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Third Review

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Foreword

It is essential to monitor progress towards environmental sustainability and to evaluate how countries reconcile environmental and economic targets and meet their international environmental commitments. Through regular monitoring and evaluation, countries may more effectively stay ahead of emerging environmental issues, improve their environmental performance and be accountable to their citizens. The ECE Environmental Performance Review Programme provides valuable assistance to member States by regularly assessing their environmental performance. Countries can then take steps to improve their environmental management, integrate environmental considerations into economic sectors, increase the availability of information to the public and promote information exchange with other countries on policies and experiences.

Last year, during the 20 years' anniversary of ECE Environmental Performance Reviews, we undertook a process of reflection and evaluation of the review process itself. One thing is clear: it has been a valuable mechanism in evaluating the implementation of the extensive environmental legislation enacted and the numerous environment-related conventions ratified by ECE member States. All the countries of the region have benefited from the discussions on the recommendations of the Environmental Performance Reviews, which entail the sharing of environmental data and knowledge and a frank exchange on best practices and lessons learned.

Recently, new instruments, such as the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change, have been negotiated and adopted to address sustainable development challenges. ECE peer review mechanisms, including the Environmental Performance Reviews, play an important role in assessing how well countries are addressing such challenges and meeting their commitments, both old and new. These mechanisms will also continue to provide an opportunity to evaluate whether policies are achieving results, whether there might be better ways to do so, and how to address any shortcomings.

The third Environmental Performance Review of Bulgaria brings together a wealth of information to build a picture of the country's environmental governance and performance — both in terms of achievements and shortcomings. I trust that this third review will serve as a powerful tool to support policymakers and representatives of civil society in their efforts to improve environmental management and further promote sustainable development in Bulgaria. ECE wishes the Government of Bulgaria further success in carrying out the tasks involved in meeting its environmental objectives, including the implementation of the recommendations in the third review. I also hope that the lessons learned from the peer review process in Bulgaria will benefit other countries throughout the ECE region and facilitate the achievement and monitoring of the SDGs.

Christian Friis Bach

Executive Secretary
Economic Commission for Europe

Preface

This third Environmental Performance Review (EPR) of Bulgaria takes stock of progress made by Bulgaria in the management of its environment since it was peer reviewed for the second time in 2000. It covers issues of specific importance to the country related to legal and policymaking frameworks, the financing of environmental expenditures, greening the economy, air protection, water and waste management and biodiversity conservation. The review further provides a substantive and policy analysis of the country's climate change adaptation and mitigation measures and its participation in international mechanisms. It also examines the efforts of Bulgaria to integrate environmental considerations in its policies in the energy sector.

The successes of Bulgaria in the achievement of most of the Millennium Development Goals are highlighted, as well as some remaining challenges.

The third EPR of Bulgaria began in February 2016 with a preparatory mission to agree on the structure of the report and the schedule for its completion. A team of international experts took part in the review mission from 12 to 20 April 2015. The draft report was submitted to Bulgaria for comment and to the ECE Expert Group on Environmental Performance Reviews for consideration in November 2015. During its meeting on 6 December 2016, the Expert Group discussed the draft report with expert representatives of the Government of Bulgaria, focusing on the conclusions and recommendations made by the international experts. The recommendations, with suggested amendments from the Expert Group, were then submitted for peer review to the Committee on Environmental Policy at its twenty-second session on 26 January 2017. A high-level delegation from Bulgaria participated in the peer review and the Committee adopted the recommendations in this report.

The Committee and the ECE secretariat are grateful to the Government of Bulgaria and its experts who worked with the international experts and contributed their knowledge and assistance. ECE would also like to express its appreciation to the German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety and the German Federal Environment Agency for their support by providing funds through the Advisory Assistance Programme, and to Norway and Switzerland for their financial contributions. Sincere thanks also go to France, the Netherlands and Portugal for having provided their experts, and to the United Nations Development Programme for its support of this review.

ECE also takes the opportunity to thank Austria, the Netherlands and Switzerland for their general financial support to the EPR Programme and expresses its deep appreciation to Belarus, Estonia, Georgia, Germany, Hungary, Montenegro, Republic of Moldova, Romania, Sweden and Switzerland for having provided their experts for the ECE Expert Group on Environmental Performance Reviews, which undertook the expert review of this report.

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Cover page photos: Horses - Daniel Popov, Pirin National Park - Ministry of Environment and Water, Rila Monastery – Yaroslav Bulych, Central Balkan National Park – Ministry of Environment and Water, landscape - Daniel Popov

KEY ABBREVIATIONS

AAU	assigned amount unit
EIA	environmental impact assessment
EMEPA	Enterprise for Management of Environmental Protection Activities
EU	European Union
EWRC	Energy and Water Regulatory Commission
FRMP	flood risk management plan
GDP	gross domestic product
GHG	greenhouse gas
HPP	hydroelectric power plant
ICPDR	International Commission for the Protection of the Danube River
IPPC	integrated pollution prevention and control
LULUCF	land use, land use change and forestry
MEA	multilateral environmental agreement
MEPP	municipal environmental protection programme
MWMP	municipal waste management programme
NDP BG 2020	National Development Programme Bulgaria 2020
NES	National Environmental Strategy
NGO	non-governmental organization
NIP	National Implementation Plan
NSI	National Statistical Institute
NTEF	National Trust Eco Fund
NWMP	National Waste Management Plan
OP	operational programme
POP	persistent organic pollutant
RBMP	river basin management plan
RES	renewable energy sources
RIA	regulatory impact assessment
RIEW	regional inspectorate on environment and water
RO	recovery organization
SAC	Special Area of Conservation
SCI	Site of Community Importance
SPA	Special Protection Area
SEA	strategic environmental assessment
SEEC	Supreme Environmental Expert Council
SEIS	shared environmental information system
SEWRC	State Energy and Water Regulatory Commission
SPA	special protection area
TPP	thermal power plant
WSS	water supply and sanitation
WWTP	wastewater treatment plant

SIGNS AND MEASURES

..	not available
-	nil or negligible
.	decimal point
$	dollar
cap	capita
eq.	equivalent
g	gram
Gg	gigagram
GWh	gigawatt-hour
ha	hectare
kg	kilogram
km	kilometre
km^2	square kilometre
km^3	cubic kilometre
kt	kiloton
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
l	litre
m	metre
m^2	square metre
m^3	cubic metre
Mg	Megagram
MW	megawatt
PJ	petajoule
ppm	parts per million
t	ton (1,000 kg)
toe	ton of oil equivalent
TWh	terawatt-hour

CURRENCY CONVERSION

Exchange rate (period average)
Monetary unit: 1 Lev = 100 stotinki

Year	Lev/Euro	Lev/US$
2005	1.96	1.57
2006	1.96	1.56
2007	1.96	1.43
2008	1.96	1.34
2009	1.96	1.41
2010	1.96	1.48
2011	1.96	1.41
2012	1.96	1.52
2013	1.96	1.47
2014	1.96	1.47
2015	1.96	1.76
2016	1.96	1.77

Source: ECE Database. Accessed on February 2017.

Executive summary

The second Environmental Performance Review (EPR) of Bulgaria was carried out in 2000. This third review intends to assess the progress made by Bulgaria in managing its environment since the second EPR and in addressing new environmental challenges.

Environmental conditions and pressures

Annual emissions of sulphur dioxide dropped from 821 Gg in 2007 to 189 Gg in 2014 – a substantial 76.98 per cent decrease. Nitrogen oxide emissions diminished from 166 Gg in 2007 to 133 Gg in 2014. Emissions of total suspended particles decreased by 33.40 per cent, from 144.2 Gg in 2007 to 96.0 Gg in 2014.

The volume of water abstraction has been in steady decline since 2007. The total volume of water abstracted in 2014 was 5,375 million m^3, 13.32 per cent less than in 2007. Total water losses diminished by 28.67 per cent.

Estimated wastewater generation in 2014 was 768.49 million m^3 – 3.86 per cent less than in 2007. In 2014, the major proportion of wastewater (76.33 per cent) was treated before discharge.

The number of functioning urban wastewater treatment plants (WWTPs) rose from 68 in 2008 to 89 in 2014. However, the number of plants using secondary treatments increased from 52 to 56 and the number of plants capable of tertiary treatment rose from 1 to 24. In 2014, 74.9 per cent of the population was connected to a wastewater collection system but only 56.8 per cent of the population was connected to a plant.

Bulgaria has extensive land areas in agricultural use and under forest. In 2012 around 52.6 per cent of land was either agricultural cropland (32 per cent) or pasture grassland (20.6 per cent), while 37.7 per cent was under forest and 6.1 per cent was shrubland. Built-up and artificial areas took up less than 2 per cent and water about 1 per cent of the land area.

At the end of 2015 there were 1,012 protected areas, covering 584,530 ha. This was 6.90 per cent more than at the end of 2006. Although the number of protected areas is vast, the share of the total land area of the country designated as protected area was only 5.27 per cent in 2015 – one of the smallest shares among EU countries.

The generation of municipal solid waste decreased by 23.48 per cent during the review period, from 4,172,000 tons in 2007 to 3,192,500 tons in 2014. While the number of municipal waste landfill sites has quickly reduced from 435 sites in 2007 to 147 in 2014, the share of the population served by municipal waste collection systems has increased from 92.51 per cent to 99.56 per cent.

Legal and policymaking framework and its practical implementation

Bulgaria has strengthened its legal framework for environmental protection and sustainable development. Nevertheless, since 2007, the European Commission has opened 54 infringement procedures against Bulgaria, for 3 of which the country was taken to the European Court of Justice for not sufficiently implementing and enforcing the environmental legislation. Up to the end of May 2016, 44 infringements had been closed.

The 2005 Genetically Modified Organisms Act is in line with the EU legislation, and some parts of it even set stricter conditions. In 2010 Bulgaria adopted an official ban on GMO cultivation. Non-governmental organizations were one of the key drivers behind the current ban on GMOs in Bulgaria.

Since 2007, Bulgaria has strengthened its policy framework for integration of environmental concerns with social and economic concerns. The country adopted the National Development Programme Bulgaria 2020 (NDP BG 2020), the National Reform Programme and the Government Programme for Stable Development for the period 2014–2018.

Bulgaria has continuously strengthened its legal framework to promote its transition towards a green economy. The NDP BG 2020, the National Reform Programme and the Government Programme for Stable Development provide, to some degree, long-term strategic guidance for the transition towards a green economy in Bulgaria.

Sectoral policy approaches to a green economy in Bulgaria are not sufficiently integrated due to the lack of coordination on development, implementation and monitoring of the policies and initiatives to promote a green economy. There are no specific coordinating mechanisms for green economy policies in place.

The Ministry of Environment and Water is the main authority in charge of funding for green economy initiatives through the OP "Environment" and its two subordinated project financing institutions, the Enterprise for Management of Environmental Protection Activities and the National Trust Eco Fund. The Enterprise support for green initiatives in the period 2003–2015 amounted to more than 2,600 contracts worth over six million leva. The Fund has implemented four major programmes to promote green initiatives since 2007.

SEA has been implemented since July 2004. The Environmental Protection Act establishes the general regulatory framework for SEA. The SEA Ordinance further specifies the SEA system.

Bulgaria has established a single environmental ex-ante quality assurance system by integrating Natura 2000-appropriate assessment procedures, as well as coordinating Integrated Pollution Prevention and Control permitting process and integrating the Seveso process of chemical safety in the EIA procedures.

In 2008, the Liability for Prevention and Remedying of Environmental Damage Act was adopted. The law has transposed the 2004 Directive 2004/35/EO on environmental liability with regard to the prevention and remedying of environmental damage.

Bulgaria successfully implements the Regulation (EC) No 1221/2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS). The number of valid ISO 14001 certificates was 6 in 2001 and reached 1,761 in 2014.

Economic instruments for environmental protection and the financing of environmental expenditures

Bulgaria has made progress in the use of economic mechanisms for pollution management, but the polluter-pays principle is applied only partially. A water pollution tax has been introduced, but it is not differentiated according to the type and characteristics of pollutants. Moreover, the uniform charge rates are very low, which raises doubts about their environmental effectiveness.

The main economic instrument for pollution management continues to be sanctions for exceeding established threshold values for the quantity of air, water and soil pollutants discharged into the environment. This was, however, a blunt instrument for many years, given that the low rates of fines provided little, if any, incentives for changes in the behaviour of polluters.

In the area of waste management, Bulgaria applies enhanced producer responsibility (EPR) schemes, which aim at internalizing environmental externalities. These schemes are associated with quantitative recovery and recycling targets and a landfill tax. There is little transparency as regards the recovery fees charged by each of the recovery organizations and competition among the organizations in the market for a given product group is not regulated. There is also no information on the extent to which EPR schemes cover the costs related to the management of these waste streams.

Charges for water abstraction were increased in 2012, but the extent of cost recovery is still low. In a similar vein, fees for irrigation water are not cost reflective, and the bill collection rate is also low. The authorities have started to introduce incentive tariffs for the use of water-saving irrigation technologies. In the face of insufficient mobilization of financial resources, the irrigation infrastructure has deteriorated significantly.

In the water supply and sewerage services sector a range of problems exist. These include high proportions of non-revenue water due to technical losses and low bill collection rates, which is depressing the revenues of water companies. In general, tariffs allow for the recovery of operating costs only.

Environmental monitoring, information and education

Air quality monitoring in Bulgaria has been significantly modernized and upgraded since 2000. The most noteworthy change has been a shift from a system that was largely based on manual sampling (52 stations reported in 2000) to automatic sampling stations (16 stations reported in 2000). This has improved the quality and regularity of air quality measurements and data as well as ensuring that comprehensive statistics on air quality are automatically analysed and published.

Bulgaria has operationalized a national system for noise monitoring to prevent adverse health and environmental effects from the impact of noise. In 2014, the national system on noise carried out monitoring activities in 710 locations across the country and data from the national system for noise monitoring covers noise levels in 35 cities.

The present biodiversity monitoring system was developed between 2004 and 2006 and, based on experience and activities between 2007 and 2015, was updated and upgraded in 2016. Moreover, as a part of developing Bulgaria's monitoring system, a practical guide was made available on monitoring and assessment methodologies by biological groups and for particular species.

Bulgaria has a long history and tradition of forest management, which includes large-scale monitoring. The Executive Environment Agency maintains a network of permanent sampling plots where data have been actively and manually collected over long periods. This network provides the long-term data needed for analyses, assessments and forecasts to support the preservation and protection of Bulgarian forests.

The present water monitoring systems consist of 500–600 points to monitor the physical and chemical status of surface water, 372 points for groundwater and 700–800 points for hydro-biological monitoring of surface water. Seawater quality is also checked at monitoring stations located on the coast and at the mouths of the rivers flowing into the Black Sea and there are at present 24 automatic monitoring stations for surface water that provide early warning of pollution.

Due to insufficient financial capacities, the Executive Environment Agency has been dependent on project-based funding to support parts of its biodiversity monitoring system. This has resulted in a shortage of scientific data as regards certain species and habitats covered by the system.

As a consequence of lacking financial resources the register of polluted areas has also been delayed. The national database on soil quality is not upgraded and an online system with services that makes pertinent data on soil quality publicly available has not yet been created.

Implementation of international agreements and commitments

Bulgaria became party to the vast majority of global and regional multilateral environmental agreements (MEAs) prior to its accession to the EU in 2007. After 2007 the country became party to very few agreements, including the 2003 Protocol on Pollutant Release and Transfer Registers, in 2010; and the 2010 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization and the 2015 Paris Agreement, in 2016.

Implementation of MEAs is a priority for the Ministry of Environment and Water and other governmental institutions. Good efforts are applied and clear criteria for prioritization of meetings exist to ensure the participation of Bulgaria in all important meetings under MEAs, given financial constraints. National implementation reports are generally submitted on time and focal points are appointed for all MEAs to which the country is a party.

The implementation and compliance cases against Bulgaria in various MEAs indicate some systemic issues with MEA implementation, e.g. for biodiversity treaties, such an issue is the rapid development of wind energy in the absence of strong nature protection legislation.

Bulgaria ensures public participation in the development of the Bulgarian position for decision-making in the framework of MEAs and in implementation of MEAs. Consultations with NGOs have been organized prior to

and after important MEA meetings, representatives of NGOs have been included in national delegations to MEA meetings. In many cases, draft national reports are published with an invitation to the public to submit comments. However, in general there is no systematic policy on how to involve the public and NGOs in development of the Bulgarian position for decision-making in the framework of MEAs and in implementation of MEAs.

Climate change

Bulgaria is particularly vulnerable to climate change and to related extreme events, such as flash floods and droughts. Climate-related risks are expected to increase in the next decades.

Although warming generally has a negative impact on agriculture in the country, rising temperatures allow the cultivation of early agricultural products outdoors or in greenhouses, where energy costs decrease.

In general, Bulgaria's transport system was designed, built and operated on the basis of the country's own specific geographic conditions, including those related to climate factors. Because of the diverse peculiarities of the weather in the different parts of the national space, the transport system is relatively flexible, recognizing both the normal atmospheric conditions and local characteristics and manifestations of extreme meteorological phenomena that directly or indirectly affect the functioning of the transport sector.

Emissions from the energy sector decreased by 37.17 per cent from 83,081 Gg CO_2 eq. in the base year 1988 to 51,072 Gg CO_2 eq. in 2011. The main source of emissions in the energy sector is fuel combustion of solid fuels, which is responsible for 65.8 per cent of the emissions.

The 2012 Third National Action Plan on Climate Change for the period 2013–2020 outlines the framework for action to combat climate change. Bulgaria focuses its efforts on actions leading to reduction of the negative impacts of climate change and implementation of the commitments undertaken under the UNFCCC and the Kyoto Protocol.

As a party to the Kyoto Protocol Bulgaria is committed to developing a national adaptation strategy. The same commitment also arises from the Climate Change Mitigation Act. The Ministry of Environment and Water initiated a process towards developing a national adaptation strategy, which should comprise the period up to 2030.

Bulgaria successfully participated within the framework of the Joint Implementation mechanism. Twenty-eight projects have been approved in Bulgaria, 21 of which have already been achieved and have verified emission reductions. The execution of those projects led to GHG emission reductions of around 8 million tons of CO_2 eq. for the period 2008–2012.

Water management

In the period 2010–2014, 23 new and modernized urban WWTPs were put into operation with a total capacity of 1,116,000 PE. In 2014, 89 urban WWTPs were operating, of which 56 had secondary treatment and 24 had more stringent treatment than secondary.

By European standards, Bulgaria has a high rate of access to piped water (99 per cent of the population). More than 5,000 towns and villages are covered by centralized water supply systems, with a total pipe length of more than 75,000 km. Only two districts in Bulgaria have less than full coverage from centralized piped water.

In 2013, Bulgarian tap water quality generally met the requirements for safe drinking water. For the larger drinking water zones, typically with more than 5,000 inhabitants or more than 1,000 m^3 of water supplied per 24 hours, Bulgaria meets the tap water quality criteria in more than 95 per cent of cases for microbiological, physical, chemical and organoleptic indicator parameters. Notwithstanding this success, there are quality issues in some, mainly smaller, drinking water zones, where microbiological non-compliance exceeds 5 per cent.

Bulgaria has one of the highest rates of water abstraction per capita and relies mainly on surface water sources due to the large volumes of water used for cooling in energy production. A continuing trend towards improving

the quality of surface waters is reported. Likewise, a gradual improvement in groundwater quality, on most indicators, is being observed.

The current water monitoring regime has more of an informative nature and there is no analysis of reasons, causes, sources or measures for solving the problems. The results from the current monitoring show that, in practice, this monitoring does not provide the necessary volume of information to definitively determine the status of water bodies.

Bulgaria has adopted the Black Sea Strategic Action Plan. In order to reduce the pressure on the littoral and territorial waters for the period 2016–2021, additional measures are planned, linked mainly to reducing the introduction of waste from land-based sources.

Air protection

Significant reductions have been achieved in recent decades for most emissions of air pollutants. Emissions from large industrial sources have been reduced by more than 80 per cent for SO_2 and halved for NOx. This is partly the result of the shutting down of obsolete industrial installations, and predominantly the result of applying modern emission abatement techniques and control measures to reduce emissions.

For some pollutants, the levels of air pollution in urban areas in Bulgaria are exceeding the national and European standards for shorter and longer periods. The levels of NOx, lead, CO, benzene, nickel and arsenic are below the air quality limits. For cadmium and SO_2, only a small number of local exceedances have occurred, and for ozone and PAHs the number of exceedances is limited. The overall trend for all pollutants shows a decrease in their levels.

The European Environment Agency has estimated that 100 per cent of the inhabitants of urban areas in Bulgaria were exposed to levels of PM_{10} above the EU standards for air quality over the period 2009–2011. The National Statistical Institute reports that air quality limits are exceeded on half the days of the year in the two largest cities in Bulgaria. This is suspected to have serious impacts on public health.

The causes of urban air pollution are not fully identified in the country. Domestic heating with solid fuels is suspected to be the largest source of emissions of particulate matter during winter in urban areas. The Ministry estimates that domestic heating is the predominant cause of high levels of PM_{10} in the winter in Bulgarian cities, in combination with unfavourable weather conditions.

Air pollution by particulate matter is exceeding the limit values for air quality during the winter period. Most of the occurring high levels of pollution are caused by a combination of an unfavourable meteorological situation and high levels of emissions of PM during winter. Particulate matter, especially PM_{10} and $PM_{2.5}$, can have a severe impact on public health. However, information on the costs for society of the impact of air pollution on public health is not easily available in Bulgaria.

Waste management

The total amount of municipal waste generated decreased from close to 5 million tons in 2000 to slightly more than 3 million tons in 2014. The amount of waste generated per capita decreased accordingly, from more than 600 to 442 kg/capita/year. The number of settlements and inhabitants served by collection services increased substantially. Nowadays, 99.6 per cent of the population is covered with waste services.

The formal system of separate collection of packaging waste was introduced in Bulgaria in 2004. At that time, only slightly more than one third of the generated packaging waste was recycled, and by 2014 this proportion had reached 61.7 per cent.

Bulgarian policy on organic waste is to reduce landfilling, especially of biodegradable organic waste. Construction of regional sanitary landfills is the first step to reducing the environmental burden of such waste (preventing contamination of the soil and groundwater and reducing methane emissions). Bulgaria has a target to reduce biodegradable waste on landfills to 35 per cent of the total quantity of organic waste generated in 1995

until 2020. The Ministry of Environment and Water has set a target of 25 per cent separate collection of municipal biowaste in 2016, 50 per cent in 2020 and 75 per cent in 2025.

The fourth National Waste Management Plan for the period 2014–2020 aims at discontinuing the link between economic growth and waste by preventing the generation of waste and by setting specific quantitative targets for preparation of reuse, recycling and other forms of recovery for specific wastes. For the first time, within the scope of development of the Plan, a National Waste Prevention Programme has been developed.

As a means of deterrent against waste disposal, a landfill tax was introduced for municipal waste in 2011. The level of the landfill tax is doubled for the disposal of waste in non-compliant landfills.

Biodiversity and national ecological networks

There has been a 43 per cent increase in the number of protected areas, from 858 in 2004 to 1,012 in 2014, and a 25.56 per cent increase in the area covered by protected areas, from 544,394.9 ha in 2004 to 584,530 ha in 2015. At the end of 2015, the protected areas network included three national parks, 11 nature parks, 55 reserves and 35 managed reserves, 564 protected sites and 344 nature monuments.

Bulgaria is still among the EU countries with the lowest percentage of terrestrial and marine areas that are nationally designated protected areas. This ambivalence is rooted in the state policy, which was directed towards expanding the network of protected areas, mostly by the designation of "protected sites" and "nature monuments". These sites, although large in number, are usually very small in area.

In 2015, Bulgaria reviewed its entire UNESCO Biosphere Reserve Network (16 sites), which was established in the 1970s. Fifteen of the biosphere reserves are strict reserves and one (Srebarna) is a managed reserve; both categories are quite strict and do not allow human activities related to sustainable use of natural resources to be performed within their boundaries. Consequently, none of the 15 strict reserves correspond to the zoning and functional requirements of the UNESCO Seville Strategy and Statutory Framework of the World Network of Biosphere Reserves, and thus a revision of the biosphere reserve status is under way.

The biological richness of Bulgaria’s flora and fauna creates opportunities as well as challenges for the national conservation strategies. Bulgaria is among the European countries with the highest territorial share of Natura 2000 sites. Whereas the average across the EU is 18 per cent coverage, Bulgaria has 34.4 per cent of its territory inscribed on the list. The total area of the network is more than 4 million ha, of which 56.47 per cent is forests, 32.35 per cent agricultural land and the rest is other types of land.

Due to the country’s abundance of biological diversity and hosting of a large proportion of species that are threatened at European level, Bulgaria has a particular responsibility for biodiversity conservation. A large proportion of the natural diversity, e.g. 20.5 per cent of the vascular plants, is threatened by various negative factors, such as deterioration, fragmentation and loss of habitats due to infrastructure development, competition with invasive alien species and intensive land use.

Energy and environment

Bulgaria’s energy dependence for the last few years is significantly lower than the average of EU member countries. It was made possible thanks to the measures undertaken in the last few years to stimulate energy efficiency, increased energy generation from renewable energy sources (from 12.2 per cent in 2009 to 19 per cent in 2013) and projects realized by the new capacities of local coal have shown a positive reflection in the energy dependence indicator.

The major local energy resource of Bulgaria is lignite coal. It is dominant in the coal production structure, accounting for 93.0 per cent in 2014. Lignite coal is followed by brown coal at 7.0 per cent and black coal at 0.001 per cent (or 300 tons).

The extraction of natural gas in Bulgaria is on a decreasing trend: 278 million m^3 in 2013, 179 million m^3 in 2014 and 82 million m^3 in 2015. Oil is produced in insignificant amounts and oil demand is mostly covered by import.

Electricity production also peaked in 2011, was decreasing during 2012–2013 and then trended upward again in 2014–2015. The structure of electric power generation is dominated by thermal power plants using coal, followed by Kozloduy nuclear power plant. Major sources for the generation of electrical power are local coal and nuclear fuel.

As to the energy intensity of its economy Bulgaria ranks last among the 28 EU member countries, having the highest energy intensity rate of 610.6 kgoe/€1,000 (according to comparable prices for 2005). The average European intensity is 141.6 kgoe/€1,000. However, the different parity purchasing powers within the EU mitigate this dramatic contrast without eliminating it.

In 2004, Bulgaria's share of renewables in gross final energy consumption amounted to 9.6 per cent. Since then the country made remarkable progress and by 2012 had already achieved its 2020 renewable energy target: the share of renewables in gross final energy consumption stood at 16.3 per cent, against a target of 16 per cent for 2020.

In the last decade, Bulgaria managed to substantially reduce the total amount of emissions of the main pollutants into atmospheric air from power stations and industrial fuel combustion. For example, emissions of sulphur oxides were reduced more than fivefold: from 795,071 tons in 2007 to 139,860 tons in 2014. This remarkable achievement was reached by modernization of old TPPs and installation of desulphurization equipment. Emissions of nitrogen oxides were reduced by half, thanks to improvements of the burning processes.

Introduction

ENVIRONMENTAL CONDITIONS AND PRESSURES

I.1 Demographic and socioeconomic context

Population

Bulgaria's population has shown a steady declining trend. The country's total population of 7.20 million in 2014 was 5.76 per cent lower than in 2007, at the beginning of the review period, when the total population was 7.64 million. The life expectancy of the male and female populations increased between 2007 and 2013, by 1.8 and 1.7 years, to 71.02 and 78.01 years, respectively. During the same period the total fertility rate increased by 4.22 per cent, from 1.42 to 1.48, while the infant mortality rate decreased from 9.2 per 1,000 live births in 2007 to 6.6 in 2015 – a significant 28.3 per cent decrease. The decrease of the population was caused by negative natural increase and net migration.

About 73 per cent of Bulgaria's population live in urban areas and approximately one sixth of the total population was concentrated in the capital, Sofia, in 2014. The average population density in 2014 was 64.9 inhabitants/km^2. The main cities include Sofia (pop. 1,221,292); Plovdid, an agro- and heavy industry centre (pop. 341,041); and Varna, an important port and seaside resort (pop. 335,819).

Economy

Bulgaria became a member of the European Union (EU) in January 2007. Bulgaria accumulated fiscal surpluses between 2004 and 2008, and reduced public debt from over 70 per cent of gross domestic product (GDP) in 2000 to 13.3 per cent in 2008, which at the time was the second lowest debt level in the EU. Not only did public debt diminish but the annual average GDP growth from 2000 to 2007 was good, at 6.07 per cent. The 2008 international financial crisis hit Bulgaria's economy hard. The public debt ratio rose from 13.0 per cent of GDP in 2009 to 27.6 per cent in 2014 and the 2007 pre-crisis high of 7.7 per cent GDP growth melted away and GDP growth turned to 4.2 per cent negative in 2009. Since then the country's GDP performance has improved, very slowly at first, but it finally reached a healthy 3.0 per cent annual growth in 2015. However, the average annual growth between 2008 and 2015 was sluggish at 1.14 per cent.

GDP-per-capita development followed the general GDP development. GDP per capita grew at a relatively high rate of 7.2 per cent per year from 2000 to 2007, which accelerated the convergence of Bulgarian and EU income levels. Between 2008 and 2015 the annual average per capita GDP growth was just above 1.0 per cent. Nonetheless, GDP per capita measured by purchasing power parity in 2005 US dollars rose 14.46 per cent between 2007 and 2015.

Inflation measured by the Consumer Price Index (CPI) reached its highest level of 12.4 per cent in 2008. After 2008 CPI fluctuated between 0.9 and 4.2 per cent until inflation turned to deflation in 2014. The latest available CPI figure, for 2015, was -0.1 per cent.

Since 2007 there have been two positive developments in foreign trade. Exports measured in the current year's dollars and PPP increased 49.65 per cent between 2007 and 2014, while imports increased only 11.55 per cent during the same period. This produced an important change in the balance of trade in goods and services, causing the trade deficit to decrease from US$8.36 billion in 2007 to US$0.49 billion in 2014.

In 2007 Bulgaria attracted US$12.9 billion worth of net foreign direct investment (FDI). This massive inflow of investment to the Bulgarian economy was worth 31 per cent of the country's 2007 GDP. In 2010 the investment boom was over and the net FDI in Bulgaria was down to 2.5 per cent of GDP. The latest available FDI figure, for 2014, was 3.5 per cent of GDP, which was still higher than the figures for neighbouring Greece, Romania and Turkey. At the beginning of the review period in 2007, the unemployment level was a relatively low 6.9 per cent. After reaching its lowest level of 5.6 per cent in 2008, it deteriorated through to 2013 when it reached 13.0 per cent. The latest available unemployment figure of 9.4 per cent for 2015 was slightly lower than the EU average of 9.6 per cent.

The poverty level has stayed surprisingly stable throughout the dip in GDP after 2008 and the steady increase in the unemployment rate up to 2013. The share of the population living below the national poverty line was 21.4 per cent in 2008, diminishing slightly to 21.0 per cent in 2013.

Gender

Bulgaria has been a party to the Convention on the Elimination of All Forms of Discrimination against Women since 1981; the Convention on the Political Rights of Women since 1955; and the Convention against Discrimination in Education since 1962.

The political representation of women in parliament is still at a relatively low level and there have been some setbacks in the development of this. According to the UNSTAT's Millennium Development Goals (MDGs) indicators, the proportion of female legislators in the Bulgarian parliament increased from 22.1 per cent in 2007 to 24.6 per cent in 2014 but dropped back to a typical figure in the long term of 20.4 per cent in 2015. The numbers of women holding ministerial positions and, especially, having a seat in the European Parliament are higher. In 2016, six of 20 ministerial positions were held by a woman; in 2013 six of the 18 Bulgarian Members of the European Parliament were women.

There is no gender imbalance at the primary or secondary education level. According to the World Bank, the gender parity index (GPI) in 2014 was 0.99 at primary level and 0.97 at secondary level. At tertiary education level it was 1.25, indicating female overrepresentation at that level.

In international gender-based comparisons Bulgaria has done relatively well. The 2015 UNDP Gender Inequality Index gave Bulgaria a score of 0.112 in 2014, which ranked it 44th of the 188 countries compared, while the World Economic Forum's 2015 Gender Gap Report gave Bulgaria a score of 0.722, which ranked it 43rd of the 145 countries compared.

I.2 Key environmental trends

Air and climate change

Air

Annual emissions of sulphur dioxide (SO_2), which were 821 Gg in 2007, dropped to 189 Gg in 2014 – a substantial 76.98 per cent decrease (figures I.1 and I.2). Because virtually all SO_2 was emitted from combustion of fossil fuels in energy and energy transformation industries, this reduction was a result of shutting down the obsolete polluting industrial installations as well as applying modern emission abatement technologies.

Nitrogen oxide (NOx) emissions diminished from 166 Gg in 2007 to 133 Gg in 2014. The total emission reduction was 19.48 per cent. NOx emissions from the energy sector decreased by 30.57 per cent and from the transport sector by 12.32 per cent. Ammonia (NH_3) emissions dropped by 40.67 per cent during the review period, from 52.5 Gg in 2007 to 31.1 Gg in 2014. Practically all NH_3 emissions were generated by the agricultural sector.

Emissions of total suspended particles (TSP) decreased by 33.40 per cent, from 144.2 Gg in 2007 to 96.0 Gg in 2014. Most of the TSP decrease came from the energy sector, where emissions diminished by 53.44 per cent or by 38.64 Gg between 2007 and 2014, while transport emissions diminished during the same period by 9.21 Gg. PM_{10} emissions decreased by 9.32 per cent, from 51.13 Gg in 2007 to 46.36 Gg in 2014, while $PM_{2.5}$ emissions decreased by 0.18 per cent from 28.52 Gg to 28.47 Gg.

There were significant reductions in emissions of the heavy metals of cadmium and mercury during the review period of 2007–2014. Cadmium emissions decreased by 16.00 per cent, and mercury by an impressive 51.08 per cent. Emissions of lead during the same period increased by 67.42 per cent. Emissions of non-methane volatile organic compounds (NMVOCs) were very stable. There was a modest 6.41 per cent decrease of NMVOCs, from 101.35 Gg in 2007 to 94.85 Gg in 2014.

Greenhouse gas emissions

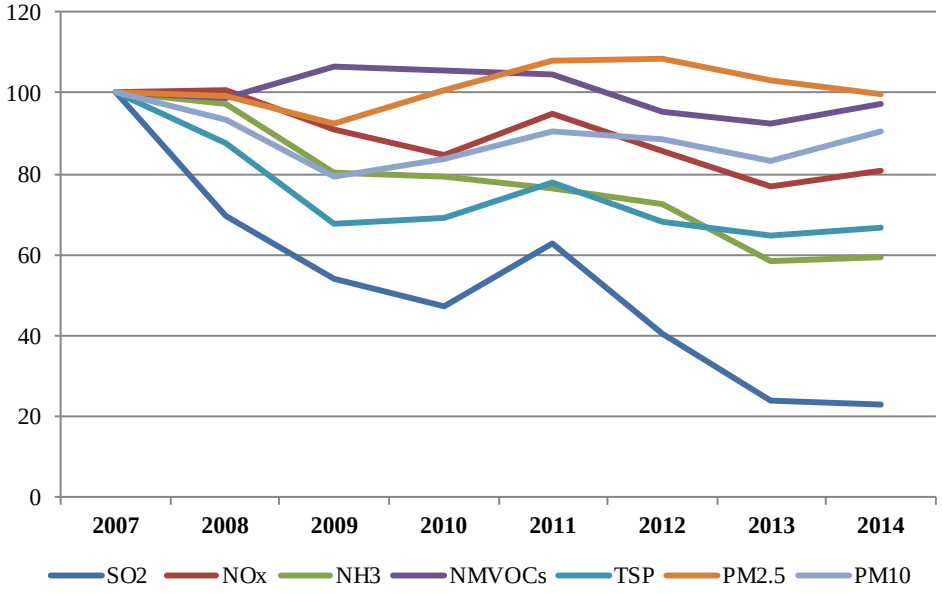
Between 2007 and 2014 the total greenhouse gas (GHG) emissions expressed in CO_2 equivalent decreased by 14.95 per cent, from 67,375.41 Gg to 57,303.70 Gg. After the 2008 international financial crisis the volume of GHG emissions plunged with the economic slowdown and diminished demand for energy and industrial products. However, emissions returned to pre-crisis levels in 2011 and therefore almost all of the recent GHG reduction took place after 2011. Emissions of CO_2 declined by 18.19 per cent and of ammonia (CH_4) by 8.92 per cent. A reversal of the general trend in GHGs was the continuing growth of fluorinated gas emissions. Emissions of hydrofluorocarbons (HFCs) increased by 236.27 per cent from 2007 to 2014 and emissions of sulphur hexafluoride (SF_6) increased by 77.17 per cent during the same period. No data was made available on perfluorocarbons (PFCs).

There were huge variations in sectoral GHG emissions between 2007 and 2014. While several sectors had rapidly decreasing GHG emission levels some sectors had very high emission level growth rates. The GHG emissions of the energy sector's subsector of manufacturing industries and construction decreased by 65.36 per cent, the industrial sector by 46.98 per

cent and the waste sector by 10.46 per cent during the review period. During the same period the transport sector had a modest 4.31 per cent increase in GHG emissions, and the agricultural sector a 5.78 per cent increase, but the emissions from solvent and other product use increased by a tremendous 176.93 per cent.

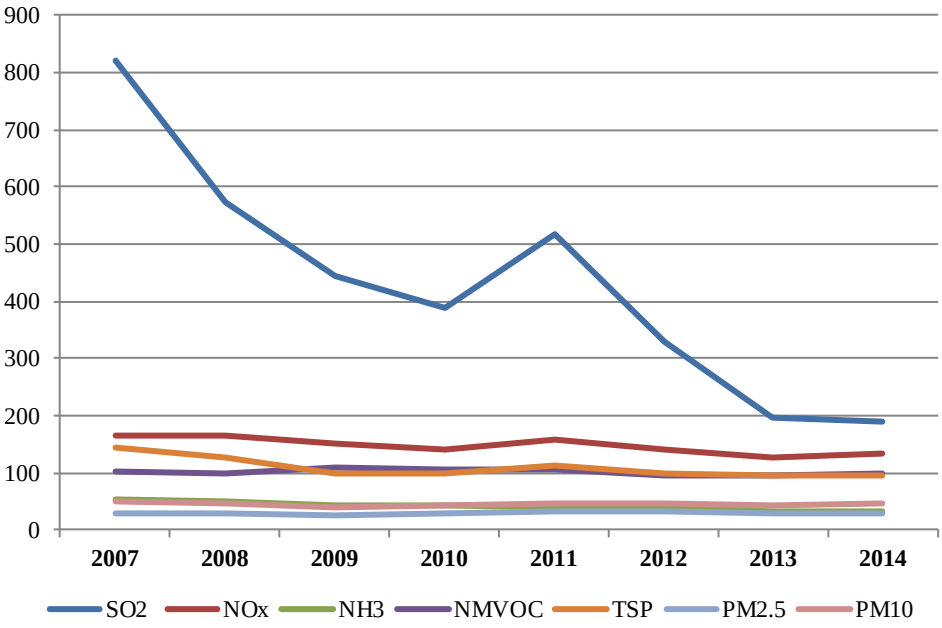
Energy consumption per capita in Bulgaria, although higher than in its neighbours Greece, Romania, Serbia and Turkey, is not very high. In 2013 Bulgaria's annual energy use per capita was 2.33 tons of oil equivalent (toe), which was 12.73 per cent less than in 2007. At the same time, the EU's average per capita energy use was 37.49 per cent higher and that of OECD member countries was 80.05 per cent higher than that of Bulgaria.

Figure I.1: Air emissions, 2007-2014, 2007=100



Source: Bulgarian ecology, table 1.1 and annex III

Figure I.2: Total air emission trends, 2007-2014, Gg



Source: Executive Environment Agency, 2016.

Photo I: Palace of Justice, Sofia

Unlike energy consumption per capita, the energy intensity of the country is extremely high. Bulgaria's energy intensity decreased by 20.0 per cent between 2007 and 2013. However, in 2013, while the EU's energy intensity was 0.11 toe per 1,000 (2005) US dollars, that of Bulgaria was 0.48, almost four and a half times higher.

Surface water and groundwater

Water resources

The volume of water abstraction has been in steady decline since 2007. The total volume of water abstracted in 2014 was 5,375 million m^3, 13.32 per cent less than in 2007. Between 2007 and 2014, water abstraction for public water utilities declined by 16.58 per cent, for agriculture by 28.44 per cent and for total industry by 9.33 per cent. Water use by manufacturing industry declined the most, by 46.22 per cent, over the same period. Total water losses diminished by 28.67 per cent.

The volume of water used for hydropower generation, which is not included in the water abstraction figure above, was vastly greater than that of abstracted water. In 2014 hydropower generation used almost five times more water that all other uses together; moreover, the amount of water used for hydropower generation increased by 182.48 per cent during the review period of 2007–2014.

The biggest share, 60.03 per cent, of abstracted water went to energy sector cooling, whereas water losses accounted for 16.08 per cent, public water supply for 15.93 per cent and agricultural use for 13.52 per cent of the total water abstraction.

Water pollution

The point sources of pollution from urban areas and industries to the surface waters are primarily urban waste waters, energy enterprises, plants manufacturing and processing metals, and mineral and chemical industries. Diffused source pollution are effluents from agriculture, non-treated wastewaters from settlements without a sewerage system and non-insulated landfills without a drainage system in place.

The point sources of groundwater pollution are industrial sites – plants manufacturing and processing metals, mineral and chemical industries, together with uranium mines. Diffused groundwater pollution is coming mainly from landfills and settlements without a sewerage system, livestock – i.e. pig livestock lagoon and from agriculture. Finally, water abstraction in areas with intense economic activity can be a source of groundwater pollution.

Wastewater

Estimated wastewater generation in 2014 was 768.49 million m^3 – 3.86 per cent less than in 2007. In 2014, the major proportion of wastewater (76.33 per cent) was treated before discharge. Practically all wastewater (97.48 per cent) was discharged to inland waters and the small amount remaining was discharged to the sea.

Total source point wastewater discharges diminished by 12.22 per cent, from 503.27 million m^3 in 2007 to 441.77 million m^3 in 2014. Almost two thirds (61.60 per cent) of the wastewater discharges were of domestic origin, industry generated one third (33.11 per cent), and the rest were generated by agriculture, forestry fishing and the production and distribution of electricity, heat and gas.

The number of functioning urban WWTPs rose from 68 in 2008 to 89 in 2014 but the designed BOD5 capacity (tons of O_2 per day) of these plants increased by only 7.6 per cent. However, the number of plants using secondary treatments increased from 52 to 56 and the number of plants capable of tertiary treatment rose from 1 to 24. In 2014, 74.9 per cent of the population was connected to a wastewater collection system but only 56.8 per cent of the population was connected to a WWTP.

Improved sanitation facilities were available for 86.0 per cent of the total population in 2015 – 84.0 per cent of the population in rural areas and 87.0 of the population in urban areas. According to monitoring of the MDGs, there has not been any change in the availability of improved sanitation facilities since 2007.

Water quality

Surface water

Surface water quality assessment in 2012 revealed that, of the 759 assessed water bodies (freshwater, transitional, coastal and marine), 4.7 per cent were of high ecological status, 38.6 per cent of good status, 31.9 per cent of moderate status, 14.4 per cent of poor status and 10.3 per cent of bad status. Of the 929 water bodies assessed in 2016, 5.5 per cent had high water quality, 39.0 per cent had good water quality, 31.6 per cent were considered as having moderate water quality, 8.4 per cent were rated as poor and 5.1 per cent as having bad water quality.

The 2012 and 2016 assessments used slightly different categories for water quality. In the 2016 assessment, 10.3 per cent of the water bodies belonged to the "unknown" quality category, which was not used in the 2012 assessment. Nevertheless, the two lowest categories of the 2016 assessment most likely correspond to the "poor" and "bad" status used in the 2012 assessment; therefore, it seems that about 24.7 per cent of the water bodies assessed in 2012 had inadequate water quality whereas this had diminished to 13.5 per cent in 2016.

Table I.1: Water abstraction and use, 2007-2014, million m^3

Water abstraction by source and by activity	2007	2008	2009	2010	2011	2012	2013	2014
Total gross fresh water abstraction [1)]	**6 201.8**	**6 425.4**	**6 120.7**	**5 960.1**	**6 385.1**	**5 715.1**	**5 468.2**	**5 375.6**
Public water supply	1 026.4	1 016.2	978.4	929.4	916.6	933.8	911.2	856.2
Agriculture, forestry and fishing	1 015.3	1 009.1	996.3	939.3	1 049.8	949.4	825.0	726.6
Industry	4 148.8	4 387.0	4 133.7	4 076.3	4 405.2	3 817.3	3 701.0	3 761.8
of which:								
Electricity, gas, steam and air conditioning supply	3 891.6	4 141.2	3 936.5	3 877.4	4 237.2	3 656.2	3 556.2	3 614.1
of which:								
for cooling	3 497.8	3 749.5	3 559.3	3 493.7	3 778.5	3 273.2	3 170.9	3 227.0
Services	11.4	13.1	12.4	15.0	13.5	14.5	30.9	31.1
Water abstraction for purposes of hydropower generation [2)]	**8 673.4**	**8 609.4**	**9 880.9**	**13 759.6**	**11 839.5**	**13 657.8**	**17 002.7**	**24 500.6**
Water losses, total [3)]	**1 211.9**	**1 145.8**	**1 070.7**	**973.0**	**1 088.0**	**1 154.9**	**992.1**	**864.4**

Source: National Statistical Institute, 2016. http://www.nsi.bg/en/content/5139/water-distribution-public-water-supply-total-country-statistical-region-and-river-basin

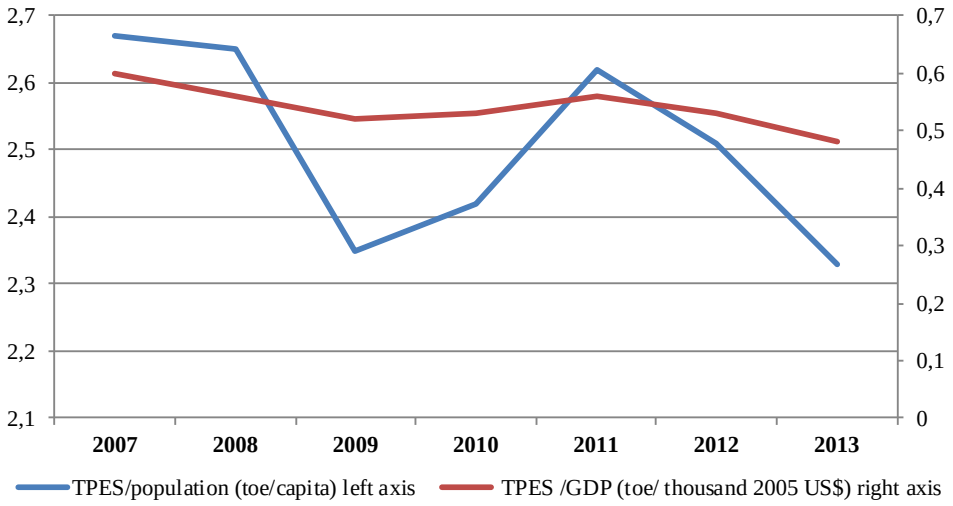
Notes:

1) Abstracted water is calculated as a sum of water abstracted for water supply and self-supply of enterprises (without water for hydropower generation). The data source is an exhaustive survey on water supply (irrigation systems and public water supply /PWS/) and self-supply – a partial statistical survey covering the bigger water users (with more than 36,000 m^3 of water annually). Self-supply of households is not included.

