



# Climate change adaptation of major infrastructure projects

Country report for Poland

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**Note for the readers of the printed version:** the present country report links to a large number of resources via hyperlinks, which by nature are only active in the electronic version. In order to find the identified resources, an online search will usually deliver the right result; but otherwise it is also possible to make use of Annex II of the main report where all the identified resources and their hyperlinks are presented.

**Disclaimer:** The identified resources are non-exhaustive and present a snapshot of the readily available and accessible material during 2017. This information was collected through finite web-based desk research, and through questionnaires and interviews aimed at the relevant national competent authorities (ESIF managing authorities, research institutes, ministry officials, etc.). Further resources might be available but not accessible due to privacy restrictions, or a lack of mandate to share related material. Following the publication of the present report, more resources will continue to reach the public domain, including through Climate-ADAPT and the identified national websites.

## 1. INTRODUCTION

The [EU Strategy on Adaptation to Climate Change](#) of 2013 includes actions to enhance the resilience of infrastructure and mainstream climate adaptation into the European regional and cohesion policy. The [Common Provisions Regulation](#) (CPR) of 2013 states under article 8 that climate change mitigation and adaptation, and risk prevention shall be taken into consideration for investments made with the support of the European Structural and Investment Funds (ESI Funds). The regulation integrates climate change adaptation considerations into the preparation and approval of major projects<sup>1</sup> or other projects funded by the ESI Funds through the requirement to conduct climate change vulnerability and risk assessments. In coordination with the ESI Funds, and complimentary to them, the LIFE fund in addition assists in the realisation of the climate change adaptation objectives. Climate change analyses (such as vulnerability and risk assessments) are also sporadically found to be undertaken for infrastructure projects that are financed outside the framework of EU funds.

This report for Poland focuses on the adaptation to climate change of infrastructure projects supporting the requirement to undertake climate change vulnerability and risk assessments by presenting:

- **Legal, policy and institutional framework:** A schematic outline of national and regional policy and legal framework, and organisational structure to deal with adaptation;
- **Resources:** Offering the most important resources supporting the realisation of climate change vulnerability and risk assessments for infrastructure projects. The available resources for data, methodologies, tools, guidance, design standards, system framework and institutional capacity are contextualised and listed in this section;
- **Sector overview:** Identifying the approach, main strengths and weaknesses for each of these sectors: Transport, Broadband, Urban development, Energy, Water and Waste; and
- **Case studies:** Current practice in adaptation and resilience of infrastructure projects.

### **Country Overview**

The [Polish National Strategy for Adaptation to Climate Change for sectors and areas sensitive to climate change by 2020 with a vision to 2030](#) (NAS) was adopted in 2013. The project "Development and implementation of a strategic adaptation plan for the sectors and areas vulnerable to climate change" with the acronym [KLIMADA](#), has been the basis for the preparation of a strategic plan for adapting the country to climate change. A number of [local adaptation initiatives](#) are also available at the project website. The responsible authorities on matters of climate change adaptation are the Ministries of Environment, with its Department for Sustainable Development and International Cooperation; and the Ministry of Investments and Development with its Department of Infrastructural Programmes. Supportive services are provided by the Institute of Meteorology and Water Management ([IMGW-PIB](#)), the Institute of Environmental Protection ([IOŚ-PIB](#)), and the Institute for Ecology of Industrial Areas ([IETU](#)).

Climate change data are gathered by [IMGW-PIB](#) (The Institute of Meteorology and Water Management – National Research Institute). The datasets are available upon request, but

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<sup>1</sup> major project: an operation comprising a series of works, activities or services intended in itself to accomplish an indivisible task of a precise economic or technical nature which has clearly identified goals and for which the total eligible cost exceeds EUR 50 000 000 and in the case of operations contributing to the thematic objective under point (7) of the first paragraph of Article 9 of Regulation 1303/2013 where the total eligible cost exceeds EUR 75 000 000

