		3. Supporting investments related to improving the level of protection against the results of natural risks[119] and serious malfunctions, improving the elimination of their effects and enhancing selected elements of environmental management	financing	system of environmental protection funds
until 2030	Execution of the strategic project *Adaptation to climate change*		analysis/ programming/ financing/ investments	minister responsible for environment IOŚ-PIB NFOŚiGW minister responsible for water management minister responsible for marine economy GUS
until 2020	Execution of the strategic project *Comprehensive programme of adaptation of forests and forestry to climatic change until 2020*		investments	PGL LP
until 2030	Execution of the strategic project *Water for agriculture*		legislation/ financing/ programming	minister responsible for rural development minister responsible for regional development minister responsible for water management PGW WP
Objective: Environment and education. Developing the ecological competence (knowledge, abilities and positions) of the society (IV)				
Direction of intervention: Ecological education, including the shaping of sustainable consumption patterns (IV.1)				

[119] According to the directions of actions listed in the *Strategic Adaptation Plan for sectors and areas sensitive to climate change until the year 2020 with prospects until the year 2030.*

continuous	68. Providing comprehensive ecological education	1. Performing studies of the ecological awareness of Poles	analysis	minister responsible for environment
continuous		2. Conducting informal and non-formal education in areas covered by the strategy, including in cooperation with non-government organisations	other	minister responsible for environment
continuous		3. Conducting and supporting formal education in areas covered by the strategy, including in cooperation with non-government organisations	other	minister responsible for education and pedagogy minister responsible for environment
until 2025		4. Preparing a strategic plan of actions for ecological education	programming	minister responsible for environment
until 2020		5. Supporting the execution of projects related to ecological communication and education	financing	system of environmental protection funds
until 2020	69. Promoting green public procurements	1. Execution of actions and initiatives included in the "National Plan of Actions related to sustainable public procurements for the years 2017–2020"	other	UZP
continuous	70. Providing reliable and up-to-date information on the environment and its state	1. Performing studies, observations and evaluations of the status of environmental components and impacts under National Environmental Monitoring in order to provide knowledge and inform about the condition of the environment and sharing data on the condition of the environment	analysis	GIOŚ
		2. Releasing information on the environment and its protection	other	minister responsible for environment GIOŚ
		3. Increasing the availability of public data from the area of the environment and their update, as well as providing referentiality and interoperability of existing systems and databases	other	minister responsible for environment minister responsible for water management minister responsible for computerisation
		4. Continuation of construction and development of spatial databases along with maintenance, popularisation and development of spatial information infrastructure,	other	minister responsible for environment GDOŚ

		including the geoportal.gov.pl service		GIOŚ minister responsible for water management minister responsible for construction, planning and spatial development and housing / Surveyor General of Poland minister responsible for computerisation
until 2030		5. Digitisation of historical resources	other	minister responsible for environment
Objective: Environment and administration. Improving the functioning efficiency of environmental protection instruments (V)				
Direction of intervention: Improving the environmental protection control and management system and perfecting the financing system (V.1)				
until 2020	71. Strengthening existing state control authorities in the area of the environment, increasing their efficiency in terms of law enforcement, including fighting the grey market (SOR)	1. Increasing the efficiency of control authorities, in particular related to fighting the grey market (reforming the Inspection for Environmental Protection)	other	GIOŚ WIOŚ
continuous		2. Performance of actions related to controlling and preventing illegal transboundary movement of waste	other	GIOŚ WIOŚ
continuous		3. Performance of actions related to controlling and preventing illegal disassembly of end-of life vehicles	other	GIOŚ WIOŚ
continuous		4. Performance of actions related to controlling and preventing the processing of electric and electronic waste	other	GIOŚ WIOŚ
continuous		5. Performance of actions related to controlling and preventing the placing of illegally acquired timber on the market	other	GIOŚ WIOŚ
until 2020		6. Supervising and overseeing compliance with regulations in terms of using microorganisms and genetically modified organisms	legislation	minister responsible for environment
continuous		7. Intensification of actions for fighting illegal sales and trade of specimens of species subject to EU regulations on CITES, national protection of species, dangerous, alien invasive and others subject to limitations in possession, sales or trade	other	minister responsible for environment minister responsible for public finances minister responsible for internal affairs / National Police Headquarters

				GDOŚ
until 2022		8. Maintaining or perfecting structure ensuring effective fighting of crime related to sales and trade of specimens of species subject to CITES regulations, national protection of species, dangerous, alien invasive and others subject to limitations in possession, sales or trade	other	minister responsible for environment minister responsible for public finances minister responsible for internal affairs National Police Headquarters GDOŚ
until 2022	72. Securing the financing of tasks related to environmental protection from domestic and foreign funds after the year 2020	1. Creating a coherent monitoring system for the environmental effects of investments supported by environmental protection funds	analysis/ programming	system of environmental protection funds
until 2020		2. Evaluation of the national system of financing environmental protection and water management and introducing necessary corrections	analysis	minister responsible for environment minister responsible for water management
		3. Evaluation of projects financed from POIŚ 2014–2020 funds based on the Evaluation Plan	analysis	minister responsible for environment minister responsible for water management
		4. Monitoring and participating in the development of instruments intended to finance tasks related to environmental protection after 2020 from foreign funds	analysis/ programming	minister responsible for environment
		5. Monitoring instruments intended to finance tasks related to environmental protection after 2020 from national resources within a scope related to the activities of environmental protection funds	analysis	minister responsible for environment NFOŚiGW
continuous		6. Conducting the financial management of environmental protection funds in a manner securing maintenance of their financial and organisational potential	analysis/ programming	system of environmental protection funds
until 2025	73. Increasing the efficiency and responsibility of the system of environmental impact assessments	1. Standardisation of the nature inventory process and the format of reporting about the environmental impact of a project	analysis/ legislation	minister responsible for environment GDOŚ
continuous	74. Supporting systemic management of environmental	1. Preparing directions of actions intended to construct a system of legislative and financial solutions supporting	other	minister responsible for environment

	protection	implementation of the Eco-Management and Audit Scheme (EMAS) in organisations		GDOŚ
until 2025		2. Implementation of project management standards in the environmental department	other	minister responsible for environment
until 2020	75. Strengthening the resources of experts and analysts in the area of environment and water management	1. Constructing a knowledge base for tests, evaluations, analyses, studies, reports on the environment executed by institutions of the environmental sector/resort and other entities working for environmental protection in Poland	analysis	minister responsible for environment minister responsible for water management
continuous		2. Performance of studies and analyses related to environmental protection resulting from current needs of the environmental department	analysis	minister responsible for environment
		3. Development and implementation of a programme for cooperation of the minister responsible for environment with non-government organisations	analysis/ programming	minister responsible for environment
		4. Improving the competences of the environmental department personnel	other	minister responsible for environment

9. Territorialisation of PEP2030's directions of intervention

Territorialisation[120] in PEP2030 is presented in the form of a synthetic description of voivodships, which focuses on problem areas – occurring frequently or repeating more frequently than indicated by average GUS indices for the country for each voivodship. The described phenomena had or have a territorial nature/territorial impact – primary on the scale of a voivodship, but not limited to it.

The problem was described as significant for a voivodship when the given voivodship was listed in the statistical yearbook of GUS as one of voivodships[121] which are characterised by the least preferable values for statistical date related to the described problem[122].

Sectors in which the given voivodship did not exhibit significant problems reaching beyond those typical of the country were not listed in the given description.

The selected problems were mainly those[123] which indirectly indicate related tendencies and problems – in such cases related data feature an analogical tendency (e.g. a high share of devastated/degraded areas is usually associated with a large amount of accumulated waste and a high number of plants harmful to the environment).

Based on an indication of negative trends, state intervention should be directed towards these phenomena in order to counteract them effectively. The most important directions of intervention for the individual voivodships include:

[120] The informational basis for short characteristics of voivodships in terms of the most important environmental problems typical of a given voivodship included: reports on the execution of environmental protection programmes, WIOŚ and IOŚ reports, GUS statistical yearbook "Environmental protection 2018" and the documents of voivodship statistical offices, information from the PEP2030 forecast, statements and data for forecasts involving various plans and programmes for the individual voivodships, information/data/reports from marshal offices and voivodship offices and the STRATEG portal (in particular long-term data).

[121] One of three to five voivodships (or as many voivodships as there are with indices of similar values).

[122] It was assumed that there are significant (by an order of magnitude) differences in indices between negative "leaders" of the statistics and the rest of the voivodship.

[123] The sequence in which the problems and data are listed (the individual points relate to selected voivodships):

a. Condition of ground surface – including waste management, geology, e.g. above-average sizes of degraded and devastated areas,
b. Condition of air quality/climate change/adaptation to climate change, e.g. emissions excessive in terms of magnitude and/or time: of dusts and contaminants (solid and gaseous), effect of climate change which are frequent or cover a large area or a high probability of their occurrence, frequent extreme weather conditions,
c. Condition of water resources, e.g. Excessive share of waters with unsatisfactory or low air quality, excessive draining of untreated wastewater into the water or ground, excessive abstraction of surface or groundwater,
d. Forests, e.g. wood cover percentage of a voivodship being significantly below the national average,
e. Protection of nature, e.g. the share of important protected areas being considerably below the average,
f. Situation related to noise/electromagnetic fields, e.g. considerable and frequent exceeding of limits, in particular in larger areas – in urban agglomerations, along arterial roads, etc.

Voivodship / Direction of intervention	Dolnośląskie	Kujawsko-Pomorskie	Lubelskie	Lubuskie	Łódzkie	Małopolskie	Mazowieckie	Opolskie	Podlaskie	Podkarpackie	Pomorskie	Śląskie	Świętokrzyskie	Warmińsko-Mazurskie	Wielkopolskie	Zachodniopomorskie
Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eliminating the sources of emission of pollutants into the air or a significant reduction of their impact	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Protection of land surface, including soils	x	x	x	x	x	x			x	x	x	x	x	x	x	x
Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection							x		x		x					
Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Supporting multifunctional, sustained and sustainable forest management	x	x	x		x		x	x	x			x			x	
Waste management towards a circular economy	x			x	x	x	x			x		x		x	x	
Managing geological resources by developing and implementing a Raw Materials Policy	x		x		x							x	x			
Climate change mitigation			x		x		x	x				x				
Adaptation to climate change and the management of the risk of natural disasters	x	x	x			x	x	x		x	x				x	x

Dolnośląskie Voivodship

Dolnośląskie is an area in which numerous industrial investments were commenced during the last dozen years or so. One of the side effects of economic development involves, e.g. generation of large amounts of waste and earth surface contamination. Intense economic development was one of the reasons behind the creation of a large area of devastated and degraded lands requiring rehabilitation inside the voivodship, considering its total surface area[124]. In the years 2014–2016 there was an upward trend in the size of these areas. In the year 2017 this trend was stopped and a certain drop in the size of devastated and degraded areas took place[125]. However, the area of rehabilitated and developed land in an analogical period did not compensate quantitatively – even by a half – the size of abovementioned areas requiring land rehabilitation[126]. Additionally, as part of this spatial phenomenon, it is possible to distinguish the largest area of unrehabilitated waste disposal sites in the country[127].

Dolnośląskie is also an area of traditional extraction of fossil raw materials, which causes degradation of the natural land relief. Nowadays, such a phenomenon, or even just the risk of its occurrence, often generates social conflicts.

Due to the geological and geophysical structure, vast areas of the voivodships are subject to landslides and mass wasting.

In terms of forest management, in 2017 Dolnośląskie was ranked second in terms of the volume of wood removed as part of intervention cuts[128], which resulted, e.g. from the fact that a considerable area of the voivodship's forests featured a diminished health level: for example, the area of forests prone to infectious diseases reached a 9% share in the forest area of the Regional Directorate of State Forests in Wrocław[129]. This data is consistent with the fast that a large area of protective forests in Dolnośląskie was damaged by industry[130].

In terms of air condition, in 2017 in urban areas of the Dolnośląskie the recorded permitted number of exceeded daily average standard was exceeded for PM_{10} dust (in 18 measurement stations), and an excess target level of benzo(a)pyrene present in the PM_{10} dust was recorded in all measurement stations[131]. The exceeded target average annual arsenic level is a specific feature of the voivodship due to the existence of the Legnica-Głogów Copper District within its boundaries[132].