2) Water abstraction for purposes of hydropower generation is not included in total freshwater abstraction.

3) Water losses are reported by the operators (public water supply and irrigation systems) and include physical losses during transport, unauthorized consumption and measurement errors.

Figure I.3: Energy use per capita and energy intensity, 2007-2013



Source: IEA Energy balances.

Groundwater

According to the 2010-2014 assessment of the groundwater bodies the situation had deteriorated slightly since the earlier assessments. Out of the 176 groundwater bodies 169 were assessed during 2010-2014, of those 58 groundwater bodies or 34.3 per cent were of poor chemical status and the rest 65.7 per cent were of good chemical status.

Bathing waters

There has been a positive development of coastal water quality since 2007. Of the 89 coastal bathing waters assessed in 2007, 89.9 per cent were of at least sufficient water quality, 76.4 per cent were excellent and 9 per cent were of poor quality. All three inland bathing waters were of excellent quality in 2007. In 2015 there were 94 bathing waters, of which 90 were coastal and four were inland. Almost all (96.7 per cent) coastal waters were of at least sufficient quality in 2015 while 70 per cent were of excellent quality. Although there had been a slight decrease in the proportion of bathing waters of excellent quality, the proportion of waters of poor quality had diminished to only 3.3 per cent, while all four inland bathing waters were of excellent quality.

Drinking water

According to statistics on progress towards achieving the MDGs, in 2015, an improved drinking water source was available for 99 per cent of the total population and 100 per cent of the urban population. The tap water meets the microbiological, physical, chemical and organoleptic parameters in 95 per cent of cases. In 2014 a very small fraction of the population (0.6 per cent) suffered restrictions in access to water.

Land

Land and soil cover

Bulgaria has extensive land areas in agricultural use and under forest. In 2012 around 52.6 per cent of land was either agricultural cropland (32 per cent) or pasture grassland (20.6 per cent), while 37.7 per cent was under forest and 6.1 per cent was shrubland. Built-up and artificial areas took up less than 2 per cent and water about 1 per cent of the land area. Bulgaria has 17 different soil types and 28 subtypes. The six main soil types cover 88.7 per cent of the soils of the country. These are cinnamon soils (22.0 per cent of soils), chernozem (20.4 per cent), grey forest soils (17.0 per cent), brown forest soils (14.8 per cent), alluvial soils (9.0 per cent) and smolnitsi (5.4 per cent).

There are three distinctive soil zones. The northern forest-steppe zone covers the Danubian Plain and the Pre-Balkan up to 600–700 m altitude. The Danubian Plain is characterized by the fertile black earth chernozem, while the Pre-Balkan is dominated by grey forest soils, which have good physical characteristics but are low in organic matter and phosphorus. The southern xerothermal zone covers southern Bulgaria up to 700–800 m altitude. The most common soil types are the cinnamon forest soils with acidic (cinnamonic) traces, smolnitsi and yellow-podzolic soils. The mountain zone covers the mountainous regions above 700–800 m altitude and has a zonal (altitude-specific) soil cover. The brown forest soils are distributed at altitudes of 1,000–2,000 m, the dark

mountain forest soils can be found at 1,700–2,200 m altitude and the mountain meadow soils are found above 1,700 m. These soils are typically shallow and prone to erosion and are usually acid to strongly acid.

Biodiversity

The location of Bulgaria at the junction of the Mediterranean, Central European and Eurasian continental– climatic regions has created an environment with great biodiversity. In addition to these climatic regions Bulgaria has a topographical relief that stretches from the Black Sea shore to high mountains, providing a background for a rich habitat and species diversity.

Ecosystems and habitat threats

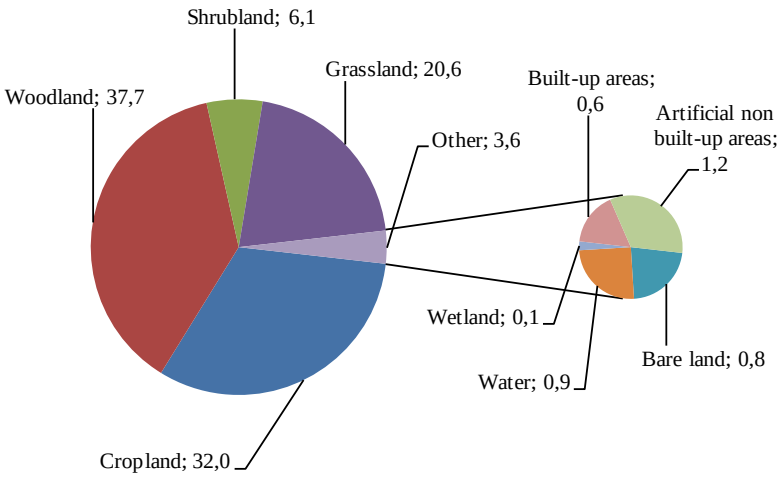
The 2014 Fifth National Report to the Convention on Biological Diversity classifies the major threats to biodiversity into five main categories. Human activities cause deterioration, fragmentation and loss of both aquatic and terrestrial habitats. The anthropogenic pressures on brackish water include the construction and operation of hydroelectric power plants (HPPs), maintenance dredging of the Danube River, and sand and gravel extraction from river beds. The marine biodiversity is affected by the building of hydraulic structures, shore protection, dredging, and drilling for oil and gas, and the marine bottom substrates are physically damaged by commercial fishing gear.

Similarly, anthropogenic pressure on terrestrial habitats is caused by construction and infrastructure projects, ploughing of land for agricultural purpose, quarrying and extraction of aggregates, construction and operation of wind and photovoltaic parks, fires and overgrazing or lack of grazing. A biodiversity problem to which a particular importance has been given is the anthropogenic disturbance of bats in their subterranean habitats.

The second major threat category is the overexploitation of biological resources and the loss of genetic resources. The forests suffer from unregulated resource use such as logging, poaching, illegal mining, uncontrolled grazing, and the taking of herbs and mushrooms. The forest operations related to forest resource use are mainly focused on the management of forest resources and do not take into account the biodiversity conservation aspect. The game resources are affected by the change of habitats including changes in agricultural crops and infrastructure such as fences, highways and irrigation canals. The stocks of fish species and other aquatic organisms in the Black Sea, the Danube River and the inland waters are mainly deteriorating because of overexploitation.

The third threat is the pollution of air, soil and water. Air pollution is mainly caused by industry and road transport. Major causes of soil pollution are the use of chemical fertilizers and pesticides, construction and operation of landfills serving urban areas, improper disposal of solid wastes and the deposition of pollutants from industry and transport. Surface water deterioration is a product of point- and diffuse effluent sources, water flow regulation and morphological changes to rivers, water abstraction and other causes such as watershed erosion, pollution from old mines, drought and water shortages.

Figure I.4: Land cover, 2012, per cent of total



Source: http://ec.europa.eu/eurostat/web/lucas/data/database.

Invasive species are the fourth main concern. There are about 60 species of flowering plants considered invasive or potentially invasive. In addition, there are 347 alien terrestrial arthropods, of which 52 species are crop pests with potential negative impact on forestry, agriculture, horticulture and greenhouse production. Of a total of 29 alien species of marine invertebrates found along the Bulgarian Black Sea coast, nine species are considered invasive. The introduction of some of them has changed the ecosystem of the Black Sea, causing the destruction of the populations of oysters, reduction in the population of clams and widespread deterioration of the mussel fields.

Lastly, climate change has an impact on biodiversity. Since the late 1970s there has been a warming climate trend and in the second half of the 20th century the winters were milder. The number of extreme weather and climate events has increased. The number of longer drought periods followed by severe storms and flooding with heavy damage and casualties has increased. Vegetation patterns are also changing – the upper boundary of the deciduous forests is shifting to higher elevations and the data from phenological observations show earlier advancement in plant development of about 7–15 days in different climatic regions.

Forest area

In 2015 the woodlands covered 4,222,874 ha of Bulgaria's land area. Of this area 3,857,658 ha or 91.35 per cent was forested. Forest area had increased by 54,921 ha compared to 2007. This increase was a partial result of the inclusion of the lands of 17 forest and hunting enterprises as well as the self afforested abandoned agriculture lands to the forest inventory area. Other contributing factors for forest area developments were.

- An increase of woodland areas through natural plant succession;
- Drastically diminished afforestation planting area; in 2008 about 3,645.5 ha were planted and this increased to 5,097.5 ha in 2009 but reduced to 1,289.4 ha in 2012;
- Replacement of coniferous forests and plantations by deciduous trees because the process of natural regeneration, secondary succession after tree cutting, and forest fires all favour deciduous plants;

The number of fires and damage they caused reduced sharply between 2007 and 2014. The number of fires in 2014 (151) was about one tenth of the number in 2007 and the affected forest area in 2014 was just 2.13 per cent of the area damaged in 2007. In 2015 there were 429 forest fires and the affected forest area increase to 4,312.8 ha. However, the year 2014 had extreme summer rainfalls and therefore it is better to compare the 2015 data with those for 2013, a year which had close to the normal weather conditions. Compared to the longer term average data for the 2004-2014, the sudden increase of fires in 2015 was within normal range.

Flora and fauna

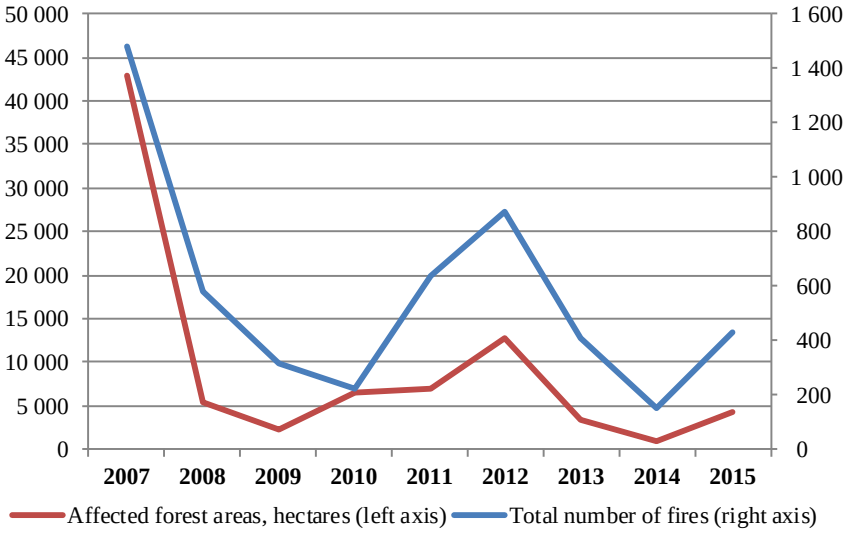
Bulgaria's flora includes about 3,100 species of algae, making the country one of the richest areas in Europe for algoflora. Non-vascular (pryophyte) plants comprise about 754 species, although the country is underexplored and six new species were found between 2009 and 2013. There about 4,100 species of vascular plants in the country; this group is also growing with the discovery of new species – about 70 new species between 2009 and 2013. Of the non-vascular plant species, about 40 per cent are threatened, while almost 20 per cent of the vascular plants are either threatened or otherwise have conservation importance.

The exact amount of the country's fauna is not fully known. To date, 30,359 fauna species have been found but it is estimated that these account for only about half of all species that exist in the country. The largest number of species belong to the invertebrates, whereas there are 781 species of vertebrates. Birds are well represented in this group – over half of the vertebrates, 407 species, belong to the aves. Bulgaria also has two special fauna groups. There is a relatively large number, 56 species, of reptiles and amphibians and, in addition, 33 of the 36 European bat species are found in Bulgaria (for threatened species and habitats, see chapter 10.)

Protected areas

At the end of 2015 there were 1,012 protected areas, covering 584,530 ha. This was 6.90 per cent more than at the end of 2006. Although the number of protected areas is vast, the share of the total land area of the country designated as protected area was only 5.27 per cent in 2015 – one of the smallest shares among EU countries.

Figure I.5: Forest fires and affected areas, 2007-2015, number and area in ha



Source: http://eea.government.bg/bg/soer/2014/forest/zdravoslovno-sastoyanie-na-gorite-v-balgariya, accessed in June 2016.

Waste

Municipal waste

The generation of municipal solid waste (MSW) decreased by 23.48 per cent during the review period, from 4,172 thousand tons in 2007 to 3,192.5 thousand tons in 2014. Per capita MSW generation decreased by 19.06 per cent, from 546.06 kg/capita to 441.96 kg/capita. While the number of municipal waste landfill sites has quickly reduced from 435 sites in 2007 to 147 in 2014, the share of the population served by municipal waste collection systems has increased from 92.51 per cent to a very high 99.56 per cent.

Non-hazardous industrial waste

Non-hazardous industrial waste generation increased by 23.28 per cent between 2007 and 2014. The generated amounts were 165,788.7 thousand tons in 2007 and 204,386.5 thousand tons in 2014. The data includes mining waste that is not within the scope of the Waste Management Act.

Hazardous waste

There was a considerable increase in hazardous waste data submitted for the first time by the reporting units in 2008, initiating a sudden increase in the recorded volume of hazardous waste. Since the increase was caused by improved and more comprehensive reporting from waste generators, it is better to calculate the growth rates from 2008 onwards. In 2008, the reported generation of hazardous waste was 13,042.7 thousand tons while the 2014 reported generation was 12,104.5 thousand tons. Therefore the amount of generated hazardous waste diminished by 7.19 per cent from 2008 to 2014. The data includes mining waste that is not within the scope of the Waste Management Act.

Medical waste

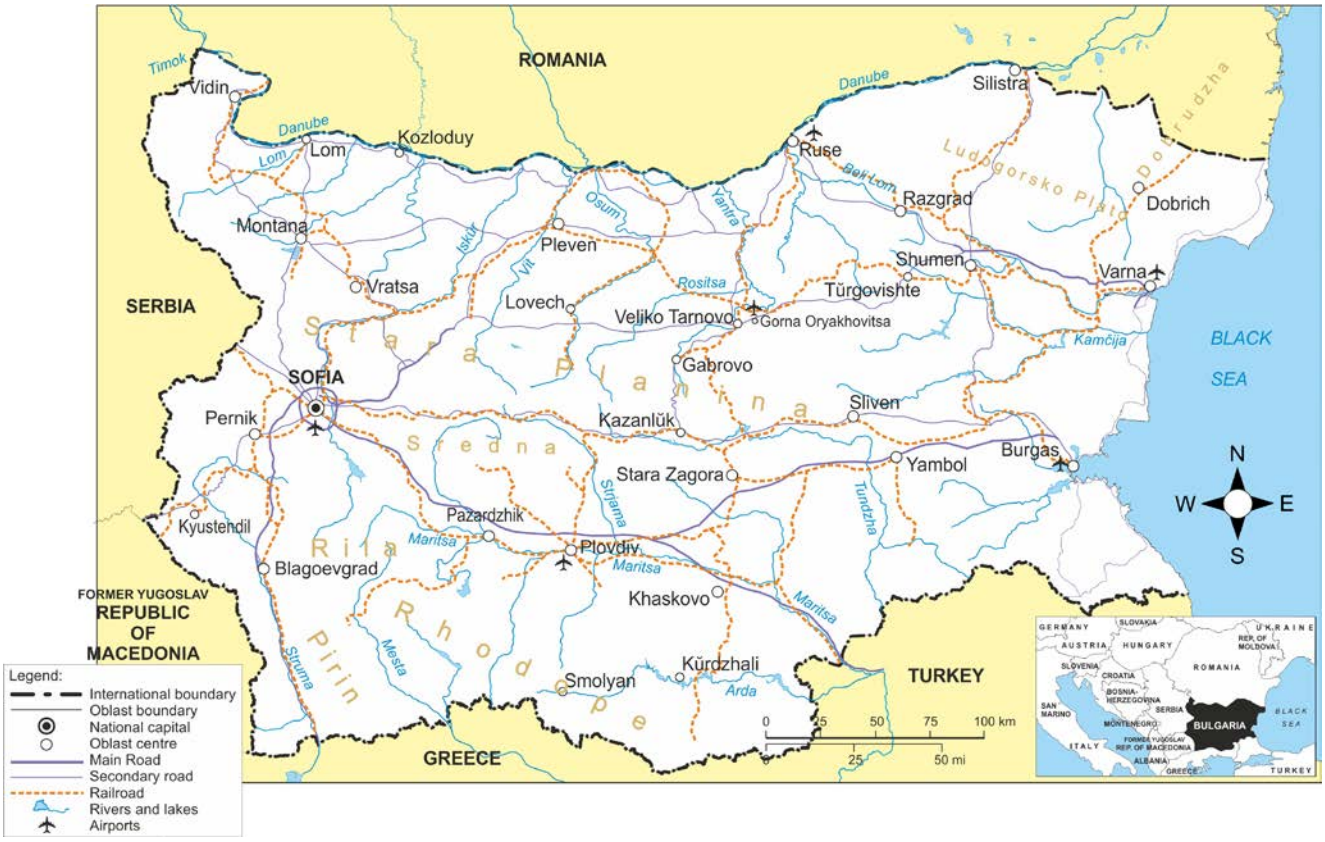
The generation of healthcare and biological waste more than tripled during the review period. The amount of medical waste increased by 357 per cent, from 661.33 tons in 2007 to 2,293.26 tons in 2013.

Table I.2: Protected areas, as of 31.12.2006 and 31.12.2015, categories corresponding to IUCN categories

	31.12.2006	31.12.2015	
Categories of protection	**Area, ha**	**Number**	**Area, ha**
Reserves	76 979.0	55	77 068.5
National parks	150 362.3	3	150 362.3
Natural landmarks	16 737.7	344	16 834.1
Maintained reserves	4 517.1	35	4 520.3
Natural parks	244 723.3	11	256 441.3
Protected areas/sites	53 465.9	564	79 303.4
Total	**546 785.3**	**1012**	**584 529.9**

Source: Ministry of Environment and Water 2015.

Map I.1: Bulgaria



Source: United Nations Cartographic Section, 2016.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

PART I: ENVIRONMENTAL GOVERNANCE AND FINANCING

Chapter 1

LEGAL AND POLICYMAKING FRAMEWORK AND ITS PRACTICAL IMPLEMENTATION

1.1 Legal framework

Harmonization with the European Union legislation

Bulgaria's accession to the EU in 2007 and its efforts to harmonize the environmental legislation with the EU environmental acquis have been the main driving force behind the ongoing strengthening of the legal framework for environmental protection and sustainable development.

While no transitional periods were agreed for transposing the EU acquis regulating biodiversity and nature protection, they have been agreed for the transposition of EU legislation in four areas: waste, water, air protection, and industrial pollution and risk management.

Bulgaria has been slow in implementing the environmental legislation, in particular at the subnational level and in the areas demanding high infrastructure investments, such as air protection and waste and water management. For instance, Bulgaria faced an infringement procedure because numerous landfills were still operating in breach of EU waste and landfill legislation after 2009.

Since 2007, the European Commission has opened 54 infringement procedures against Bulgaria, for 3 of which the country was taken to the European Court of Justice for not sufficiently implementing and enforcing the environmental legislation. Up to the end of May 2016, 44 infringements had been closed.

As of November 2016, there are 10 ongoing infringement procedures taking place against Bulgaria on environmental legislation, including 3 on biodiversity (2007/4850, 2008/4260, 2008/4461), 2 on air quality (2009/2135, 2010/2109), two on waste management (2012/2082, 2016/0594) and 3 on water management (2015/2172, 2015/0513, 2016/0593). For four of the procedures (2016/0594, 2015/2172, 2015/0513, 2016/0593), the country notified the Commission in December 2016 for the full implementation of the obligations and closure is expected in February 2017.

Environmental protection

The 2002 Environmental Protection Act, SG No. 91, is the key framework law for environmental protection and regulates:

- Environmental authorities and key areas of management of environmental protection;
- Access to information on the environment;
- Economic organization of environmental protection activities;
- Key environmental strategies and programmes;
- Environmental impact assessment (EIA) of specific investment proposals;
- Strategic environmental assessment (SEA) of plans and programmes;
- Prevention and limitation of industrial pollution;
- Prevention of major accidents involving hazardous substance and limitation of their consequences
- The National Environmental Monitoring System.

Among the key secondary legislation specifying the Environmental Protection Act includes the 2003 Ordinance on the conditions and procedure for carrying out environmental impact assessment, No. 25, the 2004 Ordinance on the conditions and the procedure for carrying out environmental assessment of plans and programmes (SEA Ordinance), the 2009 Ordinance on the conditions and procedures for issuing integrated permits, Ordinance on the conditions and procedures for determining the liability of the state and for eliminating damage to the environment resulting from past action or inaction prior privatization and the 2012 Ordinance on the procedures for registration, renewal of registration and control of the Community eco-management and audit scheme.

The implementation of some provisions of the Environmental Protection Act has not been entirely successful. For example, while Bulgaria adopted the National Environmental Strategy (NES) in 2001 with an Action Plan for the period 2000–2006, it failed to adopt a new Plan between 2006 and 2012. According to the Act, corresponding municipal environmental protection programmes (MEPPs) should be adopted on the basis of the NES. This provision could not be

fulfilled in the period between 2006 and 2012 due to the lack of a new strategy. Thus, MEPs of several municipalities are outdated or lacking.

Waste

The Waste Management Act was first adopted in 2003. The 2012 version contributed to strengthening the regulatory framework for waste management by introducing the hierarchy of waste management and the "polluter pays" and "extended producer responsibility" principles. Targeted operational goals for recycling of household waste and for recycling and recovery of materials from construction and demolition waste were established for the first time. An economic instrument for stimulating the municipalities to improve preparation for reuse and recycling of waste and to reduce the amount of household waste going to landfill was introduced, as those who meet specified targets are exempt from 50 per cent of the charges due for waste disposal. The Act also includes a legal requirement for the administrative, economic and educational organizations, and businesses, to separately collect waste paper and cardboard, plastic, glass and metal. Nevertheless, it provides the opportunity for municipalities to use the accumulated amount of waste disposal charges (deduction paid by municipalities per ton of disposed waste) to finance investment costs for household waste recycling and other recovery facilities.

The Act also defines a range of new obligations for municipal authorities and administrations, for example on separate waste collection and in terms of gradual achievement of municipal waste recycling and recovery targets, and on adoption of municipal waste management ordinances to specify the legal provisions of the Act for the waste generated on their territory. The responsibility for issuing waste permits and for their control shifted from the Ministry of Environment and Water to its regional inspectorates on environment and water (RIEWs).

The Act also previews the implementation report for the National Waste Management Plan (NWMP) to be produced every three years. However, the Act also exhibits shortcomings such as the lack of a legal obligation to monitor the state of development and implementation of the municipal waste management programmes (MWMPs) and of the regional waste management programmes. Accordingly, as of December 2016 the implementation reports of these strategic documents are not available.

The waste legislation was continuously strengthened in the period since 2007, for instance by adopting further specialized laws such as the Act for Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal as well as a range of secondary legislation. The Waste Management Act is currently specified in 22 ordinances. Four regulations, four instructions and a guide and checklist for inspection of facilities for treatment of biowaste were also issued. The Ordinance on Management of Construction and Demolition Waste and the Use of Recycled Building Materials was adopted in 2012 and a Manual for Construction and Demolition Waste Management was developed.

Insufficient progress has been achieved in terms of revising the municipal waste ordinances by 2014 in order to harmonize them with the 2012 version. While all municipalities adopted ordinances under the 2003 Act, only 44 had revised them by 2014. Bulgaria has also been slow in establishing a system of 54 regional landfills by 2009, closing the remaining non-compliant landfills and achieving the 2020 targets for reuse, recycling and recovery of household waste (chapter 8).

Climate Change

The 2014 Climate Change Mitigation Act, SG No. 22, is currently specified in 12 regulations and ordinances. Until 2014, the Environmental Protection Act provided the overall regulatory framework for climate action. The 2012 Carbon Dioxide Geological Storage Act regulates the geological storage of carbon dioxide in an environmentally safe manner.

The Climate Change Mitigation Act contributed to establishing a coherent regulatory framework for climate protection, for example by further specifying the provisions regulating the administration of the National Registry for GHG Emission Allowance Trading and the institutional framework for climate protection. The implementation of the climate legislation is challenging due to the cross-sectoral nature of the issue and the lack of financial means.

Since 2007, Bulgaria has achieved progress in terms of implementing the climate legislation. The National Green Investment Scheme was set up in 2010, which enabled government participation in the international mechanism for emissions trading by selling part of surplus assigned amount units. In 2007, Bulgaria joined ex officio in the European Emissions Trading Scheme. The actual practice began in April 2010 after the approval of the Bulgarian National Allocation Plan for 2008–2012. The first auction of general allowances for plants was launched in November 2012. The auctions of aviation allowances started in September

2014. As required by the Act, the revenues from 2012 will be spent in stages over the period 2015–2017 through the National Trust Eco Fund (NTEF) to finance green projects. Bulgaria has not yet adopted the climate adaptation strategy. Due to delays in adopting the Climate Change Mitigation Act, the Third National Action Plan on Climate Change for the period 2013–2020 is not sufficiently consistent with the legal requirements.

Air quality

The 1996 Clean Ambient Air Act, SG No. 45, defines the regulatory framework to limit and better monitor the emissions into the air from stationary sources and to fulfil the quality requirements for liquid fuels.

Bulgaria made some progress in terms of implementing the Act, for instance by adopting policy documents such as the 2007 National Programme to Reduce the Total Annual Emissions of Sulphur Dioxide, Nitrogen Oxides, Volatile Organic Compounds and Ammonia into the Air. However, Bulgaria has been struggling with achieving the limit values for key air pollutants. The EU thus launched an infringement procedure against Bulgaria as, despite a number of measures taken and some reductions in PM_{10} emissions registered at most monitoring points since 2011, data showed persisting non-compliance with the annual and/or daily limit values for PM_{10} in all the country's six zones and agglomerations, other than in Varna, which complied with the annual limit value once – in 2009 (chapter 7). Currently, there are two ongoing infringement procedures related to air quality (2009/2135, 2010/2109).

Water

The 1999 Water Act, No. SG 67, regulates water resources management including the ownership of water and water development systems and facilities. In 2014 the Act was amended to create a legal basis for implementation of the polluter-pays principle and the legal mechanisms for recovering the cost of resources and environmental costs for the widest possible range of services in the water sector. The 2005 Water Supply and Sewerage Services Regulation Act, No. 18, established the legal framework for the regulation of prices, accessibility and quality of water supply and sewerage services as provided by the water supply and sewerage service utility enterprises. The secondary legislation to the Water Act includes 16 ordinances and orders which aim to regulate and ensure the maintenance of water quantity and the appropriate water quality. Numerous further water-related provisions were adopted in the sectoral laws, such as the Spatial Planning Act.

Bulgaria has made limited efforts to consolidate the highly fragmented water legislation. A new water act was drawn up in 2004 but was never adopted, *inter alia* due to delays in development of sectoral laws on management of water systems and facilities. Consequently, the 1999 Water Act was amended more than 55 times up until 2016. The Act thus exhibits several gaps, including in relation to the responsibilities and the contents of the strategic documents for water management. The related provisions are repetitive and lack cross-references. For example, the content of and responsibilities for the river basin management plans (RBMPs) are regulated in three different chapters of the Act, including a separate section on them in chapter 10. Chapters 1 and 10 both regulate the division of responsibilities for managing waters at the national and at the basin level while not referencing to each other and differing slightly in content. The distribution of responsibilities and tasks for water management, the administrative procedures and the content of policy documents prescribed by the Act tend to be overly complex and increase the already high burden for the public administration.

Bulgaria has made some progress in implementing the water legislation and in increasing the coverage of the water supply system. In 2014, only two districts in Bulgaria (Kardzhali and Smolian) had less than full coverage by the centralized water supply system. Bulgaria faced several infringement procedures launched by the EU in the water sector due to the lack of transposition rules under the Water Framework Directive (chapter 6).

Protected areas

The 1998 Protected Areas Act, SG No. 133, defines six categories of protected areas and regulates their ownership, the regime of their protection and use, designation and management, and the managing authorities. The Act is further defined in the secondary legislation, including the 2000 Regulation for elaboration of management plans of protected areas, the 2000 Tariff for the fees in protected areas – exclusive state property and the 2000 Rules for Organization and Operation of the National Park Directorates. Since 2007, there has been an increase in the number of protected areas (chapter 9).

Management plans for protected areas are obligatory for national parks, nature parks, and managed and strict reserves, and voluntary for protected sites and natural monuments. . The first management plans for all three national parks were adopted – Central Balkan and Rila in 2001, and Pirin in 2004. To date only the updated management plan of Central Balkan National

Park has been adopted and is in force. As for the updated management plans of Pirin and Rila National Parks, their drafts have already been elaborated but are under a procedure for adoption.

The 2012 amendment of the Regulation for elaboration of management plans for protected areas foresees that the management plans for protected areas stay effective till the development and entry into force of new management plans which to replace them. In this way is guaranteed that a certain protected area shall not stay without a management plan. At present management plans are elaborated and adopted also for most of the nature parks.

The management plans for nature parks are assigned for development by the Nature Park directorates under the Ministry of Agriculture and Food and foresee regimes and norms for use which are obligatory for the owners and the users of these territories. The management plans of protected sites and natural monuments may be assigned by interested institutions such as local municipality or NGO but they can be elaborated only in case of approved by the minister of environment and water terms of reference. No matter who is assigning the elaboration of the management plans for protected sites or natural monuments once they are elaborated they have to be submitted back to MOEW in order to be adopted by the minister of environment and water after a coordination procedure with interested ministries. The regimes and norms for use which are imposed with the management plans of protected sites and natural monuments are also obligatory for the owners and users in these territories, which might be various. The management plans of nature parks, protected sites and natural monuments envisage the implementation of plans and programs which aim at improving the conservation status of natural habitats and habitats of species and stimulating of sustainable local economic development. These plans and programs are applied by all the interested stakeholders.

According to Protected areas Act the control over the implementation of the management plans is carried out by the corresponding Regional inspectorate of environment and water, Nature Park Directorate, municipalities and state forestry enterprises (under the Executive Forestry Agency).. The owners can create specialized units which to implement the management plans. As this provision in the Act is voluntary, this is rarely done.

Progress in terms of adopting and revising the management plans for protected areas under Natura 2000 and the action plans for animals and plants has been insufficient. To date, Bulgaria has adopted management plans for only five Natura 2000 sites (chapter 9). No comprehensive information is available about the level of adoption of the action plans to be developed.

Since 2007, Bulgaria has faced an increasing number of lawsuits and public complaints related to altered assigned use of protected areas in the coastal and mountain areas, including the Black Sea Area and the Pirin National Park. The developments in the Pirin National Park have been under the attention of UNESCO's World Heritage Committee for more than a decade (chapter 4).

Biodiversity

The 2002 Biological Diversity Act, SG No. 77, sets the regulatory framework for conservation and sustainable use of biological diversity. It is further specified in secondary legislative acts, including the 2009 Ordinance on terms and procedure for elaboration and adoption of management plans of protected sites Natura 2000 and the 2007 Ordinance on conditions and procedures for assessing the compatibility of plans, programmes, projects and development proposals with the protection purposes of protected sites Natura 2000.

Bulgaria encounters severe challenges in terms of definition of the borders of the protected sites and the designation and establishment of their regulatory and management regimes. Bulgaria is currently facing three infringement procedures concerning: the reduction of the designation area of six Special Protection Areas (SPAs) (Central Balkan, Kaliakra, Lomovete, Pirin, Rila, West Rhodopes) (2007/4850); - at present only for the site "Rila", after Bulgaria committed the extension for 4 sites, for "Rila" the SPA territory at present covers 72 per cent of the IBA, (for the site "Kaliakra", which was also subject to procedure 2007/4850 the procedure is now united with 2008/4260) the authorization on the Kaliakra Bird and Biodiversity Area (an Important Bird Area) of wind-farm projects without adequate assessment of environmental impact (2008/4260); and the authorization of numerous projects in all SPAs without taking account of the cumulative impact (2008/4461). Bulgaria has also not yet implemented the special monitoring programmes for protected areas and the Natura 2000 sites (chapter 9), but it is foreseen to be realized in the frame of the National system of monitoring of biodiversity.

Genetically modified organisms

The 2005 Genetically Modified Organisms Act, SG No. 27, is in line with the EU legislation, and some

parts of it even set stricter conditions. Initially, the Act prohibited several GM versions of crops important for Bulgaria (tobacco, oil-yielding rose, grapevines, all vegetables and fruits, cotton and wheat) from being released into the environment, while leaving the door open for the most common GM crops like maize, soybean and rapeseed. This changed in 2010, when Bulgaria adopted an official ban on GMO cultivation. Since 2011, Bulgaria also has an official ban on MON810, as a decision of the Government. The official confirmation of this decision by the Council of Ministers followed in June 2014. Non-governmental organizations (NGOs) were one of the key drivers behind the actual ban on GMOs in Bulgaria.

Chemicals

The 2000 Protection Against the Harmful Impact of Chemical Substances and Mixtures Act, SG No. 114, introduces procedures to reduce the risks of substance use to human health and to the environment. The responsibility to manage the risks from chemicals and to provide safety information on the substances was given to industry, which has to collect information on the properties of used chemical substances.

The Act is accompanied by numerous secondary legislative acts including the Order on Guidelines for enforcement of Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) clarifying the target groups and the enforcement priorities, the coordination and cooperation of the enforcement authorities, the planning, performing, reporting and follow-up of the REACH inspections, as well as the penalty and administrative measures in case of non-compliance. An instruction for planning and reporting of the environmental inspections including REACH and EU Regulation on the Classification, Labelling and Packaging of Substances and Mixtures was issued in 2010.

Since 2007, registration, evaluation, authorization and restriction of chemicals were improved as required by the Act. Coordination mechanisms were strengthened, for instance by establishing the Standing Committee for Implementation of REACH in 2009. Early identification of the intrinsic properties of chemical substances was improved by increasing the number of controls of registrations of substances and of authorizations of substances. The control of the enforcement of the common system for the classification and labelling of such substances has increased and the number of cases of non-compliance has risen since 2011 (table 1.1).

Noise

The 2005 Protection from Environmental Noise Act, SG No. 74, established the regulatory framework for assessment, management and control of environmental noise emitted by road, railway, air and water traffic, by industrial installations and facilities and by local noise sources.

Bulgaria made progress in implementation, in particular in relation to development and approval of strategic noise maps and action plans to reduce noise pollution. From 2009 to 2014, such maps and action plans were assigned for development and approved for agglomerations with a population of more than 100,000 residents, including Sofia, Plovdiv, Varna, Burgas, Pleven, Ruse and Stara Zagora, and for the main traffic road sections with more than three million vehicles per year. Bulgaria reported on time on the approved maps and action plans. From 2009 to 2014, such maps and action plans were assigned for development and approved for agglomerations with a population of more than 100,000 residents, including Sofia, Plovdiv, Varna, Burgas, Pleven, Ruse and Stara Zagora, and for 1,044 km of major traffic road sections with more than three million vehicles per year..

Soil

The 2007 Soils Act, SG No. 89, provides a regulatory framework for the protection of soils and their functions, and for their sustainable use and long-term restoration. It also determines management bodies, strategic documents and the monitoring and control process. The Environmental Protection Act, Agricultural Land Conservation Act, Waste Management Act and Protection Against the Harmful Impact of Chemical Substances and Mixtures Act also include provisions on sustainable land management. The implementation of the Soils Act has been limited. Bulgaria has not yet adopted the National Programme for Soil Protection, Sustainable Use and Restoration, for example.

Environment-related provisions in sectoral laws

Bulgaria increasingly mainstreamed environmental protection into the sectoral legislation, including agriculture, forestry, energy, industry, tourism and transport. The most progress was achieved in integrating biodiversity conservation, climate change and air protection requirements into the sectoral laws.

Table 1.1: Controls of the enforcement of the common system for the classification and labelling of chemical substances and the number of cases of non-compliance, 2011-2014, number

	Controls		Cases of non-compliance	
	2011	**2014**	**2011**	**2014**
Hazard classification	2 809	11 113	48	217
Hazard communication in form of:				
Labelling	2 902	11 113	72	679
Packaging	2 655	11 113	18	82
Harmonization of classification and labelling of:				
Substances	1 875	4 972	1 874	4 972
Imported goods	415	1 103	415	1 103

Source: Ministry of Environment and Water, 2016.

There is also a practice of adopting secondary sectoral legislation to mainstream or further specify the environmental provisions in the sectoral laws. For example, the 2010 Guidelines on sustainable management of forests on Natura 2000 network, covering 23 types of forest habitats in Bulgaria, aim to promote best practices and the use of a common methodology. The Ordinance on logging in the forests was amended in 2014 to include provisions allowing forest management within forest habitats included in Natura 2000 sites to be carried out in a way that maintains and restores the habitats' favourable conservation status. In relation to the enlargement of the area of protective forests in 2015 the Ordinance on logging was amended once again and a new chapter 6 "Specific requirements at performing logging in protective and special forest territories" was developed.

The aim of this chapter is to determine the special rules for management and implementation of fellings in forests with special and protective functions. With regard to the introduction of Forest Ecosystem Services (Benefits) in the forest planning on regional level new Regulation for inventory and planning in the forest territories was developed. In accordance with the Forest Law this Regulation outlines the main principals in development of Regional Forest Plans that will include zoning of forest territories according to the ecosystem services they provide. Annex No13 to article 52, para 5 of this Regulation shows the correlation between the functional zoning and the social forest ecosystem benefits for the different categories of forest territories.

The sectoral legislation increasingly includes environmental provisions at the implementing level, clarifying the responsibilities and obligations for environmental protection. For example, the 2011 Energy from Renewable Sources Act regulates the division of competences between the Ministry of Environment and Water and other sectoral ministries as well as subnational authorities. The amendment to the Energy Act in 2015 includes an obligation to create an electric power grid security fund including a Ministry of Environment and Water representative.

However, large parts of sectoral legislation are still not sufficiently coherent with the existing environmental legislation, in particular waste legislation.

Bulgaria introduced a regulatory impact assessment (RIA) as an obligatory step in the law-making procedure. The adoption of the Organization Rules of Council of Ministers and its Administration in 2013 introduced a requirement for assessment of impacts of all legislative proposals on the economy and employment that are submitted for approval to the Council of Ministers. In 2014, the Council of Ministers adopted an updated guide for conducting the RIA for the national legislation to create the conditions for development of an RIA system, which go beyond the scope of the current RIA on economic activity and employment.

The amendment of the Statutory Instruments Act in 2016 (effective from 4 November 2016) and the Ordinance on the scope and methodology for carrying out impact assessment (adopted with Decree No 301 of the Council of Ministers from 11.11.2016) introduced a legal obligation to conduct at the earliest possible stage a partial impact assessment of all legal documents and if necessary a full impact assessment. However, the existing legislative frame for RIA does not specify the capacity building measures for the RIA.

1.2 Policy framework

The Government maintains a website with all national level policy documents, including those related to sustainable development and environmental

protection (www.strategy.by). The website also includes drafts of policy and legal documents on implementation of some policy documents, and provides opportunity for the public to submit comments on the drafts.

Sustainable development

Since 2007, Bulgaria has strengthened its policy framework for integration of environmental concerns with social and economic concerns by adopting the National Development Programme Bulgaria 2020 (NDP BG 2020), the National Reform Programme and the Government Programme for Stable Development.

The NDP BG 2020 is a strategic and programming document detailing the objectives of the development policies across sectors. It is specified and detailed through a three-year action plan, which is updated and reported annually, making it possible to refine existing and add new measures, depending on changes in socioeconomic conditions, the financial framework and the country's commitments to the EU. The first Action Plan, for 2014–2016, was adopted in 2014, while the two updates to the Plan were adopted in 2014 and 2015 with time horizons of 2015–2017 and 2016–2018 respectively, including reports for implementation. The NDP BG 2020 is further specified in the regional and the municipal development plans. The entire process of elaboration, implementation, and monitoring of the indicators of the NDP BG 2020 is coordinated by the Ministry of Finance.

The National Reform Programme is a tool for integration, coordination and monitoring of different policies and initiatives; for example, concerning a green economy, it encompasses research and development, pro-innovation infrastructure, innovations in enterprises, energy efficiency and renewable energy, introduction of appropriate incentives and mechanisms for effective water use, promoting investments in modern facilities for waste recovery through recycling, reuse and/or extraction of secondary raw materials and energy, etc. As at early 2016, updating of the National Reform Programme for 2016 is ongoing.

The 2015 Government Programme for Stable Development for the period 2014–2018 prepared in accordance with the Law on Public Administration provides mechanisms for the integration of environmental policies with policies in other sectors. It covers 21 areas and has concrete goals and measures, including ecology and environmental protection, prevention and control of the risks of disasters and accidents. Measures on environmental protection are included and reported on a number of priorities from the Government Programme, in particular highlighting the need for nature conservation, mitigation of adverse climate change, sustainable economic growth through energy and resource efficiency, and construction of ecological infrastructure.

The three key overarching policy documents, together with the accompanying policies, contributed to improving the programming of the development of Bulgaria until 2020. In particular, they contributed to increasing the interdependence, coherence and synergy of environmental policies with other priority national policies. They also contributed to establishing the environmental policies as an integral part of the comprehensive national long-term strategic framework. The NDP BG 2020, for example, summarizes all adopted strategic documents and links the national priorities of Bulgaria across sectors and levels with the EU objectives in the context of European Commission's Europe 2020 strategy. At the same time, the NDP BG 2020 provides for integration of environmental considerations in the sectoral policies.

Environmental protection

After the National Environmental Strategy for the period 2000–2006 expired, a new strategy and action plan for the period 2009–2018 was drafted with public consultations. However, the strategy was not adopted due to changes in the Government in the period 2009–2014. In 2012 the Government dropped the idea of adopting this overarching policy document and declared the NDP BG 2020 to perform the role of a national environmental strategy.

The NDP BG 2020 insufficiently fulfils content requirements of the NES as outlined in the Environmental Protection Act. First, environmental protection is neither one of its key objectives nor one of its eight priority areas. Moreover, the NDP BG 2020 does not include an analysis of the key impact factors such as climate change, chemicals, noise and soil and fails to identify the corresponding objectives and priorities for these areas of environmental protection. This is particularly problematic because, according to the Environmental Protection Act, the national plans and programmes by environmental media and impacting factors shall be elaborated on the basis of the NES.

A majority of municipalities adopted municipal environmental protection programmes (MEPPs). However, many of them expired or were not revised in the requisite time. Only a few municipalities made the

implementation reports publicly available. There is no legal obligation to collect information on the development and implementation of the MEPPs across the country.

Waste

The National Waste Management Plan (NWMP) represents the key strategic framework for achieving resource-efficient and sustainable waste management. The second Plan expired in 2007. The third Plan, for the period 2009–2013, was adopted with a two-year delay. The fourth Plan, for the period 2014–2020, includes an Action Plan with eight programmes, including the National Waste Prevention Programme, which was adopted for the first time (chapter 8).

Since 2007, Bulgaria has adopted several further waste substrategies, including the National Strategic Plan for a Phased Reduction of the Quantities of Landfilled Biodegradable Waste for the period 2010–2020. In 2011, the National Strategic Plan for Management of Construction and Demolition Waste for the period 2011–2020 provided the first strategic framework for coordinated management of construction and demolition waste. In 2013, the Ministry of Environment and Water drafted a National Strategic Plan for the Management of the Urban Wastewater Treatment Plants Sludge on the Territory of Bulgaria for the period 2014–2020.

Bulgaria achieved insufficient progress in terms of developing and adopting waste policies at the local level. About 95 per cent of municipalities responding to a survey of the National Association of Municipalities of Bulgaria reported that they have adopted MWMPs for the period 2003–2012. Thus, a majority of them followed the instructions for development of MWMPs issued by the Ministry of Environment and Water in 2006. In most cases, the MWMPs were integral parts of the MEPPs.

The municipalities not responding or not having such programmes for the period 2003–2012 were mostly small municipalities along with a few medium-sized ones. The MWMPs for the period 2003–2012 remained effective until July 2014. However, municipalities largely failed to adopt the revised MWMPs for the period 2014–2020 on time, as required by the 2012 version of the Waste Management Act.

Only 5 per cent of municipalities have taken the first steps to revise their MWMP in light of the NWMP 2014–2020. MWMPs have to have the same validity period as the NWMP, which is hardly feasible given that municipalities have to wait for the approval of the NWMP 2014–2020 before starting with the revision and adoption of their new MWMP. While the RIEW controlling the revision of the MWMP can impose a fine for non-compliance on municipalities, this was not enforced in practice.

The legal and institutional mechanisms are insufficient to ensure coherence between the NWMP and the MWMPs. The Ministry of Environment and Water issued guidelines for the municipalities to support them in updating their MWMP and RWMP. . Moreover, there is no legal obligation to collect information on the development and implementation of the MWMPs. Municipalities are obliged to report to the municipal councils and RIEW annually on the implementation of their MWMP.

Climate change

The National Action Plan on Climate Change represents the key overarching document on climate protection. Since 2005, Bulgaria has adopted three consecutive action plans (2005–2008, 2008–2012 and 2013–2020) (chapter 5).

Bulgaria does not have a national strategy on climate change adaptation. In the development process, the Ministry of Environment and Water developed two documents: the framework document "National climate change risk and vulnerability assessment for the sectors of the Bulgarian economy for the period 2016–2005" and "Financial disaster risk management and insurance options for climate change adaptation in Bulgaria". The former focuses on the risk of climate-change-related natural disasters on the basis of climate models and scenarios in 2014, and assessed by a system of indicators the vulnerability of economic sectors to future climate change; the latter analyses the importance of the insurance business in the prevention of and adaptation to climate change risks (chapter 5).

Bulgaria’s policies and actions to adapt to climate change are fragmented. Several sectoral policy documents adopted since 2007 include adaptation measures. For example, the Executive Forest Agency under the Ministry of Agriculture and Food has adopted a programme of measures to adapt forests to and mitigate the negative impact of climate change on them in 2011, which is to be integrated into the national adaptation strategy.

