National climate change adaptation planning and strategies

Legal instrument: Regulation on the Governance of the Energy Union and Climate Action

Obligation: National climate change adaptation planning and strategies – GovReg

General information

EU Member State / EEA member country

Slovakia

The information in this reporting is updated until (date: YYYY-MM-DD format)

2021-03-15

Is this reporting the mandatory reporting under Art. 19 and Part 1 of Annex VIII of the Governance Regulation and Annex 1 of the Implementing Act?

Yes

National circumstances, impacts, vulnerabilities, risks and adaptive capacity

National circumstances relevant to adaptation actions

Biogeophysical characteristics relevant to adaptation actions

Annex I: 1.1a

Slovakia lies between latitudes 47° and 50° N, and longitudes 16° and 23° E. The Slovak landscape is noted primarily for its mountainous nature, with the Carpathian Mountains extending across most of the northern half of the country. Among these mountain ranges are the high peaks of the Fatra-Tatra Area (including Tatra Mountains, Greater Fatra and Lesser Fatra), Slovak Ore Mountains, Slovak Central Mountains or Beskids. The largest lowland is the fertile Danubian Lowland in the southwest, followed by the Eastern Slovak Lowland in the southeast.

Demographic situation relevant to adaptation actions

Annex I: 1.1b

The population is over 5.4 million. The average population density is 110 inhabitants per km2. According to the 2011 census, the majority of the inhabitants of Slovakia are Slovaks (80.7%). Hungarians are the largest ethnic minority (8.5%). Other ethnic groups include Roma (2%), Czechs (0.6%), Rusyns (0.6%) and others or unspecified (7.6%). Unofficial estimates on the Roma population are much higher, around 5.6%. In 2018 the median age of the Slovak population was 41 years.

Economic and infrastructural situation relevant to adaptation actions

Annex I: 1.1c

The Slovak economy is a developed, high-income economy, with the GDP per capita equaling 78% of the average of the European Union in 2018. The country has difficulties addressing regional imbalances in wealth and employment. GDP per capita ranges from 188% of EU average in Bratislava to 54% in Eastern Slovakia. Although regional income inequality is high, 90% of citizens own their homes.

The OECD in 2017 reported:
The Slovak Republic continues exhibiting robust economic performance, with strong growth backed by a sound financial sector, low public debt and high international competitiveness drawing on large inward investment.

In 2020, Slovakia was ranked by the International Monetary Fund as the 38th richest country in the world (out of 187 countries), with purchasing power parity per capita GDP of $38,321. The country used to be dubbed the "Tatra Tiger". Slovakia successfully transformed from a centrally planned economy to a market-driven economy. Major privatizations are completed, the banking sector is almost completely in private hands, and foreign investment has risen.

The Slovak economy is one of the fastest-growing economies in Europe and 3rd-fastest in Eurozone (2017). In 2007, 2008 and 2010 (with GDP growth of 10.5%, 6% and 4%, retrospectively). In 2016, more than 86% of Slovak exports went to European Union, and more than 50% of Slovak imports came from other European Union member states.

The ratio of government debt to GDP in Slovakia reached 49.4% by the end of 2018, far below the OECD average.
Unemployment, peaking at 19% at the end of 1999, decreased to 4.9% in 2019, lowest recorded rate in Slovak history.
Slovakia adopted the Euro currency on 1 January 2009 as the 16th member of the Eurozone.

The Slovak government encourages foreign investment since it is one of the driving forces of the economy. The foreign investment ratio is much lower in some regions, mostly at the east of Slovakia, which has aggravated regional disparities in many economic and social areas.

If necessary, you can upload here an additional document

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Climate monitoring and modelling framework

Main activities on climate monitoring, modelling, projections and scenarios

Annex I: 1.2a

Climate monitoring, modelling and projections:
The Slovak Hydrometeorological Institute (SHMI) is a state-subsidized specialized organization operating under the MoE SR providing Meteorological and Hydrological Services at the national and international level. In the frame of Act 201/2009 on the State Hydrological Service and the State Meteorological Service, a state hydrological network and a state meteorological network were established. These networks are managed by SHMI. They are used for the tasks of both Services namely for systematic monitoring of quantitative and qualitative parameters of air and water in Slovak territory. Data from monitoring activities are stored in databases and used in research, dealing with impact of climate change, vulnerability assessments and adaptation measures.

The monitoring systems are formally divided to:

State meteorological network

Monitoring subsystems	Number of facilities
surface synoptic stations	20
surface climatological stations	99
surface precipitation stations	540
meteorological radar network	5
network of solar radiation and ozone measurements	7
meteorological satellite receiving and processing	
phenological stations	194

State hydrological network

Monitoring subsystems	Number of facilities
surface water quantity	418
surface water quality	244
groundwater quantity	359 springs, 1144 boreholes
groundwater quality	76

Both networks are complemented with Air Quality and Radioactivity monitoring. Individual monitoring networks are characterized by a high degree of automation. Besides standard hydrological and meteorological monitoring systems also complementary infrastructures exist in agriculture, forest, energy, water management and transport sectors.

Integrated drought monitoring system
This system consist of meteorological, soil and hydrological drought subsystems, Co-operation with Czech partners takes place in the soil drought, specifically soil water regime modeling. Result of drought occurrence, intensity and regime is presented on weekly base in the web page of SHMI.

Forest fire risk monitoring system
This monitoring system is based on former DWD methodology, modeled basically the water balance of soil with regard to forest environment annual cycle. The results of forest risk are presented on daily base from March to October in the web page of SHMI.

The SHMI website provides information on Slovakia's climate, its detailed regime and trends from 1881, the recent climate change and its expected impacts, used in National Communications on Climate Change:
(http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/976840315_slovakia-nc7-1-7nc_svk.pdf)

Projections and scenarios

Since 1993, national climate change scenarios have been prepared for the Slovak Republic as modified outputs from several Global General Circulation Models (GCMs) and Regional Circulation Models (RCMs). The statistical and dynamic downscaling method used with data from Slovak meteorological network from the period 1951 – 2010. All the GCMs and RCMs offer outputs of several variables with daily frequency for the period from 1951 to 2100. The last series of climate change scenarios are based mainly on outputs from four models: GCMs CGCM3.1 (Canada) and ECHAM5 (Germany), RCMs RACMO (the Netherlands – KNMI) and REMO (Germany – MPI). These models were used to obtain climate change scenarios for the Slovak Republic. Based on the outputs and the measured meteorological data for reference periods 1961-1990 and 1981-2010 daily scenarios were designed for about 60 meteorological and about 150 precipitation stations in the Slovak Republic. Scenarios were prepared for the following variables: the daily means, maxima and minima of air temperature, daily means of relative air humidity, precipitation totals, means of wind speed and sums of global radiation. Based on thesebaseline scenarios, several other scenarios for snow cover, evapotranspiration, heatwaves, soil moisture, runoff, etc., were designed. In this approach correlation/regression and simple modeling methods to obtain scenarios for other climatic/hydrological elements were used.

In general, models suppose a comparable increase of temperature in whole area of our territory in accordance with similar assessments for Central Europe region. Scenarios of precipitation totals expected small growth in the north and decrease in southern part. Result of the future temperature and precipitation conditions would have impact on higher potential evapotranspiration and enhanced drought occurrence.

New and more detailed climate change scenarios based on GCMs and regional (RCMs) models, enabled the calculation of a series of statistical characteristics such as complex environmental and socio-economic scenarios depending on the changing climate: number of summer days, tropical days, super-tropical days, heat waves, icy days, frosty days, days with heavy rain, days with low or no precipitation, days with snowfall, days suitable for specific tourist activities (skiing, swimming, summer and winter hiking, etc.).

An analysis of current and future climate change scenarios confirms the existence of extremes and risks, their interdependence and possible consequences in the whole range from ecosystems, natural resources to the economy and the social sphere. Bonds and interactions between the effects of climate change and its possible consequences forms very complex and dynamic system.

The management of this system requires a large amount of information and is largely limited by the uncertainties of the future development of the scenarios. Climate change projections and modeling results confirm that the magnitude of climate change impacts on human and natural systems calls for adaptation measures that both reduce the vulnerability of these systems and further strengthen their resilience through technological and ecosystem-based solutions and managerial abilities.

The Slovak Environment Agency is a state-subsidized specialized organization operating under the MoE SR and is in charge of various climate change adaptation tasks. In 2017 the Slovak Environment Agency together with MoE SR and Centre for Social and Psychological Sciences of the Slovak Academy of Sciences published publication The Scenarios 2020+. 10 authors from 8 different institutions elaborated it.

Main approaches, methodologies and tools, and associated uncertainties and challenges

Annex I: 1.2b

Slovakia has already formed its national adaptation policy. Two strategies – Vision and Development Strategy of Slovakia 2030 and Greener Slovakia define the key direction for adaptation and others that are listed in this report (in attach document under 3.3) too. The main objectives of the national adaptation policy are framed in the National Adaptation Strategy. The currently preparing NAP lists the priority actions and measures.
Some sectoral tools, which were asked to be shared in this report, are listed in attach document under 3.3.

The climate (adaptation) monitoring and modelling together with other required information were reported under MMR Art.19 and from now on are to be reported under this regulation. The current schedule of the periodic review of the National Adaptation Strategy is determined by Government Resolution 478/2018.

To the tools that address climate change, including adaptation, belong database of KMIS (Climatological and meteorological information system)
KMIS is an electronic database developed mainly by experts from SHMI. It allows data entry, quality control and management, as well as data export in the form of tabular, graphical and map outputs.

Data from individual meteorological monitoring subsystems of SHMI enter the KMIS database in various ways. Operational data from subsystems with a dense collection frequency are subject to completeness, formal and logical checks. Data from the stations where the paper reports are prepared are edited after the initial checks and are inserted into the KMIS, where they are subjected to further verification procedures. The data from the individual subsystems represent the content of the individual data areas. In addition, KMIS also contains data on the climate archive and Metadata area. The database is filled with current data, but also historical data from 1872 in the accordance with data rescue activities. Currently, KMIS is not accessible to external users.

KMIS contains 21 basic data areas describing the physical state of the environment from the upper layers of the soil to the stratosphere hights. The database includes measurements of

ground station networks with automatic or manual measurement mode, as well as the results of measurements and observations of the remote monitoring system (upper-air measurements). The KMIS database stores measured elements (temperature, wind) or even subjectively determined elements and characteristics of the physical state of the environment (cloudiness, phenological phases). The frequency of data storage in the database ranges from 5 minutes (automatic meteorological stations) to 1 year (phenological stations). Data in database are subject of quality control procedures, verified data are authorized.
Measured data of other remote sensing monitoring systems (meteorological radar, satellite, network of lightning detection) are stored outside the KMIS environment.

The KMIS database enables batch and operational access to actual and regime data describing the current state of the atmosphere as well as the current state of the climate system of the Slovak Republic. For this purpose, special set of application programs was created, providing data in tabular, graphical and map forms.

Another tool to address climate change (adaptation) including uncertainties and challenges is Integrated drought monitoring system
This system consist of meteorological, soil and hydrological drought subsystems.

Meteorological drought
This subsystem is based on precipitation deficit (continuing with SPI index) and water deficit (SPEI index, Palmer´s CMI). Results of app 40 meteorological stations are used in weekly steps.

Soil drought
The integrated system for soil drought monitoring – the Interdrought mechanism is involved. Soil moisture parameters are calculated with a verified model of the water balance – SoilClim. Daily meteorological data, the vegetation cover parameters in current degree of development are interpolated on a 500 m grid. In every grid the terrain parameters, the exposure and declination of the slope and the basic physical properties of the soil are available. The current soil moisture status estimated by the model is compared with the 50-year long-term average (1961-2010) of soil moisture determined for each day, the values being expressed in a simple 7-point color scale.
The results of drought monitoring are with an independent analysis of drought impacts on vegetation using the farmers reports and satellite images of vegetation obtained by Aqua and Terra satellites - MODIS system and processed in cooperation with Mendel University, CzechGlobe and the Institute of Geography of Masaryk University.

Hydrological drought
The near-real time water discharges are compared to the average monthly discharge in about 200 profiles (water level gauges) and the percentage of actual discharges is updated daily. Water table level of ground water is compared to the reference period 1981 – 2010 and difference of levels is transposed to the drought intensity scale.

Forestry sector also shares its approach towards monitoring as follows:
From the point of view of the specific needs of forestry research, it is important to monitor the environmental conditions in relation to forest trees and the processes taking place in the forest ecosystem. Meteorological stations located near specific stands and research facilities, in which long-term ecological research takes place, are used for this purpose. Its subject is, among other things, the issues of changes in the growth and other physiological processes of forest trees in relation to the growing extremes of the climate.
The web portal of forest meteorological monitoring http://www.forestweather.sk/ provides access to online data from a network of 30 meteorological stations distributed in various forest areas of Slovakia and covering practically all forest vegetation stages in the range of altitudes from 225 m above sea level to 1,560 m above sea level.

Publication Scenarios 2020+
As mentioned in 1.2a the The Scenarios 2020+ were published by Slovak Environment Agency, MoE SR and Center for Social and Psychological Sciences of the Slovak Academy of Sciences, in cooperation with SHMI and State Nature Conservancy of Slovak Republic and other authors in 2017. The publication was elaborated as a part of the activities of the National Reference Center for Forward Looking Information and Services (FLIS). The methodology used in publication The Scenarios 2020+ was based on EEA methodological guidelines (EEA, 2012) and on approaches recommended by the EU Joint Research Center (JRC; http://forlearn.jrc.ec.europa.eu/guide/4_methodology/meth_scenario.htm). There were six steps: 1. identification of relevant objectives against which the scenarios will be defined; 2. description and analysis of objectives in the context of the obligations of the Slovak Republic; 3. analysis of the current state, driving forces, change blockers and triggers; 4. assessment of the importance of key forces; 5. creating scenario logic; 6. defining and developing scenarios. The pilot preparation was one of the first more complex experiments using quantitative and qualitative approaches and participatory methods.