[124] 5661 ha – second largest in the country – in 2017, "Environmental protection 2018", GUS, Excel file, section 2, table 11(29).
[125] Based on data from the STRATEG base.
[126] Based on data from the STRATEG base.
[127] 2506,4 ha – first among all voivodships – in 2017 r.; GUS, *Environmental protection,* Warszawa, 2018, p. 145.
[128] 1.2 million m^3 of wood removed in 2017; Team of authors of the Forest Research Institute, *Report on the condition of forests in 2017*, PGL LP 2018, p. 67.
[129] Team of authors of the Forest Research Institute, *Report on the condition of forests in 2017*, PGL LP 2018, p. 69.
[130] 43,570 ha – ranked third among all voivodships in the country – in 2017; GUS, *Statistical Yearbook of Forestry 2018*, p. 143.
[131] WIOŚ, *Air quality assessment in the Dolnośląskie in 2017*, Wrocław, 2018, p. 56.
[132] Ibid., p. 52.

Uniform parts of surface river waters in Dolnośląskie are characterised by a weak or bad condition[133]. In the catchment area of Odra there are commonly known flood hazards.

Kujawsko-Pomorskie Voivodship

Kujawsko-Pomorskie is characterised by relatively satisfactory statistics related to environmental protection; nonetheless, it is affected by problems related to air and water quality. As in numerous other voivodships, in urban areas – in agglomeration zones – there are contaminations with suspended dust PM_{10}, suspended dust $PM_{2.5}$ and benzo(a)pyrene in suspended dust PM_{10}. In 2017 – due to the protection of human health – all 4 zones in the voivodship were obliged to execute air protection programmes[134]. In the years 2014–2017, the emission of gaseous contaminants including carbon dioxide from particularly harmful plants exhibited an upwards trend[135].

Monitoring studies indicated a poor (including bad) condition of most uniform parts of waters (JCW). In the year 2017, bad chemical condition of JCW was observed in all measurement sites monitored in this regard[136]. The eutrophication phenomenon also contributes to the bad condition of waters. In the year 2017, of all 37 JCWP monitored for municipal eutrophication, only one JCWP was not affected by this phenomenon[137]. Research indicates that 72.6% JCWP investigates in the years 2007–2017 is at risk of failing to fulfil the requirements of RDW[138].

In view of the voivodship being at risk of water deficiency, it is becoming a particularly significant fact that in the years 2013–2015, in Kujawsko-Pomorskie there was an observed continuation of a trend towards a descending groundwater table (in the year 2015, the groundwater level dropped below the low warning point).

Forests belonging to the State Treasury in Kujawsko-Pomorskie are in a quite good health condition, but its woodiness ratio is one of the lowest in the country[139].

In 2017 the voivodship in question had a 31.7% share of areas with particular natural assets protected by the law in the area of the voivodship, which was close to the national average of 32.5% (excluding the Natura 2000 areas). Unfortunately, in the case of Natura 2000 areas themselves the statistics did not look that good anymore, since their share was quite low[140].

Landslides and mass wasting, wind erosion and floods are hazards with spatial impact and characteristics which occur in the voivodship mainly due to its geological structure and specific land relief.

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[133] Evaluation of the condition of uniform parts of surface waters in the Dolnośląskie in the year 2017, table 2. Discussion of classification results and an assessment of the condition of uniform groundwater parts in the Dolnośląskie, cf. p. 3.
[134] WIOŚ, *Information on the condition of the environment in Kujawsko-Pomorskie in 2017*, Bydgoszcz, 2018, p. 5.
[135] Based on data from the STRATEG base.
[136] WIOŚ, *Information on the condition of the environment in Kujawsko-Pomorskie…,* ditto, p. 42.
[137] Ibid.
[138] Ibid., p. 24.
[139] 23,5% – ranked thirteenth of all voivodships in the country in 2017; GUS, *Statistical Yearbook of Forestry 2018*, Warszawa, 2018, p. 37.
[140] 4,9 % – second lowest percentage in the country in 2017 – with a national average of 11.2%; GUS, *Environmental Protection 2018*, Excel file, table, section 5, 22(181).

Lubelskie Voivodship

Lubelskie Voivodship is not an intensely industrialised or urbanised area, but similar to many other voivodships it has problems with an increasing area of devastated and degraded lands which require rehabilitation[141]. In the years 2013–2015 there was an annual increase in the size of such areas – with a small drop in the year 2016 and again an increase in the year 2017. At the same time, in the years 2015–2017 the area of rehabilitated and developed lands was decreasing[142].

Also, similar to many other regions of Poland, in the Lubelskie Voivodship, in spite of it not being a heavily industrialised and intensely urbanised region, exceeded permitted 24-hour PM_{10} levels and exceeded allowed numbers of days with concentrations above the acceptable values of suspended dust PM_{10} occur and persist in urban zones (in most measurement stations)[143] along with the associated exceeded benzo(a)pyrene levels. In addition, in 2017 the average annual concentrations of the PM_{10} dust, as well as the number of cases of exceeded daily concentrations were higher than in the previous year[144]. In the case of benzo(a)pyrene, average annual values in the PM_{10} dust exceeded the target level in 2017 in all measurement stations[145]. These phenomena were accompanied by increasing – since 2013 – emissions of gaseous contaminants from particularly harmful plants[146]. In the climate protection area, there was also another adverse phenomenon – an increase in the emission (in the years 2013–2016) of carbon dioxide from particularly harmful plants. In 2017 there was a drop-in emission, but its level still exceeded the one-year emission level from each year in the 2013–2015 period[147].

In terms of the status of water resources, the studies of WIOŚ proved that in 2017 the condition of all assessed (49 out of 53) uniform parts of surface waters (JCWP) was bad[148]. Due to the primarily agricultural nature of the voivodship, water resources are of particularly great significance. However, this is not accompanied by a proper number of small water retention facilities, which is the lowest of all voivodships (85 in 2016). Agriculture – within the boundaries of catchment areas which it affects – causes eutrophication of surface waters with nitrogen compounds. Problems of the voivodship related to water management are also reflected by the fact that in 2017 only 52.7% of population used sewage systems, which resulted in the voivodship having been listed as the last one of all voivodships[149].

In spite of having abundant natural resources, Lubelskie has a woodiness ratio which is one of the lowest in the country (23.3 % in 2017, with a national average of 29.6 %)[150] and one of the country's lowest percentages of protective forests (22.1 %)[151].

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[141] Team of authors of the ATMOTERM S.A. company, *Report on the execution of the Environmental Protection Programme in Lubelskie for the years 2015–2016*, Lublin, 2017, p. 129.
[142] Based on data from the STRATEG base.
[143] WIOŚ, *Report on the condition of the environment in Lubelskie in 2017*, Lublin, 2018, p. 26.
[144] Ibid.
[145] Ibid., p. 28.
[146] Based on data from the STRATEG base.
[147] Based on data from the STRATEG base.
[148] WIOŚ, *Report on the condition of the environment in Lubelskie …,* ditto, p. 52.
[149] Source: Local Data Bank, Statistics Poland, Residential and municipal management → Network devices → Users of the installation as % of total population.
[150] Fourteenth among all voivodships in the country in 2017; GUS, *Statistical Yearbook of Forestry 2018*, p. 37.
[151] Fifteenth among all voivodships in the country in 2017 r., ditto, p. 143.

Lubuskie Voivodship

In a statistical approach of the environmental condition, Lubuskie Voivodship looks relatively good, although there are still areas which require proper intervention. In terms of waste management, one of the adverse phenomenons involves the large amount of stored waste, in particular of the municipal origin. In terms of the amount of municipal waste accumulated and intended for storage per 1 inhabitant, Lubuskie is ranked second of all voivodships in 2017[152]. Another adverse phenomenon of unoptimized waste management involved a drop in the amount of separately collected waste[153]. In the years 2014–2017 there was an increase in the amount of collected municipal waste which was stored in landfills per 1 inhabitant[154], despite the fact that the amount of waste in landfills should be successively reduced, and the landfills themselves should be shut down, following proper procedures. Another process related to land surface which featured a downwards trend involved the size of rehabilitated and developed areas in the years 2014–2016[155].

In terms of air quality, Lubuskie has problems typical of numerous more heavily urbanised regions. The main problem related to air contamination in the voivodship involves high concentrations of suspended dust PM_{10} and benzo(a)pyrene present therein. In 2017, the levels of permitted concentrations of PM_{10} dust were not maintained in the area of two zones of the Lubuskie[156].

In the area of water management, one of the most serious problems involves the eutrophication of water. It has been observed in 77% of sensitive areas classified in 2016[157]. The condition of all uniform parts of surface river waters monitored in 2017 and almost all lacustrine JCWP of the Lubuskie was assessed to be below good[158]. One negative trend related to water management and having a spatial impact in the years 2014–2017 involved an increase in the amount of industrial and municipal wastewater, requiring treatment and drained into waters or into the ground during the year.[159]

Lubuskie is the woodiest voivodship in Poland (49.3% in 2017).

Łódzkie Voivodship

In Łódzkie, problems associated with the condition of earth surface are of particular significance due to the occurrence of lignite deposits within its boundaries. In the voivodship there is an open pit mine in Bełchatów, and there are plans for a lignite mine in Złoczew. Rehabilitation of post-extraction areas of the Bełchatów mine will present a challenge for the upcoming years, especially considering that this is the largest excavation of this type in Europe. In the years 2012–2015, the area of soils requiring land rehabilitation exhibited a growing trend.

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[152] 185 kg per 1 inhabitant – ranked second of all voivodships – in 2017 – with a national average of 130 kg/inhabitant; GUS, *Environmental protection 2018*, Excel file, section 6, table 10 (241).

[153] Team of authors of the "E & W Consulting Beata Grzonka" company, *Report for the years 2014–2015 from execution of the environmental protection programme for Lubuskie for the years 2012–2015 with prospects until the year 2019*, part II, p. 70.

[154] Based on data from the STRATEG base.

[155] Based on data from the STRATEG base.

[156] WIOŚ, *Annual air quality assessment in Lubuskie based on immission tests performed in 2017*, Zielona Góra, 2018, p. 47.

[157] WIOŚ, *Condition of environment in Lubuskie in the years 2016–2017*, Zielona Góra, 2018, p. 95.

[158] WIOŚ, *Evaluation of uniform parts of river and lacustrine surface waters in Lubuskie in the year 2017*, Zielona Góra, 2018, p. 19-20.

[159] Based on data from the STRATEG base.

Location of numerous industrial plants (especially related to home appliances) in the voivodship favours the generation of large amounts of waste. This accelerates economic growth, but it has its side effects, e.g. a considerable amount of generated[160] and accumulated waste[161].

In the voivodship there are many active plants which are particularly harmful in terms of the emission of pollutants into the air[162]. Excess concentration of the PM_{10} suspended dust was recorded in Łódzkie in the years 2002–2017, which resulted in a need to implement air protection programmes[163]. The number and range of areas with exceeded permitted levels of the PM_{10} dust in 2017 was increased in relation to the preceding year[164]. The PM_{10} dust contains benzo(a)pyrene. This is why excessive levels of PM_{10} are associated with excess amounts of benzo(a)pyrene. Excessive target level of benzo(a)pyrene contained in the PM_{10} suspended dust was recorded in 2017 in the whole Łódź urban agglomeration area[165]. Excessive levels of $PM_{2.5}$ dust also occurred in the voivodship, having taken place in almost every county city[166].

In the context of climatic policy, it is worth pointing out that in the year 2016 Łódzkie emitted one of larger amounts of carbon dioxide in Poland[167].

In 2017 there was no recorded good condition of water in any of the studied uniform parts of surface waters of Łódzkie – neither in the Vistula nor the Oder catchment area[168]. This status is caused by municipal wastewater, outflows from urbanised and agricultural areas.

Problems in Łódzkie also occur in the forestry area. A large area of protective forests was damaged by industry[169], and the high dissemination of forest complexes along with the domination of pine monocultures in the structure of stands are not favourable. This is particularly significant considering the fact that the discussed voivodship has the lowest woodiness ratio in the country[170].

The surface area of protected natural resources in the voivodship is smaller compared to numerous other voivodships. This is evidenced, e.g. by the low share of areas with particular natural assets protected by the law in the whole voivodship[171] and the low share of Natura 2000 areas of both types[172].

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[160] 7,006.2 thousand tonnes – ranked third in all of Poland in 2017; GUS, *Environmental protection 2018*, Excel file, section 6, table 3 (234).
[161] 108,753.8 thousand tonnes – ranked fifth in all of Poland in 2017, ditto, Excel file, section 6, table 3 (234).
[162] 118 – ranked fifth in the country in 2017, ditto, Excel file; table 22(135).
[163] WIOŚ, *Report on the condition of the environment in Łódzkie*, Łódź, 2018, p. 97.
[164] Ibid.
[165] Ibid., p. 106.
[166] Ibid., p. 104.
[167] 45,707.893 thousand tonnes – ranked third in all of Poland in 2016; GUS, *Environmental protection 2018*, Excel file, section 4, table 8 (121).
[168] WIOŚ, *Report on the condition of the environment in Łódzkie*, Łódź, 2018, p. 51.
[169] 41,519 ha – ranked fourth among all voivodships in the country – in 2017; GUS, *Statistical Yearbook of Forestry 2018*, p. 143.
[170] 21.5% – ranked sixteenth among all voivodships in the country – in 2017; ditto, p. 37.
[171] 19.7% – second lowest in the country in 2017 – with a national average of 32.5%; GUS, *Environmental Protection 2018*, Excel file, section 5, table 3(162).
[172] Special protection areas for birds constitute 2.2% of the overall area of the voivodship (ranked fourteenth of all voivodships; in the whole country these areas constitute 15.7%). Special areas of conservation of habitats constitute 2.9% of the overall area of the voivodship (ranked fifteenth of all voivodships; in the whole country they constitute 11.2%). Data for 2017, ditto, Excel file, section 5, table 22(181).