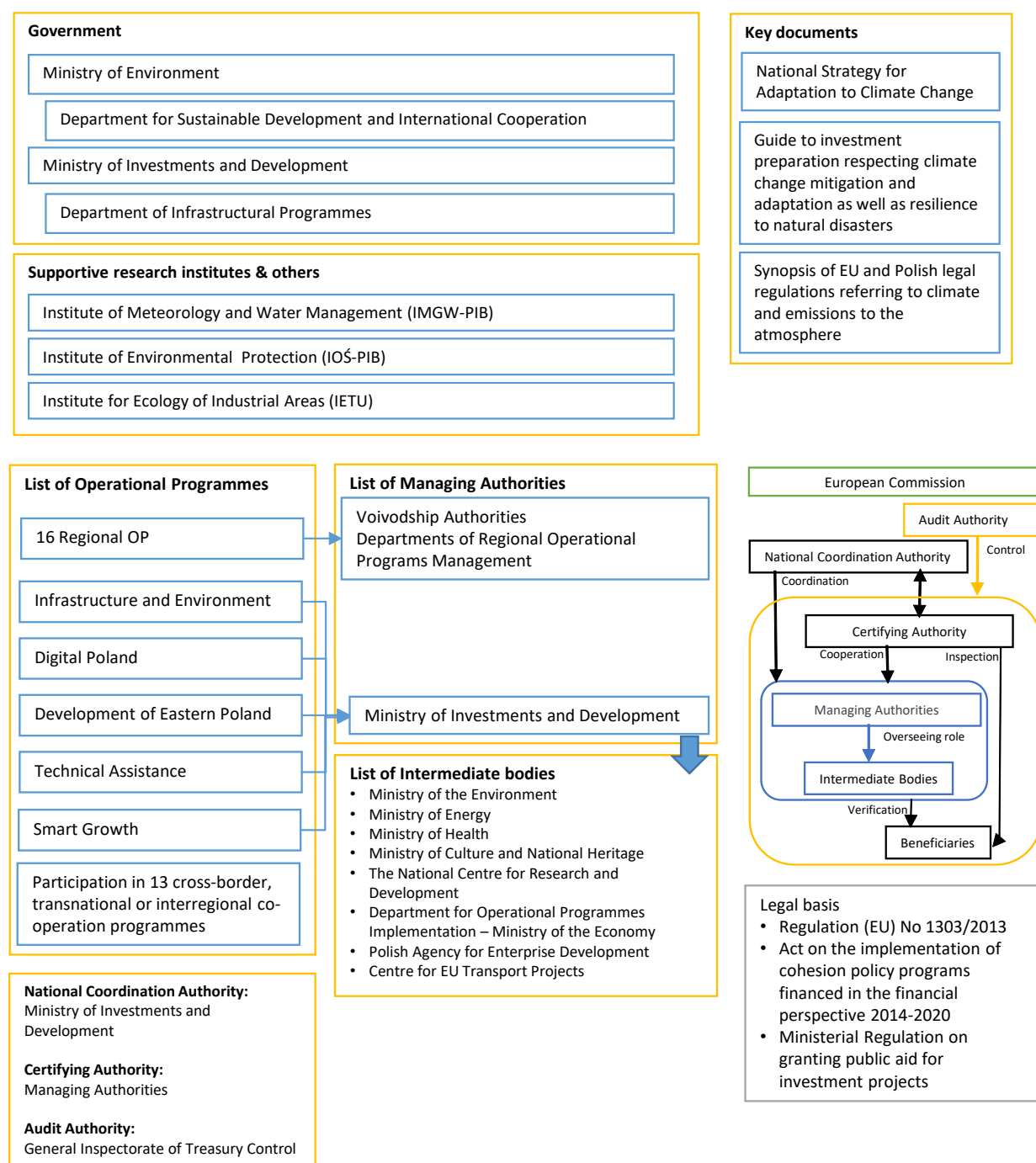
not all are currently accessible on a website. Meteorological data though is available through [monthly bulletins](#) and [synoptic maps](#), and through the website [Meteomodel](#) and the website of the [Interdisciplinary Centre for Mathematical and Computer Modelling at the University of Warsaw](#). [KLIMADA](#) holds general information, data on climate change trends and climate change scenarios. Methodologies to estimate the financial costs and benefits of adaptation measures can be found in the [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters](#) (2015) and the [Guide to the analysis of the cost and benefits of investment projects](#) (2014) –both being translated from the European Commission [Guide to Cost-Benefit Analysis of Investment Projects](#), and the non-paper [Guidelines for Project Managers](#). A number of tools are available to support adaptation. [Climate map](#) is a source of climate/weather data and refers specifically to urban environments. The tool identifies and describe threats which may occur, using expected global climate change scenarios. The relevant analytical information on risk and vulnerabilities to climate change is provided by the [Institute of Meteorology and Water Management](#) (IMGW-PIB) and some of the information is available on the weather website of IMGW-PIB. Various sectors have their own disaster management tools. [Polish National Railways](#) has an in-house system that is not available to the general public. [Tools for strategic planning and management of urban water](#) (2014) highlight the most significant strategic goals and documents associated with water management, green infrastructure and sustainable development. Guidelines for spatial planning are available from the report [Ideal city balanced city spatial planning of urbanised areas and its impact on limiting the effects of climate change](#)” (2015) that addresses water, energy and biodiversity in urban areas. The goal of projects such as [CLIMCITIES Adaptation to climate change in small and medium cities](#), [Urban Adaptation Plans](#) and [ADAPTCITY](#) is to increase the institutional capacity of cities and municipalities in terms of adaptation to climate changes. The institutional capacity (human, technical, equipment) relevant to climate change adaptation is currently developing further. One example increasing capacity at local level is [ADAPT CITY](#), where the objective is to reduce the negative impact of climate change on the ecosystem of Warsaw and to encourage adaptation measures in other large cities in Poland.

Infrastructure sectors are found to undertake adaptation initiatives. One of the first documents concerning climate change adaptation in infrastructure projects was the report “[Developing transport sector sensitivity indicators for climate change](#)” (2010), this document is a selection of the key elements of the transport system (infrastructure, means of transport, traffic conditions) that are particularly sensitive to climatic events, including impact assessments. For the road sector, the General Director for National Roads and Motorways ([GGDKiA](#)) maps [actual weather conditions](#) on highways, national and regional roads. For Urban development, the project [Urban Adaptation Plans](#) project aims at increasing adaptive capacity in 44 Polish cities. The project takes into consideration the local conditions and problems of the cities, different in terms of nature and structure, as well as of threats and difficulties that they have to cope with. This is the largest project in Poland on climate adaptation involving multiple cities. General information about climate change adaptation in energy can be found in [Polish National Strategy for Adaptation to Climate Change \(NAS 2020\)](#). For the water sector, Polish Waters together with the Regional Water Management Boards (11 institutions) has developed a [Preliminary assessment of flood risk](#), [Flood hazard maps and flood risk maps](#), [Flood risk management plans](#), and the [Development of plans of drought effects in river basin districts](#). A methodology and guidance, the [Sustainable management of water resources and hydrotechnical infrastructure in terms of forecasted climate change](#) (2012) is available. The broadband and waste sectors are not involved in the national or regional authority climate change adaptation plans or initiatives organised by governmental bodies.

Three case studies for Poland have been provided, for [urban adaptation planning](#) as well as guidance documentation for the transport (rail) sector. The relevant EU guidance for climate adaptation has been applied to the major project for [Water supply and](#)

[wastewater management in Warsaw - Phase V](#), which includes a climate adaptation analysis in the application for co-financing and in the feasibility study.

## 2. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK



In Poland, the subject of climate change adaptation is mostly the responsibility of the [Ministry of Environment](#), although other entities are also taking some actions with regard to analysing climate change impacts and adaptation in their respective areas of responsibility. The relevant document is the ["National Strategy for Adaptation to Climate Change by 2020 with the perspective by 2030"](#) (NAS) – part of the wider research project ["KLIMADA"](#) which covers the period until 2070 and is the basis for the conclusions presented in the NAS. The NAS is used as a framework guidance to help support monitoring indicators and assessment of the implementing actions at the national, regional and local levels.



At the national level, the project [Development of Urban Adaptation Plans for cities with more than 100,000 inhabitants in Poland](#) coordinated by the Ministry of Environment aims to provide support to 44 cities. The overarching goal is to identify and analyse adaptation and mitigation challenges each city may face, draft plans for local authorities, indicate sources of funding and raise awareness for the need of adaptation (see the relevant case study in Chapter 5 for more details). The [Guidelines for Urban Adaptation Plans](#), prepared in the Ministry of the Environment, details the methodology and checklist for the process of climate change adaptation plan development at a local level.

EU Structural Funds are mainly absorbed through 16 Regional Operational Programmes managed by the Voivodship Authorities, and 5 national Operational Programmes managed by the relevant departments of the Ministry of Investments and Development.

### 3. RESOURCES

This country report has reviewed the currently available resources in Poland for adapting to the impacts of climate change across six key infrastructure sectors. Adaptation to climate change is integrated in the legal basis<sup>2</sup> for ESIF-funded projects, through the processes of vulnerability and risk assessments which are, broadly:

1. Vulnerability – evaluating the sensitivity and exposure of infrastructure to climate change
2. Risk – estimating the likelihood and impact of relevant climate hazards
3. Adaptation – consideration of adaptation options and integration into the project planning

The legal requirements for major projects also foresee climate change mitigation. This study however is focused on climate change adaptation and does not cover mitigation aspects.