Air Quality

The 2007 National Programme to Reduce the Total Annual Emissions of Sulphur Dioxide, Nitrogen Oxides, Volatile Organic Compounds and Ammonia into the Air for the period until 2020 is accompanied

by an action plan with measures to ensure the implementation of the EU Directive on national emission ceilings for certain atmospheric pollutants (2001/81/EC).

All the municipalities with poor air quality in respect to PM_{10}, have developed programmes to reduce the level of pollutants and to achieve air emission limit values as required by the Clean Ambient Air Act. However, actions undertaken, in particular in relation to PM_{10}, were either not suitable or insufficient. In particular, the implemented measures to reduce the levels of PM_{10} did not contribute sufficiently to the achievement of the established levels within the established deadlines.

Consequently, the EU launched an infringement procedure against Bulgaria for not fulfilling the annual and daily limit values for the presence of PM_{10} and the obligation to draw up programmes for abatement of the pollutant levels and for reaching the approved limit values to keep the exceedance period as short as possible.

The poor air quality also had a significant negative impact on health. Bulgaria ranked the highest among the EU-28 in terms of years of life lost attributable to $PM_{2.5}$ exposures in 2012. Bulgaria does not yet have a targeted strategy to address pollution with PM_{10} and a strategy that addresses the various health risks related to high air pollution in a targeted way.

Water

The 2012 National Strategy for Management and Development of the Water Sector specifies basic objectives, stages, means and methods for the development of that sector. The current Strategy, for the period 2013–2037, followed the Strategy for the period 2004–2015. The 2014 Strategy for Development and Management of the Water Supply and Sewerage Sector of the Republic of Bulgaria 2014–2023, No. 267, specifies the main objectives, priorities, stages and requisite resources and sources of financing for the construction and development of water supply and sewerage systems and for improvement of the quality of water supply and sewerage services.

Bulgaria was in some delay with adopting the Strategy for the Protection of the Marine Environment of the Black Sea (Marine Strategy). Finally the Marine Strategy was adopted but the Council of Ministers in December 2016.

Bulgaria was in some delay with adopting the RBMPs for the programming period 2016–2021 that provide an overarching, time-based strategic framework for water management at the basin level. Bulgaria also was in some delay to adopt the flood risk management plans on the basis of the flood hazard and flood risk plans by 2015 as required by the Water Act. Due to this, the EU launched an infringement procedure against Bulgaria. No flood risk assessments were conducted by 2011 and no flood risk maps assessing the potential impact of future floods were developed by 2013. Finally the RBMPs for the programming period 2016–2021 and the flood risk plans were adopted by the Council of Ministers on 28 December 2016.

Biodiversity Conservation

The work related to biodiversity conservation follows the National Strategy for Biodiversity Conservation and the Second Biodiversity Action Plan for the period 2005–2010. The update of both documents has been delayed. The Ministry of Environment and Water is currently preparing the updated strategy and the action plan for the period 2016–2022 in order to achieve long-term biodiversity conservation and implementation of both the Aichi Biodiversity Targets and the EU Biodiversity Strategy to 2020.

The National Information and Communication Strategy for Natura 2000 Network for the period 2014–2023 supports the entire process of communication of Natura 2000 for 10 years. The National Prioritized Action Framework for Natura 2000 for the period 2014–2020 facilitates the integration of the actions set therein in the future programmes funded from different financing sources, including the European structural and investment funds (ESIFs) and the national budget. In 2012, Bulgaria also adopted the National Plan for the Protection of the Most Important Wetlands 2013–2022 (chapter 9).

Chemicals

As required by the Protection Against the Harmful Impact of Chemical Substances and Mixtures Act, an updated National Action Plan for Management of Persistent Organic Pollutants was adopted for the period 2012–2020.

Soil

There is specialized policies for soil protection – Soil act. Currently a National programme for soil protection, sustainable use and restoration is developed.

The National Plan for Development of Organic Agriculture in Bulgaria for the period 2005–2013 offers a system of measures to stabilize, preserve and restore natural resources, and for rural development and to prevent land abandonment. The National Action Programme for Sustainable Land Management and Combating Desertification 2013–2020 determines the factors and prerequisites for the processes of degradation of ecosystems and identifies practical steps to overcome the dangers of destruction and desertification of soil resources and to preserve biodiversity and water balance. The Programme also provides practical measures for sustainable land management and to combat desertification, as well as the necessary resources for their implementation.

Environmentally related provisions in sectoral policies

An increasing number of sectoral policies, including industry, energy, housing and utilities, agriculture, land use, forestry, transport, education and science, contain environmental provisions at declarative as well as implementing level.

The National Energy Strategy until 2020 sets a goal to improve energy efficiency by 25 per cent to save more than 5 million toe primary energy compared with the baseline development scenario, by 2020. The National Renewable Energy Action Plan defines environmental measures such as the prevention of the harmful effects of renewable energy sources (RES) on the environment and especially on biodiversity, species and habitats in Natura 2000.

The Innovation Strategy for Smart Specialization 2014–2020 considers resource efficiency innovations in the water and waste sectors and includes mechatronics and clean technologies as one of four thematic areas of specialization.

The National Strategy for Sustainable Development of Agriculture for the period 2014–2020 includes sustainable management of natural resources and activities related to climate change as a priority. The National Strategy for Sustainable Development of Tourism for the period 2009–2013 includes strategic objectives to conserve, protect and improve the quality of tourism resources, including natural, cultural and anthropogenic resources.

The National Programme "Digital Bulgaria 2020" with the Roadmap 2016–2020 includes the objective to promote further development and maintenance of the information systems for electronic services and information about the environment.

The Strategy for the Development of the Transport System of the Republic of Bulgaria until 2020 includes Priority 5 "Reduction of the transport sector negative impact on the environment and human health". The major objective which should be implemented until 2020 is the creation of sustainable transport system complying with the economic, social and environmental requirements and fully integrated and competitive.

The National Strategy for Regional Development for the period 2012–2022 includes measures for the development of the infrastructure for environmental protection and frames biodiversity protection as a priority.

The National Strategy for Development of the Public Procurement Sector defines the strategic framework of the state policy in the field for the period 2014–2020 and includes a measure to promote environmentally friendly ("green") public procurement.

The National Strategy for Small and Medium-sized Enterprises 2014–2020 includes as targets for SMEs to invest in energy efficiency, and to develop and offer "green" products on the market and also use them in their own production processes, and declares that the state should provide financial incentives for this purpose and should inform investors about all opportunities related to "green" technologies. One of the priority areas of the Employment Strategy 2013–2020 is the promotion of employment in "green" jobs.

The National Strategy for the Development of the Forest Sector in the Republic of Bulgaria 2013 – 2020 defines three strategic middle-term goals:

- Ensuring the sustainable development of the forest sector through achieving an optimal balance between the ecological function of forests and their ability to prove long-term material benefits and services;
- Enhancing the role of forests for ensuring economic growth in the country and more balanced social-and-economic development from territorial point of view;
- Increasing the input of the forest sector in the green economy.

Efforts have been applied to ensure the mainstreaming of environmental considerations in the operational programmes through which Bulgaria receives assistance from the EU (box 1.1).

Box 1.1: Mainstreaming of environmental considerations in operational programmes other than OP "Environment"

The 2013 "Guidelines on Mainstreaming of Environmental Policy and Climate Change Policy in CP, CAP and CFP Funds 2014–2020 Phase: Programming of the Common Strategic Framework Funds" provides strategic guidance for the Managing Authorities of the operational programmes (OPs) for introducing environmental requirements in the programming process of European structural and investment funds (ESIFs). The use of guidelines was monitored by the representatives of the Managing Authority of the OP Environment in all working groups for the elaboration of the OPs. In January 2016, the document "Guidelines on Mainstreaming of the Environmental Policy and Climate Change Policy – phase "Implementation of the Partnership Agreement and the programmes in 2014-2020 programming period"" was approved by the Council of Ministers Decision. The aim of the second phase of the mainstreaming guidelines is to assist the Managing Authorities in the practical application of the principle of sustainable development at the stage of approval and implementation of the operations. The document contains project selection criteria resulting mainly from mandatory requirements under the effective legislation applicable to EP and CCP and criteria setting higher requirements giving priority to project proposals, which contribute to EP and CCP to a higher degree. These criteria are expected to be included in the specific calls for proposals of the programmes, where applicable, according to their scope. They may be introduced as a subcriteria that represent alternative options for evaluating the environmental compliance of individual projects.

Local policies

The municipalities are required to develop and adopt policies, including plans, programmes and strategies, in many areas of environmental protection, such as:

- Programmes for environmental protection;
- Plans for liquidation of the consequences of emergency and abrupt pollution on the territory of the municipality;
- Waste management programmes;
- Action plans for wild animals and plants;
- Action plans for preventing and reducing environmental noise;
- Programmes for soil protection and recovery and sustainable land use;
- Programmes for abatement of the pollutant levels and for reaching the emission limit values;
- Operational action plans for reduction of exceedance of established norms for ambient air quality;
- Programmes for achievement of compliance of the bathing zones in the territory of the municipality.

Further relevant sectoral municipal plans and programmes that include sections on the environment are: municipal development plans, energy efficiency programmes, municipal master plans, municipal urban transport development plans, municipal road repair/reconstruction plans and municipal tourism development strategies.

The municipalities commonly adopt only a few of the environmental policies and other sectoral policies with relevance for environmental protection, even though they are prescribed by the legislation. The most common policies that municipalities adopt are the municipal development plans, municipal master plans, MEPPs, MWMPs and, for the bigger cities, operational action plans for reduction of exceedance of established norms for ambient air quality.

A major incentive for adoption of the local environmental documents has been the fact that they represent a basis for justification of project applications by the municipalities and other local actors to the national and EU budget and funds. The projects may be financed only if they are justified as priority projects in the respective programme or plan. In this respect the municipal administration pays close attention to the priorities defined in them. Local policies often follow EU and national policy priorities in order to substantiate the project proposals of municipalities in these areas. For instance, the municipal development plan 2007–2013 of Dobrich was updated every year after its adoption to include new projects in the action plan that could be financed by OP funds. Especially when funding derives from the OPs, the relevance of the municipal environmental policies is critical and municipalities tailor municipal environmental policies to environmental investment needs.

The responsibility to implement the MEPPs usually lies with the municipal administrations. In the case of the MWMPs, the contractors of waste management services carry this responsibility. Every year municipalities have to submit a report on implementation of their MEPP to the municipal council for approval. Municipal councils thus have a control function.

A majority of the municipal environmental policies were not revised in time to account for the legislative changes and to justify new environmental investments. The municipal environmental policies are often very technical and identify a range of goals without providing sufficient information on how some of the main goals could be achieved. The financial part with estimated costs and sources of funding is not always included. Some strategic objectives of the programmes are too general and do not refer to any concrete data or analysis. Often there is no proper discussion of factors and analysis of background

conditions and of possible forms of cooperation by all actors at local and national levels. At times the stated goals do not sufficiently relate to the determined measures. The public participation measures are often reduced to a media campaign and preparation of a list of stakeholders. Pressing issues such as illegal dump sites are often not sufficiently addressed. Many municipal environmental policies include an overburden of background information and identify priority problems, but do not provide measures to solve them. For example, Teteven's MEPP for the period 2009–2012 and MWMP for the period 2008–2012 identify the lack of a soil protection programme, but there is no provision in the MEPP to fill this gap.

Waste management (regional landfills) and water management (wastewater treatment and sewerage systems) were highest on the municipalities' agendas, also because these were the greatest immediate problems. While some issues are considered to be typical local issues, others are increasingly perceived and managed as non-local – including biodiversity and climate change.

The municipal environmental policies are to be prepared in accordance with the legislation and national policies and to comply with the guidance of the Ministry of Environment and Water on the content and structure of such programmes. In practice, the guidance provided by the Ministry of Environment and Water is not always followed, especially at the stage of implementation.

1.3 Green economy initiatives

Largely driven by the EU requirements, Bulgaria has continuously strengthened its legal framework to promote its transition towards a green economy. For example, so as to promote investments in modern facilities for waste recovery through recycling, reuse and/or extraction of secondary raw materials and energy, Bulgaria applied different regulatory and economic/financial instruments. For example, contracting authorities of investment projects financed with public funds were made responsible for the use in construction of a certain share of recycled building materials, which share will be increased gradually until 2020.

The 2015 Energy Efficiency Act, No. 35, has set minimum energy performance requirements for new buildings, for the major renovation of buildings and for the replacement or retrofitting of building elements (heating and cooling systems, roofs, walls) in order to ensure that the designs of new residential buildings are compliant with the high efficiency standards. The Promotion of Employment Act provides a definition of "green jobs". However, there are almost no legally binding obligations or targets at national or local level related to promotion of green initiatives.

The NDP BG 2020, the National Reform Programme and the Government Programme for Stable Development for the period 2014–2018 provide, to some degree, long-term strategic guidance for the transition towards a green economy in Bulgaria. In addition, environmental and sectoral legislation and policies such as the National Action Plan for Promotion of Green Public Procurement (GPP) for the period 2012–2014 included provisions such as objectives and targets related to implementation of green initiatives.

The Action Plan identified objectives and quantitative targets for the central and local administration and bodies governed by public law. Although the Plan has expired, it is still relevant with respect to goals and measures. According to the monitoring report, Bulgaria is far from achieving these targets, but there are some positive signals, for example the GPP of paper. The National Strategy for Development of the Public Procurement Sector 2014–2020 *inter alia* previews the elaboration of guidelines on GPP aimed at facilitating such procurement in Bulgaria, but there is still no progress in its implementation.

Sectoral policy approaches to a green economy in Bulgaria are not sufficiently integrated due to the lack of coordination on development, implementation and monitoring of the policies and initiatives to promote a green economy. There are no specific coordinating mechanisms for green economy policies in place. In addition, the institutional capacities for policy and project design, implementation and monitoring, raising the awareness of policymakers of the potential benefits to society from integrated green economy approaches, as well as effective knowledge exchange and transfer, information sharing and multi-stakeholder cooperation in the context of green economy, are insufficient.

Since 2007, Bulgaria has been scaling up investment in a green economy. By financing only those projects that are identified as priority projects in the relevant environmental policies at national and local levels, the compliance of green economy initiatives financed from the state budget with the strategic objectives in environmental protection was ensured. Bulgaria implemented a growing number of green economy initiatives with a focus on resource and energy efficiency and implementation of quality management, eco-labelling and energy management schemes and standards, sustainable urban transport, organic farming, sustainable fisheries and aquaculture,

green jobs and skills, green public procurement, waste recovery, sustainable use of water resources, and mapping and assessment of ecosystem services.

The Ministry of Environment and Water is the main authority in charge of funding for green economy initiatives through the OP "Environment" and its two subordinated project financing institutions, the Enterprise for Management of Environmental Protection Activities (EMEPA) and the NTEF (chapter 2). The Energy Efficiency and Renewable Energy Sources Fund (EERESF) and the Residential Energy Efficiency Credit Facility are financial mechanisms providing credits, credit guarantees and advice for investment projects related to the green economy. EMEPA support for green initiatives in the period 2003–2015 amounted to more than 2,600 contracts worth over six million leva. The NTEF has implemented four major programmes to promote green initiatives since 2007 (chapter 2).

Case analysis

So as to promote energy efficiency in multifamily residential buildings, Bulgaria has implemented a range of projects, for example "Demonstrative renovation of multifamily residential buildings", during the period 2007–2011, with the support of UNDP. That project addressed 50 pilot multifamily residential buildings and the spaces around the buildings in 13 cities. The dedicated financial resources amounted to 11 million leva. Another project, "Energy renovation of Bulgarian homes" was implemented from 2012 to 2015 and co-financed by the OP "Regional Development 2007–2013". The activities related to increasing the energy efficiency of Bulgarian homes were implemented in 300 buildings in 32 cities. In February 2015, a National Programme Energy Efficiency in Multifamily Residential Buildings was started with a budget of 1 billion leva, to provide 100 per cent grants to implement energy efficiency measures in multifamily buildings. The application period ends at the end of 2016.

Other financial instruments to support energy efficiency measures include EERESF, a financial institution providing credit, credit guarantees and advice to Bulgarian companies, municipalities and individuals for implementing investment projects for energy efficiency. The Residential Energy Efficiency Credit Facility, with a budget of €40 million, aims to provide financial support to householders or associations of homeowners for energy efficiency home improvements by providing them with loans and incentive grants through local participating banks. To help stimulate the updating of residential energy efficiency projects, an additional €14 million was earmarked. The grant financing comes from the Kozloduy International Decommissioning Support Fund.

The financial support to enterprises to increase their resource and energy efficiency and implement quality management, environmental protection, eco-labelling and energy management schemes and standards was provided through the OP "Competitiveness 2007–2013". The main beneficiaries were SMEs and large enterprises from both the productive and service sectors. The OP "Innovation and Competitiveness 2014–2020" started in 2015. However, there are still no open procedures for support for increasing the resource and energy efficiency of enterprises.

Under the OP "Transport" 2007–2013", Bulgaria funded the extension of Sofia subway network to establish an intermodal link (20 metro stations and 21 km metro lines are constructed). Also under the OP "Transport" 2007–2013 nearly 500 km of railway lines and 3 railway stations were rehabilitated; the costal centers in Varna and Burgas (Vessel Traffic Management Information System project) were constructed; the navigation systems and topohidrographic measurements on the Danube River were improved; the River Information System in the Bulgarian part of the Danube River – BULRIS was established.

Under the OP "Regional Development 2007–2013", Bulgaria funded the development of sustainable urban transport in the major urban agglomerations – Sofia and the next six largest cities, Burgas, Pleven, Plovdiv, Russe, Stara Zagora and Varna. The contracts for integrated urban transport amount to 494 million leva. Under the OP "Transport 2007–2013", Bulgaria funded the extension of the network of the Sofia metro to establish an intermodal link. The OP "Environment 2007–2013" provided support for purchasing environmentally friendly vehicles for the public transport systems of five big cities – 20 trams, 10 metro trains, 126 buses and 100 trolleys.

The Rural Development Programme, which is the main national instrument for providing the funding from the European Agricultural Fund for Rural Development Bulgaria for the period 2007–2013, supported organic plant production and organic beekeeping. In the current programming period of 2014–2020, the measure (now separated) will continue to support both, but in addition to this will also provide support for organic cultivation of livestock. The amount of financial support for conversion to organic farming will be €107.5 million and to support organic farming, €44 million.

So as to promote green jobs and skills, Bulgaria launched a national green jobs initiative in 2011 that provides a state subsidy to the employer for each new green job created. The subsidy is granted to enterprises that hire a person who has been registered unemployed for between six and 12 months. A list of economic activities that support the creation of green jobs has been approved. When applying for most of these, employers are required to submit a registration document (certificate) on schemes and systems for environmental management. The budget for the measure is about 1.1–1.2 million leva per year. While the initiative has existed since 2011, interest in it is still relatively low – several hundred new green jobs have been created each year. Further key sources for the promotion of sustainable job creation in Bulgaria include the OP "Human Resources Development 2014–2020", which will invest in the human resources of those enterprises that contribute to sustainable development.

In order to boost green public procurement, the Ministry of Environment and Water and the Public Procurement Agency provided practical guidance and training, mainly for procurement officials from public authorities. Increased efforts were made to integrate green public procurement into the financial instruments under ESIF. For example, according to the guidelines for the integration of environmental and climate change policy into the European structural and investment funds, projects that include GPP will have priority in selection within the procedures of the OP.

Bulgaria has set several initiatives to strengthen economic instruments in water management for sustainable use of water resources, including contracting two studies assessing cost recovery in water services and providing economic analysis of water use for the period 2008–2012 and estimates until 2021.

Bulgaria has implemented several projects to map and assess ecosystem services and has introduced the Payment for Ecosystem Services so as to achieve efficient and sustainable use of ecosystems and the services they provide. At national level, the initial mapping and ecosystem assessment was performed in 2013 in the framework of the development of the National Prioritized Action Framework. However, the report identified a need for validation of the resulting map. The active development of national methodology for ecosystem services assessment and biophysical valuation was thus not possible at that stage. Currently, nine methodologies are being developed, one for each ecosystem type that has been identified in Bulgaria, aiming at providing a synthesis between past and ongoing work with respect to cropland, grassland, heathland and shrubs, sparsely vegetated land, wetlands, rivers and lakes, marine, woodland and forests, and urban ecosystems and their services. OP "Environment 2014–2020" will provide support for the development of ecosystem services within Natura 2000. A number of local pilot projects were implemented in different regions.

Bulgaria ensured targeted financial support for promoting competitive, environmentally sustainable, economically viable and socially responsible fisheries and aquaculture within the OP "Maritime and Fisheries Programme 2014–2020".

The share of green economy initiatives financed by international donors and in the framework of bilateral cooperation is relatively low compared with financing from the EU and state funds. International organizations and bilateral cooperation continue to play a role in promoting green economy initiatives.

1.4 Strategic Environmental Assessment

SEA has been implemented since July 2004. The Environmental Protection Act establishes the general regulatory framework for SEA. It also regulates the correlation between SEA and EIA, providing an alternative between carrying out an SEA or an EIA in certain cases. For example, when a detailed urban development plan is required for a given project, the developer may request, or the competent authority can prescribe, that only one assessment (EIA) be carried out to avoid overlapping in both assessments. The SEA Ordinance further specifies the SEA system by providing lists of plans and programmes at national and subnational levels that are subject to mandatory SEA (Annex I) and that are subject to screening procedure (Annex II).

Bulgaria has an open scoping procedure that includes public consultation, although this is not a legal requirement of the SEA Directive. The public debates are obligatory when specified by law or in the case when more than two reasoned opinions have been received against the plan/programme within the consultation phase of the SEA. There is no requirement to publish the reports of public debates, but the results are being reflected in the SEA documentation and in the drafts of the plans/programmes.

The Environmental Protection Act was amended to clarify the criteria for determining the likely significance of the effects and the content of an SEA report in 2008, to define the obligations of the developer to support the experts preparing an SEA report in 2009 and to regulate the requirement for SEA

in case of the "minor modifications" of plans and programmes in 2015. The SEA Ordinance was also amended to revise the list of plans and programmes for which SEA is obligatory or required. The 2016 amendment, for example, introduced new plans and programmes in the waste, water, spatial development, energy, industry and tourism sectors for which SEA is mandatory.

The existing SEA legislation needs some improvement to guarantee the quality control of SEA, especially at regional level. There is a legal obligation to maintain a public central register providing an overview of all the SEA procedures across Bulgaria at the national and subnational levels and the Ministry of Environment and Water maintains such a registry on its website. Currently, this information is dispersed as each of the 16 RIEWs publishes separate information about the ongoing procedures within their territory but all information is linked in the public central register. The SEA legislation does not provide a definition of "reasonable alternatives", nor does it include a requirement concerning the number of reasonable alternatives to be included in the environmental assessment. The existing SEA legislation includes a description of the reasons for the choise of the alternatives studied.

The competent authority for SEA procedures at national level is the Ministry of Environment and Water, which has a separate department for EIA and SEA. RIEWs have the responsibility for SEA procedures at the regional and local level. In the RIEWs, there are structural EIA and SEA units with appointed experts whose job descriptions include the coordination of the procedures under EIA and SEA. There are 20 employees in the Ministry of Environment and Water and in the RIEWs with responsibility for the SEA procedures. This number is low in relation to the number of SEA screening procedures concluded since 2007 at the national level (4,269) and subnational level (255) (table 1.2).

While executing their powers, the competent authorities are supported by the Interinstitutional Commission, a specialized panel of the Supreme Environmental Expert Council (SEEC) to the Minister of Environment and Water, and by the environmental expert councils of the RIEWs. They review the SEA reports and their annexes after the consultation stage and vote a decision on the proposal of the Ministry of Environment and Water or of the RIEW to issue an opinion for concordance/discordance of the plan/programme. Their opinion is not binding. In the Commission and in the expert councils, representatives of the Ministries of Environment and Water, of Health, of Agriculture and Food and of Regional Development and Public Works are mandatory.

The work of the Interinstitutional Commission has not gone smoothly. As the Commission makes a majority decision to be presented to the Ministry, the representatives of the concerned public and the local authorities have very limited influence on that decision as the majority of the Commission members are the representatives of the ministries. Third, the Commission's decisions are only recommendations to the Minister/RIEW Director.

Table 1.2: SEA screenings and procedures, 2007-2015

	Ministry of Environment and Water		RIEW	
	SEA screening	**Mandatory SEA**	**SEA screening**	**Mandatory SEA**
2007	8	9	1 062	21
2008	6	6	720	30
2009	1	6	384	26
2010	16	3	487	40
2011	6	1	442	61
2012	13	1	253	22
2013	71	7	264	7
2014	17	16	349	4
2015	9	3	308	44
Total	**147**	**45**	**4 269**	**255**

Source: Ministry of Environment and Water, 2016.

In the period 2007–2015, 147 SEA screening procedures and 45 mandatory SEAs were conducted at the national level. At the subnational level, 4,269 SEA screening procedures and 255 mandatory SEAs were conducted (table 1.2). More than 97 per cent of the SEA procedures were implemented for land use plans.

The remaining 3 per cent were conducted for plans and programmes in the energy, water management, waste management and transport sectors. In some cases, the SEA resulted in the revision of the draft plan and programme. For example, in the National Programme for Ports Development, two of the proposed terminals were rejected because they conflicted with nature protected areas. In several cases, NGOs have raised concerns as to the proper coordination of SEA and Habitats Directive procedures.

Capacity building for SEA is largely limited to written instructions and guidance letters that are issued by the Ministry of Environment and Water and sent to the RIEWs and other relevant authorities. SEA manuals were issued in 2012 to upgrade the methodological capacity of the responsible authorities, including manuals for roads, railway projects, waste and wastewater, along with a practical handbook for SEA training including a list of rulings of the EU Court of Justice on SEA. The Ministry of Environment and Water organized several training programmes and organizes training workshops annually.

An electronic network including the EIA and SEA experts at national and regional levels was established in 2013, to promote the exchange of information and experience and for the electronic dissemination of information and documents by e-mail. In recent years, the Ministry of Environment and Water and the RIEWs have faced an increasing number of lawsuits against SEA decisions.

1.5 Institutional framework

Ministry of Environment and Water

The Ministry of Environment and Water is the main authority on the environment in Bulgaria. It is responsible for the development and implementation of the national environmental policy; elaboration of the environmental regulation system; coordination and control of the protection, conservation and rational utilization of natural resources, waste management policy and water management policy; as well as for coordination and management of financial resources on environmental matters, including of OP "Environment". The work of the Ministry of Environment and Water is further specified in the Rules of the Ministry of Environment and Water adopted by the Council of Ministers as well as in environmental and sectoral legislation.

The current structure of the Ministry of Environment and Water includes a Political Cabinet (7 employees), Secretary General, Inspectorate (4), Financial Controller, Information Security Officer, Internal Audit Directorate (10), Expert representatives in the Permanent Representation at the EU (3), the General Administration consisting of four directorates (81) and the Specialized Administration consisting of nine directorates (305) (figure 1.1).

The total number of staff in the Ministry of Environment and Water fell continuously, from 454 employees in 2007 to 413 employees in 2015, with two exceptions – in 2008 (468 employees) and 2010 (476). The number of employees in the Specialized Administration fell from 362 in 2007 to 305 in 2015.

The number of employees was reduced in the Water Management Directorate (from 40 in 2007 to 32 in 2015) and in the Air Protection Directorate (from 16 in 2007 to 13 in 2015). The number of employees increased in the Preventive Activities Directorate (from 18 in 2007 to 29 in 2015) and the Waste Management Directorate (from 19 in 2007 to 24 in 2015), the latter being enhanced to include soil protection in 2010. The Climate Change Policy Directorate, established in 2009 with 10 employees, grew to 13 employees in 2015. The largest number of specialized staff is employed in the Directorate General Operational Programme "Environment" (125), which was established in 2014[1].

Since 2007, the Ministry of Environment and Water has undergone four reorganizations reflecting new priorities and EU requirements. The number of directorates in the Specialized Administration was reduced significantly, from 13 in 2007 to 9 in 2015.

The changes included the establishment of the Climate Change Policy Directorate with responsibility for implementation of climate change mitigation in 2009, the abolishment of the Coordination of RIEWs Directorate and establishment of the Environmental Policies Directorate for policy coordination in 2009,

[1] Before the establishment of the Directorate General Operational Programme "Environment" within Ministry of Environment and Water in March 2014, two separate directorates were functioning separately as Managing Authority (MA) and Intermediate Body (IB) of OPE 2007-2013: The Cohesion Policy for Environment Directorate being MA of OPE 2007-2013 and the EU Funds for Environment Directorate being IB of OPE 2007-2013.

the abolishment of the Underground Resources and Mineral Resources Directorate and the enhancement of the Waste Management Directorate to include soil protection in 2011 and the establishment of the Directorate General Operational Programme "Environment" in 2014.

The work of the Ministry of Environment and Water is supported by the Collegium, a body presided over by the Minister of Environment and Water. Its main task is to discuss and approve the draft legislative and strategic documents before the procedures for public discussion, interinstitutional coordination, and consideration and approval of the draft documents by the Council of Ministers. At its meetings, the Collegium also discusses and approves draft internal documents of the Ministry of Environment and Water, progress in the implementation of different projects and other topical issues.

The Collegium consists of the deputy ministers, the Head of the Cabinet of the Minister, the Parliamentary Secretary, the Secretary General, the directors of directorates, the head of the Inspectorate, the head of public relations and protocol, and the executive directors of the Executive Environment Agency, and EMEPA. Depending on the specific topics discussed, heads of departments and experts can be invited to attend the meetings of the Collegium.

The SEEC is the highest advisory body to the Ministry of Environment and Water. The main panel of the SEEC proposes statements on EIA and on motivated proposals for modification of programmes for elimination of environmental damage resulting from past actions or inaction in privatization.

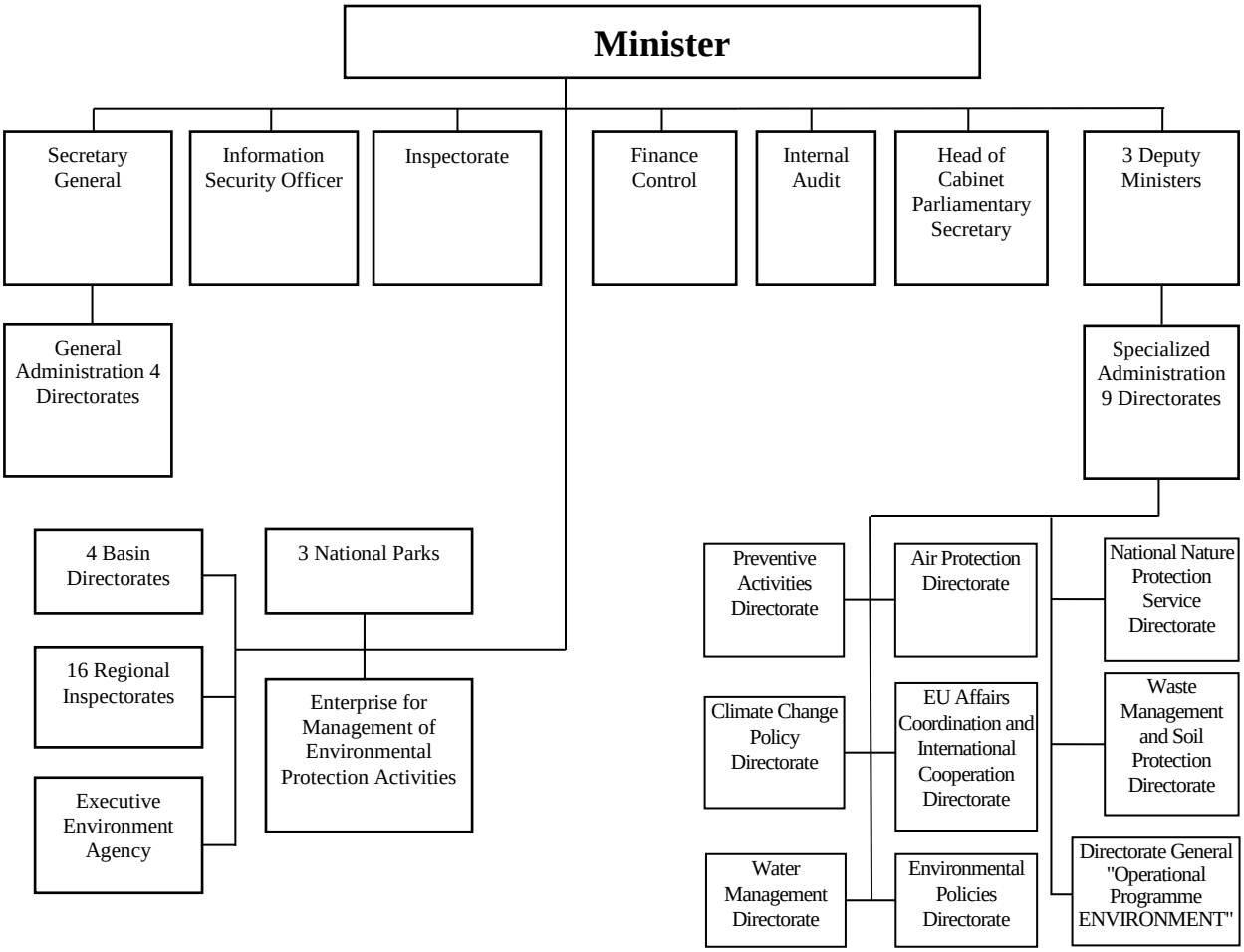
The SEEC has three specialized panels. The Interinstitutional Expert Environmental Council (IEEC) is responsible for proposing the approval of draft documentation connected with the implementation of the programmes for elimination of environmental damage resulting from past actions or inactions prior privatization. The Specialized Panel on the Protected Areas Management Plans makes decisions on draft national or nature park management plans and on the introduction of changes in approved national park or nature park management plans. The Interinstitutional Commission proposes decisions for statements on the SEA of plans and programmes and discusses SEA reports, with a focus on the environmental parts of plans and programmes.

The Ministry of Environment and Water established a number of further advisory and expert bodies:

- The National Biodiversity Council;
- The Standing Interinstitutional Working Group on Biodiversity;
- The Interinstitutional Coordination Group for Implementation of the Convention on Biological Diversity– Climate Change and Biodiversity;
- The Interinstitutional Coordination Group for Implementation of the Convention on Biological Diversity – Genetic Resources;
- The National Expert Council on Climate Change;
- The Interinstitutional Working Group on coordination of implementation of the Third National Action Plan on Climate Change for the period 2013–2020;
- The Supreme Advisory Water Council on water management at national level;
- The Consultative and Coordinative Council on the Protection of the Environment in the Marine Waters of the Black Sea on the development, implementation and monitoring of the Marine Strategy with Programme of Measures;
- The Expert Council for assessment of priority substances to develop and implement appropriate legislation to control risks in the preparation of dossiers for authorization or restriction of use;
- The Interinstitutional Working Group on Synergies to coordinate implementation of the international chemicals and waste conventions;
- The Consultative Commission on GMOs to provide opinions to the Ministry of Environment and Water and the Ministry of Agriculture and Food regarding the granting, modification and withdrawal of authorizations for contained use of GMOs and for release of GMOs into the environment and participate in the drafting of legislation related to biosafety.

However, the influence of these bodies and their role in environmental policymaking has been rather limited, in part due to their very low level of activity. The politics around their composition has been heavily criticized.

Figure 1.1: Structure of the Ministry of Environment and Water



Source: Ministry of Environment and Water, 2016.

Executive Environment Agency

The Executive Environment Agency is subordinated to the Ministry of Environment and Water and carries out the management, coordination and information functions as regards environmental protection. It:

- Administers the automated National System for Environmental Monitoring;
- Performs laboratory analyses in its own central and 14 regional laboratories;
- Provides information on the state of the environment and daily data on air quality and the radiological situation;
- Prepares and publishes nationally representative information about the environment and natural resources. For the purpose, a wide range of specialized Internet bulletins are developed – daily, three-month and annual. The National state of the Environment Report and other specialized reports are published on the website.
- Conducts integrated permitting procedures;
- Performs administrative management, and provides regular maintenance of and support to the European Pollutant Release and Transfer Registry;
- Conducts procedures for issuing and reviewing permits for GHG emissions trading and procedures for approving plans for monitoring of annual emissions and ton-kilometre data from aircraft operators for which administering member is Bulgaria;
- Performs the functions of national administrator managing the National Registry for GHG Emission Allowance Trading;
- Develops the National GHG Emissions Inventory;
- Is the National Reference Centre within the European Environment Agency.

In 2015, the Seveso procedure[2], previously managed by the Ministry, was handed over to the Executive Environment Agency and linked with the EIA process.

[2] The procedure regulated by the Seveso III Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC.

The Agency has existed in its present form since 1999. Since 2009, the Executive Director of the Agency is to be appointed, on a competitive basis, by the Minister of Environment and Water, in consultation with the Prime Minister. The number of staff has been reduced from 430 in 2009 to 390 in 2016. The Agency's work is supported by its Experts Ecological Council. The members of the Council are representatives of the Agency and the Ministry of Environment and Water. One of the key challenges that the Agency has encountered since 2007 is the lack of financial and administrative resources to maintain the laboratories and equipment (chapter 3).

Regional Inspectorates on Environment and Water

The 16 regional inspectorates on environment and water (RIEWs) represent territorial units of the Ministry of Environment and Water that are coordinated by the Environmental Policy Directorate of the Ministry of Environment and Water. RIEWs have regulatory, information and control functions. However, their main activity is enforcing environmental legal obligation and regulating the quality of environmental media and of the factors impacting on it at the subnational level. They control whether all sites within their territory are in compliance with national environmental legislation. Therefore, they are vested with sanctioning powers, monitoring the performance of municipalities and exercising an advisory and expert role in joint meetings with municipalities. They also review the draft MEPPs.

In 2012, the responsibility for issuing waste permits shifted from the Ministry of Environment and Water to the RIEWs. The 2010 amendments to the Waste Management Act, implementing the EU Regulation on shipments of waste, significantly stepped up the responsibilities of the RIEWs. In 2012, the sharing of responsibilities on EIA with RIEWs was introduced.

The work of the RIEWs is supported by expert environmental councils assisting RIEWs in the decision-making process on EIA and SEA. They include representatives of the RIEW and stakeholders at regional level – regional and municipal administrations, regional bodies of the sectoral ministries, basin directorates and national parks directorates, representatives of academia and NGOs.

RIEWs have played an essential role in terms of supporting policy development at the subnational level. RIEWs have a reputation of having the best available environmental expertise at subnational level. There is an established respect within municipal administrations for the decisions and guidelines of the RIEW. RIEW experts are in constant communication with municipal authorities. For instance, experts are often summoned by municipalities to provide opinion.

RIEWs have been fulfilling their information function. Important activities of RIEWs are related to awareness-raising, media relations and maintenance of web-based open access databases. RIEWs also provide a 24-hour "Green Hotline" for information and alerts. In 2007 the RIEW Veliko Tarnovo received the first honorary diploma for its contribution on access to information in the Ministry's system. In 2011 the Access to Information Programme nominated 11 of the 16 RIEWs in the "Institution most efficiently organizing the provision of public information" category on the occasion of the ninth celebration of the International Right to Know Day in Bulgaria. In addition, the RIEWs' information centres organize annual information and educational campaigns.

Basin directorates

The four basin directorates are the regional authorities to the Ministry of Environment and Water, which are responsible for water management at the basin level and they cover the 4 River Basin Districts in Bulgaria: for the Danube River, the Black Sea, the East Aegean and the West Aegean. . Each directorate is assisted by a basin council, which comprises representatives of regional and municipal administrations, regional structures of the Ministry of Health and the Ministry of Interior, water supply and sewerage companies, academia, companies - big water users and NGOs.

The basin directorates perform a range of management, regulatory, control and information functions, including the development and implementation of the RBMPs and the flood risk management plans (chapter 6). In addition to the RBMP and Flood risk management plan, the Black sea Basin Directorate is responsible also for the planning, development, actualization and the control reports of the implementation of the Program of measures to the Marine Strategy.

National park directorates

The three national park directorates – Rila, Pirin and Central Balkan – were established in 1999 as the regional authorities of the Ministry of Environment and Water. Their functions include development and implementation of the management plans. Since 2007, the national park directorates have played a key role in the commissioning of activities foreseen in their management and development plans and projects, coordination of control activities carried out by other

bodies in the national parks, monitoring of the components of the environment and maintenance of a database, and organizing informational and educational programmes.

Enterprise for Management of Environmental Protection Activities

The Enterprise for Management of Environmental Protection Activities (EMEPA) is a state-owned non-commercial enterprise providing funding (grants, interest-free and low-interest loans) for implementation of environmental projects and activities on water management, waste management, biodiversity conservation and protection of natural ecosystems. Beneficiaries are natural and legal entities (municipalities, enterprises, companies). It is chaired by the Minister of Environment and Water.

The Management Board includes the Deputy Minister of Environment and Water; representative of the Ministry of Finance; representative of the business sector; representative of the National Association of the Municipalities of Bulgaria; and the Executive Directors of the Executive Environment Agency and EMEPA.

The Management Board adopts priorities for funding. The main funding sources are the revenues from the environmental fees, penal decrees and fines, and earmarked funds from the state budget (chapter 2). EMEPA's budget also receives the proceeds of the sale of the annual emission allocations and the quotas for GHG emissions for aviation activities.

National Trust Eco Fund

The National Trust Eco Fund (NTEF) was created in 1995 to manage funds received through the mechanism of the transformation of part of the foreign debt of Bulgaria into projects for environmental protection ("debt-for-nature") (chapter 2). The NTEF also endorses the contracts with the beneficiaries upon project approval and monitors the project implementation.

The Managing Board is composed of an equal number of representatives of state and non-governmental organizations. Its chair is elected by the Council of Ministers, but only with the consent of the Advisory Board of the donors, and cannot be associated with a political party or administrative body. Members of the Advisory Board have the right to participate in meetings of the Managing Board, and have the power to veto projects that are financed with the Advisory Board's money. Both Boards together determine the strategy and policy of the Fund and the criteria for project selection, and make the decision to fund projects recommended by the Executive Board, which is responsible for the daily operation of the NTEF. Due to its governance set-up, management of the NTEF is relatively independent of the State.

The Managing Board submits annual reports on the activities of the Fund to the Council of Ministers through the Ministry of Environment and Water.

Sectoral ministries

The key competencies of the sectoral ministries in the field of environment are listed in table 1.3.

Municipalities

The responsibilities of local authorities on environmental protection are regulated across the environmental legislation (box 1.2). The powers of municipalities vary from full-scale legal powers regarding waste management, to developing policies and providing information on and support to administrative procedures such as SEA and EIA in the competence of the RIEWs, and to mere participation in procedures for designation of protected areas and elaboration the management plans for protected areas.

The main areas of local environmental governance are waste water management and air quality, because local administrations have both the legal obligations in these areas and the financial resources to build and manage such infrastructure.

Issues such as biodiversity and nature protection do not fall fully within the municipal competences and are sidelined because municipalities are not interested or able to invest time, staff and money in them. Municipalities have no explicit responsibilities on climate change. For many procedures, such as SEA and EIA, municipalities are not the leading authority but are involved in carrying out the procedures.

Municipalities do not have special budgets on the environment apart from the budget account for waste management, with funds collected from waste management fees.

Table 1.3.: Distribution of environmental responsibilities across sectoral ministries

Institution	Environmental responsibilities
Ministry of Agriculture and Food	Protection of agricultural lands; forest management policy; management of nature parks; payments on compensation measures
Ministry of Energy	Management of mineral resources and mining waste; energy efficiency and renewable energy policy
Ministry of Finance	Preparation and implementation of the National Development Programme Bulgaria 2020 and the National Reform Programme; fiscal and budgetary policy related to environmental protection
Ministry of Foreign Affairs	Coordination of multilateral environmental agreements (MEAs)
Ministry of Interior	Control over road vehicles with respect to the environmental noise
Ministry of Health	Monitoring the impact of the components of the environment and the working environment on human health and determining the state policy for health prophylaxis, the quality of drinking water and air in populated areas, noise management, ionizing and non-ionizing radiation and food safety
Ministry of Regional Development and Public Works	Spatial planning and construction policy; development of road infrastructure; housing policy; activities for the implementation of projects/programmes related to the renovation of residential buildings and improving energy efficiency in residential buildings; technical regulations and standards for building construction; Implementation of state policy in the water and sewerage sector; OP "Regional Development/Regions in Growth", co-funded by European Structural and Investment Funds ESIF
Ministry of Transport, Information Technology and Communications	Environment and energy policy in the transport sector; OP "Transport" 2007 – 2013; OP "Transport and Transport Infrastructure" 2014 – 2020 Control over compliance to the noise standards of air, rail and new road vehicles and infrastructure
Ministry of Tourism	Elaboration of the National Strategy for Sustainable Development of Tourism; regulation of the status and management of national resorts; certification of tourist sites; voluntary certification systems for quality and sustainable tourism development

Box 1.2: Main municipal competences in environmental protection

The main municipal competences in respect of environmental matters are:

- Horizontal legislation: as proponents of plans and programmes subject to SEA, they could be consulted on plans and programmes affecting them;
- Strategic planning: they are obliged to draft the environmental protection programmes to be passed by the municipal councils;
- Air quality: the municipalities can adopt programmes for the reduction of pollutant levels and control and manage the activities related to air quality. They can also establish local systems for monitoring and control of the quality of the ambient air;
- Biodiversity: they can make proposals for national and nature park designations as well as for designation of other protected area's categories and take part in the discussions for designation of protected areas. The municipalities are involved in the procedures for elaboration of management plans for protected areas. The municipalities also participate in the procedures for Environmental Impact assessment, Strategic environmental assessment and Appropriate assessment, carried out for plans, programs, projects and investment proposals for ensuring compatibility with the regimes and the subject of protection in protected areas and Natura 2000 sites;
- Noise: they are obliged to assign the preparation of the strategic maps on noise for agglomerations with more than 100 000 inhabitants while for the small agglomerations – on voluntary principle;
- Soil protection: they are responsible at local level for developing policy for the protection, sustainable use and rehabilitation of soils and for preparing related programmes. They can also submit proposals for the entering of contaminated soils in a register;
- Water: they are obliged to prepare the programme for the development of water supply and sewerage to be adopted by municipal councils. They can be members of the Supreme Advisory Water Council. They can also participate in the process of mineral waters concessions;
- Waste: they are obliged to prepare MWMPs and can associate in a municipal association for construction and exploitation of regional landfills;
- Energy efficiency: the municipalities can adopt energy efficiency programmes.

Source: Local environmental governance and environmental rules on the ground in Bulgarian municipalities, Plamen Peev, 2011.