Małopolskie Voivodship

Małopolskie Voivodship is one of the smaller voivodships, instead being among the most diverse ones with respect to geography. Geographical diversity corresponds – in this case – to the diversity of economic development, which includes many various areas from biotechnology, through energy, to smelting and mining industry. Economic growth and high population (Małopolskie is among the most densely populated in Poland) are associated with a considerable amount of accumulated waste[173]. In addition, compared to the previous year there was an increase in the amount of produced and accumulated waste[174]. Also, packaging waste recycling level in Małopolskie in the year 2017 was among the lowest in the country[175]. It is assessed that 79% of inventoried asbestos waste in the voivodship remains to be neutralised[176].

In the area of air quality, the WIOŚ report showed that in 2017, in relation to criteria established for health protection, in the urban agglomeration of Kraków there were recorded excessive concentrations of nitrogen dioxide, PM_{10} suspended dust, benzo(a)pyrene in PM_{10} dust and $PM_{2.5}$ suspended dust, while in the remaining part of the voivodship – PM_{10} suspended dust, benzo(a)pyrene in PM_{10} dust and $PM_{2.5}$ suspended dust[177].

In Małopolskie there are numerous plants which are particularly harmful in terms of emission of pollutants into the air, all operating and exerting impact, also spatially[178].

Large areas of mountains and uplands in Małopolskie influence more frequent occurrence of extreme weather and geomorphological phenomena. A large part of the voivodship is prone to water erosion. The risk of landslides also constitutes a problem. By the end of 2017, 34 239 landslides were identified in the whole Małopolskie[179]. Their risk always grew after long atmospheric precipitation. Małopolskie is considered to be one of areas with the largest amount of precipitation in Poland and a high degree of flood hazard.

The status of water resources in Małopolskie looks unfavourable. Among all 76 uniform parts of surface waters (JCWP) studied in 2017, 91% of JCWP presented a moderate, weak or bad condition/potential, i.e. Not fulfilling the conditions of a good water condition[180].

One of the more serious negative phenomena important for water management, and at the same time presenting spatial impact, involved the generation of a large amount of industrial and municipal wastewater which remained untreated[181].

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[173] 124,939.2 thousand tonnes – ranked fourth in the country – in 2017; GUS, *Environmental protection 2018*, Excel file, section 6, table 3 (234).
[174] GUS, *Environmental protection 2017*, p. 325; GUS, *Environmental protection 2018*, Excel file, section 6, table 3 (234).
[175] 56,8 % – ranked thirteenth in the country – in 2017, ditto, Excel file, section 6, table 28(259).
[176] WIOŚ, *Report on the condition of the environment in Małopolskie in 2017*, Kraków, p. 207.
[177] Ibid., p. 19.
[178] 139 – ranked third in the country – in 2017; GUS, *Environmental protection 2018*, Excel file, section 4, table 22(135).
[179] Team of authors of Lemtech Konsulting sp. z o.o., *Report on the execution of voivodship environmental protection programme in the Małopolskie for the years 2016–2017 – i.e. the Environmental Protection Strategic Programme*, Kraków, 2018, p. 60.
[180] WIOŚ, *Report on the condition of the environment in Małopolskie in 2017,* Kraków, 2018, p. 87.
[181] 14,1 hm^3 – ranked third among all voivodships – in 2017; GUS, *Environmental protection 2018*, Excel file, section 3, Tab. 29(74).

Mazowieckie Voivodship

Mazowieckie Voivodship is the largest in terms of area and population and it has the highest economic potential. This is associated with increased pressure exerted on the environment. Mazowieckie is one of these voivodships in the country which are at the top of statistics on the amount of generated municipal and industrial waste. The voivodship has a lot of problems related to waste management. In 2017, selectively collected rainwater constituted only 26.5% of the overall mass of rainwater collected in the years 2012–2017[182]. Problems related to waste management are also evidenced by the level of packaging waste recycling, which is among the lowest in the country[183]. Illegal dumps are an additional phenomenon related to precipitation which is negative, e.g. for the space and landscape. According to the data of GUS, in 2017 in Mazowieckie there were 143 illegal dumps with a total area of 80 906 m^2 [184]. Although in 2017 in Mazowieckie there was a considerable increase in the amount of asbestos stored in a dump[185], the process of its transport to proper landfills is slow[186].

Along with the economic growth of Mazowieckie, since 2014 there has been a growth in the total emission of gaseous pollutants from particularly harmful plants[187]. This is affected by the high number of these plants in the voivodship[188].

On the other hand, low emission, including transport, often results – mainly in the urban agglomeration of Warszawa – in the concentrations of $PM_{2.5}$ and PM_{10} suspended dusts which are exceeded above the permitted levels. In 2017, in Mazowieckie there were several cases of exceeded information and alert levels for the PM_{10} dust[189]. In one station (Warszawa, Al. Niepodległości St.), in the years 2014–2017 there were recorded exceeded average annual levels of the PM_{10} dust[190] and nitrogen dioxide[191]. Exceeded average annual level of the $PM_{2.5}$ dust was recorded in the years 2016–2017[192]. Excessive emissions of PM_{10} dusts are associated with the frequent occurrence of high concentrations of benzo(a)pyrene[193].

For big cities which are transit centres, it is common to record upward trends of harmful traffic noise in terms of frequently exceeded limits (primarily traffic and aircraft noise).

[182] WIOŚ, *Report on the condition of the environment in Mazowieckie in 2017*, Warszawa, 2018, p. 106.
[183] 56,9 % – ranked twelfth in the country – in 2017; GUS, *Environmental protection 2018*, Excel file, section 6, table 28(259).
[184] Local Data Bank (as of 28 January 2019).
[185] WIOŚ, *Report on the condition of the environment in Mazowieckie in 2017,* Warszawa, 2018, p. 110.
[186] *Programme for the removal of products containing asbestos from Mazowieckie,* Warszawa, 2018, p. 33.
[187] Based on data from the STRATEG base.
[188] 137 – fourth largest number of harmful plants in the country in 2017; GUS, *Environmental protection 2018*, Excel file, section 4, table 22(135).
[189] WIOŚ, *Report on the condition of the environment in Mazowieckie in 2017*, Warszawa, 2018, p. 20.
[190] Ibid., p. 21.
[191] Ibid., p. 17.
[192] Ibid., p. 23.
[193] Ibid., p. 28.

In the context of climatic policy, it is worth pointing out that in the year 2016 Mazowieckie emitted one of larger amounts of three greenhouse gases – methane, nitrous oxide and carbon dioxide in Poland[194].

In terms of water management, in 2017 a bad condition was recorded for 83 out of 87 evaluated uniform parts of surface waters in Mazowieckie[195]. In the voivodship there is a considerable flood hazard – in the Central Vistula area. In particular, the Vistula valley, from Wyszogród to the border of the voivodship, has been categorised as a problematic area with a countrywide significance.

Similar to the neighbouring Łódzkie, Mazowieckie faces problems related to forest management. One of them involves the lowest percentage of protected forest areas in the country[196] and one of the lowest woodiness ratios in the country[197].

Opolskie Voivodship

Similar to other regions of Poland, Opolskie Voivodship struggles with exceeded concentrations of suspended dusts – mainly in urban areas in heating seasons: $PM_{2.5}$ (annual standard value exceeded in the Kędzierzyn-Koźle station in 2017)[198], PM_{10} (24-hour permitted value in all stations measuring the concentrations of PM_{10} dust)[199] and benzo(a)pyrene (average annual concentration)[200]. Average annual concentrations of benzo(a)pyrene studied in 2017 in all measurement stations greatly exceeded the established standards[201].

Industry has been leaving its increasing gas footprint in the voivodship. Emission of gaseous pollutants from particularly harmful plants in the years 2015–2017 exhibited an upward trend[202]. In an analogical period, the emission of carbon dioxide from particularly harmful plants also exhibited an upward trend[203].

In terms of the status of water resources in the Opolskie, in 2017 a bad condition was recorded in 32 of the tested JCWPs[204]. The voivodship is listed among areas at risk of floods, in particular in the drainage basin of Oder and in the valleys of its tributaries. This is influenced, e.g. by insufficient retention capacities of the Oder catchment area.

[194] 46 677.13 thousand tonnes CO_2 – ranked second among all voivodships; 167.48 thousand tonnes of methane – ranked second among all voivodships; 7.8 thousand tonnes of nitrous oxide – ranked second among all voivodships; GUS, *Environmental protection 2018*, Excel file, section 4, table 8 (121).
[195] WIOŚ, *Report on the condition of the environment in Mazowieckie in 2017*, ditto, p. 49.
[196] 20.9 % – ranked sixteenth of all voivodships – in 2017; GUS, *Statistical Yearbook of Forestry 2018*, p. 143.
[197] 23.3% – ranked fifteenth of all voivodships – in 2017; ditto, p. 37.
[198] WIOŚ, *Condition of the environment in Opolskie in the year 2017*, Opole, 2018, p. 20;
WIOŚ, *Measurement results produced in 2018 in air quality monitoring stations in Opolskie*, Opole, p. 4.
[199] WIOŚ, *Condition of the environment in Opolskie in the year 2017*, Opole, 2018, p. 19.
[200] Ibid., p. 22.
[201] Ibid., p. 22.
[202] Based on data from the STRATEG base.
[203] Based on data from the STRATEG base.
[204] WIOŚ, *Condition of the environment in Opolskie in the year 2017*, ditto, p. 40.

In 2017, Opolskie had a quite high – close to the national average – woodiness ratio (26.7%), but at the same time it featured a large area of protective forests damaged by industry[205], even in spite of its high share of protective forests (66.8%).

In terms of natural resources, the Opolskie is characterised by the lowest share of Natura 2000 areas of both types in its overall surface area compared to all of Poland: special protection areas for birds and special areas of conservation for habitats[206].

Podkarpackie Voivodship

Podkarpackie Voivodship has numerous natural assets, which among other things results from the fact that its area comprises 3 physiographic units and 3 climate zones. At the same time, it is an area characterised by intense industrial growth, which is exemplified by its economic zones and the so-called "Aviation Valley". Within its boundaries there are also heavy industry plants which negatively affect the surrounding environment, including groundwaters and aquifers. Examples include production waste dump sites (6 tailings ponds and a landfill) of the Stalowa Wola Steel Mill. It is an example of side effects of the functioning of a large heavy industry plant which considerably adversely affects the surrounding space. In the Subcarpathian region there are also other spatial phenomena typical of mountain and upland areas – i.e. landslides. Also, hydrometeorological conditions in this region favour the erosion of soils.

Although the voivodship is less urbanised compared to the rest of Poland, in the existing town areas there are air pollutions typical of the more urbanised areas. Examples of such pollutions include the exceeded permitted daily concentration of the PM_{10} dust[207] and exceeded target values of benzo(a)pyrene in all measurement sites[208]. Excessive concentrations of the PM_{10} dust in 2017 caused the demarcation of 32 areas of exceeded daily standard of the PM_{10} dust in Podkarpackie. These areas were inhabited by approximately 500 thousand people[209].