Focusing on climate change and biodiversity, three short-term scenarios have been developed to identify the trends, weak signals and possible “wild cards”.

Scenario 1: Baseline (Progress within trends) – it is based on the projection of a stable economic and social environment. The short-term targets in the reduction of greenhouse gas emissions will be greatly exceeded, targets in renewable energy sources will be achieved with difficulties, while targets in energy savings will fail to be delivered. The key parameters of biodiversity will continue to deteriorate.
Scenario 2: Deregulation and post-politics (Unsustainable short-term economic growth and intensification of social conflicts) – it is based on the projection of continuous economic growth accompanied by the growth of investments in a deregulated framework posing a threat to the environment. The scenario is based on a rise of conflicting areas influencing development.
Scenario 3: Economic crisis (Reduced production and consumption) - it is based on the

projection of economic crisis accompanied by a fall in industrial production and rise of social polarisation. The number of investments endangering the environment is reduced. There is a strong downsizing in some segments of industrial production which results in a significant change in greenhouse gas emissions due to the size of the Slovak economy.
At the national level, the preparation of these scenarios followed on from the Draft National Priorities for the Implementation of the 2030 Agenda for Sustainable Development, Slovakia's Vision and Strategy for Development by 2030 and the Slovak Environmental Policy Strategy until 2030.

If necessary, you can upload here an additional document

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Observed climate hazards

Temperature-related - acute

Temperature-related - acute - Cold wave/frost, Temperature-related - acute - Heat wave

If other, please explain

-

Wind-related - acute

Wind-related - acute - Storm (including blizzards dust and sandstorms), Wind-related - acute - Tornado

If other, please explain

-

Water-related - acute

Water-related - acute - Drought, Water-related - acute - Flood (coastal fluvial pluvial ground water), Water-related - acute - Heavy precipitation (rain hail snow/ice), Water-related - acute - Snow and ice load

If other, please explain

-

Solid mass-related - acute

Solid mass-related - acute - Avalanche, Solid mass-related - acute - Landslide, Solid mass-related - acute - Subsidence

If other, please explain

-

Temperature-related - chronic

Temperature-related - chronic - Changing temperature (air freshwater marine water), Temperature-related - chronic - Temperature variability

If other, please explain

-

Wind-related - chronic

Wind-related - chronic - Changing wind patterns

If other, please explain

-

Water-related - chronic

Water-related - chronic - Changing precipitation patterns and types (rain hail snow/ice), Water-related - chronic - Precipitation and/or hydrological variability, Water-related - chronic - Water scarcity

If other, please explain

-

Solid mass-related - chronic

Solid mass-related - chronic - Soil degradation (including desertification), Solid mass-related - chronic - Soil erosion

If other, please explain

-

Overview of existing pressures

Member States shall report existing environmental, economic and social pressures that are likely to be significantly affected by climate change: e.g. loss of biodiversity, poor harvest, energy poverty, unemployment, migration. Annex I: 1.3a Footnote3

The climate change will affect the urban areas and rural areas as well. In urban areas, climate change is expected to increase risks to humans, the economy and ecosystems, including risks from heat stress, storms and extreme rainfall, floods, landslides, air pollution, drought, water scarcity, etc. Rural areas are expected to have a significant impact on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in food and non-food crop production areas around the world. The effects of climate change are expected to slow economic growth, make poverty reduction more difficult, prolong existing ones and create new poverty traps, especially in urban areas.

The following environmental, economic and social pressures are likely to be significantly affected by climate change in Slovakia:

- Environmental pressures: lack of water, deterioration of water quality, drought, deterioration of soil properties, reduction of organic carbon in the soil, salinization of soil, increased water and wind erosion, change in ecosystem functioning and provision of ecosystem services, degradation to forest ecosystems, habitat fragmentation, spread of non-native and invasive species, loss of biodiversity, change of landscape image, floods, windstorms, wild fires, landslides

- Economic pressures: reduction of soil fertility and agricultural production, shift of agricultural production areas to more northern areas, changes in agro-climatic production potential, changes in crop composition, reduction of forest production, changes in forest species composition, occurrence of pests, diseases and weeds, endangerment of sources of drinking water and drinking water and drinking water supply, irrigation problems, increasing the vulnerability of residential and rural environments, the need to reduce the energy intensity of buildings, deteriorating safety and traffic flow, increased energy consumption, endangering the flow of industrial operations, major industrial accidents, unstable supplies of stock, raw materials and electricity, increased risk of failures and material damage in the energy and industrial sector, the need to deal with emergencies and natural disasters, threats to human safety and health, threats to food security, changes in the prices, increased requirements for innovation and renewables, changes in the length and quality of the tourist season, threats to tourism potential, threats to competitiveness.

- Social pressures: threat to the health of the population (change in the distribution of infectious diseases, presence of new pathogens, worsening of allergic conditions), deterioration of quality of life, unemployment, migration.

Identification of key future climate hazards

Temperature-related - acute

Temperature-related - acute - Cold wave/frost, Temperature-related - acute - Heat wave

If other, please explain

-

Wind-related - acute

Wind-related - acute - Storm (including blizzards dust and sandstorms), Wind-related - acute - Tornado

If other, please explain

-

Water-related - acute

Water-related - acute - Drought, Water-related - acute - Flood (coastal fluvial pluvial ground water), Water-related - acute - Heavy precipitation (rain hail snow/ice), Water-related - acute - Snow and ice load

If other, please explain

-

Solid mass-related - acute

Solid mass-related - acute - Avalanche, Solid mass-related - acute - Landslide, Solid mass-related - acute - Subsidence

If other, please explain

-

Temperature-related - chronic

Temperature-related - chronic - Changing temperature (air freshwater marine water), Temperature-related - chronic - Temperature variability

If other, please explain

-

Wind-related - chronic

Wind-related - chronic - Changing wind patterns

If other, please explain

-

Water-related - chronic

Water-related - chronic - Changing precipitation patterns and types (rain hail snow/ice), Water-related - chronic - Precipitation and/or hydrological variability, Water-related - chronic - Water scarcity

If other, please explain

-

Solid mass-related - chronic

Solid mass-related - chronic - Soil degradation (including desertification), Solid mass-related - chronic - Soil erosion

If other, please explain

-

Secondary effects of the selected hazards, such as forest fires, spread of invasive species and tropical diseases, cascading effects, and multiple hazards occurring at the same time

Annex I: Footnote5

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Affected Sectors (14)

Title of the sector

biodiversity (including ecosystembased approaches)

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

Biodiversity loss is inseparably linked to climate change. The two phenomena are the most critical global environmental threat of the 21st century. There is ample evidence that climate change affects biodiversity, while it is clear that changes in biodiversity and the functioning of ecosystems affect climate processes. For example, peatland degradation is a significant source of greenhouse gases. To the direct effects of climate change on biodiversity belong: drought, increased risk of wild fires and limited snow cover. To the indirect impacts belongs for example spread of invasive species. Biodiversity will also be affected by related socio-economic changes, in particular land use change.
The expected consequences of climate change on ecosystems and plant and animal species cohere with increased annual air temperature, drought, extreme weather events, changes in CO2 concentration, etc. This will subsequently affect physiological and phenological changes, changes in geographical distribution of species, such as the transformation of population structures and the extinction of vulnerable species.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

An increase in air temperature, a decrease in annual precipitation totals is expected, but at the same time an increase in local precipitation totals, a decrease in relative humidity, snow cover and persistence of negative climate change impacts on the biodiversity ecosystems and plant and animal species occur. Increasing temporal and spatial variability of precipitation totals will result in an increase in local floods in different parts of the country, prone to flash floods. On the other hand, the occurrence of long periods with deficit of precipitation will result in local or widespread drought. Weakened forest vegetation will be prone to damage caused by strong winds.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Climate change is affecting the functioning of ecosystems and its services. Assessing the vulnerability of ecosystems and their services is a complex task.
Due to the increased average air temperature, the shift of vegetation zones and stages is expected. This may endanger ecosystems, habitats, species and their communities. Changes in the structure and composition of habitats are expected. It may reduce the resilience of ecosystems, reduce their ability to provide ecosystem services or disintegration. Drying of soils will lead to the loss of wetlands, bogs and peat bogs. Extreme weather events can cause disturbances in forests and strengthen the negative effects of pests. With changes in CO2 concentration, increased air temperature and water demand, increased levels of photosynthesis and respiration, changes in growth, body structure or biological productivity of species are expected. The shift shortening of the winter season and the more frequent incidence of late spring frosts in an extreme case could cause extinction of cold-sensitive populations. Changes in the geographical distribution of species will affect the most vulnerable species, endemics and relicts. Changes in species interdependence are expected between predator - prey, plant – pollinator. Symbiotic dependency changes, isolation, declining migration opportunities, extinction of vulnerable species and the spread of resistant species are expected too.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

energy

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The following key climate hazards are expected to impact the energy sector in Slovakia: changing temperature, wind conditions, precipitation patterns, heat or cold waves, storms, drought, floods, snow and ice loads as well as landslides.
Due to warming, a reduction in energy intensity can be expected in the winter months due to a reduction in heating requirements. This will lead to a deterioration in energy efficiency due to oversized district heating systems. At the same time, warming would lead to an increase in energy intensity in the summer months due to the increase in energy needed for air conditioning. Cold wave/frost can lead episodically to increased load on the heat distribution system. A change in wind conditions can endanger the produced output of existing wind power plants. Fluctuations in the flow volume on watercourses can have a negative effect on the operation of hydropower plants. Drought can lead to rising demands for technologic water within the energy infrastructure. The need to pump water for irrigation will lead to an increase in demands for electricity production and distribution capacity. Wind storm, snow loads floods or landslides can cause faults and damage to equipment, power outages, increased complications in repairs, increased damage caused by power outages at customers

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

Regarding to adapting to temperature changes, the energy sector /mainly its infrastructure/ distribution systems need to be more resilient and adapted to both to warmer conditions and cold.
As part of the preparations for the cold wave, the capacity requirements for underground natural gas storage are growing.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Energy production from fossil fuels is less affected by the negative impacts of climate change than energy production from renewable energy sources. The vulnerability of technology producing renewable energy (wind turbines, solar panels, hydropower plants) is much higher in comparison with the vulnerability of technology used for energy production from non-

renewable sources (power plants, incinerators). Nuclear power plants are a specific category, where the availability of water resources necessary for cooling water remains a risk factor.
Energy infrastructure which includes the supply of electricity, heat, gas, oil and other forms of energy, is part of the so-called critical infrastructure and its malfunction has a serious impact on the protected interests of the state (security, lives and health, economy and public administration).
Therefore, in this context, the vulnerability of the energy sector, as well as the implementation of adaptation measures, cannot be underestimated.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

In energy sector, potential environmental and operational risks arise from the nature of individual operations, facilities and processes, where the manifestations and consequences of climate change may represent a potential threat to business continuity (and thus continuity of energy production or supply), major industrial accidents or threats to human safety and health. It is in the general interest of society as a whole to ensure that measures and mechanisms for adapting to climate change are taken into account in the preparation of initial plans, which are large, long-term investment projects. In existing operations, they are actually applied mainly in the framework of expanding production capacities, introducing major technological changes or in the renewal of larger technological units.
Adaptation processes and tools are generally designed to help manage risks and adapt planning based on the projections of future climate change events. The adaptation of the energy system is perceived as the process of adapting all components of the energy system to actual or expected climate change and its consequences.

Title of the sector

forestry

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

Due to climate change, the occurrence of extreme weather events, droughts, floods, extremely high and low temperatures is likely to increase. There will be the extinction of less resistant tree species.
Climax communities can fall back to pioneer trees and only more resilient populations of trees will survive.
Risks are mainly related to reduced moisture availability in lower vegetation stages, increasing frequency and intensity of storms and wind damage, increasing frequency of dry and warm periods. Dry and warm periods can cause physiological weakening of trees and increase their susceptibility to pest infestation or infection.
Changes in the population dynamics of several pests can have an impact on forest integrity, in particular bark beetle (Ips typographus) (increasing the number of generations per growing season), gypsy moth (lymantria dispar)(shortening the latency period and widening the range) and pine sawfly (diprion pini) on pine and various inchworms on oaks, as well as changes in the virulence of some pathogens.
The wood production, both in terms of quantity and quality is expected to be seriously impacted.
Climate change may cause production decline due to reduced water availability in lower altitudes, as well as an increase in moisture due to prolongation of the growing season or faster decomposition of organic matter and consequent higher availability of nutrients in mountainous locations.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