Information on the requirements for climate change adaptation is available in the 2016 publication [Climate Change and Major Projects](#), and details on the methodology of climate resilience analysis is provided in the 2017 JASPERS publication [The Basics of Climate Change Adaptation, Vulnerability and Risk Assessment](#). Further resources are being identified in the present publication and its references. Effective vulnerability and risk assessments for the adaptation of major projects to climate change require the resources explained in the following table:

Resources	Explanation
<b>Data Availability</b>	The availability, accessibility and applicability of data on climate projections and impacts, on past and historic events, on geophysical parameters, on long-term scenarios, on economic, environmental and social impacts, etc.
<b>Methodologies</b>	The existence of quantitative or qualitative methodologies (a system of processes, a set of principles and rules) for integrating climate change adaptation in the development of infrastructure projects.
<b>Tools</b>	The availability of tools for planning, evaluation, impact estimation (i.e. software, maps, computer simulations, long term climate forecasts etc.) to assist with the adaptation of infrastructure to climate

<sup>2</sup> Regulation (EU) No 1303/2013, Commission Delegated Regulation (EU) No 480/2014, Commission Implementing Regulation (EU) No 1011/2014, No 215/2014, 2015/207; and the Directives 2001/42/EC, 2011/92/EU and 2014/52/EU

	impacts
<b>Guidance</b>	The provision of guidance on how to use methodologies (i.e. for conducting climate change vulnerability and risk assessments) or develop the required infrastructure project documentation relating to climate adaptation.
<b>Design Standards</b>	The availability of published engineering design standards (i.e. by BSI, DIN, ISO) for infrastructure projects that include sections or appropriate provisions to ensure resilience to climate change impacts
<b>System</b>	The institutional and legal framework that the formal authorities work with to deliver their primary responsibilities for climate adaptation, infrastructure, and management of European Structural and Investment Funds
<b>Institutional Capacity</b>	The human and technical capacity of institutions to carry out their functions. It depends on being adequately resourced, on having the appropriate expertise, and on collaborating effectively and enforcing laws and regulations

### **3.1. Data Availability**

Quantitative data are essential to understand the relevant risks and the requirements for any corresponding climate change adaptation in key sectors.

In Poland, climate change data are gathered by IMGW-PIB (The Institute of Meteorology and Water Management – National Research Institute) providing information on:

- Meteorological and hydrological warnings issued;
- Current radar maps; and
- Data from telemetric network IMGW-PIB: the level of rivers and rainfall.

The datasets are available upon request, though not all are currently accessible on a website. Meteorological data are available through [monthly bulletins](#) and [synoptic maps](#), and through the website [Meteomodel](#) and the website of the [Interdisciplinary Centre for Mathematical and Computer Modelling at the University of Warsaw](#). For the road sector, the General Director for National Roads and Motorways ([GGDKiA](#)) maps [actual road conditions](#) of highways, national and regional roads taking into account actual weather conditions.

[Statistics Poland](#) is the national statistics authority and maintains a database of statistics relating to the economy, society and environment. The exact content of this database was not examined in the context of the present study.

[Klimada](#) is a platform developed during the project – “Klimada” (Development and implementation of a strategic adaptation plan for the sectors and areas vulnerable to climate change). The results of this project were the basis for the preparation of the NAS. Klimada holds general information, data on climate change trends and climate change scenarios. It also presents a diagnosis on the vulnerability of 12 sectors (including Health, Tourism, Mining, Construction, etc.). The portal holds information regarding climate aspects affecting each sector in Poland, and how they can be addressed in project preparation. Klimada is also collecting data about case studies in some regions in Poland.

[ISOK](#) - IT System for Protection of the Country Data holds information about water management, natural hazards, threatened areas etc. Its objective is to improve operation of crisis management systems at all levels, but it can be also used in spatial planning (in the context of flood hazard in river valleys). The website also presents the institutions that are responsible for land planning, water management, preventing crisis situations and so on. The [GUS website](#) (Central Statistical Office of Poland) holds relevant statistical data, but they refer mostly to the causes of climate change and not explicitly to climate change adaptation.

Poland's Sixth [National Communication](#) to the United Nations Framework Convention on Climate Change (UNFCCC) also provides long-term climate change assessments across a range of sectors, with scenarios on risk and vulnerability assessments by sector.

Updates for a wide range of national adaptation actions, can be found in the [National adaptation actions deliveries database on EIONET](#), and on the [Climate-ADAPT](#) website.

### **3.2. Methodologies**

Methodologies for integrating climate change adaptation into the development of infrastructure projects rely on the basic rules of risk assessment.

In Poland, projects which are co-financed from EU funds are obliged to use the methodologies indicated in the [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters](#) (2015). Recommendations were prepared by the Department of Sustainable Development at the Ministry of Environment in cooperation with the Pilot Group, including representatives of the Ministry of Infrastructure and Development which indicate the methods that should help investors (including beneficiaries of EU funds in the period 2014-2020) in preparation of investment projects and / or in the application of EU funds on issues related to climate change adaptation and mitigation and resilience to natural disasters. A significant part of the methodology was based on the [Non-paper Guidelines for Project Managers](#): Making vulnerable investments climate-resilient prepared by EC for EU member countries.

A brief summary of information concerning the methodologies to estimate the financial costs and benefits of adaptation measures can be found in the [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters](#) (2015) (the transport sector is provided as an example). Another document is the [Guide to the analysis of the cost and benefits of investment projects](#) (2014), which is the Polish translation of the [EU Guidance](#) on the methodology of cost-benefit analysis in investment projects with EU funding.

In 2010, a specific methodology for the transport sector was elaborated, namely [Developing transport sector sensitivity indicators for climate change. Selection of key elements of the transport system \(infrastructure, modes of transport, traffic conditions\) particularly sensitive to climatic phenomena including impact assessment](#). The aim was to identify elements in the field of transport infrastructure and modes of transport, with a particular focus on road, rail, air and inland waterway transport that are particularly sensitive to climate change.