In terms of water management, evaluation of the condition of surface waters performed in the year 2017 by WIOŚ in Rzeszów indicated a bad condition of water in 87% of all evaluated uniform parts of surface waters[210]. In the year 2017 bad condition was recorded in all evaluated river JCWPs[211]. In Podkarpackie there are problems related to both the shortages of water and its excess. Due to the fact that before 2015 in Podkarpackie there was a deficiency of precipitation, every several years this place saw the occurrence of droughts[212]. In 2015, a risk of agricultural drought was recorded in the whole Podkarpackie[213]. Also, during that time, the situation related to drought could not be

[205] 82722 ha – ranked second among all voivodships in the country – in 2017; GUS, *Statistical Yearbook of Forestry 2018,* p. 143.
[206] 1.5 % special protection areas for birds – ranked sixteenth of all voivodships, with 15.7% at a national scale; 2.9% special areas of conservation for habitats – ranked sixteenth among all voivodships, with 11.2% at a national scale; GUS, Environmental Protection 2018, Excel file, section 5, 22(181).
[207] WIOŚ, *Annual air quality assessment in Podkarpackie, report for 2017*, Rzeszów, 2018, p. 29.
[208] Ibid., p. 52.
[209] Ibid., p. 94.
[210] Team of authors of the Podkarpackie Spatial Planning Office in Rzeszow, *Report on the execution of the environmental protection programme in Podkarpackie for the years 2015–2016*, Rzeszów, 2018, ditto, p. 19.
[211] WIOŚ, *Report on the condition of the environment in Podkarpackie in 2017*, ditto, p. 35.
[212] Team of authors of the Podkarpackie Spatial Planning Office in Rzeszow, *Report on the execution of the environmental protection programme in Podkarpackie for the years 2015–2016*, ditto, p. 2.
[213] Ibid., p. 72.

improved due to the relatively low number of small water retention facilities[214]. At the same time, there is a high level of flood hazard, primarily caused by frequent water surges in rivers[215]. This risk is enhanced and strengthened by the mountainous and upland nature of catchment areas in the voivodship. Also, at the same time there was too small a number of identified objects intended to prevent floods[216].

Podlaskie Voivodship

Podlaskie Voivodship is among the voivodships which generate the least waste, but this does not mean the absence of problems related to the protection of ground surface. They are exemplified by the fact that the area of rehabilitated and developed lands decreased considerably in the years 2014–2017[217].

Podlaskie is one of the least urbanised in Poland; however, in spite of this, in the urban agglomeration of Białystok and the Podlaskie there were occurrences of negative phenomena in terms of air quality: exceeded permitted concentrations of the $PM_{2.5}$ suspended dusts (in the Podlaskie) and an exceeded target level of benzo(a)pyrene (in the Podlaskie and the urban agglomeration of Białystok) in 2017[218]. One negative trend involved growing methane emissions in the years 2014–2017, with a huge increase in the year 2017 itself[219].

In Podlaskie there are occurrences of the eutrophication phenomenon, which is typical of agricultural regions. There is an observed increase in the amount of water prone to municipal eutrophication[220]. In the years 2014–2017 there was an increase in the amount of industrial and municipal effluents requiring treatment, drained into the water or into the ground during the year[221].

The woodiness ratio for Podlaskie in 2017 amounted to 30.8%, meaning above the national average (29.6%), but the quite large amount of wood was removed as part of intervention cuts in the area of Regional Directorate of National Forests in Białystok[222].

Pomorskie Voivodship

For many years, Pomorskie Voivodship – similar to the neighbouring Zachodniopomorskie Voivodship – has been at risk of the following phenomena of a spatial nature: drought (in particular agricultural), floods (especially Żuławy, for which the risk comes from the Vistula Lagoon), landslides (e.g. the cliff

[214] *Land use plan of Podkarpackie – prospect for 2030*, Rzeszów, 2018, p. 60.
[215] Team of authors of the Podkarpackie Spatial Planning Office in Rzeszow, *Report on the execution of the environmental protection programme in Podkarpackie for the years 2015–2016*, ditto, p. 62.
[216] Ibid., p. 65.
[217] Based on data from the STRATEG base.
[218] WIOŚ, *Evaluation of the levels of substances in the air and classification of zones in Podlaskie in 2017*, Białystok, 2018, p. 31.
[219] Based on data from the STRATEG base.
[220] Team of authors of the Sustainable Development Institute, *Report on the execution of the Environmental Protection Programme in Podlaskie for the years 2015–2016,* Białystok, 2017, p. 74.
[221] Based on data from the STRATEG base.
[222] 1.0 million m^3 – ranked third in the Regional Directorate of National Forests in 2016 – *Report on the condition of forests in Poland in 2016*, p. 63, PGL LP 2017, and 0.9 million m^3 – ranked fourth in 2017 – *Report on the condition of forests in Poland in 2017*, p. 67, PGL LP 2018.

in Jastrzęba Góra) and seashore erosion (including beaches) – in particular considering the predicted rise in the level of the Baltic Sea.

Pomorskie is among the most urbanised regions, and therefore it is affected by problems related to the process of expansion of urban areas. In such areas where the so-called low emission occurs, there are typically excessive levels of permitted concentrations (primarily daily) of the PM_{10} suspended dust and benzo(a)pyrene contained in it. As shown by the studies of numerous voivodship inspectorates for environmental protection, the problem of elevated benzo(a)pyrene level concerns virtually ass urbanised areas. It also occurred in Pomorskie, where in 2017 levels of benzo(a)pyrene in the PM_{10} dust exceeding permitted values occurred in two out of three monitoring stations[223].

Pomorskie has very large and varied water resources – within its boundaries there are 245 distinguished uniform parts of river waters[224], 155 uniform parts of surface lacustrine waters, 4 uniform parts of transitional waters and 7 uniform parts of coastal waters[225]. In the year 2017, all evaluated uniform parts of flowing waters were assigned a bad condition. Problems of water management also include the relatively low number of small water retention facilities, which did not increase in the period of 2013–2016[226]. In the years 2014–2017 there was an increase in the amount of industrial and municipal effluents requiring treatment per 1 inhabitant, drained into the water or into the ground during the year[227]. The phenomenon of eutrophication of water by agricultural nitrates occurs mainly in agricultural areas of the voivodship.

There is a continuous serious threat caused by the weapon (e.g. chemical) remaining since the Second World War on the bottom of the Baltic Sea, including its coastal zone. It has a high negative potential of spatial impact on the marine environment and the shore.

Śląskie Voivodship

Considering the whole country, Śląskie is an area of one of the most serious problems associated with the condition of ground surface, the amount of precipitation, the quality of air and surface waters. This is due to factors related, e.g. to history of the region, its geology and economic policy.

One of the most serious remaining problems involves the relatively high share of devastated and degraded lands, requiring rehabilitation, in the overall area of the voivodship, resulting from the functioning of mining and industry[228]. The size of these areas increased in the years 2014–2017[229].

In the voivodship there is a considerable amount of accumulated waste[230] (stored so far), which also contributes to a deteriorating condition of the land surface, and in the future it will increase demand for land rehabilitation.

[223] WIOŚ, *Report on the condition of the environment in Pomorskie in 2017,* Gdańsk, 2018, p. 32.
[224] Team of authors of the "Eko-Log Sp. z o.o." company, *Forecast of the environmental impact of the "Environmental protection programme in the Pomorskie for the years 2018-2021 with prospects until the year 2025" project,* p. 36.
[225] Ibid., p. 36.
[226] Based on data from the STRATEG base. No data for 2017.
[227] Based on data from the STRATEG base.
[228] 476,284.6 ha – ranked second among all voivodships in the country in 2017; GUS, *Environmental protection 2018*, Excel file, section 6, table 3 (234).
[229] Based on data from the STRATEG base.

Another consequence of the industrial development of Śląskie involves the country's largest area of protective forests damaged by industry[231]. Due to this, it is a point of concern that the voivodship also has one of the country's smallest areas of forestation in public forests[232].

Bad air quality is a phenomenon causing negative health effects on people, which affects many areas and cities in Poland. In Śląskie, the permitted levels of $PM_{2.5}$ and PM_{10} suspended dusts and benzo(a)pyrene are frequently exceeded[233]. 13 out of 50 cities from the WHO list of heaviest air pollutions published in the 2016 report are located in Śląskie. In the voivodship there are many plants which are particularly harmful in terms of emission of pollutants into the air (329 in 2017), though, as indicated by numerous studies, air pollution in urbanised areas is caused primarily by the so-called low emission.

In the year 2016 Śląskie emitted the highest amounts of two greenhouse gases – carbon dioxide and methane – among all voivodships[234], which is of particular significance for conducting responsible climatic policy.

The condition of uniform parts of surface waters (JCWP) in the voivodship is mostly weak and bad. This is influenced, e.g. by the large amount of industrial (especially untreated) and municipal effluents requiring treatment, drained into the water or into the ground. In 2017, the amount of generated industrial and municipal effluents, requiring treatment and drained into the water or into the ground, which remained untreated, was the largest in the country[235]. In terms of generation of the effluents characterised above (without distinguishing untreated effluents), an upward trend occurred in Śląskie from 2015 until 2017[236].

Świętokrzyskie Voivodship

Świętokrzyskie Voivodship has an agricultural-industrial nature and it does not belong to densely populated regions of Poland. In 2016, this voivodship subjected a large amount of generated waste to the process of recovery[237]. However, at the same time in Świętokrzyskie there were difficulties related to maintaining the best possible condition of ground surface. This is reflected by changes in the sizes of devastated and degraded lands requiring rehabilitation, which in the years 2014–2016 exhibited an upward trend[238]. One of factors which influence this involves the high number of quarries. Mining extraction of raw materials for the lime industry deteriorates the condition of ground surface. It is also affected by erosion, which in the area of Świętokrzyskie is very intense, since all of its types are encountered in there: water erosion, surface erosion, wind erosion and gully erosion.

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[230] 476 284.6 thousand tonnes – ranked second in the country in 2017; GUS, *Environmental protection 2018,* Excel file, section 6, table 3 (234).
[231] 182 729 ha – ranked first in the country in 2017; GUS, *Statistical Yearbook of Forestry 2018*, p. 143.
[232] 3,4 ha – ranked fifteenth of all voivodships in 2017; Ibid., p. 82.
[233] WIOŚ, *Condition of the environment in Śląskie in 2017,* Katowice, 2018, p. 19–23, 32–33.
[234] 50,601.717 thousand tonnes of CO_2 and 666.093 thousand tonnes of methane; GUS, *Environmental protection 2018*, Excel file, section 4, table 8 (121).
[235] 59.0 hm^3 – ranked first of all voivodships in 2017; GUS, *Environmental protection 2018*, Excel file, section 3, table 29(74).
[236] Based on data from the STRATEG base.
[237] 2075.1 thousand tonnes – ranked seventh of all voivodships – in 2017; GUS, *Environmental protection 2018,* Excel file, section 6, table 6 (237).
[238] Based on data from the STRATEG base.

In 2017, in several zones of Świętokrzyskie concentrations of the PM_{10} dust and average annual target level of benzo(a)pyrene exceeded the values permitted for daily concentrations[239], which is a relatively frequent phenomenon observed by voivodship inspectorates for environmental protection in other, more urbanised regions of Poland. Another phenomenon related to air quality which also occurred in several other voivodships involved the emission of gaseous pollutants from particularly harmful plants, which in the years 2014–2016 exhibited an upward trend. In the year 2017 there was a drop-in emission, but its reduced level exceeded the value of annual emissions from the years 2014 and 2015[240].

Also, it is not an exception in relation to other voivodships that the condition of uniform parts of surface river waters (JCWP) in Świętokrzyskie in 2017 was assessed as bad[241]. In the area of water and effluent management, a negative phenomenon with strong spatial impact involved the generation of a large amount of industrial and municipal effluents which remained untreated[242]. Its environmental effects were worsened by the low share of sewage systems in the voivodship, especially its rural areas. In 2017, 58.7% of the population of Świętokrzyskie used sewage systems, resulting in the 15th rank of the voivodship among all voivodships in the country[243].

In 2017, Świętokrzyskie had a high share of areas with particular natural assets protected by the law in the total area of the voivodship (65%)[244], but at the same time a low share of special protection areas for birds in the Natura 2000 network (1.9%)[245].

Warmińsko-Mazurskie Voivodship

Warmińsko-Mazurskie Voivodship does not appear at the top of statistics which present problems related to the condition of the environment. It has numerous natural and landscape assets, but it also has rather large areas of devastated and degraded lands requiring rehabilitation[246]. Several reports on the condition of the environment indicated the existence of problems related to waste management. Due to their nature, largely focusing on tourism, Warmińsko-Mazurskie are prone to contaminations of the earth surface (e.g. littering) and the water (e.g. waste from boats sailing on the lakes), which are particularly adverse for areas valuable in terms of nature and result largely from tourism.

Although Warmińsko-Mazurskie does not belong to intensely urbanised regions, in urban zones there are problems with air quality. The so-called low emission manifested itself by high levels of

[239] WIOŚ, *Air quality assessment in Świętokrzyskie in the year 2017*, Kielce, 2018, p. 19, 21.
[240] Based on data from the STRATEG base.
[241] *Results of classification and assessment of the condition of surface waters in Świętokrzyskie in the year 2017,* Kielce, 2018.
[242] 15.4 hm^3 – ranked second of all voivodships – in 2017; GUS, *Environmental protection 2018*, Excel file, section 3, table 29(74).
[243] Based on data from the STRATEG base.
[244] Ranked first of all voivodships in Poland. The national average in 2017 amounted to 32.5%; GUS, *Environmental protection 2018*, Excel file, section 5, table 3 (161).
[245] Ranked fifteenth of all voivodships in Poland. The national average in 2017 amounted to 15.7%; GUS, *Environmental protection 2018*, Excel file, section 5, table 22 (181).
[246] 4,838 ha – ranked fifth of all voivodships in Poland – in 2017; GUS, *Environmental protection 2018*, Excel file, section 2, table 11(29).

benzo(a)pyrene, which indicated exceeding the target level in the Elbląg city zone and the Warmińsko-Mazurskie in 2017[247].