In the case of most of our pests, a positive reaction to climate change is expected in the form of an increase in breeding grounds, the creation of a larger number of generations, the expansion of host trees, etc. In particular, an increase in air temperature can affect the success of the tree pest populations. In the case of the bark beetle in particular, the development of the third generation of pests and the shift of the two-generation regime to mountain areas may occur in

large areas.
A separate risk is the potential emergence of new pests and diseases, which can significantly affect the condition and development of forests composed of trees ecologically suitable for given soil-climatic conditions. Increased risk of forest destruction, either in connection with changes in population dynamics or meteorological conditions, in conjunction with forest fires, can also lead to soil degradation (loss of humus, erosion, reduction of water retention) and degradation of river sediments as well as to a reduction in water quality (surface water and groundwater).
From the point of view of forestry, a critical decline in timber production in the lower and middle altitudes can be expected for spruce and beech trees and pines can maintain current productivity in the future. In general, it is possible to expect a shift in the production optimum of timber to higher altitudes, where, however, the forest area is limited. This may result in an overall decline in forest production in Slovakia. Decreased production, deteriorating health and increased damage to forests are also linked to adverse impacts on non-productive forest functions, in particular carbon sequestration, regulation of the water regime of stands and river basins, air quality or biodiversity.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Forestry sector is one of key affected sectors due to longevity of forest tree species and forest management systems, large forest coverage of the country (almost 45%), importance of all forest ecosystem services, especially non-productive services in rather diverse geomorphology and mountainous type of country .
Particularly adverse impacts of climate change are to be expected in forests that are exposed to long-term negative effects of non-climatic factors (air pollution, areas with altered soil environment or unfavorable tree composition). In these cases, even less climate stress can result in forest decay over large areas, and the impacts of climate change can be particularly adverse.
Several factors will contribute to ensuring forest adaptation: mainstreaming adaptation principles and conceptual measures from the national level to the level of forest management, promoting adaptation based on an ecosystem approach, improving cross-sectoral cooperation and raising awareness of climate change among stakeholders. The missing element of forest adaptation are alternative models of forest management (objectives, basic frameworks and principles) with regard to the need to increase the adaptability of forest stands and support their use in forest management.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

transport

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

There are several areas in the transport sector that are directly impacted by weather events. These include high and low temperatures, extreme weather events, like heavy rains, intense storms, snow calamities and icings, the frequency and intensity of which are increasing due to climate change.
Extreme weather events cause serious complications for almost all modes of transport. They manifest themselves immediately, intensively and with significant negative consequences: they lead to an increase in transport time for the transport of goods, an extension of travel time and an increase in the probability of accidents and damage to transport infrastructure.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

A higher probability of natural threats that potentially threaten the operation or integrity of transport infrastructure (including roads and buildings) is expected. These may be dangerous for transport: strong wind, heavy rain, snow and icing loads, flash and torrential floods, landslides, drought, fires and fog.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The transport significantly conditions economic growth, makes a significant contribution to the functioning of the Slovak economy and is extremely important for regional development. Vulnerability of transport is associated with extreme weather events, which lead to threats to the safety and traffic flow (increasing transport time of passengers and goods, increasing traffic density, increasing the incidence of accidents), damage to transport infrastructure and its functionality and performance (delays to work, delays of deliveries, loss of carriers, deterioration of goods), and the associated other secondary economic consequences. In Slovak conditions, the negative impacts of climate change are manifested mainly on the road transport infrastructure (less on rail transport), especially in connection with intense storms and the subsequent emergence of flood situations. Drainage and sewerage systems, culverts, bridges and road sections in the immediate vicinity of watercourses should be considered as risk elements of transport infrastructure. In urbanized areas significant problems are caused by insufficient capacity of sewerage systems and subsequent rapid flooding of roads. Adaptation measures in transport therefore focus on reduction of safety risks in transport due to weather extremes and on improvement of transport infrastructure in high-risk locations.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

water management

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

Long-term droughts in the summer and autumn months, associated with water scarcity, can be a significant manifestation of climate change affecting the water sector. These dry periods can be interrupted by several days of rain with a high total rainfall, or by heavy storm activity with intense rainfall, which leads to flash floods.

The impacts of climate change are: an increase in runoff in the winter half-year and snow loss of accumulated winter precipitation, an increase in potential evaporation and thus evaporation in the summer semester, a decrease in soil moisture and a decrease in hypodermic runoff during the summer semester, an increase in surface runoff which can cause increased soil erosion and faster clogging of reservoirs), increasing the frequency and size of floods (especially flash floods), increasing and prolonging droughts and reducing usable water resources.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

According to The 7th National Communication of the Slovak republic on climate change, in period of 2075 to 2100, the total precipitation in Slovakia will be about 10% lower than before, the usable water resources will decrease by 30-50%. A more uneven distribution of precipitation in the regions is likely to occur. The distribution of runoff will correspond to this. According to climate scenarios, a change in the long-term average annual runoff can be expected, while a more significant decline is expected in the lowlands. Changes in long-term monthly flows are expected, an increase in winter and spring runoff and a decrease in summer and autumn runoff is expected, especially in the growing season.
Long-term droughts in the summer and autumn associated with water shortages may be a manifestation of climate change in Slovakia. This phenomenon can occur due to a significant

decrease in snow in winter and earlier melting in spring, an earlier onset of the growing season and thus a more pronounced evaporation in the spring.
Drought can also occur due to lower precipitation and higher temperatures in summer. The result is a significant lack of soil moisture in the second half of summer and early autumn. It is also important to take into account the possibility of a permanent decrease in the abundance of groundwater resources and the need to compensate for the decrease in this abundance, especially in the lowlands of central and eastern Slovakia and in summer. Dry periods can be interrupted by several days of rain with a high precipitation, or storms. The number of days with a storm should not change compared to the present (15 to 30 days/summer), but the number of strong storms will probably be up to 50% more. Furthermore, tornadoes are expected during severe storms. More frequent occurrence of flash local floods in various parts of Slovakia can be expected.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Water management is not an industry in itself, but provides water for economic sectors and for society as a whole according to its needs. However, it has no alternative sources. That is why water has been considered strategic for several years. In addition, water management has another role to play in protecting society from the adverse effects of hydrological extremes (droughts and floods). Water management practically addresses the relationship between water requirements and water resources. Therefore, influencing the conditions for the functioning of water management, whether on the side of available water resources or on the side of requirements, means the transfer of influences to all other areas of life and socio-economic sectors.
For a long time, water sources have been considered to be a stationary renewable source, in which its mean value and dispersion has not changed over time. However, when considering climate change, this process turns out to be non-stationary. This means that we identify trends in both climate and hydrological time series - water resources decrease or increase depending on the development of climatic elements.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Longer periods of drought can cause significant water shortages. According to the development so far, it is probable that climate change may have a more significant negative impact on local, low water resources, especially in the southern regions of Slovakia, depending on a wide range of other conditioning factors (natural, anthropogenic).
Changes in precipitation and runoff conditions, increasing the number and intensity of extreme meteorological and hydrological events due to climate change can have a significant impact on the health and lives of the population, both due to floods and droughts. In addition to the direct threat to lives and health from a flood wave, there is a danger to the population due to the deterioration of quality in water resources, an epidemiological risk from food contamination, etc.
Climate change can also have a negative impact on the quality of water resources. Due to torrential rains and flood conditions, the status of surface water bodies may deteriorate significantly in the short term, as may the chemical status of groundwater resources used for drinking water supply.
Water scarcity can also affect the activities of economic sectors (meeting the needs of industrial enterprises, worsened conditions for the development of tourism, etc.).

Title of the sector

tourism

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

The climate defines the length and quality of the tourist season, determines the scope of tourist activities and has an important impact on operating prices (heating, cooling, snow production, irrigation, insurance prices, water and food supply, operation of natural swimming pools). Most activities in tourism are based on a certain stability of the weather and the whole infrastructure, marketing and local socio-economic activities are adapted to these conditions. The tourism sector is highly seasonally dependent, but climate change is causing tourists to look for other

destinations and travel at a different time of year.
Changes in the length and quality of the tourist season conditioned by climate conditions (winter and summer holidays) have significant consequences for competitiveness within similar destinations and significantly determine the profitability of tourist entities. At the same time, climate change and its consequences for the natural environment and socio-economic conditions can significantly affect the tourist potential of individual regions, tourism entrepreneurs and tourists themselves.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

It is assumed that the following impacts of climate change will affect the tourism sector the most:

- Changing the landscape image: Decreasing the aesthetic value of the environment due to climate change may mean less tourist interest for the tourist destination.
- Emergencies: They pose a risk to tourist facilities, increase insurance costs and have a negative impact on tourist safety.
- Erosion, changes in pH and soil moisture: In extreme cases, they can mean the gradual destruction of archaeological sites and natural resources.
- Invasive species and new diseases (diseases not commonly occurring in Slovakia): Warming causes the spread of invasive species of plants and animals that are atypical for our climate zone. It is also necessary to take into account the increased occurrence of new allergens (from pollen of invasive and not commonly occurring plants), infectious diseases, tick-borne diseases and the extension of the pollen season.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The climate significantly determines the scope of tourist activities, is a fundamental determinant of global seasonality in tourist requirements and has an important impact on operating prices, such as. heating - cooling, snow production, irrigation, water and food supply and insurance prices. Thus, changes in the length and quality of the climate-dependent tourist season (summer

vacations, winter ski vacations) have significant implications for competitiveness in similar destinations and significantly determine the profitability of tourist entities.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

other

If sector is 'Other', please explain

Soil Environment

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

In the context of the Thematic Strategy for Soil Protection of the European Union (2006), several soil threats have been identified, a significant part of which is also linked to the impacts of climate change: effects on soil biogeochemical cycles affecting soil fertility, changes in soil nutrient balance, substances into the soil, the availability of water in the soil and changes in the humidity regime due to extreme weather events. The reduction in soil organic matter arises as a result of these threats, including inproper agricultural practices.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The results of research show that due to climate change in the territory of Slovakia, after 2025, in the growing season, the average soil temperature is likely to increase by 1 ° C and the average values of soil moisture will decrease by about 10%. This is expected to result in the following changes in soil properties (increased accumulation of soil organic mass and enhanced microbial activity, aridization (drying) of the soil profile, increase in groundwater mineralization, especially in lowland areas of southwestern Slovakia, and a slight to moderate increase in salinization, such as also alkalization of soils in areas with depressed positions due to groundwater, slight acidification of soils, salinization of soils in more arid areas).

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Soil protection and sustainable land management in the new (current) climate conditions are an essential part of the rural landscape's adaptation to the adverse impacts of climate change.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The impacts of climate change on soil can lead to an overall reduction in soil fertility and agricultural production, decline to loss of biodiversity, increased erosion, destruction of soil structure (aggregate disruption and compaction), induction and intensification of desertification processes and disruption of the overall hydropedological cycle. The consequences will be difficult to identify in an environment of anthropogenically intensively used or anthropogenically altered and damaged soils. The expected changes of anthropogenic character will manifest themselves much earlier and to a greater extent, and will affect not only the nature of the soil properties, but also the overall morphology of the soil profiles.

Title of the sector

agriculture and food

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

Agriculture is highly exposed to the adverse impacts of climate change, as agricultural activities are directly dependent on climate conditions. Rising air temperature, changes in the annual course and intensity of precipitation and the frequency of extreme weather events have an impact on water resources, soil, pests and diseases, affect the quantity, quality and stability of food production and lead to changes in plant and animal production.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The expected consequences of climate change in agriculture can be summarized as follows: Expected positive impacts of climate change on agriculture: Increased plant photosynthesis and biomass increases due to increased concentrations of CO2 in the atmosphere (an increase in CO2 concentration is also related to a possible increase in the production of some crops, depending on water availability). Shift of production growing areas in favor of the more northern areas of Slovakia. The possibility of growing new more thermophilic types of crops. Extension of the main growing season is present.

Agriculture is also exposed to the following expected negative impacts of climate change: changes in the species composition, number and location of harmful organisms (diseases, pests, weeds), but especially causing significant economic damage.Changes in temperature security of plant production. Changes in phenological conditions and agroclimatic production potential. Changes in the distribution and amount of precipitation and humidity. Changes in conditions for winter crops (absence of snow cover). Changes in soil diversity and physical and chemical properties of soil. Increased wind erosion. Complete change or loss of crop production, mainly due to drought.
Consumption of technological and drinking water will be limiting for livestock breeding in the future. The air temperature and relative humidity have a significant effect on water intake. An

increased demand for irrigation in plant and animal production is expected.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Agriculture is one of the sectors most vulnerable to climate change due to its high dependence on climate and weather conditions. Climate change is a main challenge for agriculture, food security and rural livelihoods .
"Climate-friendly agriculture" is an inclusive approach to address the interlinked challenges of food security and climate change, aiming at sustainable productivity, resilient agricultural and food security systems through measures to adapt to climate change and enhance greenhouse gas emission (mitigation).
In agriculture, emphasis is placed on the development of sustainable agriculture with the priority of greening.
The application of agro-ecological approaches aimed at maintaining soil moisture and nutrients in the soil, preservation, resp. increasing the ecological stability of the landscape, maintaining permanent grasslands, applying integrated pest management and diversifying arable crops and growing systems. These measures increase the resilience of agricultural systems to the effects of climate change, while reducing erosion and eutrophization problems.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

civil protection and emergency management

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

The most common risks in the Slovak Republic related to climate change include: floods (recently flash floods), landslides, heavy snowfalls, windstorms, fires and impacts on hazardous substances (leaks, explosions, landfill findings). These impacts are indirect.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The likelihood of major hazards will persist in the future.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

More intense manifestations of climate change and weather extremes increase the risks of short-term emergencies associated with threats to the health and life of the population. In the field of civil protection, it is therefore necessary to continuously improve and streamline procedures and means for preventing, mitigating and dealing with the consequences of risks. Given the adaptation measures implemented so far, it is necessary to continue with similarly focused projects with an emphasis on increasing adaptation to climate change and the protection of life, health, property and the environment. In the area of risk management, other priority adaptation measures should be implemented in the following areas: Monitoring of threats and risks, Civil protection system, Crisis management system, Critical infrastructure protection.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The risk of potential future impacts of climate change on the occurrence of emergencies and the security is high. An active approach to dealing with emergencies requires an effective strategy, a comprehensive risk assessment, continuous monitoring and analysis of crisis factors, as well as the establishment of management bodies, forces and the necessary resources to minimize the consequences of such threats. In the field of civil protection and crisis planning, due attention is given in the Slovak Republic to ensuring and constantly streamlining the systems of early warning, as one of the basic elements of the civil protection information system. Measures in this area are based on the need to increase the civil protection system's preparedness for risks and disasters resulting from climate change. A strong element of Slovakia's adaptation measures also appears to be the systematic involvement of civil society organizations and volunteers in civil protection mechanisms.