In the water sector, [Sustainable management of water resources and hydrotechnical infrastructure in terms of forecasted climate change](#) (2012) includes various methodologies for introducing different measures of climate change adaptation. This is a publication from the KLIMAT project<sup>3</sup> (co-financed by OP Infrastructure and Environment

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<sup>3</sup> Full title: The impact of climate change on the environment, economy and society: „Wpływ zmian klimatu na środowisko, gospodarkę i społeczeństwo (zmiany, skutki i sposoby ich ograniczania, wnioski dla nauki,

2007-2013, and lead by the Institute of Meteorology and Water Management) and it contains the information about climate change impacts especially for water sector.

Similar to railway transport, the water sector also has a series of internal, not publicly available methodologies concerning climate change adaptation. These were applied in developing water management plans, flood risk management plans, plans to prevent the effects of drought in river basin districts and other documents and plans prepared by National Water Management Authority.

In case of the absence of any further country guidance, the reader should be referred to the EU-level official methodologies. These are entirely adequate for any infrastructure project.

### **3.3. Tools**

Tools are highly valuable for facilitating climate adaptation studies and planning for infrastructure. They can be public or private, numerical or descriptive, and be provided in many media, such as software, text documents, maps, and so on. Some tools are generic (such as in risk assessments) whilst others are specific to a certain set of circumstances.

[Climate map](#) is a source of climate/weather data and refers specifically to urban environments. The tool identifies and describe threats which may occur using expected global climate change scenarios. The relevant analytical information on risk and vulnerabilities to climate change is provided by the [Institute of Meteorology and Water Management](#) (IMGW-PIB) and some of the information is available on the weather website of IMGW-PIB. This website presents current meteorological and hydrological warnings for Poland and also provides forecasts of storms.

Various sectors have their own disaster management tools. [Polish National Railways](#) has an in-house system that is not available to the general public. The system gathers information about incidents, and procedures for incidents for particular weather factors (in order to manage the railway transportation and infrastructure). Another example, for water sector, is [ISOK - IT System for Protection of the Country](#) that presents data and information about water management, natural hazards, threatened areas etc.

[Tools for strategic planning and management of urban water](#) (2014) highlight the most significant strategic goals and documents associated with water management, green infrastructure and sustainable development at the European and national level, and presents the challenges associated with their implementation at the local (urban) level. The [Integrated Development Strategy for Lodz 2020+](#) (2012) indicates how the available local strategic management tools can be used to reinforce the role of water in the city through integrated actions.

EIONET provides [Flood Maps](#) which are publically available, mapping areas of potential significant flood risk. EIONET also contains Flood Risk Management Plans.

For a continual update of available tools, the reader is referred to the European Climate Adaptation Platform [Climate-ADAPT](#), which has a dedicated tools section.

### **3.4. Guidance**

Guidance is an essential requirement to ensure consistency in applying methodologies and tools. In Poland, general methodologies are currently being applied and at the same time mainstreamed at sector level.

According to the Ministry of Environment, the main guidance for infrastructure projects is the [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters \(2015\)](#). As highlighted in the Methodology section, this guidance can be applied to any infrastructure project, but they are obligatory for projects co-financed from EU funds.

The [Guide to Cost-Benefit Analysis of investment projects](#) (2014) translates the EU [Guide](#) in Polish.

The [Blue Books](#) for projects in the public transport sector, road and railway infrastructure supplement and clarify the European Commission guide to cost of the and national guidelines on related issues with the preparation of investment projects, although they are not primarily made for guidance on climate change adaptation.

[Ideal city - balanced city spatial planning of urbanised areas and its impact on limiting the effects of climate change](#) (2015) is a publically-available document, that contains guidelines for spatial planning, water, energy and biodiversity in urban areas.

[Water in Cities](#) (2014) is a guidance document with a focus on quality of life in cities of the future, strategic planning and water management tools in space, the role of urban planning and architecture in water management, water in urban space, the health of residents and financial mechanisms for rainwater management.

[Sustainable management of water resources and hydrotechnical infrastructure in terms of forecasted climate change](#) (2012) is a publically-available guide for the water sector.

The transport sector (particular railway) has many guidance documents available that refer directly or indirectly to climate change adaptation. For example, the [Guidance Railway Instructions](#) provides traffic instructions and instructions on dealing with serious accidents and incidents. Some emergency situations are related to climate change adaptation.

### **3.5. Design Standards**

Design standards are critically important for all infrastructure projects to ensure stability and optimal functioning under the strain of natural phenomena. For civil works (including bridges, buildings, masts and towers for the mobile access networks), EN standards are available to address natural forces such as wind and snowfall, e.g. EN1991-1-4 (Eurocode 1) and EN1993 (Eurocode 3) for structures in steel. However, these standards might be outdated and not account for the impacts of climate change.

The [Polish Committee for Standardization](#) (PKN), the national standards authority, is collaborating with the [European Standardization Organizations](#) in the context of the EU Regulation No 1025/2012 on European standardisation. The European Committee for Standardisation (CEN) and Electrotechnical Standardisation (CENELEC) established the [Adaptation to Climate Change Coordination Group \(ACC-CG\)](#) to coordinate standardisation work in the field of adaptation to climate change in support of the implementation of the EU Strategy on Adaptation to Climate Change. More information is available in the section on *Available resources at the EU level* in the Final Report of the present study (European Commission, 2018).

In Poland, various sectors use their own internal standards, which are not publically available. These standards do not necessarily refer directly to climate change adaptation, but they do take relevant weather or ground conditions into account. Examples of relevant standards:

- The [Statement of the Minister of Infrastructure and Development](#) (2014) refers to the requirements for distance of trees and bushes, elements of acoustic protection and earthworks in the vicinity of the railway line, as well as the maintenance of snow curtains and fire breaks. It does not refer directly to climate change but it states how and where snow screens should be placed in order to prevent snow winnowing; and
- The [Technical conditions for maintaining the Id-3 railway substrate](#) (2009) contains technical requirements i.e. for railway track beds, dewatering and specific ground conditions (landslides, flood plains).

### **3.6. System**

The institutional system for adapting to climate change requires a legal framework (laws and implementing regulations) and strategies and policies (with implementing action plans). The system is usually conflated with disaster management (and its various components, preparedness, reduction etc.) and more generally with resilience.

#### ***Institutional and legal framework***

The initial climate change adaptation strategy for Poland was the [Strategy of Poland's adaptation to climate change](#), developed in 2012. The aim of the document was to provide a basis for extensive discussion in expert and governance circles, leading to the development of a more comprehensive adaptation programme for Poland.

At present, the main documentation in Poland concerning climate change is the [Polish National Strategy for Adaptation to Climate Change by 2020 with the Perspective by 2030](#) (2013). This document includes a description of the general characteristics of the climate, climate change from 2007-2011, scenarios and impact on sensitive sectors until 2030. Furthermore, the document includes an analysis of climate change trends and impacts on biodiversity, water management, forestry, power engineering, coastal zones, mountain areas, agriculture, transport, spatial economy and urbanised areas, construction and health.