An increase in industrial activity was observed in the voivodship, indicated by growing emission of gaseous pollutants from particularly harmful plants in the years 2015–2017[248].

In 2017, in terms of the condition of water resources of Warmińsko-Mazurskie, WIOŚ declared a bad condition of 38 uniform parts of waters[249]. Also, a bad condition was recorded regarding the water of the Vistula Lagoon[250], which additionally creates a flood hazard for coastal areas and Elbląg.

Wielkopolskie Voivodship

In the year 2017, Wielkopolskie Voivodship featured the country's greatest share of areas requiring land recultivation[251].

The amount of lands requiring recultivation also corresponded to data involving the large amount of municipal waste meant for storage per 1 inhabitant[252] and the significant amount of accumulated waste[253]. They are mainly side effects of processes such as: the development of industry, trade and industrial farming as well as an improvement in the inhabitants' standard of living.

In terms of air condition, there was a noticeable high emission of gaseous pollutants from particularly harmful plants (primarily sulphur dioxide and nitrogen oxides)[254]. These processes correlate with information on the high number of particularly harmful plants in terms of the emission of pollutants into the air[255].

Similar to numerous other areas of Poland, where the low emission phenomenon occurs, in Wielkopolskie there were higher than permitted concentrations of pollutants. Exceeded concentrations of substances occurring in 2017 required the preparation of air protection programmes for the zone of Wielkopolskie in the case of the $PM_{2.5}$ dust, for the urban agglomeration of Poznań and the zone of Wielkopolskie in the case of the PM_{10} dust and for the zone of Wielkopolskie, Kalisz city and the urban agglomeration of Poznań in case of benzo(a)pyrene[256].

In the year 2016, Wielkopolskie emitted one of the largest amounts of two greenhouse gases – methane and nitrous oxide – in Poland[257].

In 2016 Wielkopolskie saw one of the highest drought risks in the country. Agriculture was facing problems related to this, but it was also generating environmental pressures itself, causing

[247] WIOŚ, *Report on the condition of the environment in Warmińsko-Mazurskie in 2017*, Olsztyn, 2018, p. 92.
[248] Based on data from the STRATEG base.
[249] WIOŚ, Report on the condition of the environment in Warmińsko-Mazurskie in 2017, Olsztyn, 2018, p. 38.
[250] Ibid., p. 64.
[251] 10,277 ha – ranked first of all voivodships in Poland in 2017; GUS, *Environmental protection 2018*, Excel file, section 2, table 11(29).
[252] 129 kg – ranked seventh in the country in 2017; Ibid., table 10 (241).
[253] 60,615.5 thousand tonnes – ranked seventh of all voivodships in Poland in 2017; Ibid., section 6, table 3(234).
[254] 14,447.5 thousand tonnes – fourth largest in all of Poland in 2017; Ibid., section 4, table 25(138).
[255] 144 – ranked second among all voivodships in the country in 2017; Ibid., section 4, table 22(135).
[256] WIOŚ, *Report on the condition of the environment in Wielkopolskie in the year 2017*, Poznań, 2018, p. 24.
[257] 163.777 thousand tonnes of methane – ranked third of all voivodships and 9.213 thousand tonnes of nitrous oxide – ranked first among all voivodships; GUS, *Environmental protection 2018,* Excel file, section 4, table 8 (121).

eutrophication of surface waters (with nitrogen compounds) and contamination of alluvial sediments. In the year 2017 the condition of all studied 124 river JCWPs, 44 lacustrine JCWPs was evaluated as bad[258].

In 2017, Wielkopolskie had one of the lowest woodiness ratios of the whole country[259].

Zachodniopomorskie Voivodship

In 2017, in Zachodniopomorskie Voivodship there were 561.5 ha of unrehabilitated waste dump areas, with no areas subjected to land rehabilitation during that year[260]. Problems related to waste management are confirmed by reports (e.g. of WIOŚ), which list numerous shortcomings in this area – e.g. a problem involving the accumulation of large amounts of waste, which is not processed properly. This corresponds with the fact that in this voivodship in 2017 there was one of the lowest achieved levels of packaging waste recycling[261] of all voivodships.

Another source of environmental problems with territorial impact involves farms where the concentration of animal production results in turn in: contaminations of the earth, the water and odours. The negative side effects of mass breeding – with a wide spatial impact – often cause protests of local communities. In 2016 there were 91 large farms in Zachodniopomorskie[262].

In 2017 exceeded average annual concentrations of benzo(a)pyrene were recorded in two zones of the voivodship – the urban agglomeration of Szczecin and the Zachodniopomorskie zone[263].

The area of Zachodniopomorskie is dominated by rivers. The condition of 60 out of 66 river JCWPs studied in 2017, which is the outcome of evaluation of the ecological status/potential and the chemical condition, was assessed as bad[264]. Studies performed under diagnostic monitoring of 2017 provided a basis for assessing the condition of all monitored transitional and coastal waters as bad[265]. The voivodship was at risk of the following phenomena of a spatial nature: drought (in particular agricultural), landslides and seashore erosion.

10. Strategic intervention areas (OSIs)

In the perspective of 2030, regional policy will be more selective. On the one hand, it will be directed towards the straightening of factors building the competitiveness of regions, on the other hand it will focus on reducing disproportions in the economic development level of the country by supporting areas in which social-economic problems are concentrated.

According to a definition provided by the SOR, OSIs are areas with a characteristic set of social, economic or spatial conditions and features, deciding about the occurrence of structural

[258] WIOŚ, *Report on the condition of the environment in Wielkopolskie in the year 2017,* ditto, p. 36, 43.
[259] 25.8% – ranked twelfth in 2017 – with a national average of 29.6%; GUS, *Statistical Yearbook of Forestry 2018*, p. 37.
[260] GUS, *Environmental protection 2018*, p. 145.
[261] 55,6 % – ranked fourteenth of all voivodships in the country – below the national average of 57.5% in 2017; GUS, Environmental protection 2018, Excel file, section 6, table 28(259).
[262] WIOŚ, *Condition of the environment in Zachodniopomorskie. Report 2017,* Szczecin, 2017, p. 60.
[263] WIOŚ, *Report on the condition of the environment in Zachodniopomorskie. Report 2018,* Szczecin, 2018, p. 26.
[264] Ibid., p. 65.
[265] Ibid., p. 82.

development barriers or permanent, activatable development potentials within them. Among them, there were indicated medium cities loosing their social-economic functions[266], as well as areas at risk of permanent marginalisation[267].

The term strategic intervention area is used for planning state interventions with an integrated nature (combining investments, soft projects, i.e. investments in human resources and/or regulatory solutions), undertaken under various policies with regard to selected types of areas in the country. In this context, environmental policy plays a significant role due to the fact, that the goals of PEP2030 were formulated in response to the most important trends in the environmental area identified in a diagnosis, in a manner enabling harmonisation of issues related to environmental protection with economic and social needs.

There is a close relationship between marginalisation processes and environmental quality problems, as well as limited access to resources. Good quality of the environment (pure water, air, landscape assets) and access to infrastructure (sewage systems, water supply systems) is an important indicator of the inhabitants' quality of life, as well as a necessary condition for the development of tourism in the given area. On the other hand, access to resources determines, e.g. industrial development.

In this context, it is the aim of PEP2030 to give special consideration to the aspect of medium cities losing their social-economic functions when conducting the policy of adaptation to climate change, also carried out in relation to areas being at risk of permanent marginalisation. Not only should adaptive actions increase the resistance of OSIs to climate change, but they should also increase their inhabitants' quality of life, among other things by planning and execution of investments in green and blue infrastructure, economical and sustainable management of rainwater, as well as other actions related to adaptation, which would also allow increasing the attractiveness of these areas to investments. Preferences for OSIs related to the possibility of financing adaptive actions will be indicated in implementational instruments, including operational programmes.

For environmental policy, special intervention areas also include areas in which indicators of environmental status depart from the accepted standards, or for which the extent of provision of infrastructure departs from the standards (e.g. cities listed among the most contaminated in terms of air quality according to the WHO). These areas are indicated in chapters related to territorialisation and in a diagnosis of the environmental status, which is an appendix to PEP2030. At the same time, as part of execution of the postulate of preventing marginalization and the loss of social-economic functions by medium cities, it is planned to take the areas indicated in the SOR into account when planning specific supporting instruments. It will be possible to reflect orientation towards OSI in instruments involving for example the development of low-emission and zero-emission transport, improvement in air quality or protection of ground surface. In particular, under the national environmental protection financing system (funds of the National Fund for Environmental Protection and Water Management and voivodship funds for environmental protection and water management) and when planning support as part of a financial prospect after 2020, e.g. by

[266] Śleszyński P., *Delimitation of medium cities loosing their social-economic functions*, Institute of Geography and Spatial Organisation, Polish Academy of Sciences, Warszawa, 2016.

[267] Appendix to resolution no. 8 of the Council of Ministers dated 14 February 2017 on adopting the *Strategy for Responsible Development until the year 2020 (with prospects until 2030)* (M.P. item 260), figure 12. *Areas at risk of permanent marginalisation*.

formulating criteria, determining an allocation dedicated to these areas or additional points in competitions. At the same time, it should be pointed out that each time the generation of these mechanisms must be preceded by an analysis of relations between barriers existing in the given area and development chances provided by the given instrument.

Among other areas requiring intervention of environmental policy one should list those with particular natural assets. Protected areas should be an important element of social-economic development of regions characterised by great natural wealth. Support should involve determining the potential and indicating the possibilities of utilising natural resources of both existing and planned protected areas, for a social-economic development. The existence of a protected area in a given region (such as, e.g. a national park) should facilitate the acquisition of funds by local community for the development of nature-friendly tourism and services related to it. Other forms and types of economic activity which do not affect the environment negatively also deserve support and promotions.

11. PEP2030 implementation system

The development of PEP2030 is based on a medium-term development strategy for the country – SOR. PEP2030 determines directions of development for sectors of environment and water management, indicating actions which should be taken in order to accomplish detailed objectives, determining actions with a diverse nature (analytical, legislative, program-based, financial, investment-based). PEP2030 is associated with other horizontal integrated development strategies. This means that both the goals of PEP2030 are achieved by the implementation of other strategies, and the implementation of PEP2030 achieves the goals of other strategies. Relationships of PEP2030 with other horizontal strategies are presented below in the form of a correlation table.

Links to other horizontal integrated development strategies

PEP2030 is one of nine development strategies being prepared simultaneously, which constitute a basis for conducting development policy in Poland. It was a key rule during the preparation of strategy not to double actions and tasks. It was also important not to overlap reporting duties.

The actions and tasks of PEP2030 will be supplemented by actions and projects of the updated ***Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries until 2030*** (SZRWRiR), in particular resulting from Common Agricultural Policy and Common Fishing Policy, whose execution is the responsibility of the minister responsible for agriculture and the minister responsible for fishery, respectively. Actions for the protection of natural environment and biological diversity related to agricultural and fishing activities will be executed under these instruments. For example, this involves:

1) protection of water quality, including rational management of fertilisers and plant protection products;
2) increasing water retention, including in soil;
3) promoting pro-environmental methods of agricultural production, including ecological farming, integrated production;

4) protection of soils (against erosion, contaminations, acidification, depletion of organic substance);
5) supporting investments favouring environmental protection in agricultural and fishing holdings;
6) promoting knowledge on methods for environmental protection in agriculture and in rural and fishing areas, e.g. by improvement and development of an advisory system and promotion of good agricultural practices.

An equally important issue which will result from the updated *Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries until 2030* involves the adaptation of agriculture and fishery to climate change and their contribution to prevention of these changes. Actions executed under this direction of intervention will involve, for example:

1) carbon sequestration in soil and biomass generated in agriculture (e.g. cultivation of intercrops, maintenance of permanent grasslands);
2) Reducing the emission of greenhouse gases from agriculture and the agricultural food chain, including proper storage and application of natural fertilisers; promoting the cultivation of fabaceans;
3) extending and spreading knowledge related to climate-friendly practices;
4) promoting practices for adaptation to climate change in agriculture, including the build-up of organic matter resources in soil;
5) increasing and restructuring forest resources in order to improve the balance of emission of greenhouse gases;
6) orienting plant cultivation and animal breeding towards adaptation and mitigation, as well as the maintenance of a wide spectrum of genetic resources in plant gene banks;
7) replacing motors and investments improving the energy efficiency of fishing boats and support for fishing holdings with actions related to installation of devices enabling the use of renewable energy sources.