Title of the sector

finance and insurance

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

low

Describe your assessment

Insurance, as a special non-manufacturing branch of monetary services, forms an integral part of the financial market, where a specific type of service is traded - insurance and reinsurance. The main goal of the insurance company is to take on the contractually defined risks of its clients. Despite many studies, it is still only possible to qualitatively describe and estimate the extent and consequences of future climate change to a limited extent. The opportunities that climate change affects the insurance industry today are diverse, complex and uncertain.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

low

Describe your assessment

Despite the current uncertainties in describing and estimating the extent of the consequences of future climate change in the insurance sector, international experience suggests three basic risk factors that insurance should actively address as soon as possible and to an appropriate extent:
a) Physical risks: arise from events related to extreme weather events such as floods or extreme storms and similarly include impacts such as property damage or damage that may arise indirectly from subsequent events (disruption of global supply chains or lack of resources).
(b) Transitional risks: the financial risks that could arise for insurance companies as a result of the transition to a low-carbon and climate resilient economy, related to the potential revaluation of high-carbon assets and the rate at which such revaluations may occur.
c) Liability risks: risks that could arise for insurance companies from parties that have suffered losses or damage caused by climate change, and then seek to recover losses from other entities that they believe could be liable.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

low

Describe your assessment

The vulnerability of the insurance sector to the negative impacts of climate change may be assessed as low compared to other sectors.
However, based on an analysis of risk factors, climate change may be a problem for insurers' business models, as it may reduce the interest of the insurance industry in providing insurance coverage for specific groups of activities, assets or customers. It can also be assumed that the public will invoke disclosure about the financial implications of climate change risks.

Risk of potential future impacts

Annex I: 1.3c-iv

low

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Insurance will never be able to cover all the risks involved and there will still be some limits, despite efforts to maximize the insurance capacity of the market. Nevertheless, it still remains an appropriate form of ensuring targeted coverage of potential risks related to climate change. It is also a fact that opportunities are being created for new business models. These include the space to create new risk-related products for clients who anticipate the impact of climate change on their business activities (notably oil and gas transport and processing, electricity generation, transmission and distribution). The required types of insurance are likely to include various innovative types of corporate liability insurance. It will be necessary to make more and more use of the results of scientific studies and forecasts to adequately capture and assess future risks.

Title of the sector

health

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

The results of several assessments, research projects and national health impact assessments have confirmed that human health will be exposed to significant changes in climate change in the coming decades, probably mainly in more frequent and intensive heat waves, storms, extreme rainfall, floods or drought. In addition to the direct threat to lives and health during these events, there is a danger to the population due to the deterioration of water resources, the epidemiological risk of food contamination, the emergence of new vectors for the transmission of infectious diseases and the extension of the pollen season.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

In Slovakia, there may be a change in the distribution of infectious diseases, an increase in water-related diseases, especially where sanitation and personal hygiene are at a low level (especially during floods or in segregated areas). There is a risk of an increase in respiratory diseases due to air pollution, especially in cities and inversion positions, or from an increased distribution of pollen. Health depends on the stability and resilience of ecosystems. However, the health consequences of climate change also depend on non-environmental factors, in particular the degree of socio-economic development.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Vulnerable groups are mainly the elderly, children, the chronically ill and socially isolated people. Older people suffer from a number of chronic diseases and poverty. They are more isolated, have mobile disabilities and do not have sufficient access to transport and medical facilities. Children are particularly vulnerable because of their immature physiological and cognitive abilities. The whole period of fetal and child development should be taken into account, when the mother may be exposed to extreme weather conditions, lack of varied nutrition, deteriorating water quality or infectious diseases. The employed are at particular risk at their place of employment. Heat exhaustion, stress and dehydration are the biggest health risks for workers in both open and indoor areas. The risk of health hazards increases with the level of physical exertion. Workers in agriculture and construction are the most vulnerable, but heat stress also affects people working indoors. Rescue workers (police, firefighters, medical staff) of the critical infrastructure could be in a particular danger in the course of their work (life threat during disasters, caused by the impacts of climate change).

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

urban

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

Manifestations of climate change in the urban environment include an increase in the number of tropical days and the occurrence of heat waves in summer, uneven temporal and spatial distribution of precipitation, more frequent occurrence of extreme total precipitation causing rain, snow and flash floods or mud flows, more frequent occurrence of droughts causing a decrease in the capacity of water resources and the occurrence of extreme weather situations (storms, windstorms, tornadoes).

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

Serious consequences are expected for the urban area (buildings, monuments, urban infrastructure, public spaces), the natural component of the urban environment (soil, greenery, green infrastructure), water resources (drinking water supply and water resources management, water reservoirs), land use in the urban environment, health and social affairs, transport, technical and energy infrastructure, trade, industry and tourism. The impacts in urban environment will vary depending on the geographical location, size and type of city.

At present, half of Slovakia's population lives in cities (approximately 54% of the total population). The impacts of climate change in Slovakia, as elsewhere, are the most noticeable in urban areas, which are characterized by high population density, a high proportion of built-up area and impermeable, paved surfaces and a high concentration of economic activity and infrastructure (so-called "soil sealing"). The urban population spends about 90% of its time indoors. A relatively high proportion of buildings built in Slovakia is designed in accordance with technical standards created mainly in the second half of the 20th century on the basis of the

past climate conditions, technical possibilities and quality of construction. At the same time, the buildings themselves make a significant contribution to energy consumption. These two facts bring the issue of buildings and its management to the forefront from the point of view of adaptation and mitigation. The quality of life of building users, especially in cities, will be further worsened by the effect of the heat island, the lack of greenery around buildings, the absence of vegetation roofs along with the thickening of buildings, as well as inappropriate height zoning.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The aim of adaptation is to reduce the vulnerability of the urban environment to the adverse impacts of climate change and to increase the ability of cities to adapt to new, often extreme conditions. The horizontal and vertical structure of the city greatly influences its microclimatic conditions. The built-up area, the share of paved and unpaved surfaces, the spatial distribution of green areas, shading and the morphological attributes of the terrain conditioning and the air flow play an important role in creating microclimatic conditions of the cities and a key role in adaptation. Water and green areas and elements will play an important role in fulfilling this goal, as they can affect the microclimatic conditions in cities.

In the future, it will be important to specify a list of adaptation measures, which would include measures that fall within the competence of local governments (which measures may be implemented by the municipality itself, for which it can issue regulations, strategic documents or financial subsidies and motivate other entities) and measures within the competences of specific implementers such as water companies, forest owners and managers, river basin managers, etc. The main tool through which it is possible to ensure sustainable, and also climate-ideal development of the city structure is the municipal zoning plan and city zoning plan.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

Title of the sector

business and industry

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

Businesses are often exposed (directly or indirectly) to the impacts of climate change, although, similarly to energy and industry, the impacts are secondary.
In industry and energy, potential environmental and operational risks arise from the nature of individual operations, facilities and processes, where the effects and consequences of climate change may pose a potential threat to business continuity, major industrial accidents or human safety and health. It is therefore in the interest of businesses to take steps to identify and forsee the risks posed by climate change.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

Business entities are increasingly aware of risk phenomena, especially extreme weather events. So far producers are focusing more on mitigation measures, than on adaptation measures. But they are gradually implementing also appropriate, timely and effective adaptation measures.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

In order for businesses and their corporate assets and operations to be resilient to the adverse impacts of climate change, it is gradually becoming necessary to develop and implement appropriate, timely and effective adaptation measures. It is in the general interest of society, as a whole, to ensure that measures and mechanisms for adapting to climate change. Measures are consistently taken into account when drawing up initial plans, which are large, long-term investment units. In the case of existing operations and businesses, they are actually applied mainly in the context of expanding production capacities, introducing major technological changes or in the renewal of larger technological units.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

In a broader sense for the business sector, different types of risks can be identified. Risks can be divided into interconnected groups which are risks in the value chain and risks from external stakeholders, and to them is assigned the risk of endangering people safety and health due to climate change.

Title of the sector

other

If sector is 'Other', please explain

Rock environment and geology

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

When combining the diverse geological structure of an area with a changing climate, the rock environment is activated and responds to these conditions with various manifestations according to its structure, hardness of rocks, their porosity, chemical properties, susceptibility to weathering or water storage capacity. The rock environment is most influenced by the intensity and sum of rainwater, the intensity of solar radiation, the air temperature, rapid temperature changes and human activity.
We see the risks associated with the erosion of the rock material of heaps and sludge ponds, with natural waters in the rock environment, with water and wind erosion and with landslides.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

Most heaps and sludge ponds are currently stabilized, at least at the level of their natural geological environment. In the new environment that climate change will bring in the long term (several decades), the rocks become unstable compared to the current state, which will be reflected especially in faster and more intensive erosion. Erosion will be aided by abruption and frequent weather changes, in which the chemical influence of precipitation is accompanied by a physical influence, rock disruption at alternating low and high temperatures. As a result of intensive erosion, heavy metals will be doped in the rock environment (when sulphidic heaps erode), acidification due to the formation of weak sulfuric acid in flat areas with longer periods of drought, and there will also be gradual salinization of soils. When the pH drops below 4, alkalis (Na, K, Li, Cs, ...), alkaline earth elements (Ca, Ba, Sr, ...) and also aluminum get into motion. Another impact will be an increase in the susceptibility to slope movements in the form of more frequently occurring rock falls of weakened rock blocks. The largest changes in the erosion process can be expected on the heaps and tailings ponds of sulphide ores.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Climate change in relation to the rock environment has impacts for the balance of natural waters (groundwater, surface water, precipitation). Under certain conditions, the accompanying phenomena are also the intensification of erosion (increased by the effects of CO2 content in

the air), landslides, sediment transfer and changes in the morphology of the area. The intensity of these manifestations is relatively much influenced by the vegetation present.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The same impacts are expected to persist in the future as those already identified today.

In connection with the implementation of adaptation measures aimed at removing the environmental burden or mining waste repository, resp. to eliminate their adverse effects on the environment and health, it will be necessary to preferentially use such remediation technologies and remediation procedures that will not have negative impacts on the environment and health, respectively their negative impact will be minimal or minimized compared to the negative impact of the environmental burden or the extractive waste repository. It is essential to give priority to the use of environmentally friendly technologies and to ensure the sustainability of remediation.

Legal and policy frameworks and institutional arrangements

Legal and policy frameworks and regulations

Annex I: 2.1

In Slovakia there are no legal arrangements on climate change adaptation or climate change. The elaboration of climate law is one of the emerging tasks of the MoE SR.
The policy framework is elaborated but as the climate change is a cross-cutting and cross sectoral issue, the policies that include and account climate change (adaptation) into account emerge across almost all sectors and levels of state ad hoc.
Some cities and towns have already elaborated its´ policy frameworks (mostly adaptation strategies, action plans on adaptation or other documents and catalogues dealing with adaptation to the adverse impacts of climate change).

National Adaptation Strategy (NAS) (1)

NAS title

Climate Change Adaptation Strategy of the Slovak Republic

NAS status

actual NAS - adopted

Year the NAS was adopted

2018

Period covered by the NAS

2018-2025

Link to the NAS

https://www.minzp.sk/files/odbor-politiky-zmeny-klimy/strategia-adaptacie-sr-zmenu-klimy-aktualizacia.pdf

National Adaptation Plan (NAP) (1)

NAP title

National Adaptation Plan for Implementation of the Adaptation Strategy of Slovakia

NAP status

being developed

Year the NAP was adopted

-

Period covered by the NAP

2021-2027

Link to the NAP

-

Overview of institutional arrangements and governance at the national level

Climate vulnerability and risk assessment

Annex I: 2.2a

Assessing of climate vulnerability and risks is addressed under Act 24/2006 on EIA/SEA. Climate vulnerability (impact) is addressed there since its amendment 142/2017.
The assessment of the expected effects of the proposed activity on the environment, including health, and an estimate of their significance (expected effects of direct, indirect, secondary, cumulative, synergistic, short-term, temporary, long-term and permanent, caused during construction and implementation) including the impacts on climate conditions and vulnerability of the proposed activity to climate change is mandatory.
Environmental Impact Assessment (EIA) and Strategic environmental assessment (SEA) are considered to be main tools of international environmental policy for the implementation of sustainable development.

Planning, implemention, monitoring, evaluation and revision of adaptation policy

Aspects to consider include decision making, planning and coordination related to adaptation strategies, policies, plans and goals, addressing cross-cutting issues, adjusting adaptation priorities and activities, implementing adaptation actions, including facilitating action to avert, minimise and address the adverse effect of climate change. Annex I: 2.2b

In general planning, implementation, monitoring, evaluation and revision of adaptation policy are the tasks of the government of the Slovak Republic and responsible ministries. The coordination depends on the ability to plan, implement and finance appropriate policies and their measures.

Ensuring the implementation of the National Adaptation Strategy (NAS), as well as monitoring progress in the implementation of adaptation measures and the revision of the NAS is, in accordance with Government Resolution 478/2018, the task of Deputy Prime Minister and Minister of the Environment in cooperation with other relevant ministries. The resolution recommends that regional authorities, such as self-governing regions, the Association of Towns and Municipalities of Slovakia and The Union of Towns and Cities of Slovakia, also participate in the fulfillment of NAS objectives.

The main responsibility for the implementation, monitoring and reporting on the Strategy of Adaptation of the Slovak Republic to Climate Change and its implementation tool - the National Action Plan - is therefore at the MoE SR, which has a coordinating function within interdepartmental and cross-sectional tasks. Inter-ministerial coordination at the highest level takes place through the Commission for the Coordination of Climate Change Policy at the level of State Secretaries. Operational coordination of implementation takes place through the Working Group for Adaptation, whose members are nominated representatives of individual ministries and other central state administration bodies, organizations, academia, NGOs, or other interested groups.