Another applicable document which is concentrated mostly on crisis situations (also related to climate change) is the [ACT of 26 April 2007 on Crisis Management](#). The document has been developed by the Government Security Centre. It includes the characteristics of hazards and risk assessment of their occurrence, the critical infrastructure (including risk maps and hazard maps), the duties and responsibilities of participants in crisis management in the form of safety net, a statement of the forces and resources planned for use in crisis situations.

According to the revised law on Environmental Impact Assessments, it is necessary to take into account climate risk analysis. This applies mainly to projects of type I (in the EIA Report), but it is not obligatory for type II projects. Other projects are not covered by this legal requirement. Finally, the [Synopsis of EU and Polish legal regulations concerning climate and emissions to the atmosphere](#) is a document that provides an overview and brief description of all legislation acts.

#### ***Responsible authorities***

The responsible authorities on matters of climate change adaptation are the Ministries of Environment, with its Department for Sustainable Development and International



Cooperation; and the Ministry of Investments and Development with its Department of Infrastructural Programmes. Supportive services are provided by the Institute of Meteorology and Water Management ([IMGW-PIB](#)), the Institute of Environmental Protection ([IOŚ-PIB](#)), and the Institute for Ecology of Industrial Areas ([IETU](#)).

Additionally, a relevant legislation act is the [Regulation of the Minister of the Environment of 22 August 2007](#), which imposed that state hydrological and meteorological service and state hydrogeological service are obliged to provide warnings, forecasts, messages and newsletters.

### ***Management of the ESI Funds***

In order to support the preparation and implementation of the Operational Programme Infrastructure and Environment 2014-2020, the publication [Synopsis of EU and Polish legal regulations referring to climate and emissions to the atmosphere](#) (2015) was elaborated. This is a selection of legal acts of the EU, Poland and international agreements, including non-legislative documents in which climate issues (impact on climate, impact of climate change on projects, sensitivity / resilience to natural disasters and emissions to air) are regulated.

The Polish ESIF management System includes 16 regional operational programmes, 13 cross-border translational or international cooperation programmes, and five key operational programmes, namely: Infrastructure and Environment, Digital Poland, Development of Eastern Poland, Technical Assistance, and Smart Growth. The Management Authority for the last five Operational Programmes is the Ministry of Investments and Development. The various intermediary bodies involved in the management of funds include:

- Ministry of the Environment
- Ministry of Energy
- Ministry of Health
- Ministry of Culture and National Heritage
- The National Centre for Research and Development
- Department for Operational Programmes Implementation – Ministry of Investments and Development
- Polish Agency for Enterprise Development
- Centre for EU Transport Projects

### ***3.7. Institutional Capacity***

The institutional challenge for climate change adaptation is that climate policy is a cross-cutting issue, and requires co-operation across a large number of institutions. To be effective in delivering climate change adaptation a minimum level of capacity is needed on leadership, technical and human resources, effective collaboration, and financial support.

#### ***Technical and human resources***

The MoE through RDOS (Regional Directorate for Environmental Protection) and together with MoED and NFOŚiGW organize training for beneficiaries promoting the Environment Development Partnership (ENEA MA). A person interviewed for the present study from one of Poland's Ministries' stated that although there were workshops organized by Jaspers, these have not been as effective in increase the institutional capacity as some participants expected. Additionally, some employees of the Ministry of the Interior and other ministries and representatives of Marshal Offices and for RDOS have been in various types of knowledge exchange/ programmes to other Member states (Sweden, Portugal, Norway, Netherlands, and Denmark).

## ***Effective collaboration***

The cooperation between the different administrations/ ministries takes place in the case of the various Operational Programmes, which are adopted by the national government (Council of Ministers), mainly the [Polish National Strategy for Adaptation to Climate Change by 2020 with the Perspective by 2030](#). Within this context, the National Union of Environmental Bodies and Managing Authorities of EU Funds (Environment Partnership for Development) and the Environment for Development (ENEA MA) are collaborating effectively and are important institutional sources of information on climate change adaptation. There have also been effective collaboration in meetings of the Pilot GUIDE Group, who is developing guidance on the most beneficial use of EU funds.

## ***Financial resources***

The [ESI Funds are enabling the development of major projects](#) in the 2014 – 2020 programming period for Poland. Concerning major projects, by early 2018, there have been 11 642 Million EUR approved for Network Infrastructures in Transport and Energy; 2119 Million EUR for Low-Carbon Economy; 431 Million EUR in Environment Protection & Resource Efficiency; 35 Million EUR for Information and Communication technologies; 437 Million EUR in Environment Protection & Resource Efficiency; and 355 Million EUR for Climate Change Adaptation & Risk Prevention. The [data set will be updated regularly](#) to reflect changes in the programme lists and major project notifications.

## **4. SECTOR OVERVIEW**

### ***4.1. Introduction***

Since 2014, the requirements for major projects to obtain ESIF funding<sup>4</sup> demand that project applications integrate climate change considerations<sup>5</sup>, such as a vulnerability and risk analysis and adaptation option appraisal. At EU-level, material is available to assist in fulfilling these requirements. Key websites and documents are:

- The [Climate-ADAPT](#) website containing many links to data and a [map viewer](#)
- EUROPEAN COMMISSION Directorate-General for Regional and Urban policy: The [Guide to Cost-benefit analysis of Investment projects](#) (also referred to as the 'CBA guide')
- EUROPEAN COMMISSION DIRECTORATE-GENERAL CLIMATE ACTION: [Non-paper of Guidelines for Project Managers: Making vulnerable investments climate resilient](#)
- JASPERS Guidance note: [The Basics of Climate Change Adaptation, Vulnerability and Risk Assessment](#)
- JASPERS Guidance note: [An overview of the most important sources for integrating climate change in \(major\) projects](#)

Additional relevant material can be found in the Final Report of the present study (European Commission, 2018) in the section *Available resources at the EU level* and in *Annex I*.<sup>6</sup>

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<sup>4</sup> [http://ec.europa.eu/regional\\_policy/archive/projects/major\\_projects/index\\_en.cfm](http://ec.europa.eu/regional_policy/archive/projects/major_projects/index_en.cfm)

<sup>5</sup> For a compilation of the climate change requirements for major projects in 2014-2020, see: <http://www.jaspersnetwork.org/plugins/servlet/documentRepository/displayDocumentDetails?documentId=401>

<sup>6</sup> European Commission (2018) Climate change adaptation of major infrastructure projects. A stock-taking of



## **4.2. Transport**

Investments in the transport sector are very diverse, covering roads (including bridges and tunnels), inland waterways, rail, ports / airports, and public transport infrastructure. Any disruption caused in this sector can affect many other sectors (economic and societal) directly. Main threats are extreme weather events, such as strong winds, frost, extended heatwaves, flooding, heavy rainfall or storm, and landslides amongst others. Extreme weather events are a potential threat to both infrastructure and operation of the transport system (including comfort of users).