Regional governors

The governors of the 28 administrative regions have very limited direct functions in environmental matters but oversee the lawfulness of local legal rules, i.e. they monitor the decisions of local authorities on legal rules (e.g. ordinances) for conformity with the national law. The 28 administrative regions are not aligned with the territories of the 16 RIEWs.

Further environmental responsibilities of the regional governors are identified under specialized acts, including the elaboration of reports on the status of the water infrastructure and the results of control activity in the region, and the appointment of commissions for annual inspection of the technical and operational status of dam walls and associated facilities as well as of potentially hazardous water sites. Since 2007 the regional governors have gained new responsibilities, e.g. since 2011 they have the competence to control the technical condition of hydraulic engineering facilities constituting state property within their respective region.

The regional governors enjoy strong informal authority to facilitate problem solving between municipalities in difficult situations when environmental problems are beyond the powers of the municipalities, for instance in the case of closure of illegal dump sites, redirecting waste or establishing a regional landfill. Such an occasion was the closure of the illegal dump sites in the Dobrich region in 2009. The regional governor's office successfully intervened with the municipalities, RIEWs and agricultural services to find a solution to the problem. The RIEWs can inform the regional governor if a municipality fails to fulfil its obligations, before taking more drastic action.

However, the regional governors do not have any real power to control and finance regional projects in the face of the increased regional processes in the waste sector (e.g. regional landfills). Without their active and legally grounded involvement in intramunicipal communication and cooperation, their capacity to help solve problems surrounding the regional aspects of environmental protection is very limited. Biodiversity, in particular, would benefit from more formal regional governance of shared natural resources in protected areas.

NGOs

NGOs have been active in relation to the conflicts between local development interests and environmental protection in highly sensitive nature areas. When municipal authorities have been supportive of such developments as new ski resorts, residential villages and complexes, and wind and solar energy parks in highly sensitive nature areas, due to their social and economic benefits for the local community, NGOs have intervened to defend environmental considerations, within the EIA and SEA procedures or through national campaigns. For example, the expertise and active position of NGOs was decisive in several "hot" EIA procedures (e.g. for the proposed golf course in Lukovit) and in campaigns to save marine and coastal habitats (e.g. Irakli beach) or against the construction of ski resorts (e.g. in Strandzha National Park). The activities of the environmental NGOs resulted in stronger protection of national parks and the banning of GMOs on the territory of Bulgaria.

NGOs generally play a marginal role in the formulation and implementation of environmental legislation and policies. The involvement of NGOs in the advisory and expert councils of the Ministry of Environment and Water and in the interministrial working groups has been low.

In the past few years a new type of environmental NGO has emerged, which aims at the balanced representation of economic and environmental interests in environmental legislation and policies. These NGOs are financially supported by businesses and primarily follow their business agenda.

There is no budget line in the national budget specifically for the environmental NGOs. At the local level, some municipalities have reserved local funds for NGO activities, but the amounts are marginal. Since the EU accession in 2007, the funding conditions for NGOs have changed (e.g. OPs have new conditions for beneficiaries) and many international donors have reduced or ceased to provide their financial support to NGOs. Consequently, many of the environmental NGOs that were set up in the 1990s closed down as a consequence of new financial and social conditions. There is also a trend towards increasing EU and international focus in the work of the environmental NGOs to increase their eligibility for public funding at the EU and international levels.

Special interest groups

The Bulgarian Chamber of Commerce and Industry, an independent professional and business organization comprising all legal entities engaged in business, has been actively and regularly involved in the policy process, for example in the working group to develop the OP Environment for 2007–2013 and for 2014–2020. The Chamber was also involved in a number of capacity-building projects on environmental

protection. The role of other business associations in environmental policymaking, such as the Bulgarian Industrial Association, Bulgarian Branch Chamber of Power Engineers, Bulgarian Branch Chamber of Machine Building, Bulgarian Chamber of Power Engineers, Confederation of Employers and Industrialists, and National Association of Small and Medium Business, was marginal.

The number of consultancy services for drafting environmental legislation and policies has increased significantly since 2007. Due to the lack of substantive capacity and sufficient in-house expertise at national and local levels, the development of environmental legislative and policy documents has been increasingly outsourced to external consultants. Drafting is undertaken mostly by consultancy companies from the bigger cities (Sofia, Varna, Plovdiv and Bourgas).

Coordination

The institutional mechanisms for coordinating and monitoring the implementation of environmental provisions in the sectoral policies are insufficient. In particular, in the water and climate sectors the distribution of functions and responsibilities among ministries has been wide, making coordinated action and integrated management of such sectors essential. For example, in the water sector the responsibilities are distributed among seven ministries, municipalities and water companies, which sometimes leads to a blurring of responsibilities between organizations. While water management is regulated by the law, coordination is not guaranteed in practice, due to the lack of institutional mechanisms for cooperation among the basin councils, basin directorates and ministries with water management functions of various types. The legislation has not provided for coordination mechanisms that will effectively ensure synergy in the water sector.

The Ministry of Environment and Water participates in numerous coordinating bodies established by the sectoral ministries and other state authorities, including, for example, the Council for Development. The Council is a high-level consultative body (comprising deputy prime ministers and ministers) chaired by a deputy prime minister. It coordinates, monitors and controls the development, implementation and reporting procedures for the NDP BG 2020 and the three-year Action Plan for its implementation. However, the power of the Ministry of Environment and Water to influence the decisions of the Council is limited and power struggles among the Ministry of Environment and Water and the sectoral ministries make coordinated action difficult.

Municipalities do not have any formal coordination mechanisms in place. Cooperation and coordination among the municipalities, and between them and the regional and national level authorities, largely takes place within two informal networks. The National Association of Municipalities is a network and platform for communication and coordination among the municipalities. It also represents municipalities in several advisory councils and working groups at the national level. It has only informal power, its activities take place on a voluntary basis and its involvement in policy and legal processes is not legally grounded in any legal obligations.

The Bulgarian Association of Municipal Environmental Experts was established in 1995. It includes environmental experts from more than 65 per cent of the municipalities. The environmental experts in municipalities not only manage environmental matters within the administration but, through their networks and associations, have become an important institutional actor in local environmental governance. They intensively rely on informal professional networks with neighbouring or similarly sized municipalities. The impact of the Association on legislation and policymaking is high, in particular in terms of knowledge transfer among municipalities and experts.

1.6 Regulatory instruments and procedures

Since 2000, the focus of ex-post control activities shifted to the ex-ante measures focusing on activities preventing environmental impacts through regulatory instruments and procedures, as well as compliance promotion activities.

Environmental impact assessment

The main development during recent years has been the integration of Natura 2000-appropriate assessment procedures (introduced in 2007), as well as coordination of Integrated Pollution Prevention and Control (IPPC) permitting process (introduced in 2008) and integration of the Seveso process of chemical safety (introduced in 2015) in the EIA procedures into a single environmental ex-ante quality assurance system of development proposals, extensions or modifications.

The EIA-related provisions in the Environmental Protection Act have largely been based on EIA Directive 85/337/EEC. The analysis of implications of recent changes in the EIA Directive to Bulgarian EIA-related legislation is currently under way.

The current sharing of responsibilities between the Ministry of Environment and Water and RIEWs follows the amendments to the Environmental Protection Act in 2012. The competent authority on EIA procedures is the Ministry of Environment and Water for the following types of development proposal, extension or modification:

- Those affecting any protected areas according to the procedure established by the Protected Areas Act;
- Those affecting an area covered by two or more RIEWs;
- Those referred to the transboundary procedures;
- Those that have been designated works of national importance by an act of the Council of Ministers;
- For drilling for exploration and production of unconventional hydrocarbons, including shale gas.

The RIEW is the competent authority for the purposes of making a decision on EIA for other development proposals, extensions or modifications. Other competent authorities involved in the EIA procedure, depending on the type of project, include the basin directorates for water management, the Ministry of Health, Executive Environment Agency, regional government, local authorities and other ministries.

The Ministry of Environment and Water maintains a public register of EIA procedures on its website.

Domestic context

There is a well-established screening procedure for EIA. According to the Environmental Protection Act, the developer informs the competent authority and the public concerned of the proposal, declaring the said proposal in writing at the earliest stage of the initiative, which ensures preparation of the terms of reference for the scope of the EIA by the competent authority. The Ministry of Environment and Water determines whether an EIA is to be conducted.

The EIA procedure includes public participation and public information on the decision-making process. According to the EIA Ordinance, the EIA procedure shall be determined by discussion between the concerned parties case by case. The concerned parties shall ensure that the population in the areas likely to be affected is informed.

According to regulations, all natural and legal persons concerned may participate in the discussions. However, as was reported by several NGOs, there has been debate on the degree of transparency in the selection of parties invited to be part of the whole EIA process as concerned members of the public, which goes beyond scheduling a public hearing.
From 2007 to 2015, a total of 18,651 EIA procedures were conducted (table 1.4).

Since 2007, most of the EIA procedures have been conducted on development proposals in the waste management, water management, energy and transport sectors. The number of development proposals for wind farms, solar farms and installations for hydroelectric energy production declined in the last few years. The number of EIA procedures is generally in decline for both Annex I and Annex II projects, contrary to the trends in other EU countries. The ratio of mandatory EIA processes to the overall number of EIA screening procedures (table 1.4) is rather low in the case of Annex II EIAs managed by RIEWs. It could be interpreted that the screening procedure is quite effective, enabling development conditions to be established without the full EIA procedure.

Transboundary context

The Ministry of Environment and Water is the responsible institution for the transboundary procedures. In accordance with the Environmental Protection Act, affected countries are notified at the earliest stage of the development proposal but not later than the date of notification to the Bulgarian population (chapter 4). The minimum information contained in the notification includes that on:

- The nature of the proposed activity;
- The spatial and temporal boundaries of the proposed activity;
- Expected environmental impacts and proposed mitigation measures with special reference to the transboundary impacts and measures;
- Availability of documentation;
- Relevant contacts;
- Public participation, including relevant timetable.

Permitting

Surface water withdrawal and groundwater abstraction, as well as water discharge permits, are issued by the basin directorates, which also regulate the use of alluvial deposits. Where there is municipal ownership of the waters, permits for the withdrawal of waters and for mineral water extraction can be issued by the municipal council.

Waste permits are issued by RIEWs. Permits regulate waste treatment, utilization, decontamination activities, recovery and disposal.

The licensing of hunting is organized by the Executive Forest Agency based on the Hunting and Game Protection Act. Fishing permits are issued by the National Agency of Fisheries and Aquaculture of the Ministry of Agriculture and Food.

However, for protected animal species listed in Annex 3 of the Biological Diversity Act, the Ministry of Environment and Water can issue derogations, in particular for the periods of species breeding, rearing and wintering. The only derogation not issued by the Ministry of Environment and Water is related to the killing of Brown bear, in which case the exemption is issued by the Ministry of Agriculture and Food. Since 2004, 675 derogations have been issued, and during recent years the number of permits has declined slightly (2013 – 64 permits, 2014 – 60, 2015 – 44).

The permits were issued mainly for scientific studies, related to the safety of electric systems etc. Permits and certificates were also issued related to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulates international trade in endangered species of wild fauna and flora (2013 – 266, 2014 – 222, 2015 – 226). The majority of CITES export permits are related to the caviar trade and the majority of CITES import permits are related to small leather products.

For placing on the market of chemicals, the EU criteria for classification, packaging and labelling of chemical substances have been introduced by the Protection Against the Harmful Impact of Chemical Substances and Mixtures Act.

Biocidal products are marketed and used after authorization by the Ministry of Health. The draft permit is considered at the Experts Council on Biocides, based on toxicological expert opinion, prepared by the Ministry of Health, and eco-toxicological expert opinion, prepared by the Ministry of Environment and Water.

Plant protection products are placed on the market after the issuing of a permit by the Food Safety Agency under the Ministry of Agriculture and Food.

Integrated permitting

Integrated permitting has been implemented since 2002. The legal framework in Bulgaria is set in Chapter VII, section II of Environmental Protection Act and in the Ordinance on the conditions and procedures for issuing integrated permits. In 2012 the Environmental Protection Act and the Ordinance were amended in order to transpose the Directive 2010/75/EU of the European parliament and of the Council on industrial emissions (integrated pollution prevention and control) (IED).

The responsibilities of the competent authority were initially placed on the Ministry of Environment and Water. In 2011 those responsibilities were transferred to the Executive Environmental Agency making the overall permitting process much quicker (halving the minimum time from 14 months to 7 months). In 2008 part of the IPPC permitting process – approval of applying Best Available Techniques (BAT) was integrated into the EIA process on voluntary basis.

According to Bulgarian legislation permitting is conducted and integrated permit is issued after the site selection and prior to issuing of the final construction permit. However, alterations might occur when the developer is able to prove in the EIA process that the technology used in the operation will be in accordance with the principles of BAT. Then integrated permit is required not for starting of construction, but for the introduction of installations into operation. Thus to the operator is given the opportunity to speed up his investment process by issuing the IPPC during the construction work.

Currently, 499 active installations have an integrated permit. There are 440 issued permits in total, although some of them have been discontinued. The number of operators with integrated permits is currently 380.

Within the Executive Environment Agency, 17 specialists are involved with the permitting process. Currently, the permitting authority has enough administrative capacity to carry on with the IPPC permitting procedures. There are very few new IPPC permits being issued at present – most activity is related to reviewing existing permits. RIEWs take an active part in the IPPC permitting procedures, checking compliance with the conditions throughout the process.

The inspectors provide opinion on the information contained in the permit applications submitted by operators. Furthermore, the inspectors provide information on the present environmental conditions and/or performance of installations and can suggest measures and permit conditions to ensure higher levels of environmental protection. In addition to the RIEWs, other authorities, such as basin directorates, are involved in the permitting process.

Table 1.4: EIA procedures, 2007–2015

	Ministry of Environment and Water			RIEW		
	EIA screening	Mandatory EIA		EIA screening	Mandatory EIA	
		Positive	**Negative**		**Positive**	**Negative**
2007	22	9		3 092	76	1
2008	37	17	1	3 159	137	2
2009	53	27		2 158	121	2
2010	62	25	2	1 369	63	5
2011	58	25	1	1 407	63	
2012	61	12		1 771	67	1
2013	38	8		1 915	47	2
2014	9	6		1 325	34	1
2015	12	2		1 321	24	1
Total	**352**	**131**	**4**	**17 517**	**632**	**15**

Source: Ministry of Environment and Water, 2016.

The public has access to the permit application submitted by an operator. Information on any decision relating to the issuing, updating or cancellation of integrated permits is published on the website of the Ministry of Environment and Water and can be subject to appeals by the public.

GHG Emissions Permits

The operation of new and existing installations from the categories listed in Annex No. 1 of Climate Change Mitigation Act shall be permitted following the issue of a GHG emissions permit. The Executive Director of the Environment Agency Executive issues the permit within three months of the date of receipt of the application made by the operator.

The RIEWs are involved in the permitting process. They are also responsible for monitoring for compliance with the terms and conditions of the GHG emissions permit and notifying promptly the Executive Director of the Environment Agency Executive in case the installation has ceased operations or in cases of established non-compliance with the terms and conditions of the GHG emissions permit.

Seveso establishments[3]

Bulgaria is currently reorganizing its control system for hazardous accidents. At the end of 2015 the proposed amendments to Article 103 of the Environmental Protection Act were introduced, with Annex 3 setting the criteria for upper tier and lower tier Seveso establishments. The Seveso process for new establishments is currently linked with the EIA process. At the beginning of 2016 the registering of Seveso establishments began and the Executive Environment Agency was designated the responsible governmental agency for the Seveso process. In cooperation with the Ministry of Environment and Water, the Agency is setting up a process of consultation with operators of installations listed in Annex 1 of the Environmental Protection Act to determine the Seveso classification and define further steps for the existing establishments.

1.7 Compliance assurance mechanisms

Environmental inspections and non-compliance response

The main responsibility of inspection lies with the RIEWs. The inspection routines are developed on the basis of the EU Recommendation providing for minimum criteria for environmental inspections in the Member States (2001/331/EC) and the Reference book for Environmental Inspection developed by the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL). To support the RIEWs' supervisory role, the Ministry has developed manuals and methodological guidelines on the implementation of Bulgarian environmental law in the following sectors: air quality, water quality, waste management, nature protection, industrial pollution and risk management, chemicals and GMOs.

The programme of inspections is developed on a quarterly basis. Approximately 60 per cent of the inspections are scheduled. The frequency of checks is based on risk assessment of the subjects under control. Selected data on inspection activities are presented in table 1.5.

[3] Establishments subject to the Seveso III Directive

According to the annual report of the RIEW of Pasardzik, there were 788 scheduled inspections in 2015 and all 472 installations under its jurisdiction were checked. There were also 496 unscheduled checks (38 per cent of all checks), based on alerts or emergencies.

Complex inspections are performed on all components. However, not everything is controlled on every inspection; the rotation principle is used when selecting components for particular inspections. In order to eliminate bias and conflicts of interest (which principle was introduced in 2015), inspectors rotate through the different installations.

Inspections are documentation based and also involve site visits. The checks involve installations with all risk levels in all development stages, such as ex-ante control, ex-post control of EIA, and IPPC. Inspections may also be carried out as joint operations with other administrations, such as the National Customs Agency, Police or the municipalities.

There is an established appeal system in Bulgaria. The control over the administrative acts is implemented in two ways – through administrative and judicial procedures. The administrative procedure is broader because both the expediency and legal conformity of the appealed administrative act can be contested, while the judicial procedure only checks on the legal conformity of the administrative act. The administrative contestation of administrative acts is not an obligatory prerequisite for their judicial appeal.

The administrative acts issued by structures of the Ministry of Environment and Water can be appealed to the Ministry of Environment and Water through administrative procedure. The Ministry may declare the nullity of the contested administrative act, repeal it in whole or in part, or reject the appeal (table 1.6).

In the implementation of their control and regulatory activities, the Ministry of Environment and Water and its structures issue penal decrees, which are subject to contestation only through judicial procedure. The first course of appeal of penal decrees is to the regional courts pursuant to the Administrative Violations and Sanctions Act. The judgment of the regional court confirming, modifying or revoking the penal decree is subject to cassation appeal to the relevant administrative court.

In 2015, control and public involvement practices were strengthened in RIEWs, where additional focus was set on dialogue with the public and dissemination of the results of control activities. The websites of the RIEWs and Ministry of Environment and Water are updated monthly, and results of inspections are published. The annual results and plans of upcoming inspections are also publicly available (i.e. the analytical part). Annual reports are also published on the website of the Ministry of Environment and Water.

Table 1.5: Data on inspection activities of RIEWs, 2013-2015

Indicators	2013	2014	2015
Inspections, number	19 582	20 281	22 097
Violators, number	8 565	8 472	8 218
Notices of violation issued, number	812	801	889
Fines imposed, leva	8 048 545	2 951 721	2 889 290
Damage compensation suits filed, leva	1 635 561	985 534	3 009 421
Damage compensation collected, leva	3 839 367	3 476 447	2 726 605
Installations temporarily closed, number	43	29	39

Table 1.6: Submitted complaints against administrative acts issued by structures of and contested to the Ministry of Environment and Water under administrative procedure, 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Basin directorates	7	14	24	23	40	39	47	31	56
Executive Environmental Agency				3	2	3	1	1	
National park directorates					2	1	1	2	
RIEWs	32	41	60	48	68	51	56	70	40
Total	**39**	**55**	**84**	**74**	**112**	**94**	**105**	**104**	**106**

Photo 1: Office house of the National Assembly, Sofia

Environmental liability

In 2008, the Liability for Prevention and Remedying of Environmental Damage Act was adopted. The law has transposed the 2004 Directive 2004/35/EO on environmental liability with regard to the prevention and remedying of environmental damage. The scope of the law covers business activities listed in its Annex 1 and refers to cases of imminent threat or the occurrence of environmental damage to protected species and habitats, water and water bodies and soils. The law also applies in cases where business activities do not fall within Annex 1 but lead to causing environmental damage to protected species and natural habitats. Each operator performing activities listed in Annex 1 should, before commencing the activity, prepare a risk assessment of imminent threats and possible cases of ecological damage relevant to this activity and should allocate financial resources so as to be able to implement immediate and prescribed preventive/remedial measures.

Labelling

There are no national environmental labelling schemes. Bulgaria follows the EU Ecolabel scheme, which has been implemented according to the Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel. The Ministry of Environment and Water is the competent body to award the EU Ecolabel. There are three licence holders with 18 products in Bulgaria – two tissue paper producers (9 products) and one detergent producer (9 products).

By joining the EU in 2007 Bulgaria adopted CE[4] marking. CE marking proves that the labelled product had been assessed and meets EU safety, health and environmental protection requirements.

Compliance promotion

As a Member State of the EU Bulgaria implements the Regulation (EC) No 1221/2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS). The Ministry of Environment and Water is the national competent body responsible for the registration of organizations.

The Ministry of Environment and Water undertakes measures and initiatives for the promotion of EMAS – workshops, presentations at different events, brochures, etc. Policy incentives to encourage EMAS registration include: less frequent IPPC inspections for EMAS-registered organizations; the National Action Plan for Promotion of Green Public Procurement for the period 2012–2014, adopted in 2011 with recommendations to public sector procurement

[4] "Conformité Européenne", which means literally "European Conformity".

officials to reach a certain level of tenders with "green" criteria, which include EMAS registration; and targeted support provided to enterprises under the OP "Competitiveness 2007–2013" for achieving compliance with internationally recognized standards, including EMAS.

From 2007 to 2015 only six organizations were registered under EMAS. The first two registrations took place in 2012, but in 2014 the registrations were discontinued on the initiative of organizations themselves and by the end of 2015 there were only four EMAS-registered organizations as voluntary schemes were generally considered expensive to adopt and to maintain. Currently, the situation has changed somewhat as five applications are in progress. As has happened elsewhere, the triggering factor for increased adoption of voluntary accreditation schemes is expected to be change in the competitive situation introduced by GPP procedures. The number of valid ISO 14001 certificates was 6 in 2001 and reached 1,761 in 2014 (Figure 1.2).

1.8 Conclusions and recommendations

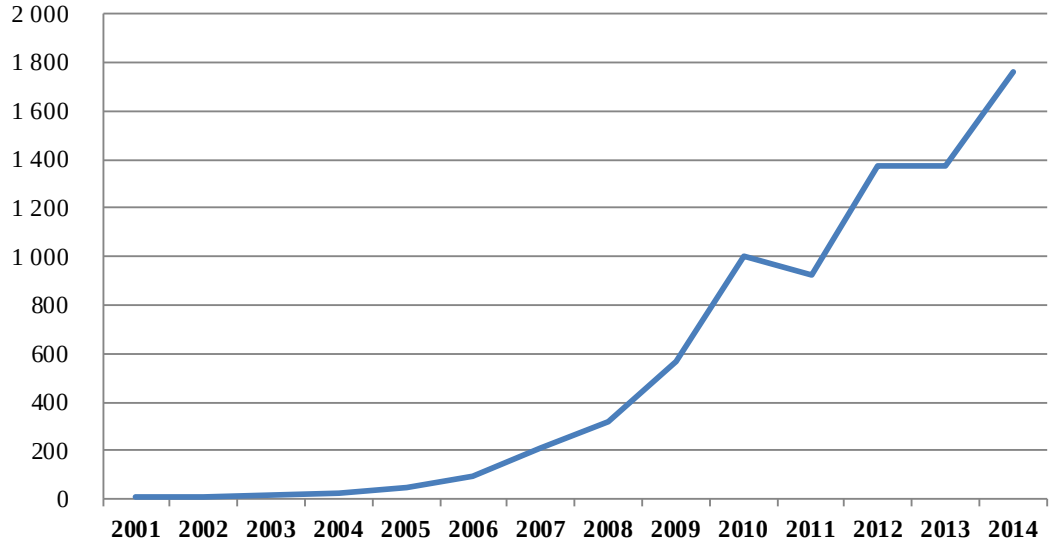
Currently, no effective system exists to monitor the implementation of environmental policy documents (strategies, programmes and plans) across the country. Environmental authorities have difficulties to fulfil the monitoring obligations, in particular in terms of producing regular progress reports on the implementation of the various overarching and specialized national and subnational environmental policy documents. This significantly limits coordinated and transparent policy documents implementation. The Government maintains a website with all national level policy documents, including those related to sustainable development and environmental protection (www.strategy.bg) .

Recommendation 1.1:
The Government should:

(a) Ensure systematic monitoring of implementation of national and local environmental policy documents (strategies, programmes and plans), in particular municipal environmental policies and plans and municipal waste management plans;
(b) Strengthen its administrative capacity to monitor the implementation of local environmental policy documents;
(c) Ensure that all implementation reports of national and local environmental policy documents are posted in the respective websites.

Environmental legislation and the policy framework for environmental protection and sustainable development driven by the EU requirements has been strengthened. However, effective implementation of legislation and policies remains a challenge. Bulgaria has been particularly slow in implementing the environmental legislation at the subnational level in areas demanding high infrastructure investments, such as waste and water management. Several key overarching environmental policies have not yet been adopted or have been adopted with delays.

Figure 1.2: Valid ISO 14001 certificates, 2001-2014, number



Source:
ww.iso.org/iso/home/standards/certification/home/standards/certification/home/standards/certification/home/standards/certification/iso-survey.htm?certificate=ISO 9001&countrycode=BG#standardpick.

At the same time, there are various requirements for specialized environmental policies, in particular at the local level, which further increase policy fragmentation and the administrative burden. The processes of strategic planning are poorly linked to budget plans. At all levels, there is insufficient capacity to develop and implement the wide range of environmental policies. The necessary level of legislative and policy coordination between national and local environmental authorities has not yet been achieved. Bulgaria has established a legislative framework specifying the procedure, scope, methodology and quality assurance system for the obligatory RIA. The scope and the implementation of RIA on the ground has included assessment of environmental impacts.

Recommendation 1.2:
The Government should:

(a) Consolidate the air quality legislation;
(b) Consolidate the water legislation;
(c) Harmonize the national and local waste management legislation;
(d) Ensure timely adoption or revision of the key overarching environmental policies, including the National Environmental Strategy and the national adaptation strategy;
(d) Strengthen with additional capacity-building measures and develop methodologies on the application of the regulatory impact assessment system as an integral part of the law-making procedure, including obligatory assessment of the environmental impacts of all legislation.

The existing SEA legislation needs improvement of the quality control of SEA, especially at regional level. There is a legal obligation to maintain a central public register providing an overview of all the SEA procedures across Bulgaria at national and subnational levels and the Ministry of Environment and Water maintains susch a register on its website. Currently, this information is stored at the level of each of the 16 RIEWs, which publish separate information about the ongoing procedures within their territory.

Recommendation 1.3:
The Ministry of Environment, in cooperation with the Regional Inspectorates on Environment and Water, should improve the quality assurance mechanism ensuring the effective implementation of the obligations of the Strategic Environmental Assessment, especially at regional level and the provision of support to those carrying out Strategic Environmental Assessments.

The NDP BG 2020, the National Reform Programme and the Government Programme for Stable Development for the period 2014–2018 provide, to some degree, long-term strategic guidance for a transition towards a green economy in Bulgaria. While Bulgaria has been scaling up investment in a green economy, sectoral policy approaches to a green economy are not sufficiently integrated due to the lack of coordination on development, implementation and monitoring of the policies and initiatives to promote a green economy. There are no specific coordinating mechanisms for green economy policies in place.

Recommendation 1.4:
The Government should adopt an overarching strategic framework for a green economy aimed at strengthening coordinated and coherent development and implementation of green economy initiatives across the country, and establish institutional mechanisms for intersectoral coordination of green economy initiatives.

Bulgaria does not have national environmental labelling schemes. Instead, the country follows the EU Ecolabel scheme and CE marking. EU Ecolabels are awarded by the Ministry of Environment and Water. However, the scheme is not widely applied in the country and there are only three license holders with 18 products.

As an EU Member State, Bulgaria implements Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organizations in a Community eco-management and audit scheme (EMAS). The Ministry of Environment and Water undertakes measures and initiatives for the promotion of EMAS – workshops, presentations at different events, brochures, etc. Despite all these efforts, only six organizations were registered under EMAS from 2007 to 2015. Currently, five more applications are in progress.

Recommendation 1.5:
The Ministry of Environment and Water should promote the application of the:

(a) EU Ecolabel scheme among Bulgarian producers;
(b) Community eco-management and audit scheme (EMAS).

NGOs have been active in relation to the conflicts between local development interests and environmental protection in highly sensitive nature areas. Environmental NGOs' activities resulted in stronger protection of national parks and the banning

of GMOs on the territory of Bulgaria. However, NGOs generally play a marginal role in the formulation and implementation of environmental legislation and policies. The involvement of NGOs in the advisory and expert councils of the Ministry of Environment and Water and in the interministerial working groups has been limited.

There is no budget line in the national budget specifically for the environmental NGOs. Some local funds have reserved for NGO activities, but amounts remain marginal. Since the EU accession in 2007, the funding conditions for NGOs have changed and many international donors have reduced or ceased to provide their financial support to NGOs. As a result, many environmental NGOs that were set up in the 1990s closed down as a consequence of new financial and social conditions.

Recommendation 1.6:
In line with its obligations under the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, the Government should:

(a) Endeavor to provide access to civil society groups, including NGOs, to national funding for activities on matters related to the environment;
(b) Improve conditions for the involvement of NGOs in the advisory and expert councils and in the interinstitutional working groups in relation to environmental matter.

Chapter 2

ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL PROTECTION AND THE FINANCING OF ENVIRONMENTAL EXPENDITURES

2.1 Economic instruments

Pollution charges

Water pollution tax

As of the beginning of 2012, Bulgaria applied a levy for the discharge of wastewater and pollutants into surface and groundwater bodies. The corresponding tax rates are established in the 2011 Decree on Charge rates for water abstraction, use of water bodies and for pollution, No. 50. The water pollution tax has also been included in the 2015 amendments to the Water Act (SG No. 58). The Water Act also contains a provision for a tax on diffuse source pollution from agriculture, which, however, is due only in cases where neither the tax on wastewater discharge into surface waters nor that on the discharge of pollutants into groundwater has been paid.

At the end of 2016 a new tariff on charge rates for water abstraction, use of water bodies and for pollution was adopted with the Decree No 383 of the Council of Ministers. The tariff complies with the 2015 amendments to the Water Act. These amendments specify adjustment coefficients to the fees for pollution regarding the type of receiving waters, the number of discharges and the level of treatment. The Water Act also specifies adjustment coefficients for an increase of some fees for recovery of the environmental and resource costs.

The discharge of wastewater into surface water bodies is subject to a single charge rate of 0.005 lev (€0.0026) per m^3, i.e. the charge rate is independent of the quantity and characteristics of pollutants discharged with the wastewater. A special charge rate applies to the discharge of water, used for cooling which results in an increase in the water temperature thus causing thermal pollution in the receiving surface water body. The main sources of thermal pollution are electric power plants and industries such as petroleum refineries and steel melting plants, which require very large volumes of water for cooling purposes. In these cases, the single charge rate is 0.00001 lev (€0.000005) per m^3 multiplied by a factor calculated as the difference between the temperature of the discharged wastewater and the average normal water temperature in the water body.

The tax base for the discharge of pollutants to groundwater is the quantity (in kg) of pollutants discharged. But there is only a single (uniform) tax rate of 1 lev (€0.51) per kg that is applied to all 45 so-called priority substances and compounds under the Water Act. These substances are listed in the 2010 Ordinance on standards for environmental quality for priority substances and certain other pollutants, No. 256.

A different government decree (2007 Ordinance for exploration, use and protection of groundwater, No. 87, effective from 21 February 2012), moreover, contains a list of 41 water pollutants subject to pollution charges. Those that are not mentioned in the Ordinance No. 256 are subject to a uniform tax rate of 0.1 lev (€0.05) per kg. Any other pollutants, including chemical substances, not covered by these two decrees are subject to an even lower tax rate. There are, moreover, separate fees for thermal groundwater pollution and the use of water sites for the injection of carbon dioxide, natural gas and liquefied petroleum gas (table 2.1).

The base tax rates for discharges to groundwater are multiplied by a "correction factor" of 100 in cases where the chemical status of the corresponding groundwater body meets the environmental quality standards for groundwater pollution, which is specified in the discharge permit. In a more general way, however, the application of a uniform single tax rate for all types of substances and compounds means that tax rates are not directly proportionate to the level and type of pollutants in the wastewater discharged. Average annual revenues from the water pollution tax amounted to 13.2 million leva (€6.75 million) during 2013–2015.

Noise pollution charges

The legal base for noise pollution charges is the 2005 Protection from Environmental Noise Act. It regulates the assessment, management and control of environmental noise emitted by road, railway, air and

water traffic, as well as by industrial installations and facilities and by local noise sources, and fines for non-compliance with noise pollution standards. Limit values for noise pollution are established in a separate ordinance issued by the Ministry of Environment and Water and Ministry of Health (2006 Ordinance on indicators for environmental noise, No. 6).

The level of fines, which has not changed since 2006, ranges from 500 to 10,000 leva. The criteria for setting the level of fines within the specified range is: the higher fines are in case of a higher exceedance of the limit values or a repeated violation. Noise caused by legal entities can be charged within a range of 1,000 to 10,000 leva; the corresponding range is much lower for natural persons (500 to 3,000 leva). The fines are applicable to all noise sources included in the scope of the Protection from Environmental Noise Act.

Separate legislation, namely, the 2003 Ordinance on the procedures for determining and sanctioning of damages or pollution exceeding permissible limits, No. 169, established sanctions (fines) for exceeding noise limits for two different types of noise pollution, namely, sound and electromagnetic radiation that can affect health. But this legislation, which was revoked only in late 2011, was not implemented upon the entry into force of the Protection from Environmental Noise Act on 1 January 2006.

Bulgaria introduced an environmental aircraft noise tax, which entered into force at the beginning of 2013. The tax is based on an amendment of the 2011 Civil Aviation Act. This charge is levied on air companies to cover the costs of limiting adverse impacts on the environment and health from noise pollution in the areas surrounding airports.

The tax base is the maximum take-off weight (MTOW) of aircraft, but the tax rate per ton of MTOW depends also on the noise category of aircraft, of which there are five, and the time of take-off and landing. The tax is applied only to aircraft with an MTOW exceeding 9 tons. For Sofia Airport,[5] the tax rate ranges from €0.19 to €2.03 per ton of MTOW in 2016. For illustration, the MTOW of a Boeing 737 is some 75 tons.

Sanctions for exceeding pollution limits

The long-standing policy instrument applied in Bulgaria for controlling environmental pollution is to impose financial sanctions on those natural and legal persons that are exceeding permissible pollution levels and/or do not comply with the established emission values and restrictions. The legal base for this is the Environmental Protection Act. The environmental domains covered by these sanctions comprise air pollution, water pollution and soil pollution. There is, moreover, a separate sanction on insufficient control of industrial sources of odour.

The specific base amounts per unit of polluting substances and the procedures for imposing sanctions and other modalities are established in regulations issued by the Council of Ministers. The latest amendment was made in the Ordinance on the type, amount and procedure for the imposition of penalties for damage or pollution of environment above the admissible norms and / or failure to comply with the emission norms and restrictions (2011 Decree No. 247).

Base charge rates for air pollution are tripled in the case where pollution is taking place in the vicinity of nature parks and the rate is doubled if it takes place near protected regions, water supply or sanitary zones. In a similar vein, the base rates for non-compliance with water pollution are increased by a factor of three when pollution is taking place within national parks and sanitary protection zones around water sources and facilities for drinking water supply and around the sources of mineral water used for therapeutic, prophylactic, drinking and hygiene needs. In the case of pollution within other categories of protected areas, the base rates are multiplied by a factor of two.

The specific charge rates for non-compliance with pollution standards were held constant at a rather low level for all pollution categories between 2003 and 2012, meaning that companies generally had little incentive to engage in pollution abatement measures. But there was a general, and in some cases drastic, increase in these base rates across all the above-mentioned environmental domains in 2013 with the aim to create more effective incentives for operators of polluting facilities to maintain emissions at or below the established limit values. The old rates and the new base rates for air and water pollutants are shown in tables 3.1 and 3.2.

As regards emissions of air pollutants from stationary sources, there are 15 categories of substances for which specific charges per kg have been established.

In the case of water pollutants, 29 categories of pollutants are distinguished. In both cases, sanctions apply only to the volume of emitted substances (per

[5] Application No. 1: Methodology to determine airport charges collected from Sofia Airport issued by the Ministry of Transport, Information Technology and Communications.

m^3 of mass flow in the case of air pollutants and per m^3 of wastewater in the case of water pollutants) that exceeds the corresponding maximum allowed concentration values.

It is somewhat surprising that the recently introduced water pollution tax is not pollution specific, while at the same time there are pollution-specific charge rates for non-compliance with environmental standards for a large number of water pollutants. This could suggest that there may be problems with the accurate measurement of the discharge of multiple water pollutants.

In the case of odour originating from various substances used in industrial processes, and organic waste stored on landfills, sanctions increase with the distance from the source of odour. Fines, which were also raised significantly in 2013, range from 5,000 leva (€2,554) for noticeable odour at distances up to 100 metres to 100,000 leva (€51,072) for noticeable odour at distances over 1,000 metres.

Table 2.1: Non-compliance base fees for emissions of air pollutants

	Effluent charges		
Receiving water bodies / pollution indicators	**Unit**	**Lev**	**€**
Surface water bodies			
Discharge of wastewater	per m^3	0.005	0.0026
Thermal pollution	per 1 °C/m^3	0.00001	0.000005
Groundwater			
Priority substances and compounds under Art. 135 of the Water Act (Ordinance I)	per kg	1	0.51
Other substances and pollutants not included in Ordinance I but in Ordinance II on groundwater protection.	per kg	0.1	
Other pollutants not specified in Ordinance I and II	per kg	0.0001	0.000051
Chemical pollutants in case of re-injection of water	per kg	0.01	0.0051
Thermal pollution	per 1 °C/m^3	0.0002	0.00001
Injection of carbon dioxide, natural gas and LPG	per million m^3	10	5.1

Source: Regulation on standards for environmental quality for priority substances and certain other pollutants, adopted by 2010 Decree No. 256; Ordinance II: 2007 Regulation No. 1 for exploration, use and protection of groundwater.
Notes: Tariffs for water use and water pollution. Effective from 1 January 2012.

Table 2.2: Non-compliance fees for emissions of air pollutants, 2007, 2011, 2013, lev/kg

Pollutants	**2007**	**2011**	**2013**
Ammonium (NH_3)	0.12	0.12	1
Ashes (soot)	0.30	0.30	1
Cadmium	90.00	90.00	1 250
Dust	0.08-0.12	0.08 - 0.12	1
Lead	30.00	30.00	100
NOx	0.15	0.15	1
Sulphur dioxide	0.001-0.03	0.001 - 0.03	1
VOCs	..	..	1 250

Source: 2003 Decree on the procedures for determining and sanctioning damage or pollution above the permissible limits, No. 16; 2011 Decree on the procedures for determining and sanctioning damage or pollution above the permissible limits, No. 70; Ordinance on the type, amount and procedure for the imposition of penalties for environmental damage or pollution above the admissible norms and/or failure to comply with the emission norms and restrictions (2011 Decree No. 247).
Notes: Selected pollutants.
2007: effective since 06.09.2003
2011: effective 10.11.2011
2013: effective 30.08.2013.

Table 2.3: Non-compliance fees for discharge of selected water pollutants, 2007, 2011, 2013, lev/kg

Pollutant / substance	2007	2011	2013
Active pH reaction	0.05	0.05	0.12
Anion active detergents	1.40	1.40	3.36
BOD, COD	0.45	0.45	1.08
Cadmium	200.00	200.00	480.00
Cyanides	27.00	27.00	64.80
Mercury	2,000.00	2,000.00	4,800.00
Nitrites	34.00	34.00	81.60
Phosphorus	1.40	1.40	3.36
Suspended solids	0.15	0.15	0.36
Sulphur hydrogen	20.00	20.00	48.00

Source: 2003 Decree on the procedures for determining and sanctioning damage or pollution above the permissible limits, No. 16; 2011 Decree on the procedures for determining and sanctioning damage or pollution above the permissible limits, No. 70; Ordinance on the type, amount and procedure for the imposition of penalties for environmental damage or pollution above the admissible norms and/or failure to comply with the emission norms and restrictions (2011 Decree No. 247).
Notes: Measured or estimated effluents of oxydizeable matters (BOD, COD).
2007: effective since 06.09.2003
2011: effective 10.11.2011
2013: effective 30.08.2013.

In the case of soil pollution, base rates for non-compliance with established soil protection norms are defined in terms of national currency units per m^2 of soil affected (table 2.4). This pertains for example to the disposal of waste of all kinds, discharge of wastewater, and application of manure, slurry and fertilizers. As regards excessive deposition of (toxic) heavy metals, such as mercury (Hg), cadmium (Cd), lead (Pb), chromium (Cr) and arsenic (As), as well as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and petroleum, sanctions are calculated taking into account, besides the volume of soil polluted, the extent to which the corresponding maximum allowed concentrations have been exceeded.

Certain types of soil pollution (acidification, salinization, swamping and physical damage such as soil erosion) are not subject to sanctions where they are caused by agricultural practices. Whereas in principle the polluter-pays principle is applied with regard to the liability for contamination of land and the associated costs of clean-up and remediation measures, in the specific case that a polluter cannot be identified or no longer exists, it is always the property owner or the tenants of the land who will be held liable for the contamination regardless of whether or not they were aware of the contamination. The concept of non-retroactivity, moreover, does not apply under the Soils Act. Thus, even if the former owner of the land has caused the pollution, it is the present owner who is liable for the damage.

The legislation distinguishes between two types of sanctions, namely, payment of a lump sum (one-time payment) and a "continuous" sanction, which is applied over a more or less long period of time depending on the length of period of non-compliance. A one-time penalty is imposed in cases of accidental pollution, non-compliance with pollution standards that occurred for a short period during official operating hours and discharge of waste gases into the atmosphere that exceed the limit values established in corresponding permits. In all other cases, notably the discharge of wastewater, "continuous" sanctions will be imposed. Continuous sanctions, in turn, can be imposed at a fixed rate (e.g. per month) or at an increasing rate. A fixed penalty rate for a specified period of time is imposed if the company that is discharging the wastewater does not have a valid permit. The sanction ends after the specified period if the operator has halted the pollution. In the event that the pollution continues, an increasing penalty rate is imposed.

Sanctions are imposed by the competent regional inspectorate of environment and water (RIEW) in the municipality/region where the source of pollution is located. The corresponding revenues are collected by the National Revenue Agency. Eighty per cent of these revenues are allocated to the budget of the municipality where the corresponding sanctioned company is located (Environmental Protection Act). The remaining 20 per cent is at the disposal of EMEPA. Municipalities shall, in principle, use these revenues for financing projects identified as priorities in their MEPPs. Municipalities also receive any revenues from fines imposed under the Environmental Protection Act by municipal mayors (as opposed to fines imposed by the RIEW) for such financing.

There were 2,976 sanctions imposed during the period 2007–2014. The large majority of these sanctions was related to water pollution (61.3 per cent) and air pollution (37.5 per cent). The remaining sanctions (1.2 per cent) were related to soil pollution and odour. There is a noticeable tendency for the number of sanctions related to air and water pollution to decline after 2012, which may partly have to do with the significant increase in charge rates for non-compliance with pollution standards as of 2013. On the other hand, there is no such decline in the aggregate monetary value of sanctions imposed, which, rather, increased strongly in 2015 compared with the preceding years (table 2.5) It is also striking that the cumulative revenues collected from the new water pollution tax during 2013–2015 is more than eight times the value of monetary sanctions imposed for non-compliance with water pollution standards (table 2.5). This suggests that the pollution tax, adequately differentiated by types of pollutants, could become an effective instrument for creating financial incentives for water pollution abatement by companies. The improved pollution tax, complemented by the long-standing instrument of sanctions, should then allow for making the necessary headway with meeting EU requirements in the field of water pollution.

Table 2.4: Base fees for excessive soil pollution of selected activities and pollutants, 2007, 2011, 2015, lev/m^2

Activity/category	2007	2011	2015
Manure and slurry	6.50	6.50	15.60
Acidification of soil	37.00	37.00	88.80
Construction waste	6.00	6.00	14.40
Hazardous waste	17.00	17.00	40.80
Mineral fertilizers	7.00	7.00	16.80
Pesticides	1.1-3.5	1.1 - 3.5	40.80
Salinization of soil	37.00	37.00	88.80
Wastewater	6.00	6.00	14.40

Source: 2003 Decree on the procedures for determining and sanctioning damage or pollution above the permissible limits, No. 16; 2011 Decree on the procedures for determining and sanctioning damage or pollution above the permissible limits, No. 70; Ordinance on the type, amount and procedure for the imposition of penalties for environmental damage or pollution above the admissible norms and/or failure to comply with the emission norms and restrictions (2011 Decree No. 247).
Notes: Pesticides: charge rates depend on allowed limits per kg.
2007: effective since 06.09.2003
2011: effective 10.11.2011
2015: effective 30.08.2013.

Table 2.5: Sanctions for non-compliance with air and water pollution standards, 2007-2015

Domain	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Sanctions, number								
Air pollution	171	164	168	132	116	155	103	56	52
Water pollution	254	244	191	187	228	236	169	158	156
Total above	425	408	359	319	344	391	272	214	208
	Monetary value, 1 000 leva								
Air pollution	568	292	238	412	257	299	299	227	932
Water pollution	704	303	259	658	365	478	478	730	2 024
Total above	1 272	596	497	1 070	622	778	778	958	2 956
Memorandum item									
Revenues from water pollution tax	..	..	..	..	..	2 026	13 268	13 403	12 897

Source: Ministry of Environment and Water; Executive Environment Agency, National Report on the Status and Protection of the Environment in Bulgaria (annual reports 2007–2015).

Environmental liability and damage compensation

The Liability for Prevention and Remedying of Environmental Damage Act entered into force in 2008. The rules and procedures for determining the type of preventive and remedial measures at minimum costs in the face of an imminent threat of environmental damage are established in a separate regulation (2008 Ordinance on the type of preventive and remedial measures No. 1, issued by the Ministry of Environment and Water). The law applies notably to environmental damage being caused or to an imminent threat of such damage occurring by a range of occupational activities that are listed in its Annex 1. They include activities related to waste management, use of water and water bodies, and activities that involve chemical substances and compounds etc. In total, some 1,500 operators are involved in the activities listed in Annex 1.

As of the beginning of 2011, operators have to execute the preventive and remedial measures through at least one of the following financial security instruments: (i) insurance policy; (ii) bank guarantee; (iii) mortgage of corporeal immovable and/or rights in rem thereto; (iv) pledge of receivables, movable things or securities.