Actions for climate are closely related to the draft of ***Energy Policy of Poland until 2040*** (PEP2040). Its goal is energy safety maintaining the competitiveness of economy, energy efficiency and decreasing the environmental impact of the energy sector, with an optimal use of own energy resources. The document indicates eight directions. The ones which will affect the environmental sector include:

1. optimal use of own energy resources (in terms of rational extraction of black coal and lignite deposits, as well as rational use of biomass and non-agricultural waste),
2. extending the production and network infrastructure for electrical energy (in terms of an increased use of renewable energy sources),
3. implementation of nuclear energy,
4. development of renewable energy sources (in terms of supporting the development of renewable energy sources, reducing the emission of the energy sector and diversification of energy production),
5. development of heating and cogeneration (in terms of the use of renewable energy sources and waste),

6. improvement of the energy efficiency of economy (in terms of improving ecological awareness; intense thermal modernisation of housing; limiting low emission).

Providing **energy safety** will mean satisfying current and future needs of receivers for fuels and energy in a technically and economically justified manner, maintaining the requirements of environmental protection. PEP2040 indicates that black coal and lignite are the main raw materials used to satisfy the demand for **electrical energy**, but the contribution of renewable energy sources (OZE) and natural gas is becoming increasingly significant. For the highest efficiency of utilising the raw material, as well as for the highest possible reduction of contaminants, it is necessary to provide competitiveness of effective and low-emission solutions. It is expected that the share of renewable energy sources will continue to grow in the balance due to the fulfilment of international commitments. In the nearest years, the increase in the **use of renewable energy sources** for production of electrical energy will be maintained at a stable level, and its dynamics will increase after 2025 due to the expected achievement of technological-economic maturity of the individual technologies. It is estimated that in 2030 the share of renewable energy sources in power engineering will amount to approx. 27%.

In order to ensure energy security of the country, it will be also important to implement nuclear energy – providing stable, clean and relatively cheap electrical power. According to PEP2040, it is planned to launch the first nuclear power plant around 2033.

The development of **heating**, and primarily the construction of energy-efficient heating systems, will be achieved by the following actions:

1) the development of cogeneration, which constitutes the most environmentally efficient way of using fossil fuels;
2) an increase in the use of renewable energy sources in district heating – it will proceed mainly by the use of local renewable energy resources, i.e. biomass, biogas or geothermal energy;
3) an increase in the use of waste in district heating.

Further development of the **use of energy from renewable sources** is considered as one of the instruments for limiting the environmental impact of the energy industry. The document assumes that a key role for reaching the goal in electricity and energy will be played by the development of photovoltaics (especially starting from 2022, in particular in terms of satisfying needs for coolth – in the summer peak of demand for electrical power for the purposes of cooling) and marine wind farms (the first one will be activated after 2025). It is estimated that the use of geothermal energy will grow at a faster pace – although its current use is at a relatively low level.

Although the fulfilment of environmental requirements affects improvement in energy efficiency and reduction of the environmental impact of the energy industry, this may lead to a premature termination of the operation of some production units. Due to the expected considerable reduction of power in the nearest dozen years or so (for natural and ecological-economic reasons) and an increasing demand for electric energy, there are plans to extend production resources.

In the existing situation it has become particularly important to use any available zero-emission and low-emission technologies with a simultaneous increase in the level of energy safety and a drop in the emission of contaminations. This is why one of the directions included in PEP2040 involves the

implementation of nuclear energy. Nuclear units provide stability of energy production with zero emission of air pollutants. Currently used technologies (of generation III and III+) and rigorous global standards related to nuclear safety provide safety of operation for a nuclear power plant and waste disposal. Work aimed at increasing the safety level of reactors performed in the recent years have also led to a decrease in the environmental impact of nuclear power plants in the case of a possible serious malfunction. Nuclear power plants do not emit sulphur and nitrogen oxides, dusts or toxic chemical substances. Also, they do not emit carbon dioxide, and the amounts of emissions present at other stages of the fuel cycle are comparable to the emission levels of wind farms and hydropower plants.

The ***Sustainable Transport Development Strategy until 2030*** (SRT) is a document which sets the most important directions for the development of transport, also in an environmental aspect. The SRT involves all sectors of transport: by roads, by railways, by sea, by inland waterways, urban and intermodal. The main objective of national transport policy involves increasing the availability of transport, as well as improving the safety of traffic users and the efficiency of the transport sector by creating a cohesive, sustainable, innovative and user-friendly transport system in a local, national, European and global aspect. The SRT aims at limiting the negative environmental and climatic impact of transport and improving its energy efficiency via the implementation of modern technological solutions, or the shaping of new mobility patterns. One significant aspect of the SRT involves the development of collective transport. The document also notices a need to take into account the observed and predicted climate change in transport policy, along with the performance of adaptive actions in that regard.

The following directions of intervention of the SRT are the most important for achieving the goals of environmental policy:

1) building an integrated, interconnected transport network serving competitive economy;
2) improving the method of organisation and management of the transport system;
3) changes in individual and collective mobility;
4) limiting the negative environmental impact of transport.

The main objective of ***Strategy for productivity*** (SP) has been defined as follows: “Fast and stable growth of productivity under the conditions of economy: low-emission, circular, data-based”. The SP indicates that economic macrotrends which Poland will have to address in the upcoming years include the construction of circular economy, the low-carbon aspect of economy and bioeconomy. Therefore, the SP supports and supplements the execution of environmental policy in the area of air quality, waste management, resource management, climate protection and eco-innovations.

SP indicates objectives related to the area of natural resources, which include an increase in the resource efficiency of economy, as well as the growing use of renewable resources and biomass in economy. It points out that economy of the future requires that the production factors (including natural resources) enable the generation of commodities with the highest possible added value, with simultaneous minimisation of the negative impact of processes of manufacturing and using these commodities on the environment and society, while maintaining the future generations’ ability to achieve economic growth (in compliance with the sustainable development principle).

The most important directions of intervention of the SP, which will support the execution of ecological policy, include:

1) optimising the management of non-renewable resources, with particular emphasis on their quality, value and possibility of repeated use;
2) increasing, in a sustainable manner, the use of renewable resources in the industry;
3) eco-innovations;
4) automation, robotization and digitisation of enterprises.

PEP2030 direction of intervention	Relationship between PEP2030 and:							
	SZRWRiR	PEP2040	SRT	SP	KSRR	SSP	SRKS	SRKL
Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good	strong	weak	weak	medium	medium	unidentified	unidentified	unidentified
Eliminating the sources of emission of pollutants into the air or a significant reduction of their impact	strong	strong	strong	medium	medium	unidentified	unidentified	unidentified
Protection of land surface, including soils	strong	weak	weak	medium	medium	unidentified	unidentified	unidentified
Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection	weak	medium	medium	weak	weak	unidentified	unidentified	unidentified
Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity	medium	weak	strong	medium	medium	unidentified	weak	unidentified
Supporting multifunctional, sustained and sustainable forest management	medium	weak	weak	medium	medium	unidentified	unidentified	unidentified

Waste management towards a circular economy	strong	medium	weak	strong	strong	unidentified	unidentified	unidentified
Managing geological resources by developing and implementing a Raw Materials Policy	unidentified	strong	unidentified	strong	medium	unidentified	unidentified	unidentified
Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT)	weak	strong	medium	strong	medium	unidentified	unidentified	unidentified
Climate change mitigation	strong	strong	strong	medium	strong	unidentified	unidentified	unidentified
Adaptation to climate change and the management of the risk of natural disasters	strong	medium	strong	medium	strong	weak	unidentified	unidentified
Ecological education, including the shaping of sustainable consumption patterns	medium	medium	medium	medium	medium	unidentified	unidentified	weak
Improving the environmental protection control and management system and perfecting the financing system	weak	weak	unidentified	weak	medium	weak	unidentified	unidentified

Links to valid programming documents

Detailed objectives	Directions of intervention	Programming documents related to individual directions of intervention	Time horizon
Environment and health. Improving the quality of environment and ecological safety	Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters	Updating water management plans	2021
		Flood risk management plans	2021
		National municipal wastewater treatment programme	2021
		Marine water monitoring programme	2019
		Plan for counteracting the effects of droughts	2020
		National programme for protection of marine waters	2020
		Construction programme of the Świnna Poręba water reservoir	official opening took place in 2017
		"Comprehensive flood protection of Żuławy" programme	2030
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		Programme of actions aimed at decreasing the contamination of waters with nitrates originating from agricultural sources and preventing further contamination	2022 with prospects until 2024
		The State Environmental Monitoring Programme for the years 2016–2020	2020
		Roadmap for transformation towards circular economy	2030
	Eliminating the sources of emission of pollutants into the air or a significant reduction of their impact	National Transitional Plan (2020)	2020
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		National Air Protection Programme until the year 2020	2020 (with prospects until 2030)
		The State Environmental Monitoring Programme for the years 2016–2020	2020
	Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection	National waste management plan 2022	2022
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		The State Environmental Monitoring Programme for the years	2020

		2016–2020	
	Protection of land surface, including soils	Raw Materials Policy (in the consultation phase)	not specified
		Programme of actions aimed at decreasing the contamination of waters with nitrates originating from agricultural sources and preventing further contamination	2022 with prospects until 2024
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		The State Environmental Monitoring Programme for the years 2016–2020	2020
Environment and economy. Sustainable management of environmental resources	Managing geological resources by developing and implementing a Raw Materials Policy	Raw Materials Policy (in the consultation phase)	not specified
		ProGeO Geological Ocean Exploration Programme	2033
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
	Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity	Programme of protection and sustainable use of biological diversity with a plan of actions for the years 2015–2020	2020
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		The State Environmental Monitoring Programme for the years 2016–2020	2020
		National Spatial Development Concept 2030	2030
	Supporting multifunctional, sustained and sustainable forest management	National Woodland Extension Programme	2020
		Strategy of the Polish Forests State Forests Holding for the years 2014–2030	2030
		National Forestry Programme (in development)	in development
		National Silvicultural Policy	not updated since 1997
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		Strategic plan of adaptation for sectors and areas vulnerable to climate change until the year 2030	2020 with prospects until 2030

		The State Environmental Monitoring Programme for the years 2016–2020	2020
		National Spatial Development Concept 2030	2030
	Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT)	Strategic plan of adaptation for sectors and areas vulnerable to climate change until the year 2030	2020 with prospects until 2030
	Waste management towards a circular economy	National waste management plan 2022	2022
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		Raw Materials Policy (in the consultation phase)	not specified
		Roadmap for transformation towards circular economy	2030
Environment and climate. Climate change mitigation and adaptation to them along with managing the risk of natural disasters	Climate change mitigation	Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		National Woodland Extension Programme	2020
	Adaptation to climate change and the management of the risk of natural disasters	Strategic plan of adaptation for sectors and areas vulnerable to climate change until the year 2030	2020 with prospects until 2030
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		National Woodland Extension Programme	2020
		Construction programme of the Świnna Poręba water reservoir	official opening took place in 2017
		"Comprehensive flood protection of Żuławy" programme	2030
		Flood risk management plans	2021
		Plan for counteracting the effects of droughts	2020
		Seashore protection programme	2023
Horizontal objectives	**Directions of intervention**	**Programming documents related to individual directions of intervention**	**Time horizon**

Environment and education. Developing the ecological competence (knowledge, abilities and positions) of the society	Ecological education, including the shaping of sustainable consumption patterns	Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		Roadmap for transformation towards circular economy	2030
Environment and administration. Improving the functioning efficiency of environmental protection instruments	Improving the environmental protection control and management system and perfecting the financing system	The State Environmental Monitoring Programme for the years 2016–2020	2020
		Action strategy of the National Fund for Environmental Protection and Water Management for the years 2017–2020	2020
		Joint action strategy of the National Fund and voivodship funds for environmental protection and water management for the years 2017–2020	2020
		Operational Programme Infrastructure and Environment 2014–2020	2020 (n+3 rule: 2023)
		General directions for the actions of the Inspection for Environmental Protection in the years 2016–2020	2020

Implementing Agenda 2030 and sustainable development goals (SDGs)

Transforming our world: Agenda 2030 for sustainable development, approved in 2015 by 193 countries, is a programme of actions, defining a sustainable development model at a global level in the 2030 perspective. *Agenda 2030* indicates a number of economic, social and environmental goals, aiming at transformation of economies in such a way as to generate bases for long-term, sustainable development, favouring the generation of new jobs. *Agenda 2030* has a horizontal nature. It includes 17 SDGs and 169 targets.