In the transport sector, the majority of guidance and methodologies that have been identified are used to increase the resilience of the sector to climate change. An important guide is the [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters](#) (2015), which is translated into applied practice at the sector level with their own particularities. Another key document is the [Blue Books](#) (for projects in the [road infrastructure](#), [railway infrastructure](#), [public transport](#)), which are national cost-benefit analysis guidelines in compliance with EC guidelines, that provide country specific recommendations and values. The scope includes economic and social analysis, financial analysis, project risk assessment and its impact on employment.

One of the first documents concerning climate change adaptation in infrastructure projects was [Developing transport sector sensitivity indicators for climate change](#), (2010) this document is a selection of the key elements of the transport system (infrastructure, means of transport, traffic conditions) that are particularly sensitive to climatic events, including impact assessment.

General information about climate change adaptation in the transport sector can be found in the [Strategy of Poland's adaptation to climate change](#) and at the KLIMADA platform. The KLIMADA portal provides climate change trends, detailed analyses of risks for transport infrastructure, and proposed actions.

### **Road infrastructure**

For the road sector, the General Director for National Roads and Motorways ([GGDKiA](#)) maps [actual road conditions](#) on highways, national and regional roads. GDDKiA also developed [Examples of addressing the climate change requirements in Polish Road projects](#) (2017). In addition, GDDKiA is currently undertaking the exercise of Mapping of climate vulnerabilities on existing national road network in Poland under the current project for adaptation of the national road network. Two relevant strategic documents are [National Road Programme for 2014-2023 \(2015\)](#) and [Strategy for Transport Development till 2020 \(2013\)](#), which refer to climate change at the general level rather than on adaptation measures.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

### **Railway infrastructure**

PKP Polskie Linie Kolejowe S.A., the main railway company in Poland, is expected to publish in 2018 and Expert Opinion on the adaption of the railway network<sup>7</sup>, with a view to:

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available resources to assist the development of climate resilient infrastructure. Final report.

<sup>7</sup> In full : « Expertise on the adaptation of rail infrastructure to climate change - maintenance of railway lines and investment projects financed from the financial perspective 2014-2020 »

- the need to mitigate the impact of railway infrastructure on climate change if such impact is found,
- forecasted climate changes and the related potential need to adapt the railway infrastructure to these changes, while taking into account human resources, organizational and financial potential of PKP and other related companies

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

### ***Airport infrastructure***

Poland has twelve international and regional airports, and is planning to build a new central large airport. However, no specific strategy on making airports climate resilient was retrieved from desk study or interviews. But more general materials are available which apply to all types of projects, including airport infrastructure. See section 4.1 for more information.

### **4.3. Broadband**

The International Telecommunication Union has issued the recommendation L.1502 [Adapting information and communication technology infrastructure to the effects of climate change](#) for the purpose of identifying climate threats and their impact. L.1502 supports resilience by design in identified risk areas, and proposes changes to equipment installation standards to ensure protection from more frequent extreme weather phenomena and their impacts. The European broadband sector standardisation bodies have not prepared vulnerability assessment and risk management framework for dealing with climate change in broadband projects.

With regard to the broadband sector, no specific documents relating to climate change adaptation appear publically available. But as for other sectors, the general [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters](#) (2015) and the [Guide to the analysis of the cost and benefits of investment projects](#) (2014) are applicable and relevant to investments in the broadband sector. Both guides take climate change adaptation into account.

It is a general best practice for operators to use flood mapping information from environmental agencies to safeguard new planned data centres from flooding. For civil works (e.g. masts and towers for the mobile access networks), EN standards are available to address wind and snowfall, e.g. EN1991-1-4 (Eurocode 1) and EN1993 (Eurocode 3) for structures in steel. But these standards don't take climate change into account. CEN-CENELEC is currently working on adapting a number of EN standards to climate change. See Final Report of the present study (European Commission, 2018) for more information in the section on *Available resources at the EU level*.<sup>8</sup>

The relevance of the broadband sector is important: following the '[European Funding for Broadband 2014 – 2020' report](#), Poland included more than a €1 billion. However, no major projects have been included, so project developers were not mandated to perform climate vulnerability and risk assessments.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

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<sup>8</sup> European Commission (2018) Climate change adaptation of major infrastructure projects. A stock-taking of available resources to assist the development of climate resilient infrastructure. Final report.

#### **4.4. Urban Development**

Investments in the urban development sector include site developments (industrial and other), urban planning, local infrastructure, building projects (such as hospitals, schools), and much more diverse projects. Cities have a unique position to analyse and respond to local impacts and vulnerabilities, such as heat island effects, which depend on the specific layout of a city, its green spaces, and numerous other factors. Cities can actively support the uptake of climate change adaptation in infrastructure projects through, for instance pilot projects, and can initiate dedicated infrastructure projects to improve their resilience to climate change.

The Sendzimir Foundation is publishing [guides](#) (for Water in Cities) and [tools](#) (for strategic planning and management of urban water) for cities to apply different adaptation measures related to spatial planning and organisation of the city.

[Ideal city - balanced city spatial planning of urbanised areas and its impact on limiting the effects of climate change](#) (2015) is a publically available document, that contains guidelines for spatial planning, water, energy and biodiversity in urban areas.

[Water in cities](#) (2014) is a guidance document with focus on quality of life in cities of the future, strategic planning and water management tools in space, the role of urban planning and architecture in water management, water in urban space, the health of residents and financial mechanisms for rainwater management.

[CLIMCITIES Adaptation to climate change in small and medium cities](#) is a project commissioned by the Ministry of Environment (co-financed under EEA Financial Mechanism). Its objective is to develop adaptability to climate change in small and medium-sized cities by providing local stakeholders with access to knowledge on adaptation to climate change and achieving the adaptation goals of the EU and national adaptation strategies.

The project [Urban Adaptation Plans](#) (2016-2019) co-financed under OP Infrastructure and Environment 2007-2013 aims at increasing the adaptive capacity of 44 Polish cities (above 100 000 inhabitants). The project takes into consideration the local conditions and problems of the cities, different in terms of nature and structure, as well as of threats and difficulties with which they have to cope. This is the largest project in Poland on climate adaptation with multiple cities.