After the approval of the National Action Plan by the Government of the Slovak Republic, Working Group for Adaptation based at the MoE SR will provide coordination, monitoring and evaluation of the implementation of the NAP.

At the level of individual sectors, it is recommended that the responsible ministries incorporate the individual tasks of the action plan in which they will participate in the planning documents, including funding, at the level of ministries and their organizations, in the case of public administration bodies in their planning procedures. In the case of project tasks, it is recommended to prepare project stacks, which will develop individual tasks into projects and applications for a non-repayable financial contribution.

Based on the monitoring of indicators of individual areas and tasks, the working group will continuously evaluate the risks of NAP implementation and will propose procedures to eliminate these risks.

More detailed procedures for planning, monitoring and evaluation of adaptation policy will be the subject of a separate law on climate change, the elaboration of which is in the interest of the MoE SR.

Integration of climate change impacts and resilience into environmental assessment procedures

Annex I: 2.2c

Integrating climate change impacts and resilience into environmental assessment procedures; is an ongoing task and climate change impacts and residence should be translated into legal arrangements more. The Act 24/2006 on EIA/SEA and its amendment 142/2017 addressed the mandatory integration.

Collection, ownership and re-use of relevant data and access to it

Relevant data: such as climate-related disaster loss data or risk data. Annex I: 2.2d

The institutional arrangements and governance on the national level /collection, ownership and re-use of relevant data and access to it is held according to the laws, government resolutions and adopted action plans. The collection, ownership and sharing is based on the relevant reporting and its rules. The reports are public, or made available on a specific demand.
The list of laws that, among other things, take Climate Change Adaptation into account is in NAS 2018 – page 128-133 and list of other relevant documents is part of chapter 3.3 and relevant attach document there.

Integration of climate change impacts and adaptation planning into disaster risk management frameworks and vice versa

Including Article 6(1) of Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (OJ L 347 I, 20.12.2013, p. 924). Annex I: 2.2e

Integrating climate change impacts and adaptation planning into disaster risk management frameworks and vice versa in the Slovak republic is one of the emerging tasks. The communication on climate change impacts and disaster risk management is the communication between the MoE SR and the Ministry of Interior. The Ministry of Interior works on disaster risk management tasks both on national (adoption of strategy, action plan and Disaster Risk Assessment) and international level – reporting under Commission notice: Reporting Guidelines on Disaster Risk Management, Art. 6(1)d of Decision No 1313/2013/EU.

Overview of institutional arrangements and governance at the sub-national level (where “sub-national” refers to local and regional)

Legal requirements and strategic documents

Annex I: 2.3a

The structure of state administration bodies for environment, including the regional and local level, is defined by Act 525/2003 on the state administration of environment and on the amendment of certain laws as amended. Performance of activities of self-governing bodies Act 369/1990 on general establishment as amended. Part of these regulations, resp. related

regulations include the setting of tasks for selected areas related to adaptation to climate change.
Legal requirements especially on adaptation action on national or sub-national level does not exist. The Envirostrategy 2030 covers these efforts (among other efforts) to the maximum of its competence.

Networks or other collaborations on adaptation across national authorities

Annex I: 2.3b

Covenant of Mayors for Climate and Energy (Convention) and the National Platform

The National Platform of the Convention was established in 2011 thanks to the NET-COM project (NETworking of Covenant of Mayors, Energy Cities), which created a permanent cooperation between individual European networks. CITENERGO is the initiator, founder and permanent coordinator of the National Platform. The Union of Cities of the Slovak Republic (UMS) is a national supporter of the Convention.

The Convention in Slovakia currently has 40 signatories of towns and municipalities.

Representatives of Association of Towns and Cities of Slovakia (ZMOS) and UMS are members of the Working Group for Adaptation.

Good practice examples of networks or other collaborations on adaptation across local and regional authorities

Annex I: 2.3c

To the cities and towns that act on climate adaptation belong, for example: Košice, Trenčín, Brezno, Gbely, Holíč, Hurbanovo, Ilava, Kremnica, Leopoldov, Liptovský Mikuláš, Martin, Modra, Moldava nad Bodvou, Nová Dubnica, Nové Zámky, Prešov, Senica, Trenčín, Zlaté Moravce, Želiezovce and Žilina.

Several cities and towns developed their adaptation strategies: Spišská Nová Ves (2012), Bratislava (strategy 2014, SAP 2017), the Bratislava region prepared a Catalogue of adaptation measures of the regional towns and municipalities. Košice - West (2014), Košice region (2020), Trnava (2015), Zvolen (2015), Kežmarok (2015), Trenčín (2019) adopted strategies and Čierny Balog did pilot study in 2016 and regional strategy of Horná Ondava was done.

Adaptation strategies, policies, plans and goals

Adaptation priorities

Annex I: 3.1

Adaptation priorities listed in the NAS 2018:

- to fulfil the requirements of the Paris Agreement,
- to improve the readiness of the Slovak Republic to adequately address the adverse impacts of climate change,
- to provide information on the ongoing and future adaptation processes,
- to establish institutional framework and coordination mechanism responsible for the implementation of adaptation measures at all levels and priority sectors,
- and to raise awareness on climate change adaptation.

Challenges, gaps and barriers to adaptation

Including those institutional, governance-related and other barriers that restrict the adaptive capacity as identified in the vulnerability assessment. Annex I: 3.2

In 2019 the Government adopted a new Envirostrategy – "Greener Slovakia" addressing main environmental challenges of the country. The document is available in English. Climate Change Adaptation is one of the main challenges to be addressed. The lack of systematic approach towards processes and tools to mainstreaming climate change adaptation on national and sub-national level can be seen as a gap or barrier. However as this is a high interest agenda.
The challenges, gaps and barriers to adaptation are also included and create an implementing framework in national adaptation strategy and local/regional adaptation strategies. The gaps and barriers are addressed accordingly.

In the field of adaptation, some conflicts of interest within ministries and organizations occur. Climate change adaptation is a cross-cutting and cross-sectoral theme. Policies and legislative measures are thus sometimes not sufficiently implemented in practice in line with all sectoral policies, or sanction mechanisms are not adequately applied across all sectors mutually. Better compliance with legislation, as well as better enforcement of existing legislative options is one of our challenges and it is already addressed in the latest strategies and plans. Many measures in the field of land management, water management or agriculture have a significant and positive impact on adaptation, so there is a potential for improvement. In the area of financing, it is problematic to draw available resources from programs co-financed from the European Structural and Investment Funds and the state budget of the Slovak Republic, there is a lack of wider involvement of local governments and further financing of examples of good practice sharing after projects. There is no wider support for adaptation to climate change as an investment-intensive priority, but with long-term benefits. Another challenge is the fact that the NAP has not yet been adopted – adoption is scheduled for august 2021.

Summaries of national strategies, policies, plans and efforts, with a focus on goals and objectives, foreseen actions, budget and timeline

Including nature-based solutions and actions leading to mitigation co-benefits and other relevant co-benefits. The summaries shall cover also efforts to build resilience and avert, minimise and address the adverse consequences of climate change, and include an explanation how gender perspectives have been taken into account. Annex I: 3.3

Greener Slovakia - STRATEGY OF THE ENVIRONMENTAL POLICY OF THE SLOVAK REPUBLIC UNTIL 2030

Thanks to the Greener Slovakia – Strategy of the Environmental Policy of the Slovak Republic until 2030 (the Envirostrategy 2030), Slovakia determined a way of how to face the biggest environmental challenges and address the most serious environmental problems. The Institute for Environmental Policy was responsible for the preparation. However, it is also result of work performed by experts not only from the MoE SR, but also from other ministries, academia, business, local administration and higher territorial units and non-governmental organisations. Priorities of the state environmental policy were determined based on the analysis "Three Environmental Challenges in Slovakia" that compares Slovakia with the EU and OECD countries in terms of basic result indicators. Main environmental problems and challenges were elaborated, assessed and analysed based on current evaluation reports of Slovak Environment Agency, European Commission, European Environment Agency and OECD. The aim was to prepare a brief and readable document that could also be understood by the general public. That is also why the Envirostrategy 2030 only has 44 pages of text, which is relatively rare for this type of document.
The Envirostrategy 2030 was approved by the Slovak Government on 27 February 2019.

The vision of Envirostrategy 2030 is to achieve better environmental quality and sustainable circulation of the economy, which is based on rigorous protection of environmental compartments and using as little non-renewable natural resources and hazardous substances as possible, which will lead to an improvement in health of the population. Environmental protection and sustainable consumption will be part of the general awareness of citizens and policy makers. Through the prevention and adaptation to climate change in Slovakia, the consequences will be as subdued as possible.

Building green infrastructure, implementation of sustainable solutions in transportation, development and implementation of adaptation, strategies at the level of local authorities, prevention and mitigation of the climate change impacts by protecting ecosystems and their services are the objectives of Chapter 6 (Climate change preventions and reduction of its impacts) of the Envirostrategy 2030.

As far as budget is concerned the Envirostrategy mentions following: sufficient state, public and

private funding sources will be secured to ensure that all objectives and measures of the Envirostrategy 2030 will be fulfilled. If there are any increased costs, the State will provide sufficient resources for central government authorities and their professional organizations, as well as municipalities and the business sector. It will be administrated according to the priority areas and measures set in the Envirostrategy 2030. The measures will be prioritised on the basis of professional criteria, taking into account the principles of value for money.

The operating period of the Envirostrategy 2030 is not stated but it will be updated by the end of 2025.

The National Adaptation Strategy – 2018

The revised NAS was developed by MoE SR and adopted in October 2018 by Government Resolution 478/2018. The main goal of the revised NAS is to fulfil the requirements of the Paris Agreement: to improve the readiness of the Slovak Republic to adequately address the adverse impacts of climate change, to provide information on the ongoing and future adaptation processes, to establish institutional framework and coordination mechanism responsible for the implementation of adaptation measures at all levels and priority sectors, and to raise awareness on climate change adaptation. The strategy presents six framework measures, which contribute to the fulfillment of the main goal. Conscious national adaptation policy-making, effective implementation of the proposed adaptation measures, their monitoring and evaluation, promoting multi-level governance and cooperation with horizontal (state) and vertical (regions, towns) levels, promoting awareness raising, strengthening the synergies between adaptation and mitigation measures and promoting nature based solutions are of key importance. Furthermore, the revised NAS supports the implementation of cross-cutting goals of United Nations 2030 Agenda for Sustainable Development, Paris Agreement, Sendai Framework for Disaster Risk Reduction 2015 – 2030 and Convention on Biological Diversity. The revised NAS proposes adaptation measures for sectors (geology, soil, energy and industry, business sector, tourism), that should be implemented by 2025. The measures should be financed from existing budgets.

The overview of (sectoral) national strategies, beside mentioned here and in Records below, is in Tab.1 in attached file, under chapter 3.3.
These documents are in line with/take into account measures and objectives of the NAS.

National Adaptation Plan (SAP) (5)

Title of the measure or action

Recovery Plan

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Creation of new policies; laws or strategies

Short description of the measure or action

The national Recovery Plan is currently in the final stages of preparation in the Slovak Republic. It is a joint response of the countries of the European Union to the severe economic downturn due to the pandemic of the new coronavirus. Its preparation is conditioned by the Commission's requirements, including the allocation of 37 percent of the allocation to the green economy and 20 percent for the digital transformation. The recovery plan is divided into 18 parts - components that include reforms and investments totaling around 6 billion €, of which 150 million € is to go to climate change adaptation measures. Slovakia plans to submit the Recovery Plan to the European Commission by 30 April 2021.

Climate threat

-

Sectors affected

-

Status

studies ongoing

Administrative level the measure is implemented

-

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Climate Change Adaptation Strategy of the Slovak Republic

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Revision of policies; laws and strategies

Short description of the measure or action

The revised NAS was adopted in October 2018 by Government Resolution 478/2018. (more information in 3.3)

Climate threat

-

Sectors affected

-

Status

-

Administrative level the measure is implemented

-

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

https://www.minzp.sk/files/odbor-politiky-zmeny-klimy/strategia-adaptacie-sr-zmenu-klimy-aktualizacia.pdf

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Title of the measure or action

National Adaptation Plan for Implementation of the Adaptation Strategy of Slovakia

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A2: Management and Planning

Specification

Mainstreaming (institutional; organisational; administrative) into existing programs and plans (e.g. agricultural programs and plans; water plans and programs; NAP)

Short description of the measure or action

National Adaptation Plan for Implemantation of the Adaptation Strategy of Slovakia (NAP) is being prepared to support the implementation of measures of the revised NAS of the Slovak Republic. It is currently under SEA procedure.