Polish perspective of actions for sustainable and responsible economic development was formulated in SOR, which is a strategic instrument for managing the policy of social-economic development of the country, executed by state institutions, with respect for the environment. The new model of development for Poland outlined in the SOR meets the expectations formulated in *Agenda 2030*. The concept of a lasting and responsible development which served as a basis for the SOR, is coherent with the ambitious vision of *Agenda 2030* – the vision of a world free of poverty, where each man has the ability to benefit from progress. The convergence of the SOR and *Agenda 2030* is noticeable at the level of priority goals, areas and actions.

As an extension of the environmental part of the SOR, PEP2030 implements 11 out of 17 SDGs. Correlation of PEP2030 directions of intervention was performed based on compliance with the 169 targets of *Agenda 2030*.

1	Sustainable water management, including ensuring access to clean water for the public and the economy as well as achieving good status of waters	
2	Eliminating the sources of emission of pollutants into the air or a significant reduction of their impact	
3	Protection of land surface, including soils	
4	Tackling threats to the environment and ensuring biological security, nuclear safety and radiological protection	
5	Managing the resources of natural and cultural heritage, including the improvement and protection of the state of biological and landscape diversity	
6	Supporting multifunctional and permanently sustainable forest management	
7	Waste management towards a circular economy	

8	Managing geological resources by developing and implementing a Raw Materials Policy	
9	Supporting the implementation of ecoinnovations and the dissemination of the best available techniques (BAT)	
10	Climate change mitigation	
11	Adaptation to climate change and the management of the risk of natural disasters	
12	Ecological education, including the shaping of sustainable consumption patterns	
13	Improving the environmental protection control and management system and perfecting the financing system	

Implementation and coordination system

The PEP2030 coordinator function is served by the minister responsible for environment in cooperation with the minister responsible for water management. Some of the tasks will be executed by means of programmes being currently in effect, provided in the national strategic management system (including operational programmes), which also decide about the amount and method of financing the actions and the precise course of their execution.

It will also be important for the execution of the goals of PEP2030 to participate in the implementation of subjects at a regional and local level, in particular a voivode and government of a voivodship, which is responsible for tasks related to programming and performing key actions for development in the region. State policy for environmental protection[268] is performed based on development strategies, programmes and programming documents, as well as by means of environmental protection programmes (POŚ) of voivodships, counties and municipalities. POŚ is prepared by the executive authority of a voivodship, county and municipality, respectively, and established by a voivodship council, a county council or a municipal council. The POŚ draft is opinionated by the Minister of Environment for a voivodship; by a provincial executive board for a county and by a county executive board for a municipality. The primary goal of preparing and adopting a POŚ is the execution of environmental protection policy by territorial government units **in compliance with the assumptions of the most important strategic and programming documents.** POŚ should constitute a basis for the functioning of an environmental management system, combining all actions and documents related to environmental protection and nature at the level of a given JST.

[268] The Act of 6 December 2006 on the rules of pursuing development policy (OJ L of 2019, item 1295)

According to the guidelines of the Minister of Environment for the preparation of environmental protection programmes of voivodships, counties and municipalities, solutions adopted in POŚ must primarily take into account actions leading to sustainable management of environmental resources, improving the condition of the environment, improving the condition of air quality, providing rational waste management and wastewater management, counteracting climate change and adapting to them, preventing natural disasters and increasing the flood safety of the inhabitants. The goals, directions of intervention and tasks should be established based on an analysis of the current situation and expected changes in environmental protection. **When formulating them, one should take into account valid provisions of Polish and EU law, current national and regional strategies, concepts and planning documents, also including those for sectors.** A POŚ should define goals, directions of intervention and tasks, their schedule and means necessary to reach the goals, including legal-economic mechanisms and financial resources. During the development of a POŚ, particular attention should be paid to proper definition of goals and assignment of indices to them. Due to this, a POŚ is to identify **areas requiring urgent actions to be taken in order to improve the condition of the environment and redirect the highest financial support to these areas.** The following correlation should be preferred: the **worse** the condition of the environment in a given area, the **more** financial resources are to be used for remedial actions. The POŚ of a voivodship constitute ones of the bases for adopting plans of activity by voivodship funds for environmental protection and water management, and therefore it has a real impact on choosing which investment projects could be financed in a given voivodship.

Reports on the execution of a POŚ are prepared in biannual cycles.

In the execution of PEP2030 an important role will be played by the Coordinating Committee on Development Policy (KKPR), which as an opinion-providing advisory body of the President of the Council of Ministers provides efficient coordination of programming and implementation of valid development policies, as well as monitors and assesses the status of their execution.

Monitoring and reporting

PEP2030 will be monitored at the level of objectives, directions of intervention, actions, tasks and strategic projects. Also monitored will be the indicators of execution of the individual objectives, including indicators at a voivodship level which are mentioned in appendix no. 4 to PEP2030.

The reporting system of PEP2030 results from many years of experience of administration in the preparation of reporting documents involving the execution of a medium-term country development strategy and other development strategies. It is presented in detail in the document ***Monitoring system for Responsible Development Strategy and nine development strategies,*** which constitutes a strategic monitoring description of the SOR. The ***System*** compiles valid arrangements on monitoring included in documents with a strategic nature, as well as previous experience and practices related to monitoring the medium-term development strategy of the country and the remaining development strategies.

The PEP2030 report for the preceding year will be submitted to the KKPR until the end of April. Minister responsible for environment conveys the abovementioned information to minister responsible for regional development for the needs of preparing annual information on execution of

the SOR. Annual monitoring of PEP2030 will be performed with consideration of tasks reaching beyond the scope of the SOR and it will provide basic information on the status of their implementation. In addition, three evaluations of the implementation of PEP2030 will be performed: for the years 2019–2022, 2023–2026 and 2027–2030, which will be brought to the attention of the Council of Ministers. The table of actions and tasks (chapter 9 PEP2030) takes into account strategic projects included in the SOR, proper for the *Environment* area, as well as new projects contributing to execution of the goals of PEP2030. The list of these projects has an open nature; ongoing management of the process of changes in strategic projects is performed by the Governmental Project Monitoring Office in Prime Minister's Chancellery (KPRM). Any possible changes related to the executed projects are approved by resolutions of the Council for Monitoring the Portfolio of Strategic Projects and considered in the portfolio of strategic projects, governed by the Council. The approved changes are reflected on the list of strategic projects during a comprehensive update of the document.

Strategic projects included in PEP2030 undergo cyclical strategic monitoring and ongoing operational monitoring, performed as part of the MonAliZa computer tool.

The monitoring of projects in the MonAliZa system takes place under a uniform monitoring system effective for all projects. The rules of managing monitored projects should take into account the specifics of organisation, scope of the project as well as good practice and recommended standards.

Designated project leaders provide data necessary to drive the MonAliZa system, and through it they indicate, e.g. risks and the produced results. For management purposes, projects can be combined into programmes whose execution is the responsibility of programme managers. It is also planned to use the computer tool to monitor the implementation of PEP2030 at the level of tasks, including tasks reaching beyond the scope of the SOR.

12. Financial framework[269]

Financial framework is meant to be understood as any funds for development and supporting expenditures. The financial framework is not limited to the presentation of funds for the execution of new actions. They show the wide range of financing possibilities for environmental policy. They present the areas within the frames of which the partners of PEP2030 can act.

The financial framework of PEP2030 is based on budget parts and departments, expenses in the units of the sector of government and local government institutions, the budget of European and foreign funds. PEP2030 is consistent with the priorities of European cohesion policy and Common Agricultural Policy. Therefore, a significant part of expenses related to the implementation of PEP2030 will be co-financed by European funds.

Table: Financial framework of PEP2030 (public funds).

NATIONAL ECOLOGICAL POLICY 2030 (PLN million)	Other strategy	2016	2017	2018-2020	2021-2025
DEVELOPMENT EXPENSES OF THE STATE BUDGET ACCORDING TO THE DEFINITION OF DEVELOPMENT EXPENSES CLASSIFICATION (CONSOLIDATED. EXCEPT FOR SUBSIDIES FOR JST)					
21. Maritime management		3276	33.65	120.22	319.41

[269] This chapter is prepared based on the guidelines of the Ministry of Investments and Development.

900 Municipal management and environmental protection		32.76	33.65	120.22	319.41
22. Water management		0.00	0.00	OXJ	0.00
710 Service activities		0.00	0.00	0.00	0.00
41. Environment		27.18	27.36	8181	136.36
020 Forestry		1.20	1.39	3.89	6.48
801 Education and upbringing		24.59	24.54	73.68	122.81
854 Educational upbringing care		0.04	0.04	0.12	0.21
900 Municipal management and environmental protection		1.35	1.39	4.11	6.86
68. National Atomic Energy Agency		0.88	1.01	2.83	4.71
150 Industrial processing		0.88	1.01	2.83	4.71
85. Voivodes – subsidies for JST	KSRR	29.21	2130	60.22	100.38
020 Forestry		0.10	0.33	0.65	1.09
900 Municipal management and environmental protection - subsidies for JST (paragraphs 221. 203. 633)	KSRR	9.62	1.41	1.01	1.69
925 Botanical and zoological gardens, as well as areas and objects of nature protection – subsidies for JST (paragraphs 223. 203. 653)	KSRR	19.49	19.55	58.56	97.60
Total		90.03	83.31	265.08	560.86
EXPENSES SUPPORTING DEVELOPMENT, NOT CLASSIFIED UNDER DEVELOPMENT EXPENSES					
22. Water management		92.39	93.38	278.65	464.42
710 Service activities		41.70	38.53	120.35	200.58
750 Public administration		50.69	54.85	158.31	263.84
41. Environment		417.54	334.34	1127.83	1879.71
020 Forestry		3.03	2.83	8.79	14.66
750 Public administration		97.10	96.10	289.81	483.02
801 Education and upbringing		1.85	3.39	7.87	13.11
854 Educational upbringing care		15.37	16.01	47.06	78.44
900 Municipal management and environmental protection		300.17	216.01	774.27	1290.44
925 Botanical and zoological gardens, as well as areas and objects of nature protection		0.01	0.00	0.03	0.05
68. National Atomic Energy Agency		30.98	3186	9426	157.11
150 Industrial processing		0.20	0.17	0.56	0.93
750 Public administration		30.78	31.70	93.71	156.18
35. Voivodes	KSRR	1424	0.50	2212	36.87
900 Municipal management and environmental protection	KSRR	14.17	0.37	21.81	36.35
925 Botanical and zoological gardens, as well as areas and objects of nature protection		0.08	0.13	0.31	0.52
Total		555.15	460.09	152287	253811
EXPENSES OF THE REMAINING UNITS OF THE SECTOR OF GOVERNMENT AND LOCAL GOVERNMENT INSTITUTIONS (IF DATA ON FINAL EXPENSES IS MISSING, THIS IS THE AMOUNT OF STATE BUDGET SUBSIDIES FOR A UNIT)					
National Fund for Environmental Protection and Water Management - non-repayable means of assistance (subsidies, write-offs, interest rate subsidies)		1089.85	641.50	5600.00	14900.00
National Fund for Environmental Protection and Water Management – repayable (loans. capital activity)		818.50	521.50	6500.00	20400.00
Voivodship funds for environmental protection and water management - non-repayable means of assistance (subsidies, write-offs, interest rate subsidies)		593.00	525.00	1641.00	2179.00
Voivodship funds for environmental protection and water management – repayable (loans. capital activity)		1181.00	1227.00	4978.00	6649.00
Other units of the sector of government and local government institutions		86.47	87.42	260.85	434.74
Total		3 768 82	300242	1897935	**4456274**
EXPENSES UNDER COHESION POLICY AND CO-FINANCING					
Environment	KSRR	728.65	3102.84	14 866.19	13180.33
R+D and entrepreneurship	KSRR	0.00	3.47	13.45	11.92
Total		72865	3106.31	14879 £3	1319225
EXPENSES UNDER OTHER INSTRUMENTS AND FOREIGN FUNDS					
LIFE		42.96	72.10	137.36	244.66
Norwegian Financial Mechanism, EOG Financial Mechanism		41.04	33.70	112.10	186.84
National Green Investment Scheme		61.60	70.00	35.40	0.00
Total		145.60	175.80	28456	431.50
FINAL AMOUNT		5 28825	6827.93	35 93230	61285.47

Table: Financial framework of PEP2030 (public funds)[270].

[270] The financial framework has been developed by the Ministry of Investments and Development based on the classification of development expenses of the sector of government and local government institutions (KWR). Development expenses should be understood as financial resources spent under state development policy by units of the sector of government and local government institutions in favour of units outside this sector, leading to positive social-economic

In addition, it is assumed that environmental policy will be implemented based on private funds. Costs paid by households prevail in the structure of expenses for environmental protection. In 2017 their share amounted to approx. 66%[271].