In the capital city of Warsaw, the [ADAPTCITY project](#) (2014-2018), co-financed under the LIFE programme<sup>9</sup>, aims at the development of a strategy for adaptation to climate change - with the use of city climate mapping and with public participation. One of the key project results was the development of the [Climate Map](#), which is available online and provides information related to climate change and city resilience.

Radom is also an example of a city that is developing an adaptation plan with the project [RadomKlima](#) (2015-2020) co-financed under the LIFE programme<sup>10</sup>. The objective is to increase climate resilience of Radom City by building demonstrative "green-blue infrastructure" for managing extreme storm water flows and control local flood risks.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

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<sup>9</sup> [http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n\\_proj\\_id=5067](http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5067)

<sup>10</sup> [http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n\\_proj\\_id=5356](http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5356)

#### **4.5. Energy**

Project investments in the energy sector are related to power generation infrastructure (including RES), energy efficiency of buildings, and energy distribution/transmission networks (gas pipelines, electric grids, district heating). Potential impacts of climate change on energy infrastructure may include increased damage to power generation plants or problems with energy provision, leading to black-outs, changes in power demand or other disruptions. Disruptions in the energy sector can have large impacts on different sectors due to the increasing dependency on (electric) power provision for all kind of operational systems such as water supply (pumping installations, ...), the food system (transport, cooling, ...), transport (electrified vehicles, dynamic traffic information, ...), etc. In Poland, the majority of the energy network consists of overhead power lines, so it is very vulnerable to climate change.

The [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters](#) (2015) is relevant and applicable for infrastructure projects in the energy sector. Also the [Guide to the analysis of the cost and benefits of investment projects](#) (2014) can be applied to energy sector infrastructure projects. Both guides take climate change adaptation into account.

General information about climate change adaptation in this sector can be found in [Polish National Strategy for Adaptation to Climate Change \(NAS 2020\)](#) and on the [KLIMADA website](#).

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

#### **4.6. Water**

Investments in the water sector are linked to efficient water supply (including reduction of leakage), wastewater treatment and water reuse as well as the implementation of [River Basin Management Plans \(RBMP\)](#) to ensure integrated water management at the river basin scale. Important threats are linked to water quantity (droughts and floods) as well as quality (water pollution). Climate change can have an impact on both water quantity and quality. Following the EU Floods Directive 2007/60/EC, Member States are obligated to perform flood risk assessment and to elaborate flood hazard and risk maps and flood risk management plans. Flood risk maps include the history of floods and climate scenarios. Member States also need to take climate change into consideration when developing RBMP. A [Guidance document on adaptation to climate change in water management](#) is available to ensure that the RBMP are climate-proofed. [Evaluations of the RBMP and FRMP](#) are also available on the EC website.

In terms of methodology and guidance, the [Sustainable management of water resources and hydrotechnical infrastructure in terms of forecasted climate change \(2012\)](#) is available for the water sector. This document refers to an extensive range of water problems related to climate change. General information about climate change adaptation in this sector can be found in [Strategy of Poland's adaptation to climate change](#) and at the [KLIMADA website](#).

[Water supply and wastewater management in Warsaw - Phase V](#) includes a climate analysis as part of the framework of the application for co-financing and the feasibility study. The project was carried out based on and in accordance with the "Guidance on the preparation of investments with regard to climate change mitigation and adaptation and disaster resilience". It refers to a vulnerability analysis as well as climatic risk analysis both in the context of adaptation and mitigation of climate change (Beneficiary of POIiŚ 2014-2020: Municipal Water Supply and Sewerage Company in m.st. Warsaw S.A.).

As for all sectors, the [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters \(2015\)](#) and the [Guide to the analysis of the cost and benefits of investment projects \(2014\)](#) are also applicable and relevant for infrastructure projects in the water sector. Both guides take climate change adaptation into account.

Polish Waters<sup>11</sup> (the national water management body, Wody Polskie) together with the Regional Water Management Boards (11 institutions) has developed several documents and projects that relate to climate change adaptation, including:

- [Preliminary assessment of flood risk](#) – the objective is to designate areas endangered by flooding, i.e. areas at significant risk of flooding or where the occurrence of high risks is likely;
- [Flood hazard maps and flood risk maps](#) – developed within ISOK project;
- [Flood risk management plans](#) – to reduce the potential negative impacts of floods on human life and health, the environment, cultural heritage and business. This will be achieved by implementing measures to minimise the identified risks; and
- [Development of counteraction plans of drought effects in river basin districts](#) - the objective is to propose reduction and preventive measures to reduce the negative impact of drought on society, the environment and the economy.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

#### **4.7. Waste**

Project investments in the waste sector are related to separate collection infrastructure, re-use and recycling infrastructure, energy recovery facilities and closure of landfills. Potential impacts of climate change on waste infrastructure may include increased rates of waste decomposition, odour and dust due to increased temperatures, flooding of landfills and waste treatment facilities, and reduced water availability for wet processes in waste treatment facilities. Also the impact on transport infrastructure should be considered, as transport is a critical component of waste management (collection, transport to and from waste treatment facilities). The impact on transportation is discussed in the section on transport above.

Specific documents relating to climate change adaptation of the waste sector are not publically available. But as for other sectors, the general [Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters \(2015\)](#) and the [Guide to the analysis of the cost and benefits of investment projects \(2014\)](#) are also applicable and relevant to investments in the waste sector. Both guides take climate change adaptation into account.

For landfills, [Directive 1999/31/EC on the landfill of waste](#) requires that landfills are situated and designed in such a way that pollution of the soil, groundwater or surface water is prevented. This requirement is translated into [national design standards](#) for the construction of landfills that include the consideration of temperature, precipitation extremes and flooding where relevant.