Regarding the financial security, these operators may conclude an insurance policy for implementing preventive and remedial measures based on their own risk assessment of the possible imminent threats of occurrence of environmental damage and cases of environmental damage caused. Since the law came into force (29.04.2008), 50 insurance policies from 23 operators (of a total of 1,500 operators) have been presented to the Ministry of Environment and Water. The sum insured under the insurance contract shall not be less than 50,000 leva. No bank guarantees to ensure effective implementation of the law have been issued so far.

Waste management charges

Extended Producer Responsibility Fees

Bulgaria applies an extended producer responsibility (EPR) scheme for a range of products that create special waste streams after their useful life. The legal base for the EPR is the Waste Management Act and ordinances issued by the Council of Ministers regulating the schemes for each of these product groups. The legal framework is consistent with the principles of "producer responsibility" and "polluter pays". The Bulgarian EPR scheme comprises six product groups:

- Batteries and accumulators;
- Electrical and electronic equipment;
- Oils;
- Packaging materials;
- Road motor vehicles;
- Tyres.

The core objective is to ensure that persons (producers/importers) who place these products on the domestic market are responsible for their separate collection and treatment, as well as for attaining the specified targets for separate collection, reuse, recycling and/or recovery. Producers/importers can fulfil their responsibilities in two ways: (i) individually, by establishing a take-back or deposit-refund system for the corresponding waste streams; or (ii) collectively, by becoming a member, together with other producers/importers, of a "recovery organization" (RO). The RO takes over the responsibility for meeting the recovery and recycling targets for a given product group based on a corresponding contract with its members. In general, these ROs are set up as a separate legal entity (incorporation) by the corresponding producers/importers who own it. For its operation, each RO requires a special permit from the Ministry of Environment and Water (chapter 8).

The ROs are constituted as not-for-profit legal entities under the Bulgarian Law on Commerce, i.e. they are not allowed to distribute any profit to their members, but, rather, have to use such funds for improvements in their waste management activities. Each RO is financing the costs of its operations from so-called recovery fees that it agrees with and collects from its members. License fees are specified in terms of national currency units per unit of product (typically measured in kg) placed on the domestic markets. An additional source of income for the ROs is the revenue from sales of recovered/recyclable materials.

For the proper functioning of the ROs, the revenue from recovery fees has to cover at least the costs of collection, sorting and treatment of separately collected waste management less the revenues for recovered material sales, i.e. the full net costs. There is little information on the fees paid by producers to the ROs and the extent to which they cover the costs for collection and treatment of waste. These fees will differ within and between waste streams, given also differences in volume and product characteristics. By allocating operating permits to several ROs for a given waste stream, the Government has, moreover, allowed for economic competition between ROs.

A producer/importer can only be a member of a single RO for a given waste stream during a given contract

period. Producers/importers will pass these costs through to the final consumers, but there is no aggregated public information of the overall costs of the EPR system for either industry or consumers. Moreover, there are also the costs related to the enforcement and surveillance of the EPR system.

Producers/importers who do not avail themselves of either the individual or the collective compliance schemes have to pay a product fee to the Environmental Fund, that is, to EMEPA. This is *de facto* a third option to achieve compliance with the obligations under the EPR scheme because it involves the transfer, against payment of a product fee, of the responsibility for the corresponding waste management to EMEPA. Producers who join an accredited collective or individual compliance system do not have to pay this product fee.

The product fee has to be paid within the framework of an individual scheme or by an RO only in cases where the specified targets for waste collection, recovery and recycling are not attained (Waste Management Act). Since 2012, 3 per cent of the revenues collected by EMEPA from product fees for motor vehicles are being transferred to the Ministry of Interior to cover the costs of administrative services associated with the registration of these vehicles.

The product fee rates are established by the Council of Ministers in separate ordinances (table 2.6). The main function is to create strong incentives for producers/importers to engage in individual or collective schemes and to achieve the specified collection, recovery and recycling targets. In the event, product fees are significantly higher than the actual costs of achieving the waste collection, recycling and recovery targets per unit of products that enter the waste streams.

This is illustrated by table 2.7, which compares the recovery fees applied by two ROs (EcoPack and Repack) with the corresponding product fees for packaging materials. The general feature is that product fees are significantly higher than corresponding recovery fees charged by the ROs. The largest difference is for plastic materials, for which the product fee is 2.33 leva per kg, while the recovery fee charged by these two ROs ranges only from 0.10 to 0.157 leva. This illustrates that the product fee is tantamount to a significant financial sanction in the case of failure to achieve the established waste management targets or of not establishing an effective individual scheme or joining a collective scheme.

Given, moreover, the importance of economies of scale, it is not surprising that the responsibility for the implementation of the EPR scheme in Bulgaria has been largely transferred by the producers and importers of the corresponding products to ROs. In 2012, there were some 10,000 producers and importers that had made contractual agreements with ROs for dealing with the six waste streams. In contrast, only 19 companies assumed the responsibility for dealing with these waste streams on an individual basis.

Against this background, revenues from product fees for the six waste streams have been, in general, relatively small in recent years; they amounted to 1.28 million leva (€0.65 million) in 2015, down from 3.68 million leva in 2010 (table 2.8). Some 43 per cent of total revenues was accounted for by packaging waste during the period 2010–2015.

Table 2.6: Selected product fees within the framework of the EPR scheme

		Lev per uni		€ per unit
Product	**Unit**	**2010**	**2016**	**2016**
Paper and cardboard	per kg	0.61	0.67	0.34
Plastics	per kg	2.12	2.33	1.19
Glass	per kg	0.18	0.20	0.10
Waste oil	per kg	0.62	0.64	0.33
Tyres for vehicles (new, less than 20kg)	per kg	0.30	0.30	0.15
Refrigerators	per kg			
Washing machines	per kg		1.55	0.79
TV receivers	per kg		0.90	0.46
New cars	per kg		1.95	1.00
Cars aged more than 10 years	per vehicle	133.00	138.00	70.56
Cars with age of more than 10 years	per vehicle	242.00	275.00	140.61

Source: Ministry of Environment and Water, 2016.

Table 2.7: Fees for packaging materials in 2015, lev/kg

	Recovery fee				Product fee
Product group	"Ecobulpac"	"Ecopack"	"Bulecopack"	"Ecocollect"	
Plastic	0.110	0.157	0.144	0.110	2.33
Paper and cardboard	0.079	0.112	0.120	0.078	0.67
Metals	0.027	0.041	0.035	0.030	0.13
Aluminium	0.100	0.144	0.128	0.100	0.60
Glass	0.043	0.060	0.051	0.043	0.20
Composites	0.135	0.194	0.158	0.135	1.73
Wood	0.044	0.062	0.052	0.043	0.40
Textiles	0.180	0.259	0.194	0.170	0.80
Pottery, porcelain, etc.	0.180	0.259	0.194	0.170	0.80

Source: Ministry of Environment and Water, 2016.
Note: Base fees; excl. VAT.

Table 2.8: Revenues from waste-related product fees, 2010-2015

	2010	2011	2012	2013	2014	2015	2010-2015	2010-2015
Type of product	million leva							€ million
Packaging	1.59	1.84	1.71	2.14	1.77	0.70	9.73	4.98
Tyres	3.25	1.09	0.20	0.27	0.05	0.19	5.04	2.58
Batteries and accumulators	0.71	0.58	0.34	0.34	0.06	0.01	2.04	1.04
Vehicles	0.10	0.02	0.00	0.16	0.83	1.45	2.57	1.31
Oils	0.66	0.21	0.08	0.03	0.05	0.02	1.06	0.54
WEEE	0.90	0.39	0.10	0.26	0.40	0.13	2.17	1.11
Total	**7.20**	**4.13**	**2.42**	**3.21**	**3.16**	**2.50**	**22.62**	11.57
Total in € million	3.68	2.11	1.24	1.64	1.62	1.28	11.57	

Source: Enterprise for Management of Environmental Protection Activities, 2016
Note: WEEE = waste electrical and electronic equipment.

While the collective schemes allow mutualizing the responsibilities of a large number of individual producers with different cost structures, there is a risk that the average fee rates applied for a given product category may tend to reduce incentives for individual producers to improve the eco-design of their products

Product charge on plastic bags

A charge on plastic (polymer film) shopping bags, which is separate from the above-mentioned EPR scheme, has been levied since October 2011. The legal base is the Waste Management Act. The charge is due from the domestic producers and importers that place these products on the market. Where the producer/importer cannot be identified, the tax is due from the retailers. The rationale is to reduce the use of these bags and the litter associated with them by encouraging customers to reuse shopping bags. Since October 2012 the charge is paid for bags with a thickness below 25 microns (0.025 mm) and maximum size dimensions of 39 x 49 cm. Earlier, the charge applied only to bags with a thickness below 15 microns. The tax rate has been 0.55 lev (€0.28) per bag since 2014, up from 0.45 lev (€0.23) in 2013 and 0.35 lev from October 2012. In general, retail shops have passed on their increased costs due to the product tax to their customers. The average annual number of plastic bags for which the tax was paid was only some 184,000 during the period 2012–2015. This corresponds to only 26 bags per annum per 1,000 inhabitants. This suggests that most customers either refused to pay the tax and/or decided to use the same plastic bag more or less regularly for their shopping. Annual numbers of plastic bags subject to the tax were very volatile during the period 2012–2015, which could reflect special factors.

The period covered is too short to enable identification with sufficient confidence of any sustained downward trend. An issue on which there is no published information is movement away from taxed plastic bags towards those that are not taxed, e.g. those of greater thickness. Total revenues collected from the plastic bag charges are earmarked for EMEPA. These amounted to 390.9 thousand leva (€199.8) from the inception of the tax in October 2011 until 30 June 2016. There is missing information on the annual

number of plastic bags subject to taxation compared with the annual number of plastic bags that can be used as shopping bags.

In addition, from 2016 an annual statistical survey is provided by the National Statistical Institute on the total production and consumption of plastic bags, regardless of their type (thickness). First results are expected in the begging of 2017.

Landfill tax

A landfill tax has been imposed effective from 1 January 2011. The purpose of the tax is to create incentives for reducing the landfilling of waste and promoting waste recycling and recovery. The tax is considered to be an integral part of the instruments for financing the costs of municipal waste management, including the construction, maintenance and closure of sanitary landfills (Local Taxes and Fees Act).

The tax base is the volume of municipal waste as well as inert construction and demolition waste disposed at landfills. Tax rates are established by the Ministry of Environment and Water (2013 Landfill Tax Ordinance, No. 7). Since 2013, there is a uniform tax rate for disposal of all types of non-hazardous municipal waste, including construction and demolition waste. The tax rate rose to 36 leva (€18.4) per ton in 2016, up from 15 leva (€7.7) in 2013.

Further marked increases are planned for the period up to 2020, when the tax rate is scheduled to amount to 95 leva (€48.5) per ton. Tax rates are doubled for disposal of waste at landfills that do not conform to the standards established in the EU Landfill Directive (1999/31/EC). In contrast, reduced tax rates may be applied by municipalities in regions that meet specified targets for reuse and recycling of waste materials (i.e. at least 50 per cent of the total weight of such waste) and limit the quantity of deposited biodegradable waste to 35 per cent of such waste (Waste Management Act).

The owners of the landfills, which currently are the municipalities, pay the tax. Revenues are collected by the RIEW and accumulated in a special bank account of the corresponding municipalities. Funds are earmarked for financing of investment in waste treatment and recovery facilities, including machinery and equipment, but also for the closure and post-use management of landfills. These funds have also been helping municipalities to mobilize the required own resources for obtaining external financing within the framework of the OPs "Environment 2007–2013" and "Environment 2014–2020". Total revenues collected amounted to 27.4 million leva (€14 million) in 2012.

Charges for municipal waste collection and disposal

The Local Taxes and Fees Act regulates the structure and setting of waste fees. Waste fees have to be determined annually by the municipal councils based on separate cost estimates for three different services: (i) collection and transportation of waste, (ii) disposal of municipal waste at landfills and other facilities, and (iii) cleaning of public areas (Local Taxes and Fees Act). The peculiarity of waste fees in Bulgaria over the last decade or so has been that the tax base for the setting of waste charges for households has been the tax value of the residential property. Nearly every private household in Bulgaria owns the residence in which it is living. The owner of a rented residential property must pass on these costs to the tenant.

For each of the three services covered by the waste fee, there is a separate tax rate (as per mille of the tax base). In Sofia, the annual waste fees paid for residential properties by private households corresponds to 1.6 per mille of the tax valuation of real estate in 2016. Of this, 1.02 per mille, or some 64 per cent of total fees, is for waste management; the remainder is for cleaning of public areas (table 2.9). The rate of 1.6 per mille has been applied in Sofia since 2009. In 2005, the tax rate was 2.45 per mille, but it was subsequently reduced in various steps to 1.6 per mille in 2009. The background to this was a significant rise in the tax value of residential real estate by a factor of 2.5 in 2009 compared with 2005. At the given tax rate, this meant that households had to pay much higher waste fees than was warranted by the extent and quality of municipal waste and cleaning services.

Waste charges for companies with residential property are determined in the same manner as for households, and the tax rates applied are identical. For non-residential properties of companies, the tax base is the book value of the property or the market price of the real estate, whichever is higher. In general, the book value is applied. The aggregate tax rate is 10 per mille of the book value, which is also divided into three components, and is more than six times the rates applied to residential property (table 2.9). This suggests that legal entities with non-residential property contribute a much larger share to the revenues from waste fees compared with their share in total generation of municipal waste. On average, legal entities cover more than twice the costs they should incur based on their share in total municipal waste generation. But companies have the option to pay a waste fee according to the type and number of waste containers they are using. In this case, they still have to pay the tax for waste disposal at landfills and cleaning of public areas. A third option is to fully rely

on private service providers for waste collection and disposal at a landfill. In this case, only the tax for cleaning of public areas applies.

There are a number of problems with this method of setting waste fees. The tax base, i.e. the tax value or book value of real estate, is not related at all to the volume of waste generated.

Therefore, changes in the tax base (up or down) directly affect the level of waste fees to be paid independently of the volume of waste. There is discrimination between persons within each customer group. There is, moreover, a prevalence of cross-subsidies. For a given waste volume, persons whose real estate has a high valuation pay more – possibly significantly more – than those whose property has a low tax assessment.

Moreover, businesses with non-residential properties pay significantly more for the same waste services than do private households. And, finally, the "waste tax" has to be paid in addition to the regular real estate tax, which is tantamount to double taxation. In Sofia, the real estate tax in 2016 is 1.875 per mille of the tax valuation, while the "waste tax" is 1.6 per mille. All told, this system of waste fees does not provide any incentives for waste minimization, i.e. it is not in line with the polluter-pays and user-pays principles. Rich households and the business sector have to shoulder a disproportionate share of municipal waste management costs.

Revenues collected from waste fees have, moreover, tended to be consistently higher than the estimated costs of waste services, including street cleaning. Data from the National Statistical Institute (NSI) show that, in each year during the period 2004–2013, revenues collected have exceeded costs of waste and cleaning services estimated in line with the Local Taxes and Fees Act. On average, revenues collected exceeded expenditures by 17.5 per cent during this period, with a maximum of 29.5 per cent in 2010. The upshot is that a significant share of revenues was spent on municipal activities other than solid waste management.

Against this background, in 2014 the Government amended the Local Taxes and Fees Act to the effect that the calculation of waste fees based on the tax value, book value or market price of the real estate is prohibited. But the development of a new methodology for setting waste fees has taken more time than anticipated. The prohibition should now come into force at the beginning of 2017 rather than the beginning of 2016, as planned. A taskforce has been established under the Council of Ministers to develop a draft proposal for calculation of the waste fee, which will then have to be adopted by the Parliament.

A waste tariff reform is also necessary for generating funds that contribute to the financing of the necessary investments in the municipal waste management system in order to achieve the ambitious recycling and recovery targets by 2020. The NWMP 2014–2020 estimates that the total required investments to reach these targets amount to some 1.3 billion leva (€0.67 billion).

Sensitivity analyses concerning the affordability of higher waste tariffs for private households show that a threshold corresponding to 1.2 per cent of average household incomes, and assuming 100 per cent bill collection, will generate revenues that will allow operating costs to be covered but leave hardly any funds for financing investments. The question is, however, whether average household incomes constitute a proper benchmark for assessing affordability problems. More generally, this also points to the large scope for mobilizing financial resources based on public–private partnerships.

Table 2.9: Municipal waste fees in Sofia, per mille of tax base

	Residential property		Non-residential property
	Households	Companies	Companies
Services/tax base	***Tax valuation of real estate***		***Book value of assets***
Waste collection and transport	0.60	0.60	3.72
Disposal at landfill and other facilities	0.42	0.42	2.64
Cleaning of public areas	0.58	0.58	3.64
Total	1.60	1.60	10.00

Source: 2014 Decision No. 867, Sofia Municipal Council.

GHG emissions trading

Bulgaria participates in the trading of EU Emissions Trading Scheme (EU ETS) emission allowances, EU aviation allowances and Kyoto credits. This trading takes place on the European Energy Exchange (EEX). Auctioning of emission allowances is the default method within the EU ETS. Businesses have to buy an increasing proportion of allowances through auctions; in 2013, this share was over 40 per cent, but it will progressively increase during the period 2013–2020. Auctioning is an effective way of applying the polluter-pays principle. In 2010, Bulgaria was temporarily suspended from carbon trading due to problems with its national system for recording GHG emissions. The revenues from sales of CO_2 emission allowances, except those from sales of allowances for the aviation sector, are allocated to the newly established Security of Electric System Fund, which is designed to help consolidate financial imbalances that have accumulated in the energy sector. Revenues from sales of aviation allowances are earmarked for financing of environmental projects by NETF.

Fees for extraction of timber and non-timber forest resources

The use of timber and non-timber forest resources is governed by various laws, such as the Forestry Act, the Protected Areas Act, the Biological Diversity Act and the Medicinal Plants Act.

State-owned forests

The management of state-owned forests is carried out by six state forest management enterprises under the governance of the Ministry of Agriculture and Food and the Executive Forest Agency. Forests that are municipal property are governed by the relevant municipal council.

Wood harvesting and sale from state-owned forests to commercial companies is organized on the basis of public tenders and auctioning. The resulting exploitation contracts are concluded by the relevant state forest enterprise and can have a validity of up to 15 years. Harvesting of standing timber by natural persons for their own use is subject to quotas and sale prices that are established by the corresponding state forest enterprise. This is, in general, limited to sanitary and technical cuts.

The utilization of non-timber forest products (excluding medicinal plants), such as mushrooms and forest fruits, is subject to permits and specific exploitation charges in the case that it constitutes a commercial activity. The corresponding prices are established by the Ministry of Agriculture and Food.. An annual fee is gathered for non-timber forest products, including medicine plants, which are not covered under the Annex I from the Medicinal plants act. Collection of these non-timber forest products for personal use is free of charge. The collection of medicinal and aromatic plants is governed by special provisions based on the Medicinal Plants Act. There are around 770 species that are medicinal in Bulgaria, and some 250 of them are used in large quantities for trade and processing. These plants represent a traditional export product and are well placed on the international markets. The Ministry of Environment and Water issues an annual order with list of plants that can be collected as well as corresponding quantities ("quotas"), which are distributed among districts. The collection of herbs is carried out by so-called herb processors, based on a corresponding permit issued against a fee. The revenues from permit fees are earmarked for EMEPA when the medicinal plants are gathered from national parks. The revenues from fees enter also in the forest and hunting enterprises, municipalities and state budget according to the ownership of the land from which the medicinal plants are gathered. Those funds are subsequently used for management and restoration activities in these lands..

The charge rates for the exploitation of medicinal plants are determined by the Council of Ministers (Decree No. 94, 2000). These fees apply for state-owned lands and forests as well as for protected areas. Fees for such plants on municipal territories are set by the relevant municipal councils. Charge rates for a given species at the municipal level cannot be higher than the corresponding fee at the state level (Medicinal Plants Act). Fee rates for these plants are very low; they range from 0.02 lev (€0.01) per kg to 0.15 lev (€0.08) per kg. Fees for use of genetic material of medicinal plants, especially those under the protective regime, for cultivation, including in laboratories, are much higher (table 2.10). The main rationale for cultivation is not only to meet current and future demands for larger volume production but also to relieve harvesting pressure on wild populations. Fee rates for medicinal plants set at the state level have not changed since 2000. It may be surmised that these fees no longer reflect the commercial value of these plants, taking into account that cumulative consumer price inflation between 2000 and 2015 amounts to 85 per cent.

Proceeds from the sale of timber and non-timber forest products, as well as from allocation of rights for pasturing in state-owned forests, are allocated to the corresponding state forest enterprises for financing their activities and duties. Average annual revenues

were within a range of 230–250 million leva (€117–128 million) in recent years, which was significantly above operating costs (160–180 million leva). Part of the revenues from sale of timber and non-timber forest products are allocated to a Forest Investment Fund for each of the forest enterprises designed to finance activities such as afforestation, as well as the design and construction of forest infrastructure such as roads (Forestry Act). The accumulated funds amounted to some 55 million leva (€28 million) at the beginning of 2014. There is also a legal obligation (Forestry Act) to use 10 per cent of any profits after tax for building a reserve fund to cover any operating losses within the current or previous fiscal year.

Protected areas

In the national parks which are exclusively state property commercial logging is prohibited. Permits can be issued, however, to the local population for use of wood for purposes such as own construction and use as firewood, but this is subject to quotas within the framework of forest maintenance and restoration activities. There are also annual permits for grazing of cattle and other farm animals in specific areas in the national parks. Other permitted use of non-timber resources, also for commercial purposes, include the collection of wild fruits, mushrooms and medicinal plants. Annual permits for all these activities are issued by the directors of the corresponding national parks.

Gathering of medicinal herbs on the territories of the national parks is restricted. The national parks management plans determine the places where the herbs can be collected and the quantities allowed for picking. The corresponding fees are governed by the Medicinal Plants Act and the associated decree on fee rates. All other fees for uses of natural resources in national parks – wild fruit, mushrooms, hay, etc are set in a separate decree on permitted uses of natural resources in protected areas – exclusively state property issued by the Council of Ministers. Fees for the use of wood and non-wood resources, except medicinal plants, from protected areas – exclusively state property (national parks) were raised in March 2016 after they had remained unchanged since 2000.

The new fees are significantly higher than the previous ones, which were very low and hardly reflected the market value of these resources against the backdrop of the significant cumulative inflation over this period (table 2.11). A significant increase in fees for grazing of farm animals and hay production was, however, reversed by the Council of Ministers in May 2016 in the face of strong protest from affected farmers. User fees are the same for all three national parks. There are no entrance fees for protected areas, though this is, in principle, envisaged in the Protected Areas Act. Total revenues collected from fees for the permitted use of natural resources in the three National Parks (Central Balkan, Pirin and Rila) amounted to 0.84 million leva (€0.43 million) during the period 2008–2015; the Rila National Park accounted for about two thirds of these incomes.

Table 2.10: Selected fees for collection of wild medicinal and aromatic plants

		Currency per unit	
Types of plants	**Unit**	**Lev**	€
1. Herbs (raw)			
Tubers, roots, rhizomes			
Peony	kg	0.09	0.05
Dandelion	kg	0.01	0.01
Leaves			
Barberry	kg	0.08	0.04
Hawthorn	kg	0.02	0.01
Stems			
Snowflake	kg	0.10	0.05
Cranberry red/black	kg	0.15	0.08
2. Protected medicinal plants			
Fruits	100 g	20.00	10.23
Seeds	100 g	50.00	25.56

Source: 2000 Decree on fees for use of medicinal plants, No. 94.
Note: Protected medicinal plants: Use of genetic material for cultivation.

Table 2.11: Fees for use of selected natural resources in protected areas

Resource	Unit	Lev		€
		2007	2016	2016
Wild fruits (except from medicinal plants)				
Juniper blue	kg	0.10	0.20	0.10
Walnuts	kg	0.15	0.20	0.10
Raw mushrooms				
Boletus	kg	0.22	0.40	0.20
Chanterelle	kg	0.06	0.30	0.15
Wood for local population				
Coniferous trees, beech, oak	m^3	60.00	75.00	38.35
Firewood	m^3	0.30 - 3.00	1.00 - 10.00	0.51 - 5.11

Source: 2000 Decree on fees for permitted uses of protected areas, No. 93; 2016 Decree on fees for permitted uses of protected areas, No. 63.
Note: Fees for wood are for the category "Large – Ia assortment".

Concession contract in Pirin National Park

A concession contract concerning a ski zone next to the town of Bansko in the Pirin National Park was concluded in 2001. The concessionaire is a company (Ulen Joint Stock Company (JSC)), which is owned by private investors and the Bansko Municipality. Revenues from annual concession fees, which are allocated to the central government budget, amounted to some 1.85 million leva (€0.95 million) during the period 2008–2015.

There have been controversies surrounding this concession contract given that the Pirin National Park was included in UNESCO's World Heritage List in 1983 and that the limitations concerning the territory designated for the ski zone were not respected (chapter 4). With Decision 34 COM 8B of the World Heritage Commiittee from its session in 2010 was approved the extension of the Pirin World Heritage Site (with approximately 12 000 ha high mountain grasslands and remarkable alpine formations). With the same decision, the Committee accepted the exclusion of Bansko and Dobrinishte ski zones (1 078.23 ha) and transformed these in a new buffer zone of the Property.

Those changes were in fulfillment of the recommendations by the World Heritage Committee and IUCN from their previous missions to the Property.

Revenues from use of timber and non-timber forest resources

Revenues collected from timber resources and non-timber forest products in national parks are transferred to EMEPA and used for purposes identified in the Protected Areas Act. Revenues from gathering of timber resources and non-timber forest products in territories, which are state forest are transferred to the respective Regional forestry enterprises and are used for purposes identified in the Forestry Act. As regards medicinal plants, the collected funds are to be used for maintenance, regeneration, resource assessment, creation of an information system and education programmes related to medicinal plants. Revenues from fees received by the municipalities are allocated to the municipal budget and earmarked for environmental protection.

Fees for extraction of underground mineral resources

The extraction and primary processing of subsurface mineral resources, i.e. metals, non-ferrous underground resources including industrial minerals, building materials and facing-stone materials, is governed by the 1999 Subsurface Resources Act. The right to exploration activities is allocated based on public tenders; annual fees depend on the size of the area and the type of underground resources. Extraction of mineral resources, in turn, is solely based on concessions. Concessionaires have to pay royalties to the State, regardless of the profits made from the activities.

The amount of royalties is either based on a specific formula that takes into account the type and market value of resources and specific conditions for extraction and primary processing or is a fixed fee per ton or cubic metre. Half of the concession royalty is allocated to the local municipality on whose territory these activities are conducted. A local tax on the extraction of quarrying materials, such as gravel, sand, dolomite and limestone from rivers, lakes and ponds, was repealed in 2009. Persons pursuing these activities based on a concession were exempt from payment of this local fee.

Charges for the right to use water resources

Charges for the right to use water resources are based on the Water Act. The Water Act distinguishes between charges for water abstraction, extraction of alluvium deposits from water sites, the discharge of wastewater and pollutants, and concession fees. The corresponding charge rates are established by the Council of Ministers. The rates applied in 2016 have been in effect since the beginning of 2012 (Tariffs for water abstraction, for use of water sites and pollution). In a more general way, these fees are expected to contribute to the application of the user-pays and polluter-pays principles, which are enshrined in the Water Act. However, the extent of cost recovery is low. At the end of 2016, a new tariff on charge rates for water abstraction, use of water bodies and for pollution was adopted with Decree No 383 of the Council of Ministers. The tariff corresponds to the 2015 Water Act amendments concerning the polluter pays principle as well as the recovery of costs for water services. The new tariff is operational from January 2017 and the water fees will be calculated based on the new Tariff from the beginning of 2018.

Water abstraction charges

Water abstraction charges depend on the type of water use and the source of water, namely surface or groundwater. With the exception of potable water abstraction, fees per m^3 of groundwater abstraction are significantly higher than those for surface water abstraction (table 2.12). Fee rates may appear low, but in the face of the large volumes of annual freshwater abstraction – 5.375 billion m^3 in 2014 – total revenues collected are non-negligible. They amounted to some 52.5 million leva (€26.8 million) in 2014. These figures do not include the abstraction of fresh water for production of hydropower (24.5 billion m^3 in 2014) with associated charges of some 39 million leva for hydropower producers.[6] Revenues collected from water abstraction fees are paid to the competent basin directorate and transferred thereafter to EMEPA.

The extraction of mineral waters, which are exclusive state property and public municipal property, is based on concessions, which are regulated by the 2006 Concessions Act, No. 36, and the Water Act. These concessions are granted for water use intended for bottling of mineral flat and/or carbonated water and other beverages with mineral water in their composition, as well as for extraction of valuable substances from mineral water. The extraction of mineral water for all other purposes is based on permits. Concessions are arranged based on open tender procedures and are subject to payment of an annual concession royalty. The municipality on whose territory the concession right is established is entitled to receive at least 30 per cent of the concession royalty for its budget, and the remainder goes to the state budget. The actual distribution is determined by the Council of Ministers. The extraction of mineral waters is, moreover, subject to a volumetric fee, which depends on the purpose of water use and the temperature of the water extracted (table 2.13).

Concession fees

Concession fees for use of water resources are paid only for the bottling of mineral waters, which are exclusive state property. The corresponding fees are established in the concessions, which are allocated based on public tenders. The minimum concession fee has been set at €2.5 per m^3.

Fees for use of water sites

Fees for the use of water sites for the extraction of alluvium deposits (such as sand, gravel, clay and silt) from surface waters depend on the volume of these materials taken out. There is a uniform fee of 1 lev (€0.51) per m^3.

Revenues from water use rights

Revenues collected from water abstraction, fees for use of water sites and the water pollution tax are allocated to EMEPA (Water Act) and earmarked for the financing a broad range of measures, including improvement of river basin management, water protection measures and the financing of investments in water sector infrastructure (Water Act).

Fees for irrigation water

Fees for irrigation water are established in annual ordinances by the Ministry of Agriculture and Food. The methodology for tariff setting is opaque and influenced by considerations of what is socially acceptable. The tariff system distinguishes between irrigation water from gravity-fed and pumped systems. For each of these two water supply systems there are separate tariffs for cultivation of rice and the aggregate of other crops. Tariffs for water from pumped irrigation systems for crops – though not for rice – depend, moreover, on the elevation level, i.e. the

[6] All figures are calculated by ECE based on water abstraction volumes published by the NSI and the individual charge rates for each type of water use.

difference between the level of the water source and the level of the irrigation system, given that this impacts on the required water pressure – and therefore energy consumption – to pump the water up.

There are different providers of irrigation water that apply different tariffs, but the large bulk of water is supplied by Irrigation Systems JSC (ISC). This a 100 per cent state-owned company, which was established as a separate legal entity in 1993. There are also more than 100 irrigation associations but most of them are not operational. ISC applied uniform national irrigation tariffs up until 2014. This was tantamount to cross-subsidies across regions, given existing differences in costs of water provision. But, as of 2015, tariffs also distinguish between regions of water use. At the same time, a special incentive tariff was introduced for farmers who apply drip irrigation for the cultivation of non-rice crops.

Another feature of tariff policy has been the high degree of cross-subsidies between the two types of irrigation systems (gravity-fed and pumps) and the two types of crops (table 2.14). To illustrate, in 2016, tariffs for gravity-fed systems range from 0.022 to 0.024 lev per m^3 for rice, while for all other crops the regional tariffs are within a range of 0.13 to 0.24 lev per m^3, i.e. 6 to 10 times the tariffs for rice. The difference in tariffs is even more pronounced for pumped irrigation systems. In 2016, the regional tariffs for non-rice crops range from 0.28 to 0.44 lev; this is 10 to 20 times the uniform water tariff of 0.028 lev per m^3 for rice cultivation.

Table 2.12: Charges for use of water resources, lev/m^3

Type of water use	Surface water	Groundwater
1. Water abstraction		
Drinking water for household use	0.02000	0.02000
Industrial water supply	0.04500	0.07000
Water for irrigation, agriculture and fish farms	0.00100	0.01000
Water used for cooling	0.00030	0.00080
Water use by hydropower plants	0.00160	..
Other purposes (except mineral water abstraction)	0.06500	0.16000
2. Use of water bodies for extraction of sand, silt, clay and gravel	1.00000	..

Source: Ministry of Environment and Water, 2016.
Notes: Industrial water supply from groundwater is limited to water used for production of food, medicinal and cosmetic products. Tariffs in force since 2012.

Table 2.13: Fees for abstraction of mineral water, lev/m^3

Purpose of water use/temperature	up to 30°	30° to 50°	more than 50°
Drinking water supply	0.031	0.030	0.029
Medicinal purposes, treatment and rehabiltiation	0.040	0.045	0.050
Other purposes	0.150	0.035	0.500

Source: Ministry of Environment and Water, 2016.

Table 2.14: Tariffs for supply of irrigation water, 2007, 2010, 2013, 2016, lev/m^3

		Lev/m^3				€/m^3
Type of crops	Irrigation system	2007	2010	2013	2016	2016
Rice	Gravity-fed	0.027	0.020	0.025	0.022/0.024	0.011/0.012
	Pumps	0.028	0.025	0.030	0.028	0.014
Non-rice crops	Gravity-fed	0.190	0.200	0.240	0.13/0.24	0.066/0.123
	Drip irrigation				0.035	0.018
	Pumps	0.325	0.410	0.440	0.28/0.44	0.143/0.225
	Drip irrigation				0.070	0.035

Source: Ministry of Agriculture and Food, 2016
Notes: Tariffs excl. VAT. Tariffs for 2015 and 2016 shown indicate the range of regional tariffs. Non-rice crops: Minimum pumping system tariffs for first elevation stage.

Irrigation water tariffs for rice cultivation in 2016 are the same (pump system) as in 2007 or even slightly lower (gravity-fed system). Tariffs for the aggregate of other crops were on an upward trend between 2007 and 2014 (gravity system), broadly in line with consumer price inflation. But the introduction of regionally differentiated tariffs in 2015 led partly to significant declines compared with 2014 levels. The lower range of regional tariffs (0.13 lev per m^3) in 2015 and 2016 is 46 per cent below the level in 2014. A similar pattern can be observed for pumped system tariffs. Financial incentives as of 2015 to apply drip irrigation for non-rice crops are quite strong. To illustrate, the corresponding fee per m^3 in 2016 is 73 per cent below the minimum regional tariff and some 85 per cent below the highest regional tariff.

Although irrigation tariffs are established per m^3 of water used, the actual volume of water used is not measured but only roughly estimated. The conveyance efficiency is very low, with water losses estimated at some 70–80 per cent. Revenues collected are largely insufficient to recover operating and maintenance costs for irrigation services. Demand for irrigation water has been declining dramatically due to various factors, notably the insufficient quality and reliability of irrigation services. Lack of adequate funds for maintenance and rehabilitation has led to a significant deterioration of the hydro-melioration infrastructure since about 1990. And relatively high tariffs have been creating affordability problems for non-rice crop farmers.

As a consequence, farmers have shifted increasingly towards growing mainly rain-fed crops, such as cereals and sunflowers. Irrigation water is demanded only if weather conditions really require it, even if this means a decline in productivity. The total irrigable area amounts to 0.45 million ha, corresponding to 15.5 per cent of total arable land. But only some 30,000 ha, i.e. 6.5 per cent, is actually irrigated. Some 90 per cent of total irrigation water supplied by ISC is used for rice cultivation. The corresponding revenues collected account for more than half of the total revenues of ISC, although the size of irrigated land for rice cultivation amounts to only some 15,000 ha, i.e. half the actually irrigated area.

Tariffs for water supply, sewerage and wastewater treatment

The provision of water supply and sewerage services is dominated by water companies, which are owned by either the State or the municipalities. Some of these companies have a mixed ownership structure, with 51 per cent owned by the State and 49 per cent by the municipality. The major exception is Sofia (which has 18 per cent of the population), where water supply services are operated by a private company, based on a 25-year concession, which started in 2000. Tariffs for water supply, sewerage and wastewater treatment are regulated by the Energy and Water Regulatory Commission (EWRC).[7] The main legal provisions for water supply and sewerage services are established in the Water Act and the 2005 Water Supply and Sewerage Services Regulation Act. The tariff methodology is determined in the Ordinance for the regulation of prices for water and sewerage service issued by the Council of Ministers. Since 2009, the EWRC has applied the "price cap" method,[8] where the regulator determines tariffs for the water supply and sanitation (WSS) services operator for the first year of the regulatory period and then adjusts fixed costs on an annual basis to account for inflation, while at the same time decreasing tariffs by a factor to improve the efficiency of operations of water companies.[9] Variable costs are also adjusted annually based on their projected changes. The price cap method will also be applied during the regulatory period 2017–2021.

Tariffs for WSS services distinguish between two customer groups: (i) private households, budgetary institutions and similar customers, and (ii) industry and commerce. Tariffs have three components, namely, drinking water supply, sewerage and wastewater treatment. Tariffs for drinking water supply to households and industry are identical. For some water utilities the EWRC has established dual water supply tariffs that depend on the way the water is abstracted and supplied to the population (gravity fed, by pumping or combined supply). For industrial and other commercial consumers, sewerage and wastewater treatment tariffs are differentiated on the basis of three categories of pollution levels in terms of (aggregate) pollutants per mg/l. Table 2.15 allows the gauging of tariff developments in Sofia between 2007 and 2016. There have been significant increases in part in the various tariff components, which by far exceed

[7] Effective 06.03.2015, the State Energy and Water Regulatory Commission (SEWRC) was transformed into the Energy and Water Regulatory Commission (EWRC).

[8] The other options that the Law provides for the regulator are the rate of return (cost plus) and the revenue cap methods.

[9] Thus, the current tariff is multiplied by a factor (CPI-K), where CPI is the inflation index and K is a measure of expected average efficiency improvements in the WSS sector.

the increase in the CPI by some 25 per cent over this period. Residential water supply and sewerage tariffs differ significantly across the country. The average tariff for WSS services in 15 major cities was 1.77 leva (€0.90) per m^3 in 2015 (table 2.16). The average national tariff for WSS services was only slightly higher at 1.84 leva (€0.94) per m^3.

Water companies lack funds for investment. Billed revenues allow, in general, only for recovery of operating costs. For 30 Bulgarian water companies, of 56 formal WSS operators that report on their financial performance to the International Benchmarking Network for Water and Sanitation Utilities, the average operating cost recovery ratio (billed operating revenues/operating costs per m^3) was exactly 1 for 2014. The best performer was the private water operator in Sofia with a ratio of 1.6. There are many companies, probably among those that do not report to the Network, which do not achieve full recovery of operating costs. Another issue is the extent to which current tariff levels allow water companies to allocate sufficient resources for operation and maintenance. In general, the efficiency of provision of water supply and sewerage services is quite low.

Non-revenue water, i.e. the difference between the volume of water put into the water distribution system and the volume that is billed to customers, accounted for 61 per cent of total drinking water abstraction in 2014. This reflects mainly technical losses due to leakages in the inadequately maintained water transportation network. Staff productivity, gauged by the number of staff of water companies per 1,000 water connections, is quite low compared with other countries in the region and the EU average. This suggests that there is overstaffing in many water companies. All water that is sold is metered. The average bill collection rate, including overdue payments, was 84.6 per cent during the period 2009–2014. But this masks the fact that the annual bill collection rates (excluding arrears) have been quite low, at some 75 per cent. The 30 water companies referred to above had an average bill collection rate of only 78 per cent in 2014.

All told, there is considerable scope for improving the efficiency of operations in the WSS sector by effectively addressing the issues of high non-revenue water and low bill collection. Economies of scale will also be reaped from the ongoing consolidation of water operators in regional water companies. But for many water companies, tariff increases will be required just to enable them to recover only their operating costs. And higher tariffs will also be necessary for ensuring the co-financing of investments and recovering – at least – the high operating expenditures of the many new WWTPs that are needed for meeting the international water quality standards.

Table 2.15: Tariffs for water supply, sewerage and wastewater treatment services in Sofia, 2007-2016

	Lev/m^3		€/m^3
Customer category/service	**2007**	**2016**	**2016**
Private households, budgetary organizations			
Potable water supply	0.724	1.040	0.506
Sewerage (discharge of wastewater)	0.126	0.230	0.102
Wastewater treatment	0.169	0.250	0.143
Total tariff	**1.019**	**1.520**	**0.752**
Industry and commerce			
Potable water supply	0.724	1.040	0.506
Sewerage (discharge of wastewater)			
Pollution level I (up tp 200 mg/l)	0.196	0.360	0.159
Pollution level II from 200 mg/l up to 600 mg/l)	0.252	0.460	0.199
Pollution level III (above 600 mg/l)	0.297	0.540	0.235
Wastewater treatment			
Pollution level I (up tp 200 mg/l)	0.264	0.390	0.220
Pollution level II from 200 mg/l up to 600 mg/l)	0.339	0.500	0.281
Pollution level III (above 600 mg/l)	0.399	0.590	0.332
Total tariff			
Pollution level I (up tp 200 mg/l)	1.184	1.790	0.885
Pollution level II from 200 mg/l up to 600 mg/l)	1.315	2.000	0.987
Pollution level III (above 600 mg/l)	1.420	2.170	1.074

Source: EWRC; Sofiyska Voda, 2016
Notes: Tariffs excl. VAT. Tariffs for 2016: effective 1 May 2016.
Exchange rate: €1 = 1.9558 lev.

Table 2.16: Residential water supply and sewerage tariffs in 15 major cities in 2015

	Population, 1 000	Water supply	Sewerage	WWT	Total	Total
		Lev/m³ (excl. VAT)				€/m³ (excl. VAT)
Blagoevgrad	69.6	1.02	0.13	0.24	1.39	0.71
Burgas	203.0	1.10	0.20	0.51	1.81	0.92
Dobrich	86.3	2.01	0.13	0.23	2.37	1.21
Gabrovo	55.0	1.45	0.15	0.23	1.83	0.93
Pazardhik	69.4	0.85	0.10	0.35	1.30	0.66
Pernik	74.8	1.10	0.18	0.29	1.57	0.80
Pleven	99.6	1.45	0.10	0.18	1.73	0.88
Plovdiv	341.6	1.19	0.09	0.24	1.52	0.78
Ruse	145.8	1.43	0.15	0.28	1.86	0.95
Shumen	77.7	1.77	0.15	0.28	2.20	1.12
Sliven	87.9	1.35	0.07	0.28	1.70	0.87
Sofia	1260.1	0.99	0.20	0.28	1.47	0.75
Stara Zagora	136.8	1.81	0.10	0.36	2.27	1.16
Varna	334.5	1.34	0.24	0.41	1.99	1.02
Veliko Tarnovo	68.3	1.28	0.11	0.08	1.47	0.75
Memo item						
Average		1.34	0.14	0.28	1.77	0.90

Source: EWRC (Tariffs); NSI (Population in 2014).
Notes: Tariffs applied in 2015. Average tariff = unweighted average.
Blagoevgrad: Combined WS tariff (pumped and gravity fed). Tariff for gravity-fed water = Lev 0.76.
Sliven: as for Blagoevgrad; tariff for gravity-fed water = Lev 0.62.
Plovdiv: WS tariff shown is for pumped water; WS tariff for gravity-fed water = Lev 0.76.

The financing of the renewal and upgrading of the water and sanitation infrastructure is one of the major challenges in the water sector. The World Bank estimates that, based on regional master plans, some 11.5 billion leva (€5.9 billion) will be needed over the period 2014–2023, of which some 65 per cent is accounted for by the cost of compliance with EU standards (chapter 6).

While it is generally acknowledged that higher water tariffs are needed to ensure the financial sustainability of water services, at the same time this raises the issue of affordability of adequate water consumption for lower income households. Bulgaria does not yet have a formal mechanism for dealing with the affordability of water tariffs for vulnerable persons. The Water Supply and Sewerage Services Regulation Act stipulates that social affordability of water tariffs is established if monthly expenditures on WSS services, based on a minimum monthly water consumption of 2.8 m^3 per person (93.3 lcd), do not exceed 4 per cent of the monthly average household income in the relevant region (district). A 2015 amendment to the law has reduced this threshold to 2.5 per cent of monthly average household income,.The social affordability limit of 2.5 per cent became effective in July 2015

There are no official household budget surveys that allow the gauging of the share of expenditure on WSS services in total household incomes. The established minimum water consumption norm of some 93 lcd is only slightly below actual water consumption by the population, which in recent years was within a range of 100 lcd in 2010 and 96 lcd in 2014. The NSI's household budget surveys show that the monthly average monetary household income was 970 leva (€499) in 2015. The average household size was 2.4 persons in 2015.The water bill, based on the actual average tariff of 1.84 leva per m^3 and monthly water consumption of 6.9 m^3 (2.4 x 2.88 m^3) for such a household was 12.70 leva.

This corresponds to only 1.3 per cent of average monthly monetary household income, which can hardly be claimed to be excessive.

According to NSI statistics there is a huge income distribution inequality between the different administrative districts in Bulgaria. And whereas in some regions the current water prices are about 50 per cent of the social affordability level, there are also regions where this level is almost reached.Under the earlier 4 per cent rule, the maximum expenditure on water bills for an average-income household was

therefore 38.8 leva (€19.8). For a 2.4-person household with average water consumption of 2.9 m^3 (as in 2014) per person per month, i.e. a total monthly volume of 6.9 m^3, the potential maximum tariff that meets the "social affordability" criteria would have been 5.6 leva (€2.9) per m^3. This compares with an actual tariff of 1.84 leva in 2015. Under the new 2.5 per cent rule, the maximum monthly expenditure on water in 2015 would be 24.25 leva for the same household, and the associated tariff for the given monthly water consumption would be 3.5 leva, i.e. 88 per cent more than the current tariff. It can be safely assumed that any such increase in tariffs can only be achieved in a gradual fashion. More generally, the existing legal provision for what constitutes a socially affordable water tariff and water bill fails to address the issue of the affordability of water tariffs for households with incomes significantly below the average in a given region. Thus, to illustrate, based on income distribution statistics it has been calculated that, if a household with an average income pays 4 per cent of its monthly income for WSS services, for the same services these costs correspond to much more (as a percentage of income) for households in the lowest income quintile or decile.

Excise duties on energy products

The EU Energy Taxation Directive and the national Excise Duties and Tax Warehouses Act provide the legal framework for the taxation of energy products. The tax base for most of these products (gasoline, gas oil, kerosene, LPG) is the quantity (litre or kg) consumed. In contrast, the tax base for coal, coke and natural gas is the energy content (in GJ). From an overall environmental perspective, the preferred tax base for all energy products should the energy content. Upon entry into the EU, Bulgaria was granted transitional periods as regards the application of EU minimum duty rates for most energy products, of which the last, for kerosene, expired on 1 January 2013. Up until the end of May 2012, Bulgaria applied a zero rate on natural gas used as motor fuel and heating fuel. This was in line with EU rules (Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity), which allows such exemptions for Member States in which the share of natural gas in total energy consumption is lower than 15 per cent. But the natural gas used by households is still exempted from excise duty, which is also an option provided by the above-mentioned Directive.