Therefore, it is estimated that the financial framework for the conducted environmental policy, including public funds listed in the table above as well as private funds, will amount to approx. **106 billion zlotys** in the years 2018–2020 and **180 billion zlotys** in the years 2021–2025.

The provisions of the SOR and current projections related to the structure of potential financing sources for development actions listed in the SOR indicate that **after 2020 the burden of financing development investments will be transferred to a greater extent to domestic funds (both public and private)**. The significance of EU funds will be relatively smaller, though still effective.

Tasks of the public sector, which so far have been largely executed with EU's cofinancing, **will be financed to a greater extent based on national public resources.** These resources will originate from the central budget and budgets of local governments, which will become more significant in the financing of development effort. This is caused by the expected reduction of funding for Poland under cohesion policy and Joint Agricultural Policy in the financial framework of 2021–2027.

It should be kept in mind that the execution of development projects must proceed while **maintaining macroeconomic stability, including in particular the sector of public finances.** The implemented budgetary policy must consider limitations related to valid financial rules and aiming at gradually approaching to a medium-term budgetary objective, whose achievement will enable entering the path of stable equilibrium of public debt.

This is indicated by the necessity to **effectively stimulate private sector investments** (from national and foreign funds) and further **increase the efficiency of public sector development expenditures**. The use of EU funds should be focused on projects with the highest added value and positive external effects.

When assessing the conditions of conducting economic policy (including primarily investment policy) in the upcoming years, it is also assumed that actions implemented under the SOR will result in positive impulses in the form of **mobilising private capital** (domestic and foreign). They will lead to an increase in its investment activity. Due to the need to provide stability of public finances, it is the **private capital that will play a key role in reaching the planned investment rate in economy**.

On the other hand, it should be also remembered that actions executed by the **public sector** (both for **investments and regulations**) favour the improvement of "boundary conditions" determining economic rationality and feasibility of the actions of private sector entities. This is because they contribute to the creation of attractive conditions favouring both the performance of economic activity and an increase in its efficiency (e.g. by **development of infrastructure necessary for the**

changes, in particular an increase in competitiveness, productivity, as well as growing social and economic cohesion. Due to the significance of subsidies directed to the JST, which constitute a considerable part of development expenses, they are also listed in the table. The KWR has been developed based on the valid budget classification (considering budget parts, sections, chapters and paragraphs). Development expenses of the remaining units of the sector of government and local government institutions not subject to budget classification, as well as expenses from the budget of European funds have also been assigned to the financial framework.

[271] Statistics Poland, *Environmental protection 2018*, p. 179.

activity of economic entities and the generation of an institutional framework effectively supporting the economic growth).

Dynamic growth of the private sector which translates into an increase in its income and profit with a simultaneous increase in labour factor wages (possible due to growing efficiency) will in turn lead to **extending the tax base**. Therefore, this will contribute to an **increase in the income of the sector of government and local government institutions**, **ensuring the possibility to finance tasks resulting from functions of the state**.

It is assumed that due to the abovementioned directions of changes in the structure of development funds spent for achieving strategic objectives, the share of these funds in the GDP will be adequately high to ensure efficient execution of strategic tasks.

This should be favoured by the macroeconomic condition of Polish economy in the nearest dozen years or so. Forecasts of both local institutions as well as renowned international centres indicate the possibility of **maintaining a relative high** rate of economic growth (albeit lower from both what was recorded in the years 2017–2018 and what is forecast for the years 2019–2024). According to long-term forecasts of the Ministry of Finance[272], in the years 2025–2030 the rate of economic growth in real terms will fluctuate from 3% in 2025 to 2.7% in 2030, which will translate into an average annual growth rate of 2.8% during this period. **Along with economic growth, income of the public finances sector will increase, which should enable financing development actions from public resources with respect to their planned execution** .

13. Glossary

Blue-green infrastructure (BZI) – an important component of the spatial structure of a city. It consists of broadly understood areas of urban greenery, both developed as well as those remaining in their natural condition, as well as watercourses and waterbodies located in the given area. BZI is used, e.g. in actions related to adaptation to climate change (e.g. it allows collecting and utilising rainwater or counteracting urban heat islands)[273].

Ecoinnovation – innovation which improves the efficiency of utilising natural resources in the economy; it reduces the negative impact of human activity on the environment or enhances the resistance of economy to environmental pressures[274].

Eco-labels – ecological labels placed on products in order to distinguish them from the same category of products present on the market. The labelling of products influences the market and shapes a pro-environmental model of consumption. On the one hand, customers receive assistance when choosing a product fulfilling specified requirements in terms of environmental protection; on the other hand, by the shaping of demand, pressure is exerted on producers to perfect their technology of production, since better commodities eliminate competition from the market. Awarding a label to

[272] *Guidelines for the use of uniform macroeconomic indicators constituting a basis for the estimation of financial effects of the planned acts.*
[273] Cf. *The significance and role of blue–green infrastructure in adaptation to climate change* – presentation of architect Justyna Gorgoń Eng.D., Institute for Ecology of Industrial Areas in Katowice, p. 2.
[274] Institute for Structural Research.

a product is preceded by its evaluation at various stages: pre-production, production, distribution (including packaging), using as well as recycling and disposal of waste[275].

Eco-labelling – tagging of products with signs informing consumers about the environmental impact of the product. There are numerous types of eco-labelling based on the country, region or type of activity[276].

Natura 2000 (the network of Natura 2000 areas) – the youngest of all forms of natural protection, introduced in 2004 in Poland as one of obligations related to the accession of our country to the European Union. (…) The main purpose of functioning of the European Ecological Network Natura 2000 is to preserve specified types of natural habitats and species which are believed to be precious and endangered in the whole Europe. Its second purpose is the protection of biological diversity[277].

Sharing economy – a trend opposite to consumerism. It assumes sharing, renting and exchanging products and services. Instead of buying a car, one can go on a journey together with someone else; instead of paying for a hotel, one can stay at a private person's place; instead of buying services (e.g. tutoring, language teaching) one can take advantage of the exchange of such services. This is usually based on a peer-to-peer model where two people communicate via a platform facilitating the " transaction "[278].

Eutrophication – enrichment of water with nutrients, in particular nitrogen or phosphor compounds, causing accelerated growth of algae and higher forms of plant life, which results in undesired disruption of biological relations in the water environment and deterioration of the quality of this water[279].

Eco-management – it is based on pro-environmental rules (systems) of management. Environmental management systems are for enterprises and other organisations one of tools aimed at improving the effects of their environmental activity, at the same time ensuring the saving of energy and other resources. Systems of eco-management (e.g. series ISO 14000) and audit (e.g. EMAS) constitute for enterprises and other organisations a management tool used to evaluate and improve the effects of their environmental activity and to file reports on that matter[280].

Low-carbon economy – an economy "whose growth is achieved due to integration of all aspects of economy around low-emission technologies and practices, efficient energy solutions, clean and renewable energy and pro-environmental technological innovations". Under such economy, energy

[275] Ekologia.pl portal
[276] Responsible Business Forum, http://odpowiedzialnybiznes.pl
[277] General Directorate for Environmental Protection.
[278] The "Sharing economy" portal, http://www.ekonomiawspoldzielenia.pl
[279] The Water Law Act of 20 July 2017, article 16, item 32 letter c).
[280] Cf. decision of the Comission (EU) 2017/2285 dated 6 December 2017 changing user's guidebook which defines actions necessary to participate in EMAS, in compliance with regulation of the European Parliament and of the Council (WE) no. 1221/2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (notified as document no. C(2017) 8072) (OJ L 328 dated 12 December 2017, p. 38).

and materials are consumed or produced in an efficient manner, along with the disposal or recovery of waste using methods minimising the emission of greenhouse gases[281].

Circular economy – a model of production and consumption which involves sharing, renting, reusing, repairing, restoring and recycling existing materials and products for as long as possible. This way the life cycle of products is extended. In practice, this means limiting waste to a minimum. When the life cycle of a product comes to an end, materials and waste which originate from it should remain in the economy. They can be successfully reused, this way creating an additional value[282].

Uniform part of surface waters – a separate element of surface waters such as a lake or another natural or artificial waterbody, brook, stream, beck, river, canal or their parts, marine transitional waters or coastal waters. The term has been introduced due to the implementation of the RDW; it is used in the context of water management, including its environmental monitoring[283].

Uniform part of groundwaters – a specified volume of groundwaters present in a given aquifer or a set of aquifers. The term has been introduced due to the implementation of the RDW; it is used in the context of water management, including its environmental monitoring[284].

Mitigation – limiting the impact of human activity on the generation of Earth's greenhouse effect, mainly by reducing emission of greenhouse gases into the atmosphere, limiting the combustion of fossil fuels, increasing energy efficiency in all areas of human activity, saving energy. The term climate change mitigation also includes actions intended to increase carbon sequestration in soils and forests or capturing carbon dioxide from the atmosphere in order to store it again[285].

Climatic neutrality – a balance between the emission of greenhouse gases and their absorption by oceans/seas, forests and soils or storage (e.g. using the technology of Carbon Capture and Storage – capturing and storing carbon, or Carbon Capture and Utilization – capturing and utilising carbon in industrial processes). The term "climatic neutrality" concerns not just carbon dioxide, but also other greenhouse gases (such as, e.g. methane)[286].

Remediation – it involves soil, earth and groundwaters. It means actions aimed at removing or reducing the amount of the so-called substances posing risk, along with controlling and limiting their spreading. The purpose of remediation is to bring about such a condition of contaminated land which would not pose hazard to humans and the environment. It should consider current and future land use. Remediation may involve self-purification. It can be performed in-situ (on site) or ex-situ when it involves the removal of polluted earth and its purification outside of an area undergoing remediation[287].

[281] "Low-carbon economy" – presentation, Kraków, 2 June 2015, authors: prof. of AGH Joanna Kulczycka Sc.D., Marcin Cholewa M.Sc., Department of Strategic Research, Mineral and Energy Economy Research Institute of the Polish Academy of Sciences.
[282] European Parliament, http://www.europarl.europa.eu
[283] "Teraz-srodowisko.pl" portal, https://www.teraz-srodowisko.pl/slownik-ochrona-srodowiska
[284] "Teraz-srodowisko.pl" portal, https://www.teraz-srodowisko.pl/slownik-ochrona-srodowiska
[285] "Climate and agriculture" portal, https://klimatarolnictwo.pl
[286] "Energy anew" portal, http://energiaodnowa.pl/pl/pytania-i-odpowiedzi/
[287] "Teraz-srodowisko.pl" portal, https://www.teraz-srodowisko.pl/slownik-ochrona-srodowiska

Renaturalisation – in nature protection, the process of restoring environment to its natural state, as close as possible to the original state from before the introduction of adverse changes by man. This term has a broader meaning than renaturing, because, apart from technical actions, it may also mean a parallel spontaneous natural process, possible, e.g. due to passive protection. Unlike renaturing, usually limited to hydrotechnical procedures, it may concern any ecosystems. In forest ecosystems it may involve, e.g. enabling spontaneous shaping of the composition and structure of a stand by eliminating breeding procedures[288].

Carbon sequestration (capture) – spontaneous processes of capturing CO_2 by oceans, forests (in the process of photosynthesis) and/or soil and active capturing of carbon dioxide by man from the atmosphere along with its storage in a form preventing (or heavily limiting) its release into the atmosphere due to physical processes (e.g. geological sequestration in deep geological structures) or due to biological processes (biosequestration).

Energy poverty – a phenomenon in which a household has difficulties with satisfying its energy needs (heating, hot water, electricity) due to low income or characteristics of an apartment. According to British approach, adopted by various international organisations, energy poverty occurs when the expenses of a household for providing heat and other types of energy necessary to satisfy basic needs exceed the threshold of 10% of their income[289].

Ecosystem services (ecosystem benefits) – a set of products (e.g. wood, forest fruits, game animals) and functions of ecosystems (e.g. purification of water and air, production of oxygen, recreation sites) which are used by the society[290].

Appendix 1: Diagnosis in the individual areas of PEP2030

Appendix 2: Summary of the implementation of the Strategy "Energy Security and Environment – perspective to 2020" (BEiŚ) in the environmental part

Appendix 3: PEP2030 strategic projects

Appendix 4: Base values of PEP2030 monitoring indicators at voivodship level

[288] Forest encyclopaedia, https://www.encyklopedialesna.pl/haslo/renaturalizacja/

[289] Lewandowski P., Kiełczewska A., Ziółkowska K., *Ubóstwo energetyczne wśród mieszkańców domów jednorodzinnych (Energy poverty in single-family homes)*, Institute for Structural Research.

[290] "Chrońmy przyrodę ojczystą" (Let's protect our native nature), Book 1 January/February 2011, p. 3–20.