Climate threat

-

Sectors affected

-

Status

studies ongoing

Administrative level the measure is implemented

-

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Greener Slovakia

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Creation of new policies; laws or strategies

Short description of the measure or action

Greener Slovakia - STRATEGY OF THE ENVIRONMENTAL POLICY OF THE SLOVAK REPUBLIC UNTIL 2030
(more info in 3.3)

Climate threat

-

Sectors affected

-

Status

-

Administrative level the measure is implemented

-

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

https://minzp.sk/files/iep/publikacia_zelensie-slovensko-aj_web.pdf

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Title of the measure or action

Vision and Development Strategy of Slovakia 2030

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Creation of new policies; laws or strategies

Short description of the measure or action

Slovakia has recently adopted the Vision and Development Strategy of Slovakia 2030 (January 2021) developed by Ministry of Investments, Regional Development and Informatization of the Slovak Republic, which aims to specify the priorities of the 2030 Agenda and the European Green Deal under the specific conditions of Slovakia, as well as an integrated development strategy.
(more info in 5.2)

Climate threat

-

Sectors affected

-

Status

-

Administrative level the measure is implemented

-

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

https://www.mirri.gov.sk/wp-content/uploads/2021/01/Slovensko-2030.pdf

Additional document on the actions and (programmes of) measures reported

3.3_1.2b_2.2d_3.5_4.1a_4.4.a_4.4b_4.5.pdf

Overview of the content of sub-national strategies, policies, plans and efforts

Annex I: 3.4

In June 2014, the Adaptation Strategy on the Adverse Impacts of Climate Change in the Region of the Slovak Capital City of Bratislava (Bratislava Strategy) was published, discussing suitable adaptation measures. In 2017, the Bratislava Strategy was followed by the approval of The Adaptation Action Plan entitled “Action Plan for Adaptation to the Adverse Effects of Climate Change on Territory the Capital City of the Slovak Republic Bratislava, 2017-2020” together with Environmental Action Plan in 2017. The Action Plan is in line with the objectives of the Bratislava Strategy and includes a set of specific measures, including identifying individual responsibilities and deadlines for monitoring compliance, as well as the possible sources of their funding. In the material, measurable indicators were proposed for each measure that allows the collection and evaluation of the information needed to fulfil the second commitment of the Mayors Adapt Initiative. Given the needs of city development the plan has determined sectors within which the adaptation measures will have to be implemented such as environmental health, green and blue infrastructure, urbanized environment, rainwater and water resources, transport and energy.

The Bratislava Strategy is supposed to define the framework for intended measures. It emphasises the sustainable development of cities, stipulated by Act 17/1992, which would safeguard the ability of present and future generations in meeting their basic life necessities, while maintaining nature's diversity as well as the natural functions of ecosystems. The Bratislava Strategy's aim was to lower the impact of climate change on city's life, to prepare for extremes, and draw-up strategies for dealing with and reducing them. In the interest of sustainable development, the emphasis is placed on alternative energy sources, supporting public transport and biodiversity.
Atlas of Vulnerability and Risk Assessment of the adverse impacts of climate change on the territory of the capital of the Slovak Republic, Bratislava (Atlas hodnotenia zraniteľnosti a rizík nepriaznivých dôsledkov zmeny klímy na území hlavného mesta SR Bratislavy) was published in 2020.

Bratislava Experiences in Green Areas Development

During the last years, the city of Bratislava has been concentrated on climate change problems very much. Therefore, several policy documents have been implemented. "The Program of economic and social development of the city from 2010 to 2020" was approved by the municipal corporation in 2008, incorporating the issues of climate change into Bratislava Strategy.

Overview of efforts to integrate climate change adaptation into sectoral policies, plans and programs, including disaster risk management strategies and action

Annex I: 3.5

The effort to integrate climate change adaptation is translated into creation sectoral policies, plans and programs, including disaster management strategies and action plans.

An overview of sectoral strategies is provided in the previous chapter 3.3 "Summaries of national strategies, policies, plans and efforts, with a focus on goals and objectives, foreseen actions, budget and timeline" and in Tab.1 in the attached document under 3.3.

Overview of measures in adaptation policy at the national level and good practice examples from the sub-national levels to engage with stakeholders particularly vulnerable to climate change impacts

Annex I: 3.6a

NAS supports activities aimed at strengthening the awareness of stakeholders and the public about the expected negative impacts of climate change and the possibilities of adaptation

measures in the conditions of Slovakia. There are currently several sources of information. The results of scientific tasks, projects, publications and reports are published on the Internet portals of institutions. Examples are the National Reports of the Slovak Republic on Climate Change available at https://www.enviroportal.sk/spravy/index, http://ghg-inventory.shmu.sk and at www.unfccc.int or flood risk maps, or information published on https : //www.siea.sk/, where citizens, but also various other actors can turn directly to the Slovak Innovation and Energy Agency.
An effective tool for improving information and education at the national level is the use of LIFE program resources, resp. other EU community programs, EU structural funds, the financial mechanism of the European Economic Area and the Norwegian Financial Mechanism, the Rural Development Program of the Slovak Republic and the Operational Program Quality of Environment for the implementation of projects and transfer of knowledge from science and research into practice.

Good practice examples at regional level:
City's actions have been intensified by implemented activities and projects. Some of the projects were funded by international grants, including EU funded projects. In 2014 Bratislava took part in project "Bratislava is preparing to the climate change" (duration of the project: 2014–2017), which was supported by the European Economic Area (EEA) and Norwegian Financial Mechanism. Since 2015, the project has been ensuring the implementation of a number of adaptation measures (i.e., increasing of the amount and accessibility of the city greenspaces, new planting trees, green roofs constructions, sustainable rainwater management) and also developed an Action Plan for Adaptation. The project's objective was to prepare the city for the consequences of climate change, with a focus on the implementation of pilot solutions to relieve heat stress and problems with rainwater discharge.

Recently Project H2020 RESIN No. 653522 "Climate Resilient Cities and Infrastructures" (2015–2018) has been finished. Bratislava was one of the core cities in the project, among Paris, Manchester, and Bilbao. Climate Resilient Cities and Infrastructures (RESIN) project helped Bratislava City to understand the impacts, vulnerabilities and risks in better way, to select the most appropriate interventions, to prepare the catalogue of adaptation options, to choose the best implementation strategy and to implement adaptation measures and appropriate monitoring system.

The Green School project was dedicated for the educational eco-program designed for kindergartens, elementary schools and high schools. The main goal of the project was to encourage children to solve the real needs of their schools and the outer environment with a help of their teachers and parents. The program distinguished seven main steps: green school consortium, environmental action plan, pro-environmental education, eco-codex, environmental audit of their school, monitoring and evaluation, information and the community involvement.

Several other programs have been implemented to involve inhabitants in urban greenery development. One of these programs, “Adopcia zelene” (Adoption of greenery), allowed to take care of green area selected by residents. Furthermore, the municipal authority opened a small grant scheme program to the city’s inhabitants, with intention to support rainwater retention solutions. The municipal authority co-financed 50 % of the investment that cost up to 1000 EUR. Inhabitants were provided with relevant consultancy services. Both initiatives were a step towards improving the relationship between the city and its citizens. The city communicates with inhabitants through an integrated website. At the same time, the implementation of a whole range of “non-investment” activities were performed, such as public counselling for sustainable management of rainwater, a subsidy scheme for the purchase of rainwater management installations, and sustainable drainage systems as a follow up activity.

Overview of measures in adaptation policy at the national level and good practice examples from the sub-national levels to engage with the private sector

Member States shall provide an overview of available information on private sector plans, priorities, actions and programmes, public/private partnerships, and other relevant private adaptation initiatives and/or projects. Annex I: 3.6b

In accordance with the NAS, entrepreneurs in their field of business, but especially in agriculture, food industry, forestry and water management, industrial production, are obliged with regard to climate change and sustainable use of natural resources to adjust their activities in the way of good economic practice in accordance with applicable legislation and best practices (in the protection of water resources, in land management, cultivation of suitable crops, storage of pollutants, discharge of wastewater, used efficient technologies in production processes, etc.).

In the case of the private business sector, the selection and prioritization of adaptation measures is its direct responsibility. State and public authorities should provide it on an ongoing basis with all available, up-to-date and objective information in the field. Given the intensity, frequency, extent and negative impacts of extreme weather events in recent years, adaptation to climate change is becoming a direct part of analysis and decision-making also for the banking sector, especially in relation to lending to entrepreneurs.

NAS also supports the creation of formalized public-private partnerships for the preparation and implementation of the adaptation strategy or action plan, which /under the leadership of the local government/ are the bearers of the adaptation strategy or action plan and are co-responsible for its implementation.

Monitoring, reporting and evaluation of adaptation actions and processes

Monitoring, reporting and evaluation (MRE) methodology related to reducing climate impacts, vulnerabilities, risks, and increasing adaptive capacity

Member States shall report on approaches, systems used, transparency and indicators. Annex I: 4.1a

The special national methodology related to reducing climate impacts, vulnerabilities, risks, and increasing adaptive capacity is not elaborated yet.

However, the sectoral methodology on reducing climate impacts, vulnerabilities and risks, on large infrastructure plans and projects was adopted by the Ministry of Transport (Assessment of climate change - Creation of methodology on incorporation of assessment impacts on climate change infrastructure plans/projects under existing processes on national level (2018); in Slovak: "Posúdenie klimatických zmien - tvorba metodiky a zakomponovanie posudzovaní dopadov na zmeny klímy infraštruktúrnych plánov/projektov do existujúcich procesov na národnej úrovni (2018)").

An overview of existing monitoring systems in the Slovak Republic relevant to obtaining information on reductions of the impacts of climate change, vulnerability, risks and increasing adaptive capacity are in Tab. 2. It is attached to chapter 3.3 together with overview of strategies, policies, plans and efforts.
Overview of the main existing information systems or other information sources (Tab.3) in the Slovak Republic relevant to obtaining information on climate change mitigation, vulnerability, risks and increasing the adaptive capacity is in Tab. 3. It is attached to chapter 3.3 together with overview of strategies, policies, plans and efforts (Tab.1).

MRE methodology related to the implementation of adaptation actions

Member States shall report on approaches, systems used, transparency and indicators. Annex I: 4.1b

MRE methodology related specifically to the implementation of adaptation actions at national level is not elaborated. The adaptation action is planned to be reported under this regulation on the EU level, and on national level (Government resolution 478/2018). On national level there is a task to submit the Information on the progress achieved in the implementation of adaptation measures in the Slovak Republic to the Government until 28 February 2023.

Adaptation measures are mainly implemented and executed by the projects financed by different financial sources, funds or operational programs. The regular outcomes and final reports related to these financing schemes are used as a main source of information and data on adaptation measures implementation.

State of play of the implementation of measures planned under 'Strategies and Plans', including an overview of the subnational level and the disbursement of funding to increase climate resilience

Annex I: 4.2

The measures are stated in the revised National Adaptation Strategy – 2018. The tasks are written out in the currently preparing National Adaptation Plan (NAP).
Significant finance on adaptation were disbursed by now mainly through the following financial mechanisms: Operational Program Quality of Environment (OP KŽP), Environmental Fund, LIFE Climate Action Sub-program and others (INTERREG, HORIZONT2020, Norwegian Financial Mechanism). Within the Ministry of Agriculture and Rural Development of the Slovak Republic, the Integrated Regional Operational Program (IROP) and the Rural Development Program are used mainly.
At present, there is no comprehensive database of financial resources, adaptation projects and activities. One of the objectives of the strategy is to follow adaptation in the Slovak Republic more comprehensively. It should include mapping financial resources used, efficiency evaluations and, ideally, monitoring the link between costs and benefits. However, this is a goal that can only be achieved in the medium or in the long-term and in the appropriate conditions.

Operational Program Quality of Environment 2014 – 2020
In the 2014-2020 programming period, activities aimed at adaptation to climate change, as well as disaster risk management, are supported from the Operational Program Quality of Environment (https://www.op-kzp.sk/en/) through two priority axes.

Under Priority Axis 2 (PA 2) Adaptation to the Adverse Impacts of Climate Change with a Focus on Flood Protection with an allocation of 293,098,900 € (EU source), flood prevention measures related to watercourses, as well as outside watercourses, are supported, streams, water retention measures in urban areas, but also the updating of flood risk management plans (including the updating of flood hazard maps and flood risk maps), the development of methodologies and information activities in this area are supported as well.

Since the beginning of the programming period, a total of 10 calls have been announced in the amount of 238,674,418.7 € (EU source). As at 31 December 2020, the rate of contracting funds for PA 2 amounts to 108,553,462.39 € (EU source) and the drawdown is at the level of 27,976,965.30 € (EU source).

Under Priority Axis 3 (PA 3) Support for Risk Management, Emergency Management and Resilience to Emergencies Effected by Climate Change with an allocation of 243,896,216 € (EU source) is supported under specific objectives for example this: modelling the development of emergencies, monitoring and evaluating the risks associated with climate change and its consequences, building systems for risk assessment and early warning and preparedness for

climate change emergencies, prevention, research and remediation of climate change-related emergency landslides, hydrology and hydrology research, optimizing its systems, services and strengthening intervention capacities for emergency management at local and regional level and building technical and institutional support for specialized rescue modules.

Since the beginning of the programming period, a total of 6 calls have been launched for 281,371,181 € (EU source). As at 31 December 2020, the rate of contracting funds for PA 3 amounts to 181,185 823.53 € (EU source) and the drawdown is at the level of 61,951 005.93 € (EU source).

State of play of the implementation of measures planned under 'Strategies and Plans': spending earmarked for climate adaptation including in disaster risk management

Annex I: 4.2a

Environmental Fund (EF)
In the years 2018-2020, 64 projects (14-25-25) were supported from the resources of the EF – 95 % subsidies from resources of the EF and 5 % from own resources, within the A3 activity (Support of Projects Aimed at Improving Air Quality Through Adaptation Measures, Especially in the Areas of Air Quality Management) in the total amount of funds actually paid out 5,987,536.31 € (1,078,007.66 - 2,329,073.36 - 2,580,455.29).

LIFE Programme 2014-2020
For LIFE Climate Action sub-program, for adaptation activities 190.39 million € was allocated for 2014-2017.

For LIFE – Climate Adaptation sub-program, a budget of 123.85 mil. € (focus on reducing greenhouse gas emissions) for adaptation measures and 47.55 mil. € (increasing resilience to climate change) for climate governance and information was allocated.