Against this backdrop, excise duty rates on all energy products (except natural gas used by households) are equal or higher than the EU minimum duty rates in 2016. The difference in tax rates compared with 2007 is considerable in parts (tables 3.17 and 3.18). Excise duties for a number of energy products used for heating purposes were raised drastically at the beginning of 2016. The aim is to prevent the improper use of heavy and marked fuels as motor fuel instead of for heating purposes. Recent amendments to the Excise Duties and Tax Warehouses Act stipulate that as from 1 January 2016 excise duty will have to be paid for heat energy produced in the case of combined production of heating and electrical energy ("co-generation"). The tax base is equal to 30 per cent of the total amount of energy products used for the combined production.

Besides the excise duty exemptions for natural gas, Bulgaria has been applying other partial or full exemptions or excise tax reductions in a number of sectors, which are optional under EU law. These optional exemptions, which are a matter of national discretion, are regulated under the Excise Duties and Tax Warehouses Act and considered to be tax incentives. They comprise zero excise duty rates on household consumption of electricity, coal and coke, refund of excise duty on electricity used by railways, and refund of excise duty on the use of gasoil (diesel) as motor fuel in agriculture.

The resulting losses in government tax revenue from preferential tax treatment of specific groups of taxpayers are known as "tax expenditures", because they are tantamount to government subsidies delivered through the tax code. Estimates by the Ministry of Finance show that total tax expenditures from preferential excise duty rates on energy products amounted to 522.60 million leva (€267.21 million) during the period 2010–2015. The reduced excise rate on natural gas used as motor fuel or heating fuel accounted for 64 per cent of total expenditures during that period. The tax expenditures resulting from the refund of excise duty for diesel used in agriculture, however, were not estimated by the tax authorities in the period from 2010 to 2013. The measure was cancelled in this period, after that recovered as a special procedure for deducting excise duty in return for fuel vouchers in the form of state iad for agricultural sector (table 2.19). The motivation for these tax expenditures has been the pursuit of social or strategic objectives. But the question is whether tax expenditures are really the most cost-efficient instrument for achieving these objectives. A case in point is the indiscriminate exemption of all households, rich and poor, from excise duties on certain energy products or the refund of excise duty on the use of diesel to all agricultural producers.

Table 2.17: Excise duty rates on motor fuels, 2007, 2015, 2016

		Lev			€	€
Products	**Units**	**2007**	**2015**	**2016**	**2016**	**EU MR**
Motor fuels						
Leaded petrol	per 1 000 litres	830.0	830.0	830.0	424.4	421.0
Unleaded petrol	per 1 000 litres	635.0	710.0	710.0	363.0	359.0
Gas oil (diesel)	per 1 000 litres	535.0	645.0	646.0	329.8	330.0
Kerosene (used as propellant)	per 1 000 litres	485.0	645.0	646.0	330.3	330.0
LPG (used as propellant)	per 1 000 kg	340.0	340.0	340.0	173.8	125.0
Natural gas (used as propellant)	per Gigajoule	0.00	0.85	0.85	0.43	2.60
Motor fuels used for commercial and industrial usage						
Gas oil	per 1 000 litres	535.0	645.0	646.0	330.3	21.0
Kerosene - industrial/commercial use	per 1 000 litres	485.0	645.0	646.0	330.3	21.0
LPG - industrial/commercial use	per 1 000 kg	340.0	340.0	340.0	173.8	41.0
Natural gas (industrial/commercial use)	per Gigajoule	0.00	0.85	0.85	0.43	0.30

Source: European Commission, 2016
Notes: Excise duty rates on 1 January of the corresponding year. 2015: 1 July.
Leaded petrol: Leaded petrol is forbidden for sale in Bulgaria.
Natural gas: Excise rates in 2015/2016 for use of natural gas as propellant became effective 1/06/2012.
EU MR = Harmonized minimum excise duty rates for the EU.
Exchange rate: €1 = lev 1.9558.

Table 2.18: Excise duty rates for heating fuels and electricity, 2007, 2015-2016

		Lev			€	€
Product	**Unit**	**2007**	**2015**	**2016**	**2016**	**EU MR**
Heating: Business use						
Gas oil	per 1 000 litres	50.00	50.00	646.00	330.30	21.00
Heavy fuel oil	per 1 000 kg	30.00	50.00	400.00	204.50	15.00
Kerosene	per 1 000 litres	50.00	50.00	646.00	330.30	0.00
LPG	per 1 000 kg	0.00	0.00	0.00	0.00	0.00
Natural gas	per Gigajoule	0.00	0.60	0.60	0.31	0.15
Coal and coke	per Gigajoule	0.30	0.60	0.60	0.31	0.15
Heating: Non-business use						
Gas oil	per 1 000 litres	50.00	50.00	646.00	330.30	21.00
Heavy fuel oil	per 1 000 kg	30.00	50.00	400.00	204.50	15.00
Kerosene	per 1 000 litres	50.00	50.00	646.00	330.30	0.00
LPG	per 1 000 kg	0.00	0.00	0.00	0.00	0.00
Natural gas	per Gigajoule	0.00	0.00	0.00	0.31	0.30
Coal and coke	per Gigajoule	0.30	0.60	0.60	0.31	0.30
Electricity						
Business use	per MWh	1.00	2.00	2.00	1.00	0.50
Non-business use	per MWh	1.00	0.00	0.00	1.00	1.00

Source: European Commission, 2016
Notes: Excise duty rates on 1 January of the corresponding year. 2015: 1 July.
Natural gas: Excise rates in 2015/2016 for use of natural gas for heating by business became effective 1/06/2012.
Natural gas used by households is exempted from excise duty.
Coal and coke: Excise duty exemption for households (Article 15 (1-h) of Council Directive 2003/96/EC).
Electricity: Zero rate for electricity, used by households (Article 15 (1) (h) of Council Directive 2003/96/EC).
EU MR = Harmonized minimum excise duty rates for the EU.
Exchange rate: €1 = lev 1.9558.

Tax on fuel oil and heavy fuel oil with sulphur content exceeding 1 per cent

Till 22 December 2015 the Clean Ambient Air Act envisaged a tax of 22 leva (€11.25) per ton of heavy fuel oil with a sulphur content exceeding 1 per cent to be paid by the end users prior to withdrawing these products from the relevant tax warehouses on the territory of Bulgaria. Revenues collected were allocated to EMEPA and earmarked for environmental projects, mainly in mountainous areas, and on reducing the pollution from motor vehicles and from power generation (Clean Ambient Air Act). Since 1st January 2012 the use of heavy fuel oil with Sulphur content over 1 per cent is forbidden in Bulgaria.

Taxes on transport vehicles

Property tax on transport vehicles

The property tax on transport vehicles is a local tax, which is regulated by the Local Taxes and Fees Act. The tax is levied on transport vehicles registered for operating on the domestic road network, ships recorded in the registers of Bulgarian ports and aircraft recorded in the state register of civil aircraft. The tax has to be paid by the owner of the vehicle. The tax rate has to be determined by each municipality (municipal council) within the statutory ranges specified in the Act.

The tax base depends on the type of vehicle. It includes the engine power (in kW) for passenger cars; the engine size (in ccm) for motorbikes; the number of seats for buses; and the permissible weight, number of axles and suspension system for trucks. For boats and ships the main tax base is the gross tonnage. Civil aircraft are taxed based on their maximum take-off weight.

Tax rates for passenger cars can vary from 0.34 lev (€0.17) per kW to 3.69 leva (€1.89) per kW depending on the engine power (table 2.20). Depending on the age of the vehicle, the corresponding tax rate is multiplied with a coefficient, which *decreases* with the age of the vehicle:

- Vehicles up to 5 years old: 2.8;
- Vehicles 5–14 years old: 1.5;
- Vehicles more than 14 years old: 1.

Table 2.19: Tax expenditures in Bulgaria, 2010-2015, million leva

Tax measures	2010	2011	2012	2013	2014	2015	Total 2010-2015
Refund of excise duty on electric power for licensed railway carriers	1.10	1.68	3.98	4.06	3.75	4.06	18.63
Zero-rate excise duty on electric power for household consumption	18.63	19.25	16.23	22.91	20.33	21.75	119.10
Reduced of excise duty on natural gas used as motor fuel and heating fuel	32.95	38.16	61.44	64.50	48.21	39.90	285.16
Zero-rate excise duty on sales of coal and coke to individuals	4.70	5.20	3.04	2.90	0.08	0.00	15.92
Refund of excise duty on diesel fuel used by agricultural producers	N.M.	N.M.	N.M.	N.M.	43.21	40.57	83.78
Total above	57.39	64.29	84.68	94.37	115.58	106.28	522.60
Memorandum item							
Total above in € million	29.34	32.87	43.30	48.25	59.10	54.34	267.21
Total above as percentage of total revenue from excise duties	1.61	1.67	2.09	2.33	2.86	2.35	..
Total above as percentage of GDP	0.08	0.08	0.10	0.12	0.14	0.12	..

Source: Ministry of Finance, Tax Expenditure Reports.http://www.minfin.bg/en/page/1144.
Note: Excise rate on natural gas used as motor fuel and heating fuel: reduced rate as from 2012.
N.M. = not measured.

Table 2.20: Property tax on passenger cars

Engine size	Lev/kW	€/kW
Up to 37 kW inclusive	0.34 - 1.02	0.17-0.52
More than 37 kW up to 55 kW	0.40 - 1.20	0.20-0.61
More than 55 kW up to 74 kW	0.54 - 1.62	0.28-0.83
More than 74 kW up to 110 kW	1.10 - 3.30	0.56-1.69
More than 110 kW	1.23 - 3.69	0.63-1.89

Source: Local Taxes and Fees Act.

From an environmental protection vantage point this is not very satisfactory, given that older vehicles generally tend to meet less stringent pollution standards and they should therefore be taxed more than newer cars. As of 1 January 2014, however, the amount of tax that has to be paid is reduced, depending on the pollutant emission standards of vehicles. For passenger cars these tax rebates are only granted for vehicles with an engine power up to 74 kW (nearly 100 hp) inclusive. Most of the passenger cars are therefore not eligible for these tax reductions, which are as follows:

- 20 to 40 per cent (to be determined by the municipality) for cars that are equipped with operational catalytic converters, but do not comply with environmental standards Euro 3 to Euro 6 and the most severe exhaust emission standards of the so-called enhanced environmentally friendly vehicles (EEV);
- 50 per cent for cars that meet Euro 3 and Euro 4 standards;
- 60 per cent for cars that meet Euro 5 and Euro 6 standards.

Tax rebates, without limits to engine size, have also been introduced for other vehicle categories:

- 40 per cent for buses and trucks that meet Euro 3 and Euro 4 standards;
- 50 per cent for buses and trucks that meet Euro 5 and Euro 6 standards and EEV;
- 90 per cent for buses operating public transport, supported by municipal subsidies, in urban settlements and sparsely populated mountainous areas.

The revenues collected from the vehicle tax are allocated to the municipality in which the owners of the vehicles have their permanent residence. Revenues are not earmarked. Tax exemptions are applied *inter alia* to vehicles owned by the state and municipal bodies, electric cars, and vehicles for persons with disabilities (defined as the loss of at least 50 per cent of working capacity). In the case of the transfer of ownership of a vehicle already registered in Bulgaria, the new owner has to pay a transfer tax, which municipalities can set within a range of 0.1 per cent to 3 per cent of the insurance value of the vehicle.

Eco-tax for motor vehicles

A product fee has to be paid for any vehicle imported to Bulgaria. The fee has to be paid by the owner of the vehicle upon its first registration. The fee is regulated by the Ordinance establishing the terms and amount of payment of product fee for products, which after use create waste streams. The fee was introduced in 2008. The amount of the fee increases with the age of vehicle. Since 2011, the fee ranges from 146 leva (€74.6) for new vehicles to 267 leva (€136.5) for secondhand cars with an age exceeding 10 years. The revenues collected from this eco-fee are credited to EMEPA.

Road user fees

The use of national roads is subject to user fees. The legal base for this is the 2000 Roads Act (as amended and supplemented). The list of roads subject to user fees is determined by the Council of Ministers. Road user fees apply mainly to the system of national motorways and roads that are part of the international E-road network developed by the ECE but also to some sections of national roads outside this network.

Road fees are collected on the basis of "vignettes", which are sold at petrol stations and other sales points. Vignette prices, which are established by the Council of Ministers, depend on the period of validity and vehicle characteristics. As regards commercial vehicles such as trucks and buses, prices are differentiated based on the admissible total weight *and* the vehicle emission standard. Vehicles that meet Euro 3 and higher emission standards pay lower fees than vehicles that do not meet them. The distinction between vehicle emission standards, however, is not made for passenger cars and other light-duty vehicles with a maximum admissible weight of 3.5 tons (table 2.21). The annual revenue from the vignette fee amounted to 206 million leva (€105 million) in 2015, broadly the same as in the preceding years. There is a separate toll for the passing of certain bridges and tunnels that are included in a list adopted by the Council of Ministers. A case in point is the use of the Danube River bridge in the direction of Ruse–Giurgiu. There is, moreover, a fee for special use of roads (Roads Act), which is determined either by the Government (for national roads) or by the municipal council (for municipal roads). The fee pertains to road vehicles that exceed the maximum permissible width, length and axle loading. The revenues collected from road user fees and from the charges for special road use are earmarked for financing the operation, repair, maintenance and reconstruction of national roads.

Energy tariffs

The method for tariff regulation applied to the electricity sector has changed from cost plus to the price cap approach since 2013. For the gas sector the price cap method has been applied since 2008.

Table 2.21: Road user fees ("vignette") in Bulgaria, 2016, lev

Validity/emission standard	Vehicles up to 3.5 t (e.g. Passenger car)	Vehicles up to 12 t or with more than 8 seats (e.g. trucks; buses)		Vehicles with more than 12 t (e.g. road haulage vehicles)	
		Euro 0,I,II	**Euro III-VI**	**Euro 0,I,II**	**Euro III-VI**
Daily		21	21	21	21
Weekly	15	53	40	87	67
Monthly	30	105	80	174	134
Annual	97	1 050	808	1 743	1 340
Annual, €	50	537	413	891	685

Source: Road Infrastructure Agency, 2016.

Table 2.22: Household electricity and gas tariffs, 2010-2015

	2010	**2011**	**2012**	**2013**	**2014**	**2015**
Electricity						
Lev/kWh	0.161	0.166	0.176	0.177	0.169	0.186
€/kWh	0.082	0.085	0.090	0.090	0.086	0.095
Natural gas						
Lev/GJ	21.700	24.495	28.520	28.000	26.470	23.585
€/GJ	11.095	12.524	14.582	14.316	13.534	12.059

Source: National Statistical Institute, 2016.
Notes: Average annual tariffs, including all taxes and levies.
Tariffs for medium-size-household consumers, with an annual electricity consumption between 2,500 and 5,000 kWh, and natural gas consumption between 20 GJ and 200 GJ.
Exchange rate: 1€ =1.95583 lev.

Electricity tariffs

As regards electricity, only prices for low-voltage electricity for household and non-household consumers are subject to regulation. Industrial consumers of high-voltage electricity, which are connected to the transmission network, are buying electricity directly in the liberalized market at prices freely negotiated among market participants (electricity generators, traders and customers). The electricity distribution network, including supply to final consumers, is privatized and owned by three foreign companies (CEZ, EVN and Energo-Pro).

The rules for the setting of prices are established in the 2013 EWRC Ordinance No. 1 on regulating the prices of electricity. As noted above, since 2013, the price cap method for electricity tariff regulation has been applied. Regulated end-user tariffs distinguish between household and non-household consumers. Consumers are free to change energy suppliers. In 2014, some 3,550 customers did so. Consumption by all customers is measured using individual meters. The implementation of smart metering is not yet economically viable. End-user tariffs are integral tariffs, i.e. besides the supply tariffs to end users, they also comprise the costs of generation, transmission and distribution of electricity as well as support for electricity generated from RES. Some 15 per cent of the electricity tariff per kWh for households is accounted for by support to RES.

Enterprises have the option to choose among a single tariff, tariffs for different time zones, or tariffs for different time zones and peak load tariffs. Households can choose between single tariffs and tariffs with two time zones (day and night). The differential tariffs are set so as to stimulate the use of electricity during night periods and limit consumption during periods of peak demand. Average bill collection rates are quite high at 98 per cent. Average annual household tariffs rose in nominal terms by 15.4 per cent in 2015 compared with 2010 (table 2.22); in real terms, i.e. after taking into account inflation, there was an increase by 11 per cent (table 2.22). Nominal electricity prices for households are the lowest in the EU; they corresponded, in euros, to some 45 per cent of the EU average in 2015. This is largely on account of the low average income levels in Bulgaria. When expressed in purchasing power parities, household tariffs correspond to 97 per cent of the average EU tariff in 2015. This suggests that, compared with average incomes, electricity prices are quite high. Regulated electricity tariffs for industrial consumers have been on a downward trend since 2013, reflecting efforts to improve their price competitiveness.

Photo 2: Central Sofia Market Hall

The regulated tariffs for end users, in particular private households, are not cost reflective. This is largely on account of the significant increase in generation costs triggered by the strong expansion of renewables due to generous subsidies for solar power and co-generation, which was not passed through to end users. The resulting tariff deficit, which has fallen mainly on the electricity distribution companies and the official electricity supplier, the National Electric Company (NEK EAD), is reflected in a deterioration of their financial situation in recent years with adverse consequences for new investments and adequate maintenance of the sector infrastructure. The World Bank estimated that the electricity tariff deficit amounted to some 800–1,200 million leva in 2013, corresponding to 1–1.5 per cent of GDP. The tariff policy during the period 2013–2015 has led to further increases in the deficit, also due to the unexpected consequences of the introduction of feed-in tariffs in 2011.

Feed-in tariffs

Bulgaria has supported the generation of electricity from RES with a scheme of feed-in tariffs (FITs), which is regulated by the EWRC. The legal bases for FIT schemes are the Energy Act and the 2011 Energy from Renewable Sources Act. The initial generous rates of FITs, combined with long-term electricity purchasing obligations, ranging from 12 to 20 years depending on the type of RES, for the grid operator, meant that investments in RES were growing much faster than expected so that the 2020 renewable target (16 per cent of the power mix) was already reached in late 2013 (chapter 10). At the same time, given that the cost of electricity from the RES network (notably wind and solar capacity) was above the cost of existing grid electricity, there was increasing upward pressure on the costs of electricity generation. The incomplete pass-through of higher generation costs into supply tariffs for end users led to a profit squeeze for distribution companies and it also affected adversely the financial status of NEK. A decision by the ERWC in early 2013 to increase household tariffs led to public protests, the resignation of the Government, and three consecutive cuts in tariffs in the same year. These tariff reductions were subsequently reversed.

Against this background, the Government decided to limit new investment in RES power generation. Amendments to the Energy from Renewable Sources Act and the Energy Act, which entered into force on 6 March 2015, eliminated preferential prices for RES electricity for new projects, with the exception of biomass producers that use at least 60 per cent animal dung. In July 2015, moreover, the EWRC introduced the new concept of "net specific generation of electricity", which is a threshold for the maximum amount of electricity to be purchased from RES facilities under the existing respective preferential FITs. This has led to an effective reduction in the effective volume of electricity from RES that benefits

from preferential tariffs compared with the previous situation. Any excess amount of electricity from RES facilities above the new threshold has to be sold at the lower prices for surplus electricity in the balancing market or at prices to be negotiated in the liberalized market.

Prices for natural gas

All natural gas is imported from the Russian Federation. Prices for end users of gas have been influenced by world market developments concerning alternatives to natural gas, notably the price of heavy fuel oil. Another important factor is the exchange rate of the national currency to the US dollar. The domestic price of natural gas has three components, namely the import price, the charges for services provided by the public supplier and the price of transmission, which is regulated by the EWRC. In the event, domestic gas prices have been on a pronounced downward trend since 2012 (table 2.22).

Heat prices

District heating companies are operating in 12 large cities of Bulgaria. Sofia, the capital, accounts for more than half of the installed capacity of 6,162 MW, which is operated by a sole company that is owned by the municipality. In contrast to Sofia, the heat companies in other cities are owned by private entities and they are facing competition from gas supply companies. At the national level, heat consumption has been on a declining trend in recent years.

Preferential tariffs are applied to encourage the use of high-efficiency combined heat and power plants to generate electricity and heat. However, according to the World Bank (2013) there are distorted incentives, which lead co-generators to sell power at preferential prices and buy back power for their own use at lower prices. Heat prices are, in general, not cost reflective. The distribution networks have deteriorated, reflecting inadequate maintenance due to lack of financial resources. The Bulgarian District Heating Association estimates that annual heat losses amount to 1.5 TWh, corresponding to annual financial losses of €55 million.

Financial imbalances in the energy sector

The Bulgarian energy sector has experienced serious financial imbalances over the past decade, which resulted in the progressive deterioration of the financial situation of the NEK, which carries out the activities of a public supplier. These difficulties have their roots mainly in long-term power purchase agreements with its suppliers, including traditional coal-fired power plants and RES facilities, which created financial obligations that NEK could not meet. Financial losses resulted also from inefficiencies in existing operations. NEK's short-term liabilities to suppliers reached 1.7 billion leva (€0.9 billion) as of September 2014. This, together with its total debt amounting to some 3.2 billion leva (€1.6 billion), corresponding to 4 per cent of GDP, has raised concerns about NEK's financial sustainability.

The Government and EWRC have taken various measures designed to improve the financial status of NEK. In 2013, the EWRC introduced a supplementary charge called "Obligations to Society" which had to be paid to NEK by all clients in the liberalized market based on the actual amount of electricity consumed. The fee, set at 16.37 leva (€8.37) per MWh, is based on the Energy Act and effective as of 1 August 2015. The EWRC determined an even fee for all consumers in the liberalized and regulated market, which amounts to 37.90 leva (€19.38) per MWh.

The financial status of NEK, moreover, is to be consolidated with the establishment of an Electric Power Grid Security Fund based on amendments to the Energy Act in July 2015. The financial resources of the Fund will originate mainly from a levy of 5 per cent on revenues from sales of electricity by domestic electricity producers and importers of electricity sold on the domestic market (Energy Act). Another source of resources is the revenues from trading of CO_2 allowances (except those of the aviation sector) received from the European Energy Exchange (EEX) common trading platform auctions.

Affordability of energy for vulnerable consumers

Expenditures on electricity account for the lion's share of household expenditures on energy in Bulgaria. Some 60 per cent of households are "energy poor", which is commonly understood as a situation where more than 10 per cent of household resources have to be allocated to financing energy needs. This reflects not only the very low incomes of large parts of the population but also the poor energy efficiency standards of buildings, which result in high needs for energy.

But the Government has not yet established a system designed to ensure adequate access of vulnerable consumers to basic energy needs. The Energy Act since July 2012 refers to "vulnerable consumers" as "household customers that receive earmarked aid for electricity, heat or natural gas in accordance with the Social Assistance Act", but specific schemes for dealing with affordability issues for low-income

households have not yet been adopted. The Government has, however, set up a working group to analyze feasible options for dealing with vulnerable consumers. Currently, there is only the Winter Supplement Programme, administered by the Ministry of Labour and Social Policy through the Agency for Social Assistance, which provides direct financial support for heating bills to vulnerable consumers in compliance and pursuant to the criteria and requirements of Social Assistance Act.

The heating assistance is focusing on all natural persons and families who have submitted application-declaration for assistance and meet the corresponding legally determined conditions and requirements. The income limit is determined on basis of the guaranteed minimum income, adjusted by the relevant per cent according to the specifics of each of the 17 defined risk groups. The average monthly income for the six months preceding the submission of the application-declaration is taken into account.

Environmental tax revenues

Environmental taxes comprise taxes whose base is a physical unit (or a proxy of one) that has a proven, specific negative impact on the environment. The four subsets of environmental taxes are energy taxes, transport taxes, pollution taxes and resource taxes. Total revenue from environmental taxes amounted to 2.3 billion leva (€1.7 billion) in 2014. Annual tax revenues have fluctuated between 2007 and 2014, reflecting changes in tax rates and variations in levels of overall economic activity and incomes. A low point for tax revenues was reached in 2009/2010 against the backdrop of the adverse impacts of the global financial crisis on economic growth (table 2.23).

Energy taxes, which also include taxes on transport fuels, account for by far the largest share of total environmental tax revenue in Bulgaria. In 2014, this share was 87 per cent, compared with an average share of 76.5 per cent for the EU-28. Transport taxes accounted for 10.4 per cent of total revenues in 2014, compared to 19.9 per cent for the EU-28. Pollution and resources taxes had a relatively small share of 2.6 per cent in total environmental tax revenues in 2014; the corresponding average share for the EU-28 was 3.6 per cent.

Total environmental tax revenues corresponded to 2.7 per cent of nominal GDP in 2014, which is slightly higher than the ratio of 2.5 per cent for the EU-28. Indeed, during each of the years since 2007, the value of this indicator for Bulgaria was somewhat above the EU average (table 2.23). This ratio is a broad gauge of the tax burden on products that are having a harmful impact on the environment. Another interesting indicator is the share of environmental taxes in total revenues collected from all taxes and social contributions, which may help in assessing the progress made towards the "greening" of the national tax system. The corresponding proportion for Bulgaria has been around 10 per cent during the period 2007–2014, compared with an EU-28 average of somewhat more than 6 per cent.

2.2 Environmental expenditures and their financing

Main trends in environmental expenditures

Environmental expenditures in the total economy rose in nominal terms by 91.5 per cent in 2014 compared with 2007. Adjusted for inflation (using the CPI) the increase amounted to 55 per cent. Expenditures per head of the population rose from 152 leva (€78) to 317 leva (€162) over this period. The ratio of environmental expenditures to GDP, which is a measure of the importance of environmental protection relative to overall economic activity, rose to 2.6 per cent in 2013 and remained at that level in 2014. This compares with an average ratio of 2.2 per cent for the EU-28. The share of environmental investments in total expenditures has been fluctuating during the period 2007–2014, reflecting a combination of factors such as the adverse impact of the global financial crisis on business and government revenues and problems with the absorption of EU funds. But the share of investments recovered considerably from a low of 24.4 per cent in 2012 to attain 46 per cent in 2014 (table 2.24).

Environmental expenditures by main providers of environmental protection services show a rising trend in the role of the general government sector, which accounted for nearly 40 per cent of total expenditures in 2013. The public sector is also involved in the sector comprising specialized producers of environmental services, such as waste collection. But there is no conclusive evidence for an increasing role of specialized producers in the provision of environmental services, which may reflect, at least partly, the limited scope for public–private partnerships in Bulgaria. The share of the business sector in total environmental expenditures fell to 36 per cent in 2013, down from some 54 per cent in 2007 (table 2.25).

Table 2.23: Environmental tax revenues, 2007-2014

	Unit	2007	2008	2009	2010	2011	2012	2013	2014
Total	**million leva**	**2 026.6**	**2 389.5**	**2 078.8**	**2 056.6**	**2 166.4**	**2 189.3**	**2 303.8**	**2 284.7**
Total	**€ million**	**1 036.2**	**1 221.8**	**1 062.9**	**1 051.6**	**1 107.7**	**1 119.4**	**1 177.9**	**1 168.2**
Composition									
Energy taxes	% share	88.9	86.8	87.8	88.1	88.7	88.9	87.6	87.0
Transport taxes	% share	8.7	9.4	9.5	9.1	8.1	9.3	9.6	10.4
Pollution taxes	% share	...	2.2	1.4	0.9	0.8	0.2	0.7	...
Resource taxes	% share	2.4	1.7	1.2	1.9	2.4	1.6	2.0	2.6
Total	**% of GDP**	**3.2**	**3.3**	**2.9**	**2.8**	**2.7**	**2.7**	**2.8**	**2.7**
Total EU-28	**% of GDP**	**2.4**	**2.3**	**2.4**	**2.4**	**2.4**	**2.4**	**2.5**	**2.5**

Source: National Statistical Institute; Eurostat, 2016.
Note: 2007 and 2014: Resource taxes incl. pollution taxes.

Table 2.24: Total economy environmental expenditures, 2007-2014

Type of expenditures	Unit	2007	2008	2009	2010	2011	2012	2013	2014
Total	**million leva**	**1,197.4**	**1,700.3**	**1,280.6**	**1,273.8**	**1,438.2**	**1,693.6**	**2,098.9**	**2,293.4**
Total	**€ million**	**612.2**	**869.4**	**654.7**	**651.3**	**735.3**	**865.9**	**1,073.2**	**1,172.6**
Total by type of expenditure									
Current expenditure	% share	47.1	50.8	57.4	57.2	64.4	75.6	64.6	54.1
Investments	% share	52.9	49.2	42.6	42.8	35.6	24.4	35.4	45.9
Total	**% of GDP**	**1.9**	**2.4**	**1.8**	**1.8**	**1.8**	**2.1**	**2.6**	**2.6**
Total EU-28	**% of GDP**	**2.1**	**2.2**	**2.3**	**2.2**	**2.2**	**2.2**	**2.2**	**..**

Source: National Statistical Institute; Eurostat, 2016.

Table 2.25: Environmental expenditures, by sector, percentage

Sector	2007	2008	2009	2010	2011	2012	2013
General government	25.6	24.1	34.2	28.2	31.5	33.9	39.6
Business sector	54.3	50.0	47.8	51.2	40.3	36.2	35.9
Specialized producers	20.2	26.0	18.0	20.6	28.2	29.9	24.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: National Statistical Institute; Eurostat, 2016.

Data on expenditures in the different environmental domains show that waste management accounted for 47.5 per cent of the total in 2014, followed by wastewater treatment, which had a share of 31.5 per cent. But looking only at investment expenditures, wastewater treatment accounted for more than half of total environmental investments in 2014, up from a low of 27 per cent in 2010. This mainly reflects the gathering pace of absorption of EU funds in this area, which is a major government priority given the challenge to meet the EU requirements for wastewater treatment until 2023 (table 2.26).

Data compiled by the NSI show that the main sources for financing of *current* environmental expenditures – mainly operating and maintenance costs – are the own funds of the enterprise sector, which accounted for 57.3 per cent of the total in 2014. The other major financing sources are municipal budgets (33.7 percent), given that they are responsible for the provision of municipal waste collection and disposal as well as sewerage and wastewater treatment services. Together these two financing sources accounted for 91 per cent of total current environmental expenditures in 2014. This combined share has changed little since 2007, when it amounted to 92.2 per cent.

In contrast, there have been significant changes in the major financing sources for environmental *investment expenditures* during the period 2007–2014. EU cohesion funds have become the primary resource for investment financing; the grants provided within the framework of the OP "Environment" accounted for 52.3 per cent of total investments in 2014, up from zero in 2007 and only 6.4 per cent in 2010 (table 2.27). The mirror image to this are significant declines in the shares of the business sector, from 51 per cent in 2010 to 28 per cent in 2014, and other domestic and foreign financing sources. EMEPA, the national environmental fund, contributed only 3 per cent to total investment financing in 2014, compared with a

share of some 23 per cent in 2007/2008 and 12.7 per cent in 2009. The combined share of public sector investment financing (state budget funds including earmarked transfers and subsidies; municipal budgets and national funds, such as EMEPA) fell from 23.4 per cent in 2007 to 16.7 per cent in 2014. Outside the EU cohesion funds, the role of foreign loans and grants provided by other foreign financial institutions and international donors has diminished significantly during the period 2012–2014.

2.3 Institutional framework for financing of environmental expenditures

The challenges and priorities for environmental protection policies and measures, including their financing, have been addressed in a range of national, sector and thematic plans and strategies, which include notably Bulgaria's National Development Plan 2007–2013, the National Reform Programme 2011–2015, the National Development Programme Bulgaria 2020, the National Programme for Waste Management Activities 2009–2013, the National Waste Management Plan 2014–2020, the National Strategy for the Management and Development of the Water Sector and the Strategy for the Management and Development of the Water Supply and Sewerage Sector 2014–2023. In a more general way, these documents emphasize the need to mobilize sufficient domestic public and private resources, taking into account the importance of revenues from cost-reflective charges for services provided (such as waste collection and wastewater treatment) and the strong reliance on foreign loans and grants, notably EU funds.

General government sector

Bulgaria has three administrative levels of government, namely central government, districts (regions) and municipalities. However, as regards fiscal policy, there are only two levels, namely the central government budget and the budgets of the municipalities (local governments). The so-called Consolidated Fiscal Plan, which is largely consistent with the international concept of General Government, comprises four main components: the state budget, autonomous budgets, social security funds, and extra-budgetary funds and accounts.

Table 2.26: Environmental protection expenditures by domain, 2007-2014, percentage

Domain	2007	2008	2009	2010	2011	2012	2013	2014
Wastewater	27.1	28.8	21.2	19.3	21.5	14.1	21.9	31.5
Air	20.6	23.9	16.4	11.3	16.5	13.0	13.0	13.6
Waste	32.9	34.2	42.2	53.2	52.1	63.7	55.9	47.5
Other	19.4	13.1	20.2	16.2	9.9	9.3	9.2	7.4
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Investments								
Wastewater	36.3	46.0	31.5	27.0	35.1	31.2	42.8	51.6
Air	34.3	23.9	22.7	13.6	28.4	28.2	23.3	21.1
Waste	18.2	21.6	21.9	44.4	32.5	35.1	29.0	24.6
Other	11.1	8.5	23.9	15.1	3.9	5.5	5.0	2.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: National Statistical Institute, 2016.

Table 2.27: Financing sources for environmental investments, 2007-2014, percentage

Financing source	2007	2008	2009	2010	2011	2012	2013	2014
Own resources of business sector	46.2	44.3	48.1	51.0	47.9	57.8	35.7	28.0
Central government budget funds	1.3	1.6	4.1	0.3	2.9	0.8	0.5	0.1
Earmarked state budget transfers	6.8	7.9	8.8	4.6	5.1	5.2	4.9	2.5
Municipal budgets	5.8	9.7	12.6	10.0	5.4	7.4	4.4	6.0
National funds: EMEPA	23.1	22.9	12.7	4.1	5.2	8.2	7.3	3.0
Other national funds	0.8	1.0	1.5	4.4	1.6	3.5	8.4	5.1
Operational Programme "Environment"	0.0	0.0	0.0	6.4	5.9	12.5	33.4	52.3
Domestic loans	2.4	3.7	2.1	3.0	7.4	0.9	0.3	2.2
Foreign grants and loans	13.5	8.9	10.2	16.1	18.6	3.7	5.0	0.9
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: National Statistical Institute; ECE calculations, 2016.

The largest part of the state budget is the central government budget, comprising mainly the budgets of the line ministries, such as the Ministry of Environment and Water. The state budget also includes subsidies to a broad range of utility and railway companies, which are all subject to state regulation as well as other transfers to municipalities. EU funds are not part of the state budget, but they are included in the Consolidated Fiscal Plan. The annual budget processes, which are regulated by the State Budget Procedures Act and the Public Finance Act, are embedded in a strategic medium-term expenditure framework.

The budgets of the 265 municipalities are not part of the state budget; they account, rather, for the lion's share of so-called autonomous budgets. Municipal governments play a relatively small role in the overall fiscal structure. Fiscal autonomy is very low. Own revenues of municipalities account in general for only some 50 per cent of the total budget; the remaining funding needs depend on transfers and subsidies from the state budget. Municipalities are allowed to borrow from banks and other financial institutions, but the amount of borrowing is constrained by limits to the annual amount of debt payments (principal and interest) and to the municipal guarantees that can be issued (Municipal Debt Act).

The extra-budgetary funds operating in Bulgaria include the State Agricultural Fund, which also manages the EU funds for the agricultural sector, the fund of the Road Infrastructure Agency and the Energy Efficiency and Renewable Resources Fund. EMEPA, a state-owned company, is treated as extra-budgetary for reporting and statistical purposes.

Enterprise for Management of Environmental Protection Activities

EMEPA is a state enterprise with the mandate to provide financial support for the implementation of environmental and water policy at the national and local levels, i.e. it acts as a national environmental fund. EMEPA was established by the 2002 Environmental Protection Act, which stipulates that it does not make or allocate any profit. EMEPA is closely linked to the Ministry of Environment and Water. The resources of EMEPA are managed by a Management Board, which is chaired by the Ministry of Environment and Water.

The Ministry also appoints the other six members of the Board, which include *inter alia* the Executive Director of the Executive Environment Agency, a representative of the Ministry of Finance, a representative of the National Association of Municipalities, a representative of the business community, the Executive Director of EMEPA and a representative of the Ministry of Environment and Water.

The daily operations of EMEPA are managed by the Executive Director. The organization and operations of EMEPA are regulated by rules adopted by the Council of Ministers (Regulation of the EMEPA Structure and Activities). EMEPA has to publish an annual report on its activities in the past calendar year as well as the plan for activities in the current year, including the financing of current and investment expenditures. Both the report and the plan for activities have to be approved by the Ministry of Environment and Water. The Ministry has also to approve the planned resources for the administrative costs of EMEPA. EMEPA had a staff of 34 in 2015 dealing with administrative, legal, financing and project-related issues. Since 2003, besides its "core business", EMEPA has been operating an incinerator for medical waste. This service, which is offered against a cost-reflective fee, employs 40 staff.

The own financial resources of EMEPA originate from the collection of fees established in laws regulating the environment, namely the Water Act, the Waste Management Act, the Protected Areas Act, the Clean Ambient Air Act, and the Environmental Protection Act. Also monetary fines and sanctions based on violations of administrative regulations related to the above-mentioned laws and a number of other legal acts (such as the Biological Diversity Act, Mineral Resources Act, Medicinal Plants Act, Soils Act) are allocated to EMEPA.

During the period 2008–2015, total revenue from all these sources amounted to 440 million leva (€225 million), of which some 75 per cent was accounted for by charges based on the Water Act and 18.5 per cent based on the Waste Management Act. Since 2011, fees and fines based on the Water Act accounted on average for 91 per cent of total revenue; the main counterpart to this was a decline in the share of revenue from waste product charges (eco fees) due to the increasing shift of waste collection activities to the so-called ROs. Total resources available to EMEPA are relatively small, corresponding on average to some 0.1 per cent of annual GDP during the period 2008–2015 (table 2.28).

The budget of EMEPA has been mainly used for financing investment expenditures of municipalities and budget entities through grants (some 90 per cent) or low interest loans. Eligible projects are chosen on the basis of the established application procedures, project selection criteria and financing terms approved

by the Board of EMEPA. Project assessment is supported by the Ministry of Environment and Water and other external expertise.

Annual spending plans are elaborated in close cooperation with the Ministry of Environment and Water and approved by the Ministry of Finance. EMEPA has largely concentrated its funding operations in the areas of municipal waste management, construction of WWTPs and sewerage networks, and biodiversity protection and restoration. A 2010 report of the National Audit Office on the activities of EMEPA for the period 2005–2009 pointed to a lack of clear criteria and rules for effective project selection and associated allocation of public funds. There were also problems with the collection of receivables from zero-interest loans and ensuring that financial commitments for selected projects are effectively matched by available financial resources. Since the end of 2009 the financing provided by EMEPA is applied in accordance with priorities, which are in compliance with the European Directives in the field of water management, waste management and biodiversity. The priorities are approved and adopted by the Management Board of EMEPA, and they have been updated regularly.

Total expenditure on environmental projects amounted to 505.4 million leva (€258.4 million) during the period 2008–2015. During the period 2011–2014, annual expenditures remained significantly below annual revenues, which could reflect *inter alia* insufficient capacities of municipalities concerning project developments and timely submission of relevant documents. At the end of 2015, unused accumulated funds, carried over for financing of projects in 2016 and beyond, amounted to 190.9 million leva (€97.6 million).

National Trust Eco Fund

The National Trust Eco Fund (NTEF) is a legal entity that was established in 1995 to manage funds paid from the state budget that were the equivalent of a partial cancellation of Bulgaria's debt towards Switzerland (debt-for-environment swap). Other sources of funding have been foreign grants and loans and state budget allocations. During the period 2009–2011, the NTEF went through a difficult transition period when external funding for projects dried up. Since 2012, it has mainly been involved in the so-called National Green Investment Scheme, which is mobilizing financial resources from the sale of Bulgaria's unused GHG emission quotas under the Kyoto Protocol, the assigned amount units, for financing projects that lead to GHG emission reductions or that have, more generally, positive effects on the environment at the national level.

The corresponding revenues are transferred to the budget of EMEPA and made available for expenditure by the NTEF. EMEPA has also been assigned to control the expenditure under contracts concluded by the NTEF with the beneficiaries of these funds (2014 Climate Change Mitigation Act). In a similar vein, the revenues from the auctioning of GHG emission allowances for aviation activities are being transferred to EMEPA for use by the NTEF for financing climate change mitigation and adaptation projects (Climate Change Mitigation Act). During the period 2007–2015, 90 per cent of total expenditure of 33.4 million leva (€17 million) on environmental projects was dedicated to improving the energy efficiency of public buildings. The remainder was spent on an environmental remediation project supported by the World Bank (1.3 million leva), and on support to RES, biodiversity protection and air pollution abatement.

Table 2.28: Revenues and expenditures of EMEPA, 2008-2015, million lev

	2008	2009	2010	2011	2012	2013	2014	2015
Revenues from environmental fees and fines	84.4	47.6	48.7	61.1	32.6	56.3	54.8	54.6
Total expenditure	144.7	83.1	76.3	27.8	30.4	37.6	40.4	87.4
Expenditure on projects	142.4	81.1	73.9	25.0	27.4	34.4	37.1	84.2
Investment	141.7	77.3	72.5	23.3	25.6	30.3	32.3	79.4
Current	0.6	3.8	1.4	1.7	1.8	4.1	4.8	4.7
Administrative costs	2.4	2.0	2.3	2.8	3.0	3.2	3.2	3.2
Memorandum item								
Revenues as % of GDP	0.16	0.09	0.10	0.11	0.06	0.10	0.10	0.12
Total expenditure as % of GDP	0.27	0.17	0.16	0.05	0.06	0.07	0.07	0.19

Source: EMEPA, 2016.

Until 2010, funding was provided as grants up to 19 per cent of the project value; the remainder was co-financed by other donors or beneficiary funds. Since 2011, projects are 85 per cent grant financed; the remaining 15 per cent has to be contributed by the beneficiaries.

The NTEF is governed by a Board of Directors whose Chair is appointed by the Council of Ministers. There is also an Advisory Committee, which comprises *inter alia* representatives of donors. The day-to-day operations are organized by the Executive Bureau subject to regulations established by the Council of Ministers (2004 Ordinance on the structure and the activities of the National Trust Eco Fund Adopted by the Council of Ministers). In 2015, the NTEF had a staff of nine full-time employees.

Energy Efficiency and Renewable Sources Fund

The Energy Efficiency and Renewable Sources Fund is a legal entity that was established by the 2004 Energy Efficiency Act. It existed under the name of the Bulgarian Energy Efficiency Fund until 2011when, in the context of the adoption of the Energy from Renewable Sources Act, its name was changed to the current one. Its mandate is to finance schemes and mechanisms for improving energy efficiency and RES projects. The activities of the Fund are governed by a Management Board, which consists of representatives of various ministries (Energy, Economy, Finance, Environment and Water, Regional Development and Public Works), the Sustainable Development Agency and the Donors Assembly. At the end of 2015, the Fund had a staff of four, including the Executive Director.

The Fund is not part of the consolidated state budget. Its activities have focused on the financing of projects for improvements in energy efficiency in public, industrial and residential buildings with interest rates below market rates and partial credit guarantees. Its revenues have come mainly from donations and loans from international financial institutions and banks. The beneficiaries of the projects financed by the Fund are municipalities, companies, including energy service companies, and other institutions such as hospitals and universities. At the end of 2015, the Fund loan portfolio comprised 176 projects, of which 98 (58 per cent) were in municipalities. The total project volume amounted to some 67.6 million leva (€34.6 million), of which 46.9 million leva (€24 million), or some 68 per cent, is funded by the Fund. The role of the Fund has been affected by alternative, more attractive financing for energy efficiency projects becoming available for small and medium-sized companies from OP "Development of the Competiveness of the Bulgarian economy", with grants up to 50 per cent of project value.

Fund for Local Authorities and Governments

In 2007, the Government established the Fund for Local Authorities and Governments. This is an independent legal entity with the status of a joint stock company that is fully owned by the State. Its mandate is to provide financial assistance to municipalities for the absorption of EU funds in the area of municipal infrastructure and to support the required administrative capacity of municipalities for project development and implementation. The Fund provides bridge financing in the form of low-interest loans only to beneficiaries that are eligible for EU funding, i.e. municipalities (or groups of municipalities) or public entities that are owned or controlled by municipalities, such as water supply and sewerage companies and waste companies. Between 2009 and 2015, the Fund provided loans with an aggregate value of some 388 million leva (€198 million) for 185 EU-funded projects under OP "Environment".

The number of new projects financed increased from an annual average of 13 during the period 2009–2012 to more than 50 in 2014 and 2015. But a large number of municipalities, notably the smaller ones, are facing financial difficulties and have problems in meeting their debt servicing obligations for loans taken on for meeting the co-financing requirements for EU grants. These problems were accentuated by the deterioration in overall public finances in 2014, which also adversely affected transfers from the state budget to the municipalities. Another financial challenge can be that some costs related to the financing of infrastructure projects, such as acquisition of land and VAT, are not eligible for EU funding. Yet another problem is that the investment costs, such as for new water supply and wastewater treatment facilities, are required up front, while the monetary revenues, including for covering the costs of operation, maintenance and capital depreciation, flow in later and are contingent on cost-reflective tariffs.

Operational Programme "Environment"

Bulgaria is an important beneficiary of the EU's Cohesion Policy. The main financial instruments supporting the EU's Cohesion Policy are the European structural and investment funds (ESIFs). The allocation of these funds is based on so-called operational programmes (OPs), which each country develops for a specific region or a countrywide specific goal. Bulgaria's OP "Environment 2007–

2013" was financed from two EU funds, the Cohesion Fund and the European Regional Development Fund.

OP "Environment 2007–2013" initially had four priority axes, namely:

1. Improvement and development of water and wastewater infrastructure in settlements above 2,000 population equivalent and in settlements below 2,000 population equivalent within urban agglomeration areas;
2. Improvement and development of waste treatment infrastructure;
3. Protection and restoration of biodiversity.
4. Technical Assistance

In 2012, the Government decided to amend the OP by adding air quality protection within Priority Axis 1, changing the name of Priority Axis 1 as follows: "Improvement and Development of the Drinking Water and Wastewater Infrastructure and Imroving the Ambient Air Quality". The European Commission approved this amendment in 2013. Total EU funds made available for OP "Environment 2007–2013" amounted to some €1.46 billion, of which nearly three quarters (€1.03 billion) was earmarked for the water supply and wastewater sector and, since 2012, air quality protection (table 2.29). National co-financing amounted to 15 per cent of the total eligible expenditure from the total resources available for the OP.