Large waste treatment plant are subject to [Directive 2010/75/EU on industrial emissions \(IED\)](#), which requires as a general principle that necessary measures should be taken to prevent accidents which may have environmental consequences, and to limit those consequences. This requires that a structured management plan should be available that

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<sup>11</sup> Formerly known as the National Council of Water Management

includes and mitigates hazards such as extreme weather conditions (e.g. flooding, very high winds). In the [BAT reference document \(BREF\) on Waste Treatments Industries](#), some information is provided on the impact of certain climatic conditions (e.g. the impact of higher temperature on biofilter performance, aerobic decomposition, etc.). Although climate change is not specifically addressed.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

## 5. CASE STUDIES

### 5.1. Case studies of climate adaptation projects

#### Development of urban adaptation plans for cities with more than 100,000 inhabitants in Poland (MPA)

Project Description	This project is a big scale project, which involves 44 of Poland's largest cities (>100,000 citizens, housing about 30% of Polish population and generating about 50% of Polish GDP). The goal of the project is to identify and analyse adaption and mitigation challenges each city may face, draft plans for local authorities, indicate sources of funding and raise awareness for the need of adaptation. This is the only initiative in Europe in which the Ministry of the Environment supports the authorities and local administration in coordinating the activities adapting to the effects of climate change in several dozen cities at the same time. The project is carried out by the consortium of organisations, including the National Research Institute of Environmental Protection, the National Research Institute of Meteorology and Water Management, the Institute of Ecology in Industrialized Areas and a consultancy company. The project implements the outcomes of the strategic adaptation plan for sectors and areas sensitive to climate change in Poland (NAS). This project should contribute to protecting about 30% of the Polish citizens against the climate change effects. The project implementation will initiate similar activities on the local level in smaller towns and communes. An important task is to educate and improve awareness on the local level, both among officials and urban communities. Duration: 01.07.2016 till 31.03.2019
Photograph	<a href="http://44mpa.pl/urban-adaptation-plans/?lang=en">http://44mpa.pl/urban-adaptation-plans/?lang=en</a>
Budget	Total cost: 31 million PLN
Climate Change Vulnerability and Risks	Project consists of six stages and each of them has an appropriate methodology and tools to achieve the main objective and develop the urban adaptation plan for 44 cities (44 plans).
Climate Change Adaptation Measures	Will be developed within the project. They will differ depending on the local conditions of the cities
Good Practice	This is a good practice in term of developing the documents that will identify the levels of vulnerability, resilience and adaptive capacity of the cities. Based on that, the necessary adaptation



	measures will be chosen and customised to local conditions.
Further Information	<a href="http://44mpa.pl/urban-adaptation-plans/?lang=en">http://44mpa.pl/urban-adaptation-plans/?lang=en</a>

## **5.2. Case studies of infrastructure projects which have addressed climate change adaptation**

<b>Water supply and wastewater management in Warsaw - Phase V</b>	
Project Description	Goal of the project was to improve and optimise the existing wastewater treatment and drinking water supply system in Warsaw. This included expanding the system to serve more inhabitants, reducing leakage and infiltration, improving reliability, reducing energy consumption and reducing CO <sub>2</sub> emissions, adjusting the infrastructure to climate change, etc.
Budget	This project is co-financed under Cohesion Fund (CF), Operational Programme Infrastructure and Environment 2014-2020. The total estimated budget is about 850 million PLN, of which about 542 million PLN will be financed by the EU. About 238 million PLN is related to operations IV and V, which are also relevant to climate change adaptation.
Climate Change Vulnerability and Risks	<p>A detailed risk and vulnerability analysis has been performed. Potential risks for the functioning of the infrastructure project include:</p> <ul style="list-style-type: none"> <li>• Heavy rainfall can negatively impact rain drainage and cause pollution due to sewage overflow. Dilution of wastewater can negatively impact the functioning of wastewater treatment.</li> <li>• Heavy storms and winds can cause interruptions in power supply amongst others.</li> <li>• High temperatures (low water availability) can cause problems for drinking water supply and can negatively impact the functioning of wastewater treatment.</li> </ul> <p>The risk for flooding was considered low.</p>
Climate Change Adaptation Measures	The project includes a central control system, including the construction of a storage reservoir (operation IV). The control system will be based on mathematical models, GIS and a network of measuring points (operation V). This modern control system will adapt the system to climate change, as it can for instance detect any damage to the system caused by extreme weather events. The new storage reservoir will retain water in case of heavy rainfall.
Good Practice	This project was developed in accordance with the <a href="#">Guide to investment preparation respecting climate change mitigation and adaptation as well as resilience to natural disasters</a> .
Further Information	

## Railway line No. 1 on the section Częstochowa-Zawiercie

Project Description	The document was prepared for the purpose of environmental impact assessment and obtaining a decision on environmental conditions for this project.
Budget	This project is co-financed under Cohesion Fund (CF), Operational Programme Infrastructure and Environment 2014-2020. The estimated budget is: 503 million PLN of which 385 million PLN will come from CF. The project will be completed in 2020.
Climate Change Vulnerability and Risks	<p>The report focuses on the issue of climate change:</p> <ul style="list-style-type: none"> <li>• A general assessment of the investment impact on climate and its changes (during implementation and operation phase);</li> <li>• Actual and projected climate change - the available data has been analysed to identify the changing elements that can affect railway infrastructure;</li> <li>• Analysis of current events related to atmospheric phenomena in the project area; the impact of weather conditions on the infrastructure (2013-2015) was reviewed and analysed on the basis of the company's records. The analysis covered all the operated railways; and</li> <li>• The methodology for determining climate impact on railway infrastructure is fully described. The methodology for assessing the adaptive capacity of railway infrastructure to atmospheric agents was identified based on certain vulnerability and exposure. For this purpose the methodology from the document was used: <a href="#">Develop sensitivity indicators for the transport sector on climate change. Selection of key elements of transport system (infrastructure, means of transport, traffic conditions) particularly sensitive to climatic phenomena together with impact assessment</a>. This methodology was detailed and extended by experience and information held by PKP Polish Railway Lines S.A. The risk assessment of the phenomenon occurrence has been carried out on the basis of the methodology set out in SMS / MMS-PR-02 - Technical and Operational Risk Assessment (Version 1.1.) dated 21 May 2015, specifying the principles of risk analysis and valuation under the Security Management System - SMS or Maintenance Management System - MMS at PKP Polish Railway Lines Company. The next step was the assessment of the inclusion of predicted climate change, which may increase or decrease the intensity of the occurrence of the individual factors. SRES A1B scenario was used to define the forecasted changes.</li> </ul> <p>At the end assessment of the impact of climatic factors on railway infrastructure was undertaken.</p>
Climate Change Adaptation Measures	In the design process of the railway lines, the information and conclusions of the KLIMAD project has been taken into consideration, Additionally, the nature of the railway pavement and its response to climatic factors and the infiltration conditions of railway trenches has been considered. The analyses carried out in the Report and adopted methodology have indicated that there is no need to propose actions



	/ remedial measures for this project since the currently proposed measures at the design and operation stages will ensure the project resilience to climate change.
Good Practice	This project is a good example of the implementation of climate change issues for infrastructure projects. The adopted methodologies can be repeated in other projects related to railway infrastructure, though they are the internal assets of PKP Polish Railway Lines Company S.A. and are not publicly available.
Further Information	



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