Financial contribution for Slovak LIFE projects/international projects with Slovak partnering organizations for period 2014-2020 (in total of 15 LIFE projects from both sub-programmes – up to 31 Dec. 2020):
-The EC contribution: 27,966,823 €
-State budget: 13,716,161.31 €

For EEA and Norwegian Financial Mechanism (NFM), this is available:
Programme SK-Climate – EEA and NFM 2014 - 2021
Programme allocation 21,430,588 € including contribution from:
EEA Grants 5,000,000 €

Norway Grants 13,216,000 €
State budget 3,214,588 €

To the extent possible, state of play of the implementation of measures planned under 'Strategies and Plans': the share of spending used to support climate adaptation in each sector

Share of spending used to support climate adaptation as the additional investment that makes a project (that would have been realised anyway) climate resilient. Annex I: 4.2b

Within the Ministry of Agriculture and Rural Development of the Slovak Republic, the following financial mechanisms are used to finance adaptation measures:

Intergated regional operational programme (IROP)
Under the Intergrated Regional Operational Programme (IROP) specific objective 4.3.1 Improving Environmental Aspects in Cities and Urban Areas by Building Elements of Green Infrastructure and Adapting the Urban Environment to Climate Change, as well as introducing systemic elements to reduce air and noise pollution, a call was launched:
- Improving environmental aspects in cities and urban areas -building elements of green infrastructure and adapting the urban environment to climate change as well as introducing systemic elements to reduce air and noise pollution
- Date of declaration: 31 March 2017, date of closing: 09 April 2020
- Allocation on call: 40,779,584 €
- Contracted: 122 projects in the total amount of 43,117,685 € Total Eligible Cost (36,650,033 € ERDF source, 4,311,769 € state budget source)
- Drawdown by 5 February 2021: 12,517,948 € (European Regional Development Fund source).

Rural Development Program (RDP) of the Slovak Republic 2014 - 2020:
Sub-measure 8.3 Support for the Prevention of Forest Damage Caused by Forest Fires and Natural Disasters and Catastrophic Events:
• Contributes to Focus Area 4B and 4C
• Allocation of 61,000,000 € (44,109,790 € EU source + 16,890,210 € state budget source)
• Number of supported projects: 64
• Drawdown as of 31 January 2021: 53 716 761 € (38 819 110 € EU source + 14 897 651 € state budget source)

Sub-measure 8.4. - Aid for the Restoration of Forests Damaged by Forest Fires and Natural Disasters and Catastrophic Events:
• Contributes to Focus Area 4A, 4B and 4C
• Allocation 32,500,000 € (23,826,330 € EU source + 8,673,680 € state budget source)
• Number of supported projects: 67
• Drawdown as of 31 January 2021: 28 619 544 (21,464,657 € EU source + 7,154,887 € state

budget source)

Progress towards reducing climate impacts, vulnerabilities and risks

Based on the MRE methodology reported above. Annex I: 4.3a

Observations over the last 19 years show a more frequent and significant changes of droughts and floods, which is also reflected in an increase in precipitation intensities, followed by more frequent flash floods, slope floods or landslides.

After 2000, years with a significant volume of precipitation were recorded (2006, 2010, 2013). Significant floods occurred during them.

Between 2005 and 2019, more than 83 000 people were affected by the floods and 6 people died. Between 2005 and 2019, the total expenditure and damage associated with the floods amounted to 838.98 million €, with the lowest damage in 2007 and the worst floods recorded in 2010. Since 2016, total expenditure and damage have declined, which may be related to with the implementation of flood prevention measures.

The first Flood Risk Management Plans for Sub-basins of the Slovak Republic were adopted in 2015 and are valid for the period 2016 - 2021.

In 2018, the update of the preliminary flood risk assessment identified:

- 144 geographical areas with a potential significant flood risk,
- 34 geographical areas with a potential significant flood risk and where it can be considered that such a risk is likely to occur,
- 17 geographical areas where a potential significant flood risk is likely to occur.

After 2000, there were also significantly dry years (2003, 2007, 2012, 2018, 2019). The overall assessment of surface waters in the Slovak Republic based on hydrological data from 42 representative and unaffected surface water hydrological monitoring and carried out by comparing the period 1961 - 2019 to the representatives period 1961 - 2000, showed the decrease of surface water amount.

The year 2019 as a whole was very, almost extremely warm. It was approximately 2.0 to 2.7 ° C warmer than the long-term average of 1951-1980. There was only one month in the whole year, which was below normal in most areas. It was May, but it was also significantly below normal only in the west of the country. June 2019 was the warmest June in the history of measurements.

Although the year 2019 was normal in most of Slovakia in terms of rainfall, during the year there was a significant and in some areas extreme drought. In April, severe drought affected more

than half of the area and extreme drought was almost at 10 % of the area. The situation improved in May and it rained all over the territory. June was again very warm and in some places dry. The lack of precipitation was mainly in the north of central and eastern Slovakia.

The lack of precipitation is reflected in the state of groundwater, especially in the significant reduction of groundwater levels. The average annual levels in 2019 compared to the long-term averages recorded mainly decreases in the whole territory of Slovakia, with the exception of the Morava, Danube and middle and upper Vah river basins, where decreases and increases were recorded.

Progress towards increasing adaptive capacity

Based on the MRE methodology reported above. Annex I: 4.3b

The issue of climate change adaptation is part of several strategic documents adopted in the Slovak Republic. NAP is being prepared as an implementation tool of NAS, but adaptation measures are also becoming part of implementation documents of other ministries and organizations. In order to adapt to climate change, projects that increase adaptive capacity are supported through various financial mechanisms.
At present, in the Slovak Republic, an information system that would comprehensively evaluate how the measures and implemented projects contribute to increasing the adaptive capacity is missing. Progress in this area should be made through the implementation of the measure proposed in the currently prepared NAP - Establishment of a National Climate Information System. It is assumed that this system will also include a mechanism for evaluating indicators designed to evaluate individual adaptation measures.

Progress towards meeting adaptation priorities

Based on the MRE methodology reported above. Annex I: 4.3c

The main objective of the revised Climate Change Adaptation Strategy of the Slovak Republic (NAS) is to increase resilience and improve the conditions of the Slovak Republic to face the adverse impacts of climate change and to establish an institutional framework and coordination mechanism to ensure effective implementation of adaptation measures at all levels and in all areas.

NAS links scenarios and the possible impacts of climate change with proposals for appropriate adaptation measures. The key areas and sectors in terms of adaptation to the adverse impacts of climate change are the following: rock environment and geology, soil environment, natural environment and biodiversity, water regime in the country and water management, residential housing, health, agriculture, forestry, transport, tourism, industry, energy, other areas of business and risk management. Its implementation document will be the NAP.

The draft NAP defines the following STRATEGIC PRIORITIES

Strategic priority 1
To support climate change adaptation as a strategic priority of the Slovak Republic, to include and integrate climate change adaptation into the policy and legal framework and strengthen the theme of adaptation in existing and forthcoming national and sectoral plans and programs.

Strategic priority 2

Strengthen the implementation of adaptation policies and legislation, reduce the administrative burden limiting the implementation of measures and improve law enforcement through transparency, improved competences
and strengthening control and sanction mechanisms.

Strategic priority 3

To build and develop an effective, feasible and functioning system for climate change adaptation in the Slovak Republic, based on the principle of subsidiarity and the joint efforts of all stakeholders and the public.

Strategic priority 4
Develop the knowledge base, data collection, monitoring and research related to dissemination of data and information.

Strategic priority 5

Promote education and public awareness on climate change adaptation issues and adaptation needs.

Strategic priority 6
Promote and develop a multi-source climate change adaptation financing system.
In order to fulfil the main goal and strategic priorities and at the same time to create a framework for the implementation of specific goals for individual areas, 5 cross-cutting measures will be supported through 18 tasks. The validity of the NAP is expected until 2027.

Progress towards addressing barriers to adaptation

Based on the MRE methodology reported above. Annex I: 4.3d

The NAP has not been adopted yet, but its adoption is expected this year. The NAP proposal details the steps necessary to achieve the goals set in the NAS. It defines procedures for solving

existing problems and obstacles preventing adaptation in the conditions of the Slovak Republic.

One of the issues in adaptation is the cross-cutting nature of most of the proposed measures. There are problems related to the competencies of the ministries and also the division of competencies between state administration and self-government. The desirable situation is to be able to improve systemic approaches to adaptation in at least the following areas:

Improving the implementation of adaptation policies and legislation and better law enforcement, increasing competences and strengthening control and sanction mechanisms
Increasing transparency, public participation in the preparation and implementation of specific projects
An efficient and functioning system for collecting, processing and disseminating data and information
Better education, information and public awareness on climate change adaptation issues and adaptation needs
A functioning multi-source system of financing projects in the field of adaptation to climate change.

The systematic approach to increase the adaptive capacity of the Slovak Republic is based on the principle of transparency. The impacts of climate change, and the measures implemented and planned, should be communicated to the public widely. The public must have the space to enter the decision-making process and be part of the solution. Approaches and solutions should be based on professional analysis of data and information.

Approaches to the implementation of measures and tasks should build on the symbiosis between solving economic, social and environmental problems. Adaptation measures require investment, and create jobs, reduce energy costs, affect the health of the population and improve the quality of life. The principle of complementarity in the field of climate adaptation process means that information, expertise and financial resources are combined to bring a common effect.

The principle of "effectiveness and efficiency" states that it is necessary to consider how much resources will be spent on a given measure (mainly "cheap" solutions. The measures aim is also to assess whether the measure will be effective enough to help reduce the risk from climate change.
The "new theme requires new approaches" principle based on the phenomenon of climate change and its impacts on social, economic and environmental systems, especially in residential environment (but not only there), will require innovative approaches, a combination of resources and testing of alternatives.
The implementation of measures and tasks should support the "partnership" principle. It means to involve stakeholders such as public administration organizations, academia, civil society and

the private sector.

Steps taken to review and update vulnerability and risk assessments

Annex I: 4.4a

Review and update vulnerability and risk assessments are given by the resolutions agreed while adopting these particular documents. The specific steps are described at other places of this report where relevant. The steps are being agreed according to the best available knowledge and in line with relevant funding. (See 4.2, 4.2a, 4.2b and attached document under 3.3.)

Steps taken to review and update national adaptation policies, strategies, plans, and measures

Annex I: 4.4b

Review and update national adaptation policies, strategies, plans, and measures are given by the resolutions agreed while adopting these particular documents. The specific steps are described at other places of this report where relevant. The steps are being agreed according to the best available knowledge and in line with relevant funding. (See 4.2, 4.2a, 4.2b and attached document under 3.3.)

Overview of good practice with regard to steps taken to review and update subnational adaptation plans, policies, strategies and measures

Annex I: 4.5

Overview of good practice with regard to steps taken to review and update sub-national adaptation plans, policies, strategies and measures are given by the resolutions agreed while adopting these particular documents. The specific steps are described at other places of this report where relevant. The steps are being agreed according to the best available knowledge and in line with relevant funding. (See 4.2, 4.2a, 4.2b and attached document under 3.3.)

Cooperation, good practices, synergies, experience and lessons learned in the field of adaptation

Good practices and lessons learnt (8)

Area of good practices

Annex I: footnote 19

Disaster risk reduction and management; innovative adaptation solutions and innovative financing mechanisms, Stakeholder engagement, Strengthening scientific research and knowledge

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

The Green Economy - Information platform - enables to present and share solutions to climate change adaptation, energy and resource efficiency and sustainable use, waste management, water management, green buildings and housing etc. It is intended for entrepreneurs, local governments, non-governmental non-profit organizations and the public. The platform provides general information, a database of companies and their environmental solutions in line with green economy principles.

Area of good practices

Annex I: footnote 19

Integration of indigenous; traditional and local knowledge into climate adaptation, Stakeholder engagement

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Subsidy program Village Renewal Program (in Slovak: Program obnovy dediny) - creates economic, organizational and professional preconditions for supporting rural communities to strive for their harmonious development. The program supports specific activities aimed at addressing the acute problems of rural authorities in the field of care for the rural environment, in particular green infrastructure and adaptation measures to mitigate the effects of climate

change and care for the countryside.

Area of good practices

Annex I: footnote 19

Adaptation goals; objectives; undertakings; efforts; strategies; policies and plans, Assessment of climate impacts; vulnerability and risks to climate change; including adaptive capacity, Climate modelling activities and methodologies, Climate risk communication, Efforts to integrate climate change adaptation into development and sectoral policies; plans and programs, Integration of indigenous; traditional and local knowledge into climate adaptation, Stakeholder engagement, Strengthening scientific research and knowledge

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Carpathian Development Institute - is an independent non-governmental organization working to support and promote a systemic approach to innovative and sustainable development of regions and local government, especially projects connected to climate change adaptation. The institute cooperates/cooperated with several municipalities in preparing local climate plans.

Area of good practices

Annex I: footnote 19

Adaptation priorities, Climate risk communication, Disaster risk reduction and management; innovative adaptation solutions and innovative financing mechanisms, Integration of indigenous; traditional and local knowledge into climate adaptation, Monitoring and evaluation, Strengthening scientific research and knowledge

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Research project activities "Data and knowledge support for decision-making and strategic planning systems in the field of adaptation of agricultural land to climate change and minimization of agricultural land degradation" (URANOS) are aimed at creating new approaches and data for early assessment, monitoring and forecasting drought; climate change prediction and comprehensive agricultural landscape impact assessment; assessment of soil degradation

degree and proposals for optimal land use.

Area of good practices

Annex I: footnote 19

Integration of indigenous; traditional and local knowledge into climate adaptation, Stakeholder engagement

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Regional territorial systems of ecological stability (RUSESs)- Within the national project "Development of documents of regional territorial systems of ecological stability for the needs of creating a basic starting point for the regulation of the design of green infrastructure construction" 42 RUSES were finalized for 42 districts of Slovakia in 2020. Project aimed to promote the sustainable use of natural resources, active adaptation to climate change and the promotion of low carbon economy.