Bulgaria's accession to the EU in 2007 coincided with the start of the EU Programming Period 2007–2013, and absorption of the funds allocated to – besides the domain of environmental protection – other major areas such as transport, regional and rural development, has been a major challenge for the country. Administrative capacities and skills, at both the central and local government levels, for project preparation and management were inadequate for swiftly exploiting the newly emerging funding opportunities. Among other implementation constraints were cumbersome procurement procedures as well as lengthy land acquisition. The measures designed to improve the absorption of EU funds also included the amendment of the Public Procurement Act in 2012 with a view to simplifying and standardizing tender processes. In view of all these problems and the discovery of irregularities, which led to a temporary suspension of EU payments in 2014, the implementation of OP "Environment 2007–2013" was extended until the end of 2015. .

The absorption rate for EU funds – the amount of EU grants paid as a percentage of the total amount of grants available – was initially very low. After the Government arranged, in 2010, for technical advice and financial support from the World Bank to accelerate the utilization of EU funds for the development of its infrastructure, the situation started to improve.

The Bulgarian experts' efforts including the MA of OPE ones' contributed to the improvement. At the end of 2015, EU grants received under the OP "Environment 2007–2013" amounted to €1.19 billion, corresponding to 84.9 per cent of total available funding. This is only slightly below the average absorption rate of 85.2 per cent for all seven OPs.

Municipalities have been the major beneficiaries of projects in the water supply, wastewater and waste sector. But mobilizing the financial resources for the required co-financing of projects has been constrained by the limited own revenues of municipalities. They have therefore had to rely on general and targeted subsidies from central government, support from EMEPA and other grants and loans.

Table 2.29: Operational Programme "Environment 2007-2013"

		€ million		million lev	% shares
Priority areas	**EU-funded budget**	**National public co-financing**	**Total budget**	**Total budget**	**Total budget**
Water and wastewater infrastructure, air quality	1 027.4	181.3	1 208.7	2 363.9	73.6
Waste treatment infrastructure	251.2	44.3	295.6	578.1	18.0
Biodiversity preservation and restoration	78.8	13.9	92.6	181.2	5.6
Technical assistance	38.0	6.7	44.7	87.5	2.7
Total	**1 395.4**	**246.2**	**1 641.6**	**3 210.7**	**100.0**
Total, million leva	**2 729.1**	**481.6**	**3 210.7**		

Source: "Operational Programme Environment 2007–2013", as amended by Commission Decision of 2 April 2016.

Moreover, borrowing by the municipalities, notably the smaller ones, is constrained by the provisions of the Municipal Debt Act, which stipulates that municipalities can only borrow if the annual debt payments (principal and interest) do not exceed 25 per cent of the sum of total own revenues and the equalizing grants received from the central government. Any debt guarantees issued by the municipality cannot exceed 5 per cent of the above sum.

The implementation of OP "Environment 2014–2020", which was approved by the European Commission in June 2015, is still at an early stage. The priority areas of OP "Environment 2007–2013" have been maintained, but improvement of ambient air quality is now a separate priority area. A new priority area is related to flood and landslide risks. The total OP "Environment" budget amounts to some €1.77 billion, of which €1.50 billion (85 per cent) will be grants contributed by the EU. The total funds, including national co-financing, are distributed as follows:

- Water: €1,196,318,599;
- Waste: €287,784,390;
- Natura 2000 and biodiversity: €101,390,000;
- Flood and landslide risk prevention and management: €78,528,323;
- Improvement of ambient air quality: €58,823,530;
- Technical assistance: €47,536,503.

The majority of the funding (67.57 per cent) will continue to focus on measures related to improving the water supply and sewerage infrastructure. Measures related to wastewater treatment account for 85 per cent of funds allocated to this priority area. Overall, the major challenge remains the issue of effective absorption of EU funds, given the significant difficulties beneficiaries have in mobilizing financial resources for co-financing of projects. There is also a need to improve administrative capacity and to upgrade planning, implementation and monitoring systems.

European Economic Area and Norway grants

Bulgaria is one of the beneficiary countries of European Economic Area and Norway grants, which are provided with the general objective of reducing economic and social disparities within the European Economic Area. The Area's grants are contributed by Iceland, Liechtenstein and Norway. In addition, Norway operates a separate grants programme with the same objectives. Based on an agreement concluded in 2011, two environmental programmes are supported: (i) Integrated marine and inland water management, and (ii) Biodiversity and ecosystem services. For each of these programmes a grant of €8 million has been allocated. National co-financing amounts to €1.4 million per programme. The programmes are operated by the Ministry of Environment and Water. The implementation period ends in April 2017.

Bulgarian–Swiss Cooperation

Within the framework of the Bulgarian–Swiss Cooperation progamme, which has the same general objective as the European Economic Area and Norway grants programme, a grant of 27.4 million Swiss francs has been allocated for the financing of two environmental projects, one dealing with the environmentally sound disposal of obsolete pesticides and the other with environmentally sound collection and temporary storage of hazardous household waste. National co-financing amounts to 4.8 million Swiss francs. Projects have to be completed by December 2019.

2.4 Conclusions and recommendations

Bulgaria has made progress in the use of economic mechanisms for pollution management, but the polluter-pays principle is applied only partially. A water pollution tax has been introduced, but it is not differentiated according to the type and characteristics of pollutants. Moreover, the uniform charge rates are very low, which raises doubts about their environmental effectiveness. The main economic instrument for pollution management continues to be sanctions for exceeding established threshold values for the quantity of air, water and soil pollutants discharged into the environment. This was, however, a blunt instrument for many years, given that the low rates of fines provided little, if any, incentives for changes in the behaviour of polluters.

Close monitoring is required in order to gauge the extent to which the significantly higher sanctions that were introduced in 2013 are creating effective incentives for pollution abatement. Another issue is the lack of complementarity between the water pollution tax, which is not pollution specific, and the pollution-specific system of sanctions for exceeding pollution thresholds. More generally, the introduction of the water pollution tax raises the issue of why a similar tax is not applied to emissions of major industrial air pollutants.

Recommendation 2.1:
The Government should:

(a) Ensure the environmental effectiveness of the water pollution tax by taking into account the quantity, type and characteristics of major pollutants (substances) discharged into surface water and groundwater and setting charge rates at a level that creates incentives for pollution reduction;
(b) Ensure complementarity between the water pollution tax and the system of sanctions for exceeding established pollution standards and the cost effectiveness of the two systems;
(c) Ensure the environmental effectiveness of the system of sanctions for other polluting activities taking into account the technical and economic feasibility of corresponding regulations.

In the area of waste management, Bulgaria applies enhanced producer responsibility (EPR) schemes, which aim at internalizing environmental externalities, i.e. the costs of environmentally sound end-of-life management of certain products. These schemes are associated with quantitative recovery and recycling targets and a landfill tax. There is little transparency as regards the recovery fees charged by each of the recovery organizations (ROs) and competition among the organizations in the market for a given product group is not regulated. There is also no information on the extent to which EPR schemes cover the costs related to the management of these waste streams (net of revenues from sales of recycled materials), which include *inter alia* costs for collection, transport and treatment of this waste and the costs of adequate monitoring and regulation.

Recommendation 2.2:
The Government should:

(a) Require transparency by recovery organizations as regards their recovery fees;
(b) Regulate effective competition between recovery organizations operating in the same market for end-of-life products;
(c) Gauge and monitor the overall costs of the enhanced producer responsibility schemes, including the costs of public sector administrations, with a view to ensuring their cost effectiveness.

Fees for municipal waste collection in Bulgaria paid by residents and companies have traditionally been based on the tax value of the real estate or the book value of the company assets. This has created no incentives for generating less waste or for recycling. The Government is aware of this and has initiated a waste tariff reform towards a pay-as-you-throw system. But implementation is not straightforward and, in the face of related problems, has been postponed until the beginning of 2017. At the time of writing it is not known whether and to what extent this new deadline will be met. Such a reform, however, could well be implemented gradually without aiming from the onset for an "optimal" approach.

Recommendation 2.3:
The Government, in cooperation with the National Association of Municipalities and other stakeholders involved, should:

(a) Establish municipal waste collection fees based on volume of waste generated;
(b) Consider using, at least at an initial stage, practicable proxy indicators for the volume of waste generated, such as fixed waste charges per capita for each household.

Fees for use of timber resources from state-owned forests are mainly based on concessions and tenders. Among non-timber forest resources (other than game), fees have been paid only for the commercial collection of medicinal plants, most of which are exported. These fees have remained unchanged since 2000. In contrast, fees for use of natural resources (other than medicinal plants) in protected areas – exclusively state property and particularly in national parks have generally been increased from the levels also established in 2000 to reverse their significant erosion by high cumulative inflation.

Recommendation 2.4:
The Government should ensure that fees for the collection of medicinal plants and for obtain of other natural resources from forests and protected areas – exclusively state property – provide an adequate rate of return for public finances and therefore adjust fee rates accordingly.

Charges for water abstraction were increased in 2012, but the extent of cost recovery is still low. In a similar vein, fees for irrigation water are not cost reflective, and the bill collection rate is also low. There are, notably, important cross-subsidies between the two types of irrigation systems (gravity-fed and pumped systems) and two main crops (rice and non-rice crops). The authorities have started to introduce incentive tariffs for the use of water-saving irrigation technologies. In the face of insufficient mobilization of financial resources, the irrigation infrastructure has deteriorated significantly.

Recommendation 2.5:
The Government should:

(a) Introduce, if necessary in a gradual fashion, cost-reflective tariffs for use of water resources such as water abstraction and for use of water for irrigation in agriculture;
(b) Progressively eliminate existing cross-subsidies in the irrigation sector;
(c) Promote the introduction of water-saving irrigation technologies.

In the water supply and sewerage services sector a range of problems exist, which are partly mutually reinforcing. These include high proportions of non-revenue water due to technical losses and low bill collection rates, which is depressing the revenues of water companies. In general, tariffs allow for the recovery of operating costs only. In the event, the sector lacks own funds for participating in the financing of investment in the rehabilitation and extension of the water sector infrastructure, notably as regards wastewater treatment facilities. A major constraint on improving the financial performance of water companies is the concern about the affordability of higher tariffs for the population, given the lack of an adequate mechanism for dealing with this problem.

Recommendation 2.6:
The Government should:

(a) Take appropriate measures to diminish or end the water supply revenue losses caused by low collection rates and high levels of technical water losses;
(b) Pursue a policy of gradual increases in water tariffs to levels that allow the generation of sufficient revenues to cover the costs of efficient operations by water companies and their substantive participation in the financing of necessary investments;
(c) Develop adequate social support policies and measures to ensure the affordability of higher tariffs for low-income households.

Bulgaria levies excise duties on energy products used as motor fuels and for heating by households and industry, in line with the existing EU legal provisions. At the same time, the Government also uses the existing scope for exemptions from some of these taxes for households, and farmers, in the pursuit of mainly social objectives. However, the question is whether tax expenditures are really the most cost-efficient instrument for achieving these objectives. A case in point is the indiscriminate exemption of all households, rich and poor, from excise duties on certain energy products, as is the refund of excise duties on the use of diesel to *all* agricultural producers.

Recommendation 2.7:
The Government should review the existing system of full or partial exemptions from excise duties on certain energy products with a view to determining whether they are really the most effective and efficient instruments for achieving the underlying policy objectives.

Transport vehicles are subject to a property tax, which for passenger cars increases with the engine power. At the same time, tax reductions are applied that increase with the age of the vehicle, which is not very satisfactory given that older vehicles tend to meet less stringent pollution standards than do newer ones. As of 2014, however, the Government has added another provision that grants tax rebates to passenger cars, depending on the vehicle emission standard. While this policy measure points in the right direction, it applies only to passenger cars with an engine power up to 74 kW (100 hp), i.e. most cars are not eligible for this scheme.

Recommendation 2.8:
The Government should consider revising the vehicle property tax by using both the engine power and the vehicle emission standard as the general tax base and diminishing, in a gradual fashion, the tax reductions granted to older cars.

Electricity tariffs for households are below cost recovery levels, reflecting the use of tariffs as a social policy instrument. This policy, however, has mainly benefited above-average income earners, which tend to have higher energy consumption than lower income households. Despite a high bill collection rate, revenues from tariffs in the electricity sector are insufficient for financing adequate maintenance of the infrastructure and new investments. This partly also reflects the hidden costs of generous feed-in tariffs for RES for end users of electricity, which rather fell on the distribution companies and the public provider NEK.

Recommendation 2.9:
The Government, in cooperation with the Energy and Water Regulatory Commission, should:

(a) Initiate a tariff reform that leads to a gradual increase in household electricity tariffs to cost-reflective levels taking into account the need for support to vulnerable consumers through preferential block tariffs and other non-tariff exemptions and protection and/or through the social welfare system;

(b) Ensure transparency for consumers as regards the costs of social policy support for energy consumption as well as of support for renewable energy sources through feed-in tariffs;
(c) Promote measures designed to improve the energy efficiency of buildings to reduce energy costs for final energy users.

It is generally recognized that the further development and improvement of performance standards for utility services, namely municipal waste collection and disposal, water supply and sewerage, wastewater treatment, and energy supply, will have to go along with the gradual introduction of cost-reflective tariffs for financing efficient operating and maintenance costs of the utility companies, and for mobilizing the resources required for financing or co-financing the necessary infrastructure investments. Such a process would also be a necessary condition for promoting public–private partnerships in these sectors. A major concern in this regard is the issue of affordability of higher tariffs for vulnerable consumers of these services, which has not been addressed by the Government to date.

Recommendation 2.10:
The Government should:

(a) Establish financial mechanisms that ensure adequate access for vulnerable consumers to utility services;
(b) Monitor and assess the affordability of all utility services based on pertinent statistics from household budget surveys and income distribution studies conducted by the National Statistical Institute.

There have been major shifts in the role played by the various domestic and external sources of financing of environmental expenditure since 2007. More than half of total environmental investment expenditure is now financed through the EU OP "Environment", reflecting the improved absorption capacities for these funds. The role of EMEPA, the national environmental fund, has diminished significantly, which is also due to reduced revenues from product fees related to waste management. For the years ahead, the Government can rely on further substantive resource flows from the EU cohesion and structural funds, but these will have to be complemented by sufficient domestic funds to meet EU requirements in areas such as wastewater treatment and waste management, and to improve conditions in many other areas, such as ambient air pollution, water pollution, flood protection and biodiversity protection.

Recommendation 2.11:
The Government should:

(a) Ensure that domestic environmental funds have a stable and sufficient revenue base for financing their activities;
(b) Ensure effective and efficient use of these funds based on selecting and prioritizing projects that support the main environmental policy goals as well as the adequate monitoring and auditing of the activities of the funds;
(c) Ensure effective complementarity between the various public sector financing sources and external financing sources;
(d) Continue strengthening capacities at the central and local government levels as required for the effective and efficient absorption of EU funds.

Chapter 3

ENVIRONMENTAL MONITORING, INFORMATION AND EDUCATION

3.1 Environmental monitoring

Air

The territory of Bulgaria is presently divided into six districts for monitoring and assessing air quality. These districts are Sofia, Plovdiv, Varna, North (Danube), South-East and South-West. Data collection and analysis relating to air quality is based on this regional subdivision and takes into account the specificities of each district. Air quality monitoring is principally carried out through the automated National System for Environmental Monitoring by the Executive Environment Agency.

The National System for Environmental Monitoring presently has 50 fixed stations: 30 automatic monitoring stations (AMSs), four automatic stations for control of limit values in ecosystems, seven differential optical absorption spectroscopy (DOAS) systems and nine stations with manual sampling and chemical analysis. This includes a joint air quality monitoring system in the Romanian–Bulgarian boundary towns on the lower Danube, which constitutes a unique collaborative monitoring activity.

The automatic stations (AMS and DOAS) operate continuously and air quality data from the automatic stations are received by local and national databases as part of a National Real Time Air Quality Information Network. Information on air quality data is also stored in regional databases managed by the 16 RIEWs as specialized control bodies of the Ministry of Environment and Water. The subdivision into national and local databases means that municipalities can have real-time access to air quality data from the region-specific stations. The manual stations for air quality measurements operate according to a unified sampling regime and standardized analytical methods; the sampling frequency is four times a day, five days a week.

The national system for real-time air quality monitoring provides data on the state of air and controls for major pollutants such as SO_2, NO_2, O_3, CO, benzene (C_6H_6), PM_{10}, $PM_{2.5}$ and other pollutants (such as for specific industrial activities) and weather parameters, including solar radiation, wind direction and speed, humidity and temperature.

Data from the AMSs are published online as preliminary daily bulletins on air quality, then in a quarterly bulletin and the National Report on the Status and Protection of the Environment after checking for accuracy and verification. The national system also reports on exceedances of the alarm thresholds for NO_2, SO_2 and O_3. Results of measurements of the stations with manual sampling and chemical analysis are entered into the same databases.

Air quality monitoring in Bulgaria has been significantly modernized and upgraded since 2000. The most noteworthy change has been a shift from a system that was largely based on manual sampling (52 stations reported in 2000) to automatic sampling stations (16 stations reported in 2000), including the addition of automatic control of limit values in ecosystems and nearly doubling the number of DOAS systems from four to seven stations. The actual number of monitoring stations has been reduced, but the system is at this stage almost entirely automatic in contrast to the previous manual data-acquisition process, the stations are located to better account for regional specificities, and unified methods for sampling and analysis are applied. This has improved the quality and regularity of air quality measurements and data as well as ensuring that comprehensive statistics on air quality are automatically analyzed and published.

A significant challenge concerns the shift from a manual to automatic monitoring system, namely, the validation of the automatic data flows being transmitted to the national database. More specifically, the validation process of preliminary data makes it difficult to have automatic transfer of data. This means that the daily bulletins on air quality are only preliminary while the quarterly bulletins provide information that has been manually validated by a technician (e.g. checked for incorrect measurements). Another challenge related to the shift from a manual to automatic system is software related. The Agency is developing a software product to submit data to the European Environment Agency and this process is

facing technical difficulties that have made the reporting process more complicated.

Noise

Bulgaria has operationalized a national system for noise monitoring that is led by the Ministry of Health to prevent adverse health and environmental effects from the impact of noise. In 2014, the national system on noise carried out monitoring activities in 710 locations across the country and data from the national system for noise monitoring covers noise levels in 35 cities. The monitoring and assessment of daily noise exposure in urban areas is carried out by regional health inspectorates according to the following arrangement: 40 per cent of noise monitoring points are adjacent to road, rail and air routes, 30 per cent of noise monitoring points focus on noise from industrial sources and 30 per cent of noise monitoring points are in areas that are subject to strengthened noise protection.

The responsibility to manage noise includes the creation of strategic noise maps (SNMs) and action plans that must be prepared and approved for agglomerations, major roads, major railways and major airports. SNM means a map designed for the global assessment of noise exposure due to different noise sources (in case of agglomerations separate strategic noise maps for noise emitted by road, rail, air and water traffic, by industrial activity sites, etc. shall be prepared) and for the different noise indicators (for the day-evening-night noise level and for the night noise level. SNMs are subject to review and revision if necessary every five years after their approval. The development of SNMs and associated action plans is divided across several competent authorities in Bulgaria and is entrusted to, among others, mayors of municipalities for agglomerations, the Ministry of Transport, Information Technology and Communications for major railways and major airports and the Ministry of Regional Development and Public Works for major roads and construction sites.

Radioactivity

Radiological sampling and monitoring for permanent control of radiation gamma background in Bulgaria and the automated systems for radiation monitoring of the Danube in the region of Kozloduy are an integral part of the National System for Environmental Monitoring, as administrated by the Ministry of Environment and Water. Radiological data are collected and submitted through the National Automatic System for Continuous Monitoring of Gamma Background in Bulgaria via the European Radiological Data Exchange Platform. The Platform constitutes both a standard format for radiological data and a network for the exchange of automatic monitoring data that provides public access to real-time data on radiation levels across Bulgaria.

National radiological monitoring and radiological monitoring of foods is reported directly to the Radioactivity Environmental Monitoring database managed by the European Commission. The Ministry of Health also reports on results from drinking water, milk and food samples to the Executive Environment Agency.

At present there are 35 measuring stations. This network is comprised of one central monitoring station at the Executive Environment Agency, one mobile monitoring station at the National Centre of Environment, nine regional monitoring stations managed by the RIEW in Bourgas, Varna, Vratsa, Montana, Pleven, Plovdiv, Sofia, Stara Zagora and Novi Han, one response centre at the National Crisis Centre of the General Directorate National Service Civil Protection at the Ministry of Emergency Situations, one emergency station situated at the Emergency Response Centre of the Nuclear Regulatory Agency and 27 local monitoring stations.

To predict and interpret radiation gamma background data, the local monitoring stations are also equipped with automated meteorological equipment that performs measurements of essential meteorological parameters. The network of radiological monitoring, furthermore, includes the manual collection of air, water and soil samples as part of the monitoring system. For example, 192 atmospheric air samples from 13 monitoring points as well as 378 samples of uncultivated soils, 84 samples of surface water and groundwater and 57 samples of sediments were collected and analyzed in 2015. The system also checks enterprises that are potential polluters (74 enterprises were checked in 2015). Surveyed indicators are uranium-238, radium-226, radium-228, kalium-40, plumbum-210, cesium-137, iodine-131, beryllium-7 in unit mBq/m^3 and thorium-232 in unit Bq/kg. For water samples the surveyed indicators are total alpha activity in unit Bq/l, total beta activity in unit Bq/l and content of natural uranium in mBq/l.

Monitoring, such as the sampling of soil as part of radiation monitoring, is performed regularly in the surveillance zone of the Kozloduy nuclear power station – the only nuclear power plant (NPP) in Bulgaria – and in areas of former uranium mining sites that are at risk of elevated levels of radioactivity, where monitoring is obligatory. For instance, according to the Ministry of Environment and Water,

there is an area of approximately 1,800 ha contaminated with radionuclides in Bulgaria (e.g. based on mapping of soil pollution). These results are supported by a recent study demonstrating significant radiation hazard (especially in the areas of the Buhovo and Sliven mines) that constitutes a danger of environmental contamination.

The European Environment Agency publishes on its website a quarterly newsletter that provides information on the radiation status of the environment as well as the National Report on the Status and Protection of the Environment. The national database for radiological environmental monitoring saves all test results conducted by laboratories for radiation measurements in Sofia, Burgas, Varna, Vratsa, Montana, Pleven, Plovdiv, Stara Zagora and Novi Han.

Biodiversity

The National Biodiversity Monitoring System (NBMS) is established to meet the requirements of Article 115 (1), point 10 of the Biodiversity Act. The National Biodiversity Monitoring System monitors species and habitats and is managed and coordinated by the Executive Environment Agency as part of the National System for Environmental Monitoring. The National Biodiversity Monitoring System provides information on the state of biodiversity on a genetic, species and habitat level covering the main kinds of ecosystems in Bulgaria. The Agency is responsible for the management, coordination and information functions associated with environmental protection. Reporting on biodiversity and protected areas for the National Report on the State and Protection of the Environment is done by experts from the Agency and the Ministry.

The present biodiversity monitoring system was developed between 2004 and 2006 and, based on experience and activities between 2007 and 2015, was updated and upgraded in 2016. The documentation that was prepared for the National Biodiversity Monitoring System, and revised by 2016, consists of a conceptual framework for biodiversity monitoring and includes lists of objects (species and habitats), monitoring sites (Annex 1 of NBMS) and an action plan for the National Biodiversity Monitoring System (Annex 2 of NBMS).

The monitoring objects on the species and habitat levels are selected species, belonging to different biological groups (e.g. plants, mosses, fungi, invertebrate animals, fish, amphibians, reptiles, mammals and birds) and certain habitat types, including all species and habitats object of reporting under the EU Habitats and Birds Directives. Moreover, as a part of developing Bulgaria's monitoring system, a practical guide was made available on monitoring and assessment methodologies by biological groups and for particular species (e.g. there are presently 60 methodologies for field monitoring).The NBMS is adopted with Order No RD210/20.04.2016 of the Minister of Environment and Water.

The primary objective of the National Biodiversity Monitoring System is provision of information basis for the implementation of an efficient and effective national environment conservation policy. This includes systematic monitoring of biodiversity and the processes affecting its status, assessing the current state of biodiversity, effects from human factors and measures taken to prevent biodiversity loss. It also entails an early warning system with regard to destructive processes and tendencies that may lead to species and habitat extinction, as well as the provision of information on biodiversity in a format that is accessible to the public.

Another aspect of recent developments in Bulgaria has been the creation of an integrated information system for collecting, analysing and unifying primary data related to biodiversity monitoring. This covered the development of a national and regional database (BIOMON) that includes all primary data for each biological group or species being monitored. Currently this covered 972 species and 115 habitats types and it contains comprehensive data from filed observations (only for species). BIOMON presently consists of 92 different electronic reporting templates to cover the range of species and habitats for over 20,000 visited sites, tracks and sample study areas covered by the system (for the period 2005-2016). Over 13621 monitoring forms had been completed and BIOMON was being utilized by more than 70 local users in 2016.

BIOMON was furthermore developed to provide public access to information on the status and distribution of species and natural habitats that are monitored and, more importantly, to provide opportunities to impute voluntary data contributions (citizen science) and visualize available data. All these later functionalities are not fully operational, but BIOMON is foreseen to be an integral part of organizing and coordinating all the activities of the National Biodiversity Monitoring System in the future.

The National Biodiversity Monitoring System still faces challenges even though field studies and methodological improvements were made for many of

the objects in recent years. One key challenge concerns the availability of funding to conduct field studies and data collection, especially for species that are outside the list for reporting under the Birds and Habitats Directives, but are of national importance.

Another challenge for the Agency is the legislative framework on public procurement. The Agency cannot directly contract an organization to conduct some parts of the biodiversity monitoring activities, due to the public procurement procedure, which could generate delays and cause non-implementation because of the lengthy steps needed. There is an ongoing legislative process to review the Biological Diversity Act, to provide possibilities for direct contracting for biodiversity monitoring.

Forests

Bulgaria has a long history and tradition of forest management, which includes large-scale monitoring. The Executive Environment Agency maintains a network of permanent sampling plots where data have been actively and manually collected over long periods. This network provides the long-term data needed for analyses, assessments and forecasts to support the preservation and protection of Bulgarian forests.

The National Programme for Forest Ecosystems Monitoring is operationalized as part of the National System for Environmental Monitoring and implemented on two levels, namely, large-scale monitoring (Level I) and intensive monitoring (Level II). The National System is managed by the Ministry of Environment and Water through the Executive Environment Agency and all activities of the Programme are carried out in accordance with the International Cooperative Programme (ICP) Forests Manual. Data collection is focused on determining stress factors and assessing the condition of forest ecosystems. It provides data for the national forest inventory, as published by the Executive Forest Agency, and the chapter on forests in the National Report on the State of Environment.

The Level I network is organized around large-scale monitoring of forest ecosystems and consists of 159 permanent sampling plots, grouped across 10 regions to cover the territory of the country. The criteria for the sampling plots are in line with requirements for environmental monitoring and the forest inventory, such as representativeness of forest biotypes, covering protected areas of the Nature 2000 network and priority habitats that are protected, and maintaining an even distribution of observation plots by tree species and origin in accordance with the distribution of forested areas in the country, and to keep as many of the sampling plots consistent over time to avoid loss of data.

Information for Level I sampling plots includes general information for each sampling point, installation date, plot size, plot status, location, orientation, slope, stand history, origin of actual stand, main tree species, type of tree species mixture, mean age, canopy, protection status, management type and forest ownership. More than 5,000 trees are monitored annually.

Level II forest ecosystem monitoring is implemented in three permanent sample plots in Vitinya, Staro Oryahovo and Jundola. The sample plots are representative as regards to the main tree species and environmental conditions, cover a minimum area of 0.25 ha and are homogeneous in species composition. They are also clearly separated and include a 10m buffer zone.

Level II monitoring is focused on collecting information on air pollution and other natural and anthropogenic stress factors affecting forests in the long term and gaining a better understanding of cause-and-effect relationships in forest ecosystems. This level represents more intensive monitoring, including more parameters, more indicators and more continuous monitoring (e.g. litter fall annually, tree growth every five years, soils every 10 years). The information from Level II monitoring provides additional and valuable information for the development of forest pathology monitoring in forests and taking measures to reduce impacts. Data also contribute to science-based concepts concerning the implementation of sustainable forest management.

All data collected through the forest monitoring system are integrated into the National System for Environmental Monitoring, which incorporates a module on forests. The information in this database is not publicly available but it is foreseen that a new platform currently under development will make all information available to the public by 2017. Annual data reports are produced for the Programme Coordinating Centre (PCC) of the ICP on Assessment and Monitoring of Air Pollution Effects on Forests operating under the Convention on Long-range Transboundary Air Pollution (CLRTAP), as well as for the Global Forest Resources Assessment of the Food and Agriculture Organization of the United Nations.

One challenge for the forest monitoring system concerns the preservation of the Level I network, to maintain high quality in the assessment of forest

ecosystem services and, more specifically, to prevent the felling of sample trees that make up the network. It is not clear whether sample trees have been felled illegally, but four sampling plots (comprising 120–224 trees) have been completely harvested in recent years. The Agency , together with the Executive Forest Agency, has addressed this issue and a new ordinance for sampling has been implemented. However, the sampling plots are not included in the regional forest management plans, essentially, as these have been georeferenced in connection with the issuance of harvesting permits.

There has, furthermore, been a staff reduction in the Agency – from two people to one person – which has adversely affected the operational capacity of the Agency to maintain its forest monitoring system.

Soil

Soil monitoring is also part of the National System for Environmental Monitoring and is focused on collecting and assessing information on soils by the monitoring and measurement of particular indicators characterizing soil condition and changes as a result of the impact of natural and anthropogenic factors. The Ministry of Environment and Water is responsible for maintaining the soil monitoring network and developing action plans. The Executive Environment Agency is responsible for collecting, processing and publishing the data on soil quality annually, and ensuring the implementation of recommendations (or measures) on monitoring that were included in the programmes and/or action plans. The current monitoring programme is organized into three levels that have varying sampling points (locations), frequencies and parameters.

Level I corresponds to large-scale monitoring carried out across a uniform 16 x 16 km grid that covers 397 sampling points. This network of sampling points provides the basis for assessing soil conditions in terms of heavy metals (Zn, Cu, Pb, Cd, Cr, Ni, As and Hg), total nitrogen, phosphorus, organic carbon, active soil reaction (pH), nitrate nitrogen, total carbon and persistent organic pollutants (POPs), such as PAH_{16}, PCB_6 and eight chloro-organic pollutants. The observation period for each sampling point is five years.

Level II is oriented towards observing regional manifestations of degradation processes, such as acidification (pH KCl, harmful acidity, exchange ions (H^+, Al^{3+}, Mn^{2+}, Ca^{2+}, Mg^{2+}) and the degree of saturation of the soil with bases) and salinization (total amount of salt in the water extract of soil, soluble Na^+, Cl, SO_4^{2-}, HCO_3^- and CO_3^{2-}, exchangeable Na+, sorption capacity of the soil). It also accounts for erosion processes, utilizing models to assess and forecast based on data from the water and wind that is monitored. The Ministry of Agriculture and Food provides data on land use, the Ministry of Regional Development and Public Works provides data on landslides and the National Institute of Meteorology and Hydrology provides data on intense rain to enable risk modelling as regards water and wind erosion. Soil sealing (e.g. as a result of the development of urban infrastructure and construction) is assessed on the basis of statistical data and the mapping of land cover.

Level III concerns monitoring sampling points that have been identified as contaminated and that, relevant to specific Bulgarian conditions and soil, have been entered into an inventory of contaminated sites. This refers to cases of local pollution and contamination and the inventory of polluted soils is still under development. For instance, it is foreseen that maps of contaminated sites will be available by the end of 2016 and a project is presently ongoing to provide information to the public through a web-based map (GIS format). It is, moreover, expected that there will be a stocktaking of polluted soils in 2016 in connection with a new method for monitoring soil pollution introduced in 2015.

Most of the soil-related data are based on samples collected and processed by the regional laboratories. The laboratories send all the records and protocols to the Agency by March each year and the results are subsequently published annually in the National Report on the Status and Protection of the Environment. All the collected information is entered into two databases on soil quality that are maintained by the Agency. At this stage, access to this information is principally upon request.

The register of polluted areas has been delayed, as a consequence of the lack of financial resources.

Water

The programme of monitoring the chemical and biological status of water bodies is directed by the Ministry of Environment and Water and four river basin directorates, forming another component of the National System for Environmental Monitoring. The delineation of river basin directorates is based on the natural distribution of the main river watersheds on the territory of Bulgaria. The monitoring programme is operationalized and managed by the Executive Environment Agency. The Ministry of Environment and Water is principally in charge of monitoring surface and groundwater, while potable water is controlled by the water suppliers and the Ministry of

Health through its regional health inspectorates and bathing waters is controlled entirely by the regional health inspectorates, applying indicators and standards that are in line with EU directives.

The sampling sites, sampling frequency and parameters for the chemical and biological status of surface water –covering, for example, macrozoobenthos, phytobenthos, macrophytes and fish in rivers and bioassay-equivalent concentrations in lakes and reservoirs, as well as the chemical status and the quantitative status of groundwater bodies, at the points of the groundwater chemical status monitoring network – have all been established by the Agency.

The parameters of monitoring are defined according to the priorities of the Ministry, based on existing and potential environmental impacts and taking into account the peculiarities of each region, ranging from coastal monitoring, fisheries and beach and swimming zones. In addition to the work being done by the Ministry, the National Institute of Meteorology and Hydrology carries out monitoring of precipitation, surface and groundwater quantity levels and spring flows (e.g. well water), including the sediment outflow, and the Institute of Oceanology monitors the ecological and chemical status of marine waters. The Executive Agency for Exploration and Maintenance of the River Danube monitors the water quantity of the Danube River.

The present water monitoring systems, as operationalized by the Agency, consist of 500–600 points to monitor the physical and chemical status of surface water, 372 points for groundwater (for the period 2010-2014) and 700–800 points for hydro-biological monitoring of surface water. Seawater quality is also checked at monitoring stations located on the coast and at the mouths of the rivers flowing into the Black Sea and there are at present 4 automatic monitoring stations for surface water that provide early warning of pollution.

The sampling frequency varies depending on the system and season in question. It can be up to four times per day in the case of automatic stations (e.g. checking meteorological parameters) as part of the National System for Environmental Monitoring to to 4 to 12 times for physiochemical parameters, twice per year for phytoplankton to once per year for all biological parameters. Sampling of groundwater is from twice to four times per year.

Methods used are standard and the Agency primarily monitors water, while many of the priority substances (substances or groups of substances that are of major concern for European waters) are not being monitored actively. There is a lack of equipment to monitor some priority substances, such as diuron , and not all substances are expected to be fully monitored until 2021. As concerns the monitoring of marine waters, there is an analysis of the Priority substances and Specific pollutants made for the 1 year long period, by the Institute of Oceanology. The results are published on the web site of the Institute.

The Agency is responsible for collecting and publishing data on water quality, of freshwater (groundwater and surface water), applying indicators for the status of water comparable to those applied by the European Environment Agency. The competent authorities collate all the information gathered by the respective institutions. In turn, data from monitoring feed into the National Report on the Status and Protection of the Environment that includes a section on the management of water resources and water quantity. The report is primarily used to monitor trends and to provide a basis for comparison over time.

The databases and information systems for ground and surface water are developed in ORACLE and MY SQL. They contain all the information from the regional laboratories. Access to the database on surface water is limited to the Ministry and the river basin directorates while the database on groundwater is password protected. A module for surface water is currently being developed to provide public access, but it is not operational yet.

Water monitoring and related data collection practices have developed significantly in Bulgaria in recent years. However, there is scope for building on the improvements that have been made. There is also scope for improving the laboratory equipment to enable the inclusion of additional priority substances within the monitoring regime. The final point is that secondary users, such as the public, cannot access most water quality data easily.

Analytical laboratories

Laboratory-based analytical work is conducted in connection with air, water and soil monitoring as well for control of genetically modified organisms (GMOs), measurement of emissions from stationary sources, radiation and noise levels, and other coordination activities. Aside from regularly scheduled monitoring activities administered through the Executive Environmental Agency, the laboratories have to take into account ad hoc demands made by the regional inspectorates and the public throughout the year.

The Agency manages its laboratory and analytical activities under a common accreditation (ENISO/IEC 17025) as a testing laboratory with 15 offices that employ 265 people. There is presently one central laboratory in Sofia and 14 regional laboratories and the scope of accreditation includes testing of water, air, noise, soil, sludge, sediment, plants and GMOs. In implementing its activities, the central laboratory coordinates the regional laboratories with the other departments of the Agency, provides methodological assistance and controls the quality of analyses made by the regional laboratories.

The central and regional laboratories are integrated with the existing monitoring networks. For example, the measurement of emissions of harmful substances into the air is in part carried out by six mobile automatic stations at the laboratories situated in Sofia, Varna, Stara Zagora, Pleven, Plovdiv and Russe. These stations cover pollutants such as sulphur oxides (SOx), nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs), ammonia (NH_3), carbon monoxide (CO), heavy metals (Hg, Hg, Cd, Pb), polycyclic aromatic hydrocarbons (PAHs) and particulate matter PM_{10}. Stationary stations measure particulate matter $PM_{2.5}$.

The laboratories are also involved in testing and ensuring data quality of surface water, groundwater and water intended for drinking, in accordance with the continuous water monitoring activities. Their other central activities include soil monitoring (e.g. t-tests for heavy metals and preparation of samples from municipal, construction and industrial waste), biomonitoring (e.g. determining biological quality elements and the control of GMOs), radiation measurements (e.g. sampling and radiometric measurements in real conditions).

Ten of the accredited laboratory facilities are equipped with an inductively coupled plasma mass spectrometer and an atomic absorption spectrophotometer and eight with an Hg instrument. They perform measurements of heavy metals (e.g. lead, copper, zinc, cadmium, nickel, cobalt, chromium, arsenic, manganese, mercury, etc.) in water, soil, waste, sediment and arsenic, cadmium, nickel and lead aerosols in the air. Eight laboratories are equipped with a flame ionization detector, gas chromatography-mass spectrometry and gas chromatographer coupled to tandem mass spectrometry, and two laboratories are equipped with a liquid chromatographer with the mass analysis capabilities of mass spectrometry.

The existing laboratory equipment provides the necessary infrastructure to monitor many important environmental pollutants and increase the quality of Bulgaria's national environmental reporting; however, there remains a need to improve capabilities. More specifically, laboratories face challenges related to the monitoring of all priority substances not being expected to be resolved until 2021, for instance. Speeding up investments to acquire equipment that can detect these specific substances would have a positive impact on the capabilities of the environmental monitoring system as a whole.

3.2 Environmental information and data reporting

National System for Environmental Monitoring

The National System for Environmental Monitoring was developed to provide timely and reliable information and data on the environment and the factors affecting it. The aim is to maintain information on which to base analyses, assessments and forecasts to support the activities of preserving and protecting the environment from harmful effects. The system is managed by the Ministry of Environment and Water through the Executive Environment Agency. The latter also administers the National System for Environmental Monitoring, providing material, technical, methodological and software-related resources necessary for its operation and continued development.

The National System for Environmental Monitoring covers the national monitoring networks for ambient air, precipitation, surface water, groundwater, seawater, geological environment, soil, forests, protected areas, biological diversity, radiological and non-ionizing radiation, and environmental noise pollution. All environmental monitoring activities are carried out by the structures of the Agency in accordance with unified methods for sampling and analysis and standard procedures to ensure the quality of the environmental information and data.

Data reporting by enterprises

Data reporting by enterprises refers only to self-monitoring. It differs across different sectors depending on varying legislative requirements for environmental monitoring and associated reporting obligations. Self-monitoring as such is not a requirement for all areas covered by the National System for Environmental Monitoring; for instance, it is not applicable to forest and biodiversity monitoring, while it is a requirement for air, noise, radioactivity, water and soil monitoring. In the case of soil monitoring, enterprises are obliged to conduct self-monitoring within the boundaries of the plant in compliance with the conditions and procedures

determined in the integrated permit and to keep the information from their self-monitoring for a period of at least 15 years.

Should enterprises have to perform a specific self-monitoring exercise based on the requirements of an issued permit and integrated permit, they have to perform measurements and submit the results to the RIEW of the territory on which they are located. These annual reports are subject to verification by the inspectorate. These measurements are subsequently summarized by the RIEW and sent to the Executive Environment Agency. All data and information are in turn collated and stored in an electronic information system containing data from the annual reports of the RIEWs, which is published on the website of the Agency and accessible by the public.

Statistical data

The Executive Environment Agency is responsible for the collection, treatment and publication of environmental data. The NSI is responsible for statistical information, including the provision of statistical forms, procedures for data collection and publications.

Environmental statistical data are made publicly available through the NSI on:

- Air emissions;
- Noise levels;
- Protected natural scenery;
- Expenditure on protection and restoration of the environment;
- Tangible fixed assets with ecological use;
- Water.

The Executive Environment Agency and the Ministry of Environment and Water provide access to statistical data through several databases that have varying levels of access. The Agency has also established an open data portal that publishes 11 data sets in open, machine-readable format, appropriate for reuse and covering soil monitoring, acidification and salinization, air data as part of its daily bulletin for air quality in the country (covering nitrogen dioxide, fine particulate matter, benzene, carbon monoxide, ozone and levels of sulphur dioxide), data from the single information system for water monitoring, and data on noise levels from industrial sources and from airports in Sofia, Varna and Burgas. Statistical data are also available on soil quality (with limited public access), as are data reports on the levels of radioactivity and on forests through the National System for Environmental Monitoring subsystem on forests and the Executive Forest Agency database.

In some areas, such as biodiversity, there are no statistical forms available. Biodiversity data are instead provided using indicators for biodiversity, as presented in the National Report on the Status and Protection of the Environment. Most of these correspond to Streamlining European Biodiversity Indicators (SEBI) and cover, to note a few, the common bird index, species of European interest, ecosystem coverage, habitats of European interest, change in area and number of protected areas, Natura 2000 sites, invasive alien species and others, such as changes in the number of waterfowl and the state of selected species such as the Brown bear in Bulgaria.

Data management

The Executive Environmental Agency maintains environmental data through its information systems, which are operationalized by the National System for Environmental Monitoring. Databases at national and regional levels are structured according to the relevant aspects of the environment and use common nomenclatures.

Results from the national system for monitoring air quality feed into the National Database for Air Quality Control in the Agency as well as the regional databases controlled by the RIEWs. Final data are published, after validation, in a quarterly bulletin and the National Report on the Status and Protection of the Environment. Results from the manual sampling and chemical analysis also enter into the national database as well as the regional databases. Data are collected, processed and stored through specialized software. The subdivision into national and regional databases reflects the role of the regional inspectorates but also allows municipalities to have direct access to the respective databases.

Data on noise is collected and maintained in a database that provides information about the noise generated by entreprises. It is published on the website of the Agency and has public access. The information provided covers the name of the facility (operator name, city), activity, location of source (residential area, central area, production and storage area and zone, etc.), distance to the nearest residential or public building in meters, limit value of noise indicators in place of impact in decibels (dB), description of the mode of operation (in hours), noise level at the boundary of the industrial source dB (A), noise level at the point of impact dB (A), and compliance with regulations.

Data from the national database for radiological environmental monitoring are stored in the

Radioactivity Environmental Monitoring database managed by the European Commission.

The Agency also manages the BIOMON database that collects data from all regional databases related to biodiversity. BIOMON aims to become an integrated information system that collects, analyses and unifies all primary data flows concerning biodiversity. BIOMON is designed for the experts who work with biodiversity monitoring, Natura 2000 sites and protected areas, as well as for academic and public institutions and physical persons who are involved in the implementation of the National Biodiversity Monitoring System.

The National System for Environmental Monitoring includes a subsystem on forests that contains statistical forms, procedures for data collection and publications. The Executive Forest Agency maintains a database that stores, among other things, information on registered forests and land within the forestry fund and a "genetic bank" list of coniferous and broad-leaved seeds.

Table 3.1: Environmental information and data systems with online access

Executive Environment Agency		
Environmental Monitoring and Assessments Directorate	**System**	**Sub-system**
Air Monitoring Department	National control system for air quality in real time	
		Daily bulletin for air quality
		Recent cases of exceeding the alert threshold for NO2, SO2 and O3
		Forecast levels of ground-level (tropospheric) ozone
		Information system for volatile organic compounds
Water Monitoring Department	Information system for permits and monitoring in water management (GIS application and registers)	
Land, Biodiversity and Protected Areas Department	Information system to the National System for Biodiversity Monitoring (maps and data)	
		Register of protected areas and protected zones within Natura 2000 (GIS application and list)
		Register of old trees
		Red Data Book (digital edition)
	National database of land cover of Bulgaria developed under Pan-European project "Corine Land Cover"	
	Register of warehouses that store obsolete pesticides (GIS application)	
Radiological Monitoring Department	Daily bulletin about the radiological situation	
	Information system for results of tests on industrial sources emitting noise	
Emission Trading Permit Department	National Register of Greenhouse Gas Emissions Trading	
Emissions Inventory Department	National Pollutant Release and Transfer Register	
	Electronic Register of Installations of cialSources of Volatile Organic Solvents	

Photo 3: Sofia University "St. Kliment Ohridski"

The Agency is, furthermore, in charge of collating a database on soil quality as an Excel file, as well as two databases on water quality, one on surface water and the other one on groundwater. Nearly all the information contained in these databases is collected by the 15 regional laboratories. Public access is restricted. For every request for information, the Agency has to ensure that no confidential data are provided and that the information provided cannot be utilized to identify specific enterprises and/or individuals.

Environmental indicators and their use

Most of the databases and associated data flows noted above are independent and not interconnected. Accessibility of environmental information and data is not assured for all media. The Agency is working towards a shared environmental information system (SEIS).Environmental indicators for all areas of monitoring are published in a number of daily, monthly, quarterly and early reports (e.g. daily bulletin on air quality and annual reports on water quality) after which most of the information is collated and published in the National Report on the Status and Protection of the Environment (Table 3.2).

Indicator-based assessments or reports

The Executive Environment Agency is the national coordination centre for reporting of information on the environment. It has been producing the National Report on the Status and Protection of the Environment annually since 1991 (initially called an annual bulletin but addressing the same topics), covering the sectors and activities related to climate change and emissions of harmful substances and air quality, waste and material resources, energy, management of water resources and water quality, noise pollution, land use and soil, forests, biodiversity, radiation and transport.