Area of good practices

Annex I: footnote 19

Integration of indigenous; traditional and local knowledge into climate adaptation, Strengthening scientific research and knowledge

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

LIFE project LIFE12 NAT/SK/000488 "Integrated management of river ecosystems in southern Slovakia" (LIFE RIVERMANAGEMENT) - the main objective of the project is to tackle the lack of water management in the targeted sites and to reduce the negative impacts of land-use changes on the conservation status and habitats of populations of target bird species. The project expects to improved water regime through the repair of floodgates and one sluice and restoration of formerly-drained wetlands.

Area of good practices

Annex I: footnote 19

Climate risk communication, Integration of indigenous; traditional and local knowledge into climate adaptation, Stakeholder engagement

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Info days - As part of the national project “Improving Awareness and Providing Advice on Improving the Quality of the Environment in Slovakia” four InfoDays "Green Measures for Local Governments" and four InfoDays "Landslides - the current state, related risks, their prevention and management" were held in 2019. Info days aimed to inform about the possibilities of reducing the adverse effects of climate change and to provide information on slope deformations as a phenomenon of climate change.

Area of good practices

Annex I: footnote 19

Climate risk communication, Integration of indigenous; traditional and local knowledge into climate adaptation, Stakeholder engagement, Strengthening scientific research and knowledge

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

EnviroCity Competition (in Slovak "Enviromesto") - two years of the competition (in 2017 and in 2019) aimed to support green infrastructure were also aimed at supporting green infrastructure and building its elements in cities. The benefit of the competition was the creation of a platform of good examples and inspiring solutions in the field of green infrastructure, which serves for an intensive exchange of experiences between cities in this area.

Synergies of adaptation actions with other international frameworks and/or conventions

In particular the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction, Annex I: 5.2

Adaptation measures which define both NAS 2018 and the currently prepared NAP were compiled with regard to the frameworks set out in several international documents including

the UNFCCC, the Paris Agreement, the 2030 Agenda for Sustainable Development, the Sendai Disaster Risk Reduction Framework 2015-2030, and the EU's Climate Change Adaptation Strategy (2013).
From international conventions, the NAS supports synergies with the Convention on Biological Diversity, the Convention to Combat Desertification and the Framework Convention on the Protection and Sustainable Development of the Carpathians. The NAS also takes into account the recommendations of the IPCC.

Slovakia adopted the “Draft Vision and Strategy for Slovakia's Development until 2030 - Long-Term Sustainable Development Strategy of the Slovak Republic - Slovakia 2030” (2021). It fulfils the role of the National Strategy for Regional Development of the Slovak Republic. Its content is in line with the international commitments of Slovakia in the field of sustainable development and with the Green Deal.

The objectives of the Sendai Framework for Disaster Risk Reduction for 2015 - 2030 were reflected in the National Strategy on Disaster Risk Management of the Slovak Republic (2016).

From Climate ADAPT International dimensions and edited
The Slovak Republic is a member state of various international initiatives focusing on climate change adaptation, and is involved in the Danube Region Strategy and the Carpathian Convention. Transnational cooperation is currently ongoing between European countries crossed by the Danube river to tackle flood risks, prepare flood management plans and build flood defenses. In 2014, Strategic Agenda on Adaptation to Climate Change in the Carpathian Region was adopted, which is being implemented mainly through the activities of the Working Group on Adaptation to Climate Change under the Convention. In October 2017, a new Article 12 on Climate Change was adopted.

Cooperation with Union Member States, international cooperation, and with regional and international organisations to share information and to strengthen science, institutions and adaptation knowledge

Excluding information on support to developing countries referred to in Part 2 of Annex VIII of Regulation (EU) 2018/1999. Annex I: 5.3a

International cooperation is ensured mainly through projects.

As an example the LIFE projects the project LIFE17 GIC/CZ/000107 “Green Infrastructure Minimising the Urban Heat Island Effect” can be mentioned. The main goal is to decrease adverse climate impacts - particularly the Urban Heat Island (UHI) effect - in European cities by increasing the efficiency and effectiveness of the planning and decision-making processes related to green infrastructure exploiting. Slovak project partner is Carpathian Development Institute.

Through the INTERREG Danube Transnational Program, the Slovak Republic participates in the project "Danube River Basin Enhanced Flood Forecasting Cooperation" (DAREFFORT). The aim of the project is to create a standardized international platform for the exchange of hydrometeorological data, which will help improve the quality and efficiency of forecasting systems in individual countries. An important element of the project solution is the principle of solidarity and exchange of experience. The project partners are the Slovak Hydrometeorological Institute and the Slovak Water Management Enterprise.

Within the project of the Operational Program Quality of Environment "International Conference Climate Change 2019 - Challenges and Solutions" took place in Bratislava in 2019. Its aim was to share and disseminate knowledge and information on climate change, mitigation, adaptation measures, but also on global megatrends, prospective studies, forecasts and scenarios as well as tools to support their creation in connection with the preparation and implementation of strategic documents on climate change in the medium and long term. The project was carried out by the Slovak Environment Agency.

As part of the Instrument for Sharing Slovak Expertise, a study visit of the Serbian delegation in the Slovak Republic focused on climate change took place in 2019. It was professionally guaranteed by the MoE SR and financed from the resources of Slovak Agency for International Development Cooperation and the MoE SR. During the individual discussion blocks, the Slovak and Serbian delegation shared experiences with the implementation of international conventions in the field of climate change (UNFCCC, Paris Agreement), Agenda 2030 for sustainable development, EU policies in the field of climate change, ETS, LULUCF, domestic environmental policies, national mitigation and adaptation policies, including links to cooperation with the nature, biodiversity and landscape protection section and its subordinate organizations, as well as its cooperation with non-governmental organizations. In this context, a possible cooperation between the Slovak Republic and Serbia was proposed with the possible involvement of other EU member states in the preparation of a communication strategy in the field of climate change in Serbia.

Cooperation with Union Member States, international cooperation, and with regional and international organisations to enhance adaptation action at the sub-national, national, macro-regional and international level

Including the area, scale and types of cooperation. Excluding information on support to developing countries referred to in Part 2 of Annex VIII of Regulation (EU) 2018/1999. Annex I: 5.3b

International cooperation is ensured through projects mainly.

For example the LIFE project LIFE17 CCA/SK/000126 "Project title: Developing resilient, low-carbon and more liveable urban residential area" can be mentioned. The main goal is to balance adaptation and mitigation efforts in residential areas consisting of prevailingly prefabricated

buildings with the aim to increase their climate resilience, to reduce the carbon footprint. Slovak coordinating beneficiary: Bratislava – Karlova Ves Municipality. Other Slovak project partners: Regional Association for Nature Conservation and Sustainable Development, CI2, o.p.s.; Institute for Passive Houses Slovakia; Carpathian Development Institute.

Within the financial mechanism INTERREG Central Europe, the Slovak Republic participates in the project "Framework for improving water balance and nutrient mitigation by applying small water retention measures (FramWat)". The goal of the project is to raise public awareness of the natural small water retention measures (NSWRM) and their benefits, and in particular to develop methods to assess the cumulative effect of these measures, test them in pilot international river basins and provide tools and guidelines to facilitate public administration into strategic documents. The project partner is the Slovak Water Management Enterprise.

Another example of a project from the INTERREG Central Europe financial mechanism is the DEEPWATER-CE project. The activities of the DEEPWATER CE project are focused on one of the possibilities of solving the adaptation to climate extremes caused by climate change. One of those activities is controlled replenishment of groundwater reserves. It is the retention of water in the country, which will allow its subsequent infiltration into the underground horizons. This appears to be one of the most effective adaptation measures to face extreme weather events, such as floods or droughts. The project partner is the Water Research Institute.

Slovakia took part also in the international project „Climate Resilient Cities and Infrastructures – RESIN“. The project is working on developing practical and applicable tools to support cities in designing and implementing climate adaptation strategies for their local contexts. One of the project outputs was the „Atlas of Vulnerability and Risk Assessment of Adverse Imapcts of Climate Change on the territory of the capital of the Slovak Republic, Bratislava“. The Atlas provides a detailed assessment of the sensitivity and vulnerability of individual city parts of Bratislava to selected impacts of climate change, including the adverse effects impacts of extreme heat waves and intense torrential rains on the population, road infrastructure and buildings. The project was supported by European Union Framework Program Horizon 2020. The partner of the project was the Capital City of the Slovak Republic Bratislava. The several others Slovak organisations cooperated to compile the Atlas.

Any other information related to climate change impacts and adaptation

Key contact details of national coordinator and organisation (3)

Organisation

Annex I: 6.1

Ministry of Environment of the Slovak Republic

Department within the organisation

-

Role of the organisation

-

Contact person

-

Role of the contact person

-

Email address

jozef.skultety@enviro.gov.sk

Website

https://www.minzp.sk/

Organisation

Annex I: 6.1

Ministry of Environment of the Slovak Republic

Department within the organisation

Climate Change Policy Department

Role of the organisation

-

Contact person

-

Role of the contact person

-

Email address

lenka.chocholova@enviro.gov.sk

Website

https://www.minzp.sk/

Organisation

Annex I: 6.1

Ministry of Environment of the Slovak Republic

Department within the organisation

-

Role of the organisation

-

Contact person

-

Role of the contact person

-

Email address

miroslava.dancova@enviro.gov.sk

Website

https://www.minzp.sk/

Relevant websites and social media sources (4)

Title

Title of relevant website or social media source used for communication on adaptation action at national and sub-national level, Annex I: 6.2

Climate Change Adaptation (website of Ministry of the Environement of the Slovak Republic)

Type

Website

National or sub-national level

National level

Weblink

https://www.minzp.sk/klima/adaptacia-zmenu-klimy/

Title

Title of relevant website or social media source used for communication on adaptation action at national and sub-national level, Annex I: 6.2

Green infrastructure

Type

Website

National or sub-national level

National level

Weblink

https://www.sazp.sk/zivotne-prostredie/starostlivost-o-krajinu/zelena-infrastruktura/zelena-infrastruktura-v-procese-adaptacie-na-zmenu-klimy/

Title

Title of relevant website or social media source used for communication on adaptation action at national and sub-national level, Annex I: 6.2

Climate change (website of Slovak Environment Agency)

Type

Website

National or sub-national level

National level

Weblink

https://www.sazp.sk/zivotne-prostredie/starostlivost-o-zivotne-prostredie-3976/zmena-klimy/zmena-klimy.html

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Title

Title of relevant website or social media source used for communication on adaptation action at national and sub-national level, Annex I: 6.2

Climate change (website of Slovak Hydrometorological Institute)

Type

Website

National or sub-national level

National level

Weblink

http://www.shmu.sk/sk/?page=1790

Key reports and publications at national and sub-national level (10)

Title

Annex I: 6.3

Atlas of Vulnerability and Risk Assessment of Adverse Effects of Climate Change on the territory of the capital of the Slovak Republic, Bratislava

Year of publication

2020

Publisher

Department of the Chief Architect, Capital of the Slovak Republic Bratislava

Weblink

https://bratislava.blob.core.windows.net/media/Default/Dokumenty/Atlas%20hodnotenia%20zranite%C4%BEnosti.pdf

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Title

Annex I: 6.3

SAP Bratislava 2017 - 2020

Year of publication

2019

Publisher

Capital of the Slovak Republic Bratislava, 2019

Weblink

https://bratislava.blob.core.windows.net/media/Default/Dokumenty/Str%C3%A1nky/Zmena%20kl%C3%ADmy%20-%20Priebe%C5%BEn%C3%A1%20sprava%202017-18

Title

Annex I: 6.3

Strategy of adaptability of the city of Trenčín to climate change "

Year of publication

2019

Publisher

City of Trencin

Weblink

https://trencin.sk/wp-content/uploads/2020/06/Strat%C3%A9gia-adaptability-mesta-Tren%C4%8D%C3%ADn-na-klimatick%C3%BA-zmenu-.pdf

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Title

Annex I: 6.3

How to prepare a Green Infrastructure Action Plan in the light of new challenges - Handbook not only for local governments

Year of publication

2019

Publisher

City District Bratislava-Karlova Ves

Weblink

https://www.karlovaves.sk/wp-content/uploads/Akcny-plan_zelena-infrastruktura_web.pdf

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Title

Annex I: 6.3

Green Infrastructure - Handbook not only for local governments

Year of publication

2018

Publisher

City District Bratislava-Karlova Ves

Weblink

https://www.karlovaves.sk/wp-content/uploads/Zelena-infrastruktura-prirucka-nielen-pre-samospravy.pdf

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Title

Annex I: 6.3

Catalogue of adaptation measures to the adverse effects of climate change in relation to land use

Year of publication

2018

Publisher

Slovak Environment Agency

Weblink

https://www.sazp.sk/app/cmsFile.php?disposition=i&ID=814

Title

Annex I: 6.3

Environmental Scenarios 2020+, Sustainable Growth, Biodiversity and Climate Change

Year of publication

2017

Publisher

Slovak Environment Agency, MoE SR and SAV

Weblink

https://www.enviroportal.sk/spravy/detail/8101

Title

Annex I: 6.3

Catalogue of adaptation measures of towns and municipalities of the Bratislava self-governing region to the adverse consequences of climate change

Year of publication

2016

Publisher

Bratislava Self-Governing Region

Weblink

https://www.sazp.sk/app/cmsFile.php?disposition=i&ID=818

Title

Annex I: 6.3

Adapting to climate change – the urgent role of cities

Year of publication

2014

Publisher

Carpathian Development Institute

Weblink

http://www.kri.sk/web_object/803.pdf

Title

Annex I: 6.3

Climate change impacts and possible adaptation measures in individual sectors - Final report

Year of publication

2012

Publisher

EFRA- Scientific Agency for Forestry and Ecology

Weblink

http://www.shmu.sk/File/projekty/Zaverecna%20Sprava%20projektu%20Klim.%20zmena%20a%20Adaptacie%202012.pdf

Any other relevant information

Annex I: 6.4

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Additional document

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