In addition, it covers investments in environmental protection, the most recent operational programme (OP) for the environment, enterprise management activities affecting environmental protection, preventive tools for integrating the objectives of environmental investment projects, and activities linked to increasing environmental awareness. The last publicly available report is for 2014.

The Report links assessment of the state of the environment with environmental policies in place and references to normative and strategic documents. It presents relevant links, in relation to the areas being monitored, to action plans, activities and other types of measures undertaken. However, the Report provides only limited comparisons with other countries, such as on the critical level of ozone for the protection of vegetation, and principally compares with aggregated European averages, if at all.

Table 3.2: Indicators in the National Report on the State and Protection of the Environment

Area	Indicator
Air	Number of exceedances: PM10
	Number of exceedances: PM2.5
	O_3 for human health
	O_3 for protection of vegetation AOT40
	CO, Benzene, PAH, Pb, Cd, Ni, SO_2, NO_2, As
Biodiversity	Common Bird Index, corresponding to SEBI 1
	Change in area and number of protected areas, corresponding to SEBI 7
	Sites designated under the EU Habitats and Birds Directive, corresponding to SEBI 8
	Species of European interest, corresponding to SEBI 3
	Habitats of European interest, corresponding to SEBI 5
	Ecosystem coverage, corresponding to SEBI 4
	Invasive alien species, corresponding to SEBI 10
	Change in the number of waterfowl
	Change in the number of game
	Status of species from the National Biodiversity Monitoring System
	Assessment of the number of Brown bear
	Assessment of the number of chamois
	Most significant summer underground bat habitats
Noise	Lden – daily equivalent noise level
	Lvecher – night equivalent noise level
	LNIGHT – night equivalent noise level
	L24 – day and night equivalent noise level
Forest	Forest area (status and changes)
	Growing stock (status and changes) corresponding to SEBI 17
	Age structure and/or diameter distribution (status and changes)
	Carbon stock (status and changes)
	Deposition of air pollutants (status and changes), corresponding to SEBI 9
	Defoliation (status and changes)
	Forest damage (status and changes)
	Increment and fellings (status and changes), corresponding to SEBI 17
	Protected forests (status and changes)
	Protective forests (status and changes)
Radioactivity	Radiation gamma background
	Specific activity in air
	Specific activity in soil
	Surface water – total alpha and total beta activity
	Specific activity in sediments
	Waste materials and waters in mine areas
Soil	Loss of land (status and changes)
	Wind erosion (status and changes)
	Water erosion (status and changes)
	Landslides (status and changes)
	Soil sealing (status and changes)
	Reserve of nutrients in the soil (status and changes)
	Contents of nutrients and water in the soil (status and changes)
	Diffuse soil contamination (status and changes)
	Local soil pollution (status and changes)
	Use of mineral fertilizers
	Use of manure
Water	Use of freshwater resources - water exploitation index (Trends)
	Oxygen consuming substances in rivers (DO, BOD5) (Status and trends)
	Nutrients in freshwater - ammonium (NH4-N), nitrate (NO3-N), phosphate (PO4) (Status and trends)
	Nitrates-NO3- Groundwater indicators (Status and trends)
	Biological indicator for river type – benthic invertebrates (Biotic Index). Indicator for organic and toxic pollution and hydromorphological alterations (Status)
	Biological indicator for lake type – chlorophyll-a. Indicator for eutrophication (Status).

The Report can be considered to be in line with the Guidelines for the Preparation of Indicator-Based Environment Assessment Reports in Eastern Europe, Caucasus and Central Asia (ECE), but the guidelines are not explicitly followed. To illustrate, the National Report on the Status and Protection of the Environment follows the recommended DPSIR framework, which is applied clearly, but it does not provide concrete and clear policy recommendations for the future.

In addition to environmental information and data presented in the National Report on the Status and Protection of the Environment, the Agency produces, among others, the following indicator-based assessments or reports:

- A daily bulletin on air quality in Bulgaria, a quarterly bulletin and a report on the last recorded exceedances of the alarm thresholds for NO_2, SO_2 and O_3. It also reports air quality data annually to the European Environment Agency, uploading the data via Eionet's data reporting system, CDR;
- Annual reports on noise from industrial sources through the respective RIEWs;
- Information on radioactivity, published through the European Commission's Radioactivity Environmental Monitoring website;
- Annual data reports to the PCC of ICP Forests, which reports to the Executive Body of CLRTAP. Data collection is principally based on eight indicators under the Agency and the Executive Forest Agency as part of the Ministry of Agriculture and Food;
- Annual reports on monitoring data for water quality (river, lake, marine water and groundwater) and for water quantity and emission to the European Environment Agency, and monitoring data for water quality (surface and groundwater) to the International Commission for the Protection of the Danube River (ICPDR).

The National Nature Protection Service is responsible for reporting on international commitments on biodiversity (e.g. national reports on the implementation of the Convention on Biological Diversity and the Bern Convention on the Conservation of European Wildlife and Natural Habitats).

Use of environmental information as a decision-making tool

There is a strong legislative basis for the provision of environmental information as an integral component of regulatory decision-making in Bulgaria. The Liability for Prevention and Remedying of Environmental Damage Act regulates the regime on liability for environmental damage, including the provision of a mechanism under which decisions can be taken. According to the Act, an environmental damage can be defined as damage to protected species and natural habitats with significant adverse effects, as well as damage to water and water bodies and soil damage, which is any land contamination that creates a significant risk to human health.

This provides a framework under which both individuals and legal entities are subject to liability if they carry out activities without having a permit or in cases where there is violation of the terms of an issued permit or the legislation as a whole. The respective competent authorities can in turn take action and make decisions based on the information that has been collected, such as issuing an order for implementing preventive or remedial measures if respectively a case of imminent threat or a case of environmental damage occurred.

There have been great improvements in the infrastructure and the legislation pertaining to both the collection and use of environmental information in decision-making; however, environmental monitoring has in some cases been ad hoc and subject to project-based, not systematic, funding. One impact from the lack of systematic monitoring means that there is no environmental information on which to make decisions. For instance, a baseline is lacking for certain species included in Annex II of the National Biodiversity Monitoring System

3.3 Access to environmental information and raising public awareness

Bulgaria is Party to the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (chapter 4). Access to environmental information was, however, already regulated in 1991. This is practically implemented through the Environmental Protection Act, which sets a number of requirements on public authorities and other competent persons concerning public access to environmental information. The Access to Public Information Act, No. 55, regulates access to public information in more detail, including environmental information. It provides guidance for the public on how to obtain information and how to appeal decisions taken by various authorities. All national and local competent authorities that collect environmental information are responsible for providing this information to the public, with the exception of the legislative and judicial authorities.

In practice this is implemented through the provision of up-to-date environmental information concerning strategic and legal frameworks, including draft documents for public consultations, permits, legal and administrative proceedings, public procurement, projects, and funding for environmental activities provided by national and international sources, through the websites of the Ministry of Environment and Water and other relevant authorities. All the relevant authorities are in fact obliged to plan, on an annual basis, the online publication of the environmental information they maintain (in open machine-readable format). This information is to be published in the Open Data Portal of the Council of Ministers.

The new State Agency "E-Governance" is responsible to establish and maintain a national portal for spatial data, which is accessible for all state agencies and from the European geo-portal. The national policy for development of the spatial information infrastructure is coordinated by the same state agency and it is in accordance with INSPIRE Directive requirements.

Aside from the online provision of information, the Ministry of Environment and Water has established public information centres to disseminate information on the environment and sustainable development among pupils, students, NGOs, academics and business. The centres provide individuals and organizations free informational materials and free access to literature in the field of environmental protection, research developments, sources of information obtained through international exchanges, videos and more. The Ministry has also set up a so-called "Green phone" and e-mail by which it can receive information from individuals and organizations on environmental pollution, including reports on pollution of water and air, improper waste disposal, illegal extraction of inert materials, possession and trading of endangered animal and plant species, and other matters.

Recently, the Ministry of Environment and Water has implemented national campaigns to raise environmental awareness. One campaign focused on "greening cities" and awarded prizes to the most environmentally active municipality or NGO, and another focused on "green ideas" and was designed to bring together fresh ideas for the protection of the environment and to draw attention to unique places in the Bulgarian countryside.

Progress on providing environmental information has been made by most of the relevant authorities, as there is proactive publishing online. Most of the important steps to facilitate access to information have been made; however, relevant documents are often not made available sufficiently early before consultations (e.g. due to the administrative burden) and no records of consultations are kept. There is no coordinating body concerned with access to information, such as an organization that could take leadership to coordinate all the efforts needed.

3.4 Education for sustainable development and the environment

Full-time education is mandatory for all children aged between the ages of 7 and 16. Education at state-owned schools is free of charge, but not for the higher education schools, colleges and universities. The education curriculum focuses on eight main subjects: national language and literature, foreign languages, mathematics, information technologies, social sciences and civics, natural sciences and ecology, music and art, and physical education and sports.

Environmental education

Environmental awareness and responsible behaviour is already taught from preschool level. The early preparation of children, prior to compulsory schooling, was deemed important and the state educational requirements prescribe teaching in relation to safety rules in the event of natural disaster, raising understanding and awareness about the need to take care of animals and raising children’s willingness to take of the environment, and so forth.

The state educational requirements in Bulgaria include environmental and nature conservation topics in the school curricula and textbooks. Environmental education is addressed under "Natural sciences and ecology" and "Geography and economics" between the 3rd and 12th grades of secondary education.

The requirements for "Geography and economics" are to evaluate natural diversity and the beauty of our planet, explain the global problems connected with nature conservation and rational use of natural resources and the environment, explain the processes of global warming and the depletion of the ozone layer, discuss the problems connected with the management of water, soil and biotic resources and solid wastes, value the concept of sustainable development as a global strategy, know the principles of ecological monitoring and understand its necessity, plot maps of geographic and economic sites and phenomena and develop school projects on geographic and economic topics.

The requirements for "Natural sciences and ecology" are to use a scientific approach when solving problems

in different areas of life, develop environmental culture and aspirations for nature conservation, distinguish structural elements and processes in different levels of organization of the biosphere, explain the state of the environment using natural ecological laws and human impact, classify and compare ecosystems, populations and organisms, anticipate the outcomes from changes in environmental factors and human pressure on environmental equilibrium, describe the application and biological impact of nuclear radiation, understand the use of thermonuclear synthesis in the production of nuclear energy and in nature conservation, and prove the necessity of recycling materials and using nature-friendly technologies.

The school curricula address environmental education through the inclusion in lessons of specific environmental notions, concepts covering specific topics (e.g. biology and evolution) and ecological and environmental concepts in several subjects (table 3.3).

Education for sustainable development

In its variety, different topics and issues applying to sustainable development are embedded in the school curricula and study content for the different levels of compulsory primary and secondary schooling. The Ministry of Education and Science has integrated the topic of sustainable development into relevant school topics. Within the framework of an EU-funded project on education, the Ministry has also drawn up draft school curricula for primary and secondary education, in which topics and issues related to sustainable development have been explicitly embedded. This integrated approach means that no separate school subject for "sustainable development" has been established but that the topic is discussed once, given its particular specificity, and then within the context of the relevant school subjects and broader cultural–educational field. This approach enables students to gain a deeper understanding and to reflect on the given environmental topics, in both the context of specific scientific fields and other areas of study.

Table 3.3: Integration of environmental concepts in various subjects

Subject	Grade	Topics
Human Being and Nature	3–6	Physical phenomena – From the atom to the cosmos, Energy, Movement and forces, Electricity Substances and their properties – Classification of substances and nomenclature, structure and properties of substances, application of substances, chemical processes Structure and life processes of organisms – Structure of life processes and classification, Human organism, Organism and environment, Observations, experiments and investigations
Biology and Health Education	7	Structure, life processes and classification – Plants and invertebrates, Organism and environment, Observations, experiments and investigations
	8	Structure, life processes and classification – Vertebrates, The human organism, Organism and environment, Observations, experiments and investigations
	9	Biosphere, The cell, Observations, experiments and investigations
Biology and Health Education Chemistry and Nature Conservation	10	The Multicellular organism, Biological evolution, Observations, experiments and investigations, Conservation of the surrounding environment
	11	The cell, The multicellular organism, Observations, experiments and investigations, Fundamentals of chemical qualitative and quantitative analysis
	12	Biological evolution, The biosphere, Observations, experiments and investigations, Fuels, Chemistry and nutrition, Problems of conservation of the environment, Analysis of the state of the environment

Article 77 of the Preschool and School Education Act has also introduced a ninth competence that is focused on sustainable development and healthy lifestyle, and a National Preschool and School Education Development Programme has been implemented to ensure that all pupils and students, including those with special educational needs and those belonging to disadvantaged or at-risk groups, understand the significance of sustainable development.

Furthermore, the educational requirement for teaching includes basic educational content on sustainable development, focusing on promoting knowledge, skills, attitudes and competence oriented towards sustainable development. This is addressed in the curriculum for various subjects and at various levels where the standards are broken down into training targets on relevant topics. The main focus on education for sustainable development is placed on standards and curricula in cultural and educational fields such as social sciences and civic education, science and ecology, and philosophy. Students are to be familiar with:

- Principles of environmental monitoring and the need thereof, positive and negative aspects of life in urban areas, main forms of international economic cooperation;
- Human activities leading to imbalance in nature;
- The impact of humans on nature and the causes of disruption of the ecological balance, and the results of changing environmental factors;
- The need for rational use of natural resources and for the secondary use of materials, waste-free and environmentally safe production.

Vocational training

The state educational requirements for acquiring professional qualifications are defined by the Vocational Education and Training Act. These qualifications are developed and updated by the National Agency for Vocational Education and Training and approved by the Minister of Education and Science in coordination with the Ministry of Labour and Social Policy. On the basis of the state educational requirements, the study content is designed to encompass and promote knowledge and skills concerning the preservation of the environment. It also provides certain possibilities for teachers to consider and reflect in class on topics and issues related to, for example, the harmful impact that different technologies have on air, water, soils, as well as effects from vibrations, noise and radiation on public health. The system of vocational education and training also prepares students for a career in environmental science and the agro-environment.

The compulsory vocational education and training in all professions leading to acquiring a third professional qualification in the school system has also introduced subjects such as entrepreneurship and economics. In the economics curricula, themes and topics are considered that reflect on crucial contemporary economic problems, such as the scarcity of resources versus unlimited consumption in everyday life, which has an impact on the environment.

The vocational education curricula (as of 2009) also support the concept of sustainable development, stimulating creative thinking and innovation while taking into account environmental considerations. In the course of four, up to five, years of vocational training, students can acquire professional knowledge, skills and competences that are linked to the analysis of products, air, water, soils, waste and production processes. Furthermore, embedded in the national examination curricula for the acquisition of a professional qualification are evaluation criteria for professional competences, related to environmental preservation.

Training of teachers

Teacher training aimed at implementing the educational aspects concerned with the sustainable development concept is ongoing. Much teacher training has been held across the country under the guidance of the Regional Inspectorates for Education and the universities' Departments for Further Teacher Training and Qualification. Other tarining has been conducted by NGOs, supported by the Ministry of Education and Science. Great improvements have been made in the educational framework concerned with both the environment and sustainable development; however, continued training-of-trainers has principally been project based (box 3.1) and there is limited systematic funding to ensure that teachers in Bulgaria continue to improve their capacities to teach on these important topics.

Non-formal and informal environmental education

In non-formal education, projects and programmes, and, in particular, those developed jointly with NGOs and civil society representatives, have played a crucial role in promoting education for sustainable development. Education for sustainable development is delivered not only within the compulsory schooling curricula, but through extracurricular and free-elective classes, in different forms, such as clubs and national contests.

Box 3.1: Training-related projects run by the Ministry of Environment and Water

Environmental management for sustainable living in schools

The Ministry of Environment and Water has implemented a project on environmental management for sustainable living in schools. The main objectives of this project were to promote and fully implement environmental education and education for sustainable development in Bulgarian schools, improve teachers' knowledge of working with modern teaching aids and support schools in the implementation of new approaches and methods of working with children and parents. The project included the translation of a teachers' guide on "Environmental management for a better way of life in schools" that was presented through seminars and practical training to 147 teachers and directors from primary and secondary schools in 50 settlements in Bulgaria, including representatives of the Regional Inspectorates of Education, Ministry of Environment and Water and municipalities. The Guide's main objectives are to train teachers and experts to work with it and integrate it into the curricular content.

With Flupi for a Better Environment

The Ministry of Environment and Water launched a two-stage campaign to improve the environment. The first stage included more than 250 kindergartens and focused on providing educational kits (e.g. the books "Flupi and Water" and "Flupi and Air", Flupi dominoes, stickers and posters and a handbook for teachers) to assist children to learn respect for the environment, how to protect clean air and water, what to do in order to reduce pollution and how to relate to the world around us. The second stage of the campaign was aimed at children between the ages of 8 and 13 and included the development and distribution of two educational packages designed for students between grades 2–4 and 5–6.

In schools, various initiatives related to sustainable development are in place, including activities such as debates and art exhibitions. The most common practice employed by schools has been to develop curricula for free-elective classes, including topics related to education for sustainable development. Apart from that, several schools have established environmental education clubs.

There are also about 140 extra-scholastic pedagogical institutions presently active in Bulgaria, attended by children and students from various schools at the regional or municipal level. Extra-scholastic pedagogical institutions are defined by Article 33 in the National Education Act as centres for working with children or centres for students' technical and scientific recreation.

The Ministry of Environment and Water organizes a number of extracurricular activities for students, including national painting, photography and essay contests and other activities on environmental topics, for example, "Water – Source of Life", "Keep Water – Keep Nature", "Nature – Our Home" and "Green Planet".

The Ministry of Environment and Water and its regional branches, the Ministry of Education and Science and municipalities also organize annual national campaigns to raise public and cultural awareness related to the international ecological calendar, such as World Wetlands Day, Water Day, Forest Week, Earth Day, Combat Climate Change Day, Biodiversity, and so on, as well as campaigns related to the conservation of certain species (e.g. bats, dolphins and bears). Within these campaigns, the Ministry of Environment and Water, and in some cases the Forest Executive Agency and nature park directorates, hold open lessons, competitions, contests, exhibitions, cleaning and reforestation actions, forums, training seminars, round tables and conferences for students, teachers, businesses, NGOs and officials from municipal and public administrations. All in all, about 60 national and international events in the areas of science, technical engineering and technologies, ecology and environmental management and civil education are organized on an annual basis.

The Ministry of Environment and Water holds an annual contest called "For a Cleaner Environment" with the motto "I love nature – I also take part", financed by EMEPA. The contest involves municipalities, schools, kindergartens and children's centres, which can participate with specific project ideas. Some of the suggested projects include cleaning and planting urban areas and creating zones for recreation. The contest also funds activities in schools and kindergartens that are directly related to increased environmental awareness and the introduction of environmental education.

In addition, the Ministry of Education and Science holds an annual National Olympiad in Civic Education to encourage students to demonstrate and practice skills and competencies relating to civic education, taking environmental considerations into account. The Ministry also organizes an annual National Contest in Key Competences in Natural Sciences, which focuses on developing key competences in research and the social competences of students. Both contribute towards helping students reflect on environmental issues and our relationship to them.

3.5 Legal and institutional framework

Legal framework

Some of the environmental acts that include provisions on environmental monitoring are the Environmental Protection Act, Biological Diversity Act, Plant Protection Act, Soils Act, Water Act, Clean Ambient Air Act, Liability for Prevention and Remedying of Environmental Damage Act and Protected Areas Act (chapter 1).

The Environmental Protection Act regulates access to environmental information and sets out a number of requirements of public authorities and other competent persons as regards the promotion and facilitation of public access to environmental information. The Act defines "information relating to the environment" as any information in written, visual, aural, electronic or other physical form regarding the state of the environment, the factors (as well as the activities and/or measures, including administrative measures, international agreements, policies, legislation) capable of affecting the environment, the state of human health and safety, cultural and historical heritage sites, buildings and installations, cost–benefit analysis, emissions, discharges and other harmful impacts on the environment.

The Access to Public Information Act further regulates access to public information, including environmental information and provides guidance for the public on the procedures in place for obtaining information and appealing decisions made by relevant authorities. For instance, each administrative structure has to make public annually a list of the information publishable on the internet related to its areas of operation and the formats in which such information is accessible. This includes publication of the information available in open machine-readable formats and free access to information. The Act was amended in 2016 and the requirements for publication of up-to-date public information (e.g. environmental information) were broadened.

The Public Education Act, promulgated in State Gazette 86/1991, the Level of Education, General Education Minimum and Curriculum Act, promulgated in State Gazette 67/1999, and the Preschool and School Education Act, promulgated in State Gazette 79/2015, regulate the structure, function and management of the public education system and set the educational requirement for each level of education, the general education minimum and the curriculum, from preschool level onwards. Together they define the national education system, including environmental education, as part of compulsory general education. The Vocational Education and Training Act, promulgated in State Gazette 68/1999, regulates the vocational education and training system, including continuous vocational training in terms of organization, institutions, management and financing.

Institutional framework

The Ministry of Environment and Water is responsible for implementing the state policy as regards the protection of the environment and for introducing EU regulations and other environmental legislative acts. The coordination, regulation and implementation of the state environmental policies are integrated within sectors such as the environment, energy, construction, agriculture and industry, carried out through different competent authorities.

The Executive Environment Agency carries out the management, coordination and information functions in connection with environmental protection and on behalf of the Ministry of Environment and Water. It manages the National System for Environmental Monitoring and is responsible for producing the National Report on the Status and Protection of the Environment and the collection and maintenance of all associated environmental information, among other things. The Agency is a National Reference Centre within the European Environment Agency and divided into general and specialized directorates (figure 1.2).

The issuing of permits and imposition of sanctions is allocated on both the national and regional levels, giving responsibility to the directorate of each respective authority. With respect to environmental subsidies, applications and grants are made through the respective departments of the Ministry of Environment and Water (chapter 1).

The national programme concerned with forest ecosystems monitoring is administered by the Ministry of Environment and Water and the Agency. However, the Executive Forest Agency, managed by the Ministry of Agriculture and Food, provides technical assistance and administrative services for the public and legal entities concerned with forests. The Executive Forest Agency implements its activities through regional forest directorates and specialized territorial forest units.

Water monitoring is directed by the Ministry of Environment and Water and the four river basin directorates. Monitoring is operationalized by the Agency and the Ministry, which is in charge of monitoring surface and groundwater. Drinking water is controlled by the water suppliers and regional health

inspectorates and bathing waters is controlled entirely by the regional health inspectorates and the Ministry of Health. In addition, the National Institute of Meteorology and Hydrology carries out monitoring of precipitation and ground and surface water levels, including the sediment outflow. The Institute of Oceanology monitors the ecological and chemical status of marine waters. The Executive Agency for Exploration and Maintenance of the River Danube monitors the water quantity of that river.

Radioactivity, soil and biodiversity monitoring are carried out by the Agency; however, the Ministry of Agriculture and Food provides data on land use, the Ministry of Regional Development and Public Works provides data on landslides and the National Institute of Meteorology and Hydrology provides data on intense rain to enable risk modelling as regards water and wind erosion. The National Nature Protection Service under the Ministry of Environment and Water, Bulgarian Society for the Protection of Birds and other entities provide information on the state of biodiversity on a genetic, species and habitat level covering the main kinds of ecosystems.

The Ministry of Health is responsible for noise monitoring system. Other ministries and competent bodies have competencies in different areas determined by Bulgarian noise legislation. Part of them are involved in the process of noise mapping and action planning for noise reducing, and others are responsible to control the noise emitted from the different noise sources.

The NSI is responsible for statistical information, including the provision of statistical forms, procedures for data collection and publications. Its objectives are to provide objective, timely and reliable statistical information on economic, social and demographic development and the environment at national and regional levels. It is also in charge of implementing new data sources and instruments for improving the production and increasing the quality of statistical products and services.

The Ministry of Education and Science is responsible for environmental and sustainable development education in terms of developing educational programmes and training materials. It is also responsible for carrying out activities in the field of education for sustainable development through collaboration and partnership among teachers, parents, students and representatives outside the school organizations and institutions. The Ministry of Youth and Sports, Ministry of Health, Ministry of Transport, Information Technology and Communications, Ministry of Interior, Ministry of Agriculture and Food, Ministry of Economy, Ministry of Energy, Ministry of Tourism and municipalities are also involved in education to increase environmental awareness.

3.6 Conclusions and recommendations

Developments such as public registries that are available online (e.g. of protected areas and old trees, and the open data portals under the Council of Ministers and under the Executive Environment Agency) are encouraging. However, not all environmental data are publicly available. The ongoing implementation of an SEIS would prevent further segregation of the environmental information system and processes and establish harmonized conditions of access to environmental data and information.

Recommendation 3.1:
The Government should:

(a) Continue to work towards the implementation of a shared environmental information system that provides relevant, comprehensive, accurate and publicly accessible data and information on the state of the environment;
(b) Expand the Open Data Portal of the Council of Ministers to cover all environmental information and data in line with Open Data, Shared Environmental Information System principles and INSPIRE implementing rules as well as promote the re-use of public sector information.

The current air quality monitoring system is well developed; however, some issues remain, such as addressing the validation process associated with the automatic data flows and ensuring that the technical difficulties associated with the software used to submit data to the European Environment Agency is resolved.

Recommendation 3.2:
The Ministry of Environment and Water, through its Executive Environment Agency, should continue improving the automatic monitoring system pertaining to air quality monitoring to provide comprehensive, accurate and publicly accessible information and data on air quality.

Level I of the forest monitoring system is characterized by fixed sampling points; however, these sites are not taken into account either as part of the process of issuing harvesting permits or in regional planning. This has resulted in some of the sites having been harvested. To avoid further destruction of the network of sampling sites, it would be crucial to ensure that the monitoring network is sustained over

time to guarantee that the programme can continue to provide accurate and high quality information and data on forests.

Joint steps taken by the Ministry of Environment and Water and the Ministry of Agriculture and Food towards the establishment of a shared online platform and database with public access pertaining to all environmental information on forests is encouraging. Finalizing the joint platform would improve the forest-related information system and associated decision-making processes affecting forests.

Recommendation 3.3:
The Ministry of Agriculture and Food and the Ministry of Environment and Water should improve the forest monitoring system by:

(a) Ensuring that the network of sampling points, particularly Level I, concerning forest monitoring is preserved and incorporated into regional planning;
(b) Supporting the continued development of the collaborative forest information system in accordance with the principles of the shared environmental information system.

Due to insufficient financial capacities, the Executive Environment Agency has been dependent on project-based funding to support parts of its biodiversity monitoring system. This has resulted in a shortage of scientific data as regards certain species and habitats covered by the system. .

The present Operational Programme "Environment" 2014-2020 principally encompasses field studies and data collection for species that are of interest to the European Community, to meet legal requirements. Monitoring activities of almost all species that are not on this list do not receive funding from the Ministry of Environment and Water. This has resulted in certain species of national importance not being monitored adequately.

Recommendation 3.4:
The Ministry of Environment and Water should:

(a) Address the shortage or, in certain cases, the lack of scientific data in some areas and components related to primary biodiversity monitoring processes and the systematic monitoring of biodiversity;
(b) Focus additional monitoring attention on species/habitats of national importance that are not being monitored.

The public procurement process, as part of the legal procedure for tendering, has resulted in delays and non-implementation of certain monitoring activities (e.g. due to the appeals process). The Executive Environmental Agency is not allowed to issue direct contracts for the adequate provision of biodiversity monitoring activities to relevant actors to guarantee the operationalization of biodiversity monitoring, although there is an ongoing legislative process to review these procedures.

Recommendation 3.5:
The Government should address delays in the public procurement process as an impediment to biodiversity monitoring and continue supporting the legislative review of the public procurement process to improve the tendering mechanism.

Communication and cooperation between the Ministry of Environment and Water and the Ministry on Health on water monitoring is limited. Efforts are not made to increase data sharing, to adhere to SEIS principles, improve data flows and accessibility, but also to find solutions that reduce costs and improve water monitoring and reporting overall. Dissemination of information to the public, such as water-quality data, is not addressed.

Recommendation 3.6:
The Ministry of Environment and Water and the Ministry on Health should implement shared environmental information system principles on water-related information and data to streamline data collection and improve accessibility.

Many steps have been taken to improve the laboratory equipment used to analyze environmental samples. Certain dangerous substances discharged into aquatic (and other) environments are presently not being monitored due to the absence of specific equipment.

Recommendation 3.7:
The Ministry of Environment and Water should invest in laboratory equipment that would allow targeted monitoring of certain dangerous substances.

The register of polluted areas has been delayed, as a consequence of lacking financial resources. The national database on soil quality is not upgraded and an online system with services that makes pertinent data on soil quality publicly available has not yet been created.

Recommendation 3.8:
The Ministry of Environment and Water should:

(a) Increase the capacities of the Executive Environment Agency regarding soil monitoring;

(b) Ensure that the national database on soil quality is upgraded and the register of polluted areas is created, and that they are developed in accordance with the principles of a shared environmental information system.

The educational framework concerned with sustainable development and the environment has seen great improvements in recent years, particularly on a legislative level; however, the training of teachers has not been systematic but ad hoc and project based.

Recommendation 3.9:
The Ministry of Education and Science should ensure regular training for teachers to enhance national educational capacities as regards teaching on sustainable development and environment-related topics, from preschool to secondary education levels.

PART II: DOMESTIC–INTERNATIONAL INTERFACE

Chapter 4

IMPLEMENTATION OF INTERNATIONAL AGREEMENTS AND COMMITMENTS

4.1 General priorities for international cooperation related to environment and sustainable development

The main priorities of Bulgaria's international cooperation in the field of environment are: (i) the development and strengthening of cooperation with neighbouring countries, the EU Member States, the Western Balkans countries and countries in the wider Black Sea region; (ii) the implementation of the global and regional agreements to which Bulgaria is party.

With regard to international cooperation on sustainable development, in 2008, Bulgaria prepared its second Millennium Development Goals (MDGs) report, which was meant to be the country's last. The report concluded that, in the period 2003–2008, Bulgaria was on track to achieve the MDGs and suggested several new targets, including completing the transition from being a recipient of international aid to being a donor of official development assistance (ODA). In the post-2015 development agenda process, Bulgaria co-chaired the Group of Friends of Children and Sustainable Development Goals (SDGs). As of early 2016, no institution was formally appointed to coordinate the activities on implementation and review of the 2030 Agenda for Sustainable Development.

4.2 Global, regional and subregional agreements

Bulgaria became party to the vast majority of global and regional MEAs prior to its accession to the EU in 2007. After 2007 the country became party to very few agreements: the 1983 Gaborone Amendment to the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), in 2010; the 2003 Protocol on Pollutant Release and Transfer Registers, in 2010; the 2003 amendments to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes, in 2012; the 2010 Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety, in 2012; the 2010 Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol), in 2016; and the 2013 Minamata Convention on Mercury, in 2016.

Conservation and sustainable use of biodiversity and nature

Convention on Wetlands of International Importance Especially as Waterfowl Habitat

Bulgaria became a party to the 1971 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) through final signature in 1975. Currently it has 11 Ramsar sites.

The country's recent successes include the designation in 2013 of three transboundary Ramsar sites between Bulgaria and Romania on the basis of earlier listed Ramsar Sites (Lake Calarasi (Iezerul Calarasi) (Romania) – Srebarna (Bulgaria); Suhaia (Romania) – Belene Islands Complex (Bulgaria); and Bistret (Romania) – Ibisha Island (Bulgaria)). Another achievement is the extension of the area of two Ramsar sites on the Danube River. In 2012, Belene Islands Complex in Pleven Province was extended by 11,432 ha. In 2013, Ibisha Island in Montana Province was extended by 2,993 ha. The National Plan for the conservation of the most important wetlands in Bulgaria for the period 2013–2022 was adopted by the National Biodiversity Council in 2013, covering 11 wetlands listed in the Ramsar Convention and 25 additional wetlands.

Notwithstanding these successes, there are a number of challenges for implementation. Not all Ramsar sites have management plans in place. The wetlands with higher categories of protection according to the Protected Areas Act and with an approved management plan have a significantly higher level of protection than other wetlands. Although the total territory of the wetlands subject to protection has been increased, especially since Natura 2000 encompasses all significant wetlands in the country, the state of the wetlands has not improved due to the diverse anthropogenic pressures and unsustainable use practices.

Another challenge is that the draft development plans or amendments to the development plans of Black Sea coastal municipalities (e.g. Durankulak, Pomorie, Shabla and Sozopol) provide for expansion of urban areas affecting areas of Ramsar sites. During the

environmental assessments of these plans, many of the proposals are not accepted by the environmental authorities as proposed. Because of this the procedures for approving these plans have not yet been completed and these municipalities are still without approved or updated development plans.

Two Bulgarian Ramsar sites are still included in the Montreux Record – a record of Ramsar sites where changes in ecological character have occurred, are occurring or are likely to occur. Durankulak Lake was included in the Montreux Record in 1993 due to the combined impacts of nutrient enrichment, groundwater abstraction and virtually unregulated hunting. Srebarna was included in the Montreux Record in 1993 after a long period of its deterioration due to a dam construction separating the lake from the river; the lake has suffered from erosion of the river bed, severe nutrient enrichment and accelerated vegetation succession.

In its 2012 national report on implementation of the Ramsar Convention, Bulgaria identified as its priority the exclusion of these two sites from Montreux Record. However, as acknowledged in the 2015 national report on implementation of the Ramsar Convention, no actions have been taken in recent years to address the issues for which these sites have been listed on the Montreux Record.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

Bulgaria acceded to the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1991.

The relations between the CITES implementation bodies are determined by the Biological Diversity Act. The Ministry of Environment and Water is responsible for coordinating the implementation of the Convention and five staff in the Ministry deal with CITES-related issues. There is also an agreement on interaction between the Ministry, the Bulgarian Food Safety Agency and the National Customs Agency in order to increase the effectiveness of the control on entry, trade, transit and export of specimens of endangered species of wild fauna and flora.

This document describes the procedures for inspection of consignments of endangered species of wild fauna and flora, records the contact details of experts from the managerial and scientific authorities and determines the disposal of seized specimens to the rescue centres. The Bulgarian Academy of Sciences provides scientific advice about certain import cases.

In 2014, the issued CITES documents included 159 import permits, 30 export permits and 33 EU-specific certificates for Annex A species. In 2013, the issued CITES documents included 181 import permits, 30 export permits, 19 re-export permits, 1 certificate of origin and 36 EU certificates, of which 33 were specimen-specific certificates and 3 were certificates for the movement of live specimens. The percentage of permits/certificates issued that were returned after endorsement by the National Customs Agency was 95.65 per cent in 2013 and 95.24 per cent in 2014.

In the period 2013–2014, there were 12 cases of total seizures/confiscations, which represents a significant increase on previous years (table 4.1). This is largely due to regular training provided by the Ministry for National Customs Agency officers.

For example, in 2014 alone, the Ministry organized two seminars for customs officers, one joint seminar for customs and border police officers, and one training for prosecutors on CITES requirements. Staff turnover in the National Customs Agency represents a challenge for effective enforcement.

The number of designated CITES rescue centres reached 8 in 2015. Seized live specimens are temporarily accommodated in these centres but once the confiscation has taken effect the specimens could be allocated to other premises, including zoos or breeding facilities for protected animals. Dead specimens are provided to local museums.

Convention on the Conservation of European Wildlife and Natural Habitats

Bulgaria acceded to the 1979 Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) in 1991. Bulgaria established the Emerald network prior to its accession to the EU. In 2009, the European Diploma for Protected Areas was granted to Central Balkan National Park.

Bulgaria has two compliance cases under the Convention. The first case, 2001/4, relates to the project to build a motorway through the Kresna Gorge (Struma motorway). In 2002, the Standing Committee of the Bern Convention issued Recommendation No. 98 (2002) in respect of this case.

Table 4.1: Seizures/confiscations of CITES specimens, 2007–2014, number of cases

	2007-2008	2009-2010	2011-2012	2013-2014
Significant seizures/confiscations	0	1	2	0
Total seizures/confiscations	4	4	4	12

Source: Ministry of Environment and Water, 2016.

The Recommendation asked the Government of Bulgaria *inter alia* to take account, in the development of this project, of the imperatives of conserving fauna, flora and habitats, to ensure that the decision on the routing of the motorway is taken on the basis of an in-depth EIA, to consider the possibility of abandoning the option of enlarging the current road and to continue studying alternative routes located outside the gorge. In late 2015, following an alert about governmental plans for the construction of the last section of the Struma motorway through the Kresna Gorge, the Committee asked Bulgaria to report on implementation of the Recommendation. Bulgaria stressed that no decision has been taken yet as to an alternative solution, and that an EIA was under way. The Committee did not reopen the case but decided to consider this closed file as a possible file at its next meeting.

The second case, 2004/2, Bulgaria: Wind farms in Balchik and Kaliakra – Via Pontica, is still open. The case was first submitted to question the building of wind farms in Balchik and Kaliakra on the Black Sea coast; it has since been extended to the exponential rise in wind farm developments in Bulgaria. In 2007, the Standing Committee of the Bern Convention issued Recommendation No. 130 (2007), which asked the Government of Bulgaria *inter alia* to review relevant decisions concerning wind energy plants and ensure that new plants are not built in the region unless an EIA proves they do not have a substantial negative effect on the biological diversity protected under the Convention. It also requested the Government to fully reconsider the development of approved windfarm projects in the Balchik and Kaliakra region situated within or near sites designated as Important Bird Areas (IBAs) and SACs.

In parallel with the process under 2004/2 in the Standing Committee of the Bern Convention, in 2008, the European Commission launched the infringement procedure 2007/4850 (concerning the insufficient geographical scope of the territory of the Kaliakra SPA, which did not cover the whole territory of Kaliakra IBA) and the infringement procedure 2008/4260 (concerning the effects of several projects for wind turbines approved in the Kaliakra IBA without proper assessment of the cumulative effect). In 2011, both infringement procedures were combined into one. In 2012, the Commission moved the infringement procedure to the next stage, reasoned opinion, and, in September 2013, brought the case to the European Court of Justice (ECJ).

In early 2016, the ECJ issued its judgment declaring a number of infringements of EU law by the Government of Bulgaria, in particular of Directive 2009/147/EC on the conservation of wild birds, Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, and Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. While the adverse effects from implementation of the projects approved by Government of Bulgaria have already taken place, the significance of the ECJ judgment lies in its strategic and educational effect for the future, as it is expected to lead to proper implementation of the country's environmental assessments and nature protection legislation. Prior to the issuance of the judgment, Bulgaria designated the new Bilo SPA, in April 2014, and extended Kaliakra SPA, in February 2014, to ensure coverage of the whole territory of Kaliakra IBA.

Convention on the Conservation of Migratory Species of Wild Animals

Bulgaria acceded to the 1979 Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS) in 1999.

The following action plans to protect specific species have been approved by the Minister of Environment and Water: Action plan for Brown bear (*Ursus arctus*) 2008–2017; Action plan for Wild cat 2008–2017; Action plan for Egyptian vulture (*Neophron percnopterus*) 2009–2018; Action plan for Dalmatian pelican (*Pelecanus crispus*) in Bulgaria 2013–2022; Action plan for Eastern imperial eagle (*Aquila heliaca*) in Bulgaria 2013–2022; Action plan for Saker falcon (*Falco cherrug*) in Bulgaria 2013–2022; Action plan for Ferroginous duck (*Aythya nyroca*) in Bulgaria 2014–2023; Action plan for Eurasian bittern (*Botaurus stellaris*) in Bulgaria 2014–2023; Action plan for Pigmy cormorant (*Phalacrocorax pygmaeus*) in Bulgaria 2014–2023; Action plan for White-headed

duck (*Oxyura leucocephala*) in Bulgaria 2014–2023; and Action plan for Testudinidae family 2005–2014. The draft Action plan for Red-breasted goose (*Branta ruficollis*) is to be approved by the National Biodiversity Council in order to be submitted for approval by the Minister.

These action plans prescribe concrete measures for the protection of species. For example, the actions for conservation of Egyptian vulture include insulation of dangerous pylons, individual supplementary feeding, vulture restaurants, nest guarding and other measures. Challenges for CMS implementation include the difficulties with law enforcement due to the shortage of personnel to perform inspection duties.

Agreement on the Conservation of Populations of European Bats

In 1999, Bulgaria acceded to the 1991 Agreement on the Conservation of Populations of European Bats (EUROBATS) set up under CMS. The latest national report was submitted in 2010. Since 2014, Bulgaria has been a member of the EUROBATS Standing Committee.

Of the 35 bat species present in continental Europe, 33 species are known to inhabit Bulgaria. Among the reasons for this high diversity of bats are the country's transitional geographic location, its mosaic of habitats which start at sea level and reach an altitude of over 2,900 m, the presence of over 5,900 caves and the high diversity and abundance of insects. The greatest bat diversity can be found in the belt between 100 and 400 m altitude, where relatively small areas are inhabited by 17–20 species. Ten bat species are included in the Red Data Book. All species of bats in Bulgaria are strictly protected under the provision of the Biological Diversity Act. Thirty-three species are listed in Annex 3 of the Act as species protected on the entire territory of Bulgaria; 12 of these are also listed in Annex 2 of the Act as conservation priority species.

Threats to bat species are connected with *inter alia* with the management of touristic caves that do not have specific recommendations concerning bats included in their management plans, new cave development projects, the management of abandoned mine galleries, road infrastructure projects, construction of wind turbines in places where they interfere with the migration of birds and bats, opening of new quarries or expansion of existing ones in limestone massifs, and the lack of specific bat protection measures in forest management.

Agreement on the Conservation of African-Eurasian Migratory Waterbirds

In 1999, Bulgaria ratified the 1995 Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) set up under the CMS. Bulgaria does not regularly participate in AEWA's Meetings of the Parties. A ban on the use of lead shot for hunting in wetlands has been in place since 2008. Measures to eliminate illegal taking of waterbirds are in place in the Biological Diversity Act and the Hunting and Game Protection Act. The International Waterbird Census is carried out annually as part of the National Biodiversity Monitoring System.

The development of wind energy has been among the key threats for conservation of waterbird species. In 2012, an Implementation Review Process was launched under AEWA in relation to Bulgaria with regard to the wind farm project adjacent to Lake Durankulak, which is putting at risk the globally threatened Red-breasted goose (*Branta ruficollis*). The issue concerned a new wind farm project (the so-called Smin project) aiming at the installation of 95 turbines. Lake Durankulak, together with the nearby Lake Shabla, is located in Dobrudzha, an area known to host up to 90 per cent of the population of the Red-breasted goose, as well as high numbers of other waterbirds.

The construction of the wind farm was authorized by the RIEW in 2012. At that time, the area for the construction of the wind farm was not designated as an existing or potential Natura 2000 site. The decision of the RIEW was appealed by NGOs and, on the basis of further evaluation, the Minister of Environment and Water revoked the decision. However, the Supreme Administrative Court annulled the Minister's decision, thus allowing for the project to be implemented. In October 2013, the Minister of Environment and Water issued an order requiring a new EIA procedure for the project. However, no new EIA procedure was actually conducted. In 2014, the Government designated the new Bilo SPA and extended the territory of Kaliakra SPA, which are located south of Lake Durankulak. Nonetheless, the designation of these areas does not prevent the construction of the Smin wind farm.

In 2013, a map of sensitive areas for birds was produced as part of the zoning map of the territory of Bulgaria in terms of opportunities for construction of wind turbines in the framework of the project "Mapping and determination of the conservation status of the habitats and species – Phase I", financed by the OP "Environment 2007–2013".

Photo 4: Old-growth Bosnian Pine forest in Pirin National Park, 2015

Convention on Biological Diversity

Bulgaria ratified the 1992 Convention on Biological Diversity in 1996. The National Biological Diversity Conservation Strategy dates back to 1998 and has not been updated since. The National Biodiversity Conservation Plan for the period 2005–2010 is still in place. The Ministry of Environment and Water intends to develop a new strategy with a new action plan.

The legal framework for the implementation of the objectives of the Convention on Biological Diversity and its Strategic Plan for Biodiversity 2011–2020 includes the Environment Protection Act, Biological Diversity Act, Protected Areas Act, Medicinal Plants Act, Genetically Modified Organisms Act, Forestry Act, Hunting and Game Protection Act, Fisheries and Aquaculture Act, Spatial Planning Act and subsidiary legislation..

Several interinstitutional bodies, whose membership includes representatives of relevant ministries, agencies, scientific institutions and NGOs, facilitate the implementation of the Convention in the country:

- The National Biodiversity Council is an advisory body to the Minister of Environment and Water in the field of biodiversity. It addresses both national and international aspects.
- The Standing Interinstitutional Working Group on Biodiversity assists the Minister of Environment and Water in activities for implementation of the Convention on Biological Diversity, the Strategic Plan for Biodiversity 2011-2020, the Aichi Biodiversity Targets, the EU Biodiversity Strategy 2020, the National Biological Diversity Conservation Strategy and the National Biodiversity Conservation Plan.
- The Interinstitutional Coordination Group for Implementation of the Convention on Biological Diversity– Climate Change and Biodiversity is mandated to deal with the implementation of the Convention in the field of climate change and biodiversity.
- The Interinstitutional Coordination Group for Implementation of the Convention on Biological Diversity – Genetic Resources deals with the implementation of the 2010 Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol).

Successes in the implementation of the objectives of the Convention on Biological Diversity and the Strategic Plan for Biodiversity 2011–2020 include

improving the scientific basis and monitoring of biodiversity, support and recovery of species and habitats, and reintroduction of some extinct and threatened species. All together 595 plant and 443 animal species are placed under strict protection, while other 54 animal species 29 plant groups and species are under regulative regimes of use. Action plans for selected species are in place.

Challenges with implementation of the Convention include insufficient administrative capacity for implementation, insufficient funding (e.g. for adapting the National Biological Diversity Conservation Strategy and Plan to the Aichi targets) and difficulties in implementing cross-sectoral policies. Integration of biodiversity considerations into sectoral policies became stronger after EU accession, since the relevant sectoral policies at EU level already include linkages to biodiversity. At the same time, actual implementation of sectoral policies does not always take into account biodiversity conservation. Work is ongoing on the mapping and assessment of ecosystem services, which is expected to lead to stronger prioritization of ecosystem conservation when ecosystem services will be assigned monetary value.

Cartagena Protocol on Biosafety

Bulgaria ratified the 2000 Cartagena Protocol on Biosafety in 2000. Most requirements under the Protocol are implemented in Bulgaria under the relevant EU regulations. Bulgaria has rather stringent legislation with regard to GMOs.

In 2010, amendments were introduced into the 2005 Genetically Modified Organisms Act to restrict the cultivation of GMOs in certain areas. These restrictions practically resulted in a ban on all releases into the environment and cultivation of GMOs covering the whole territory of the country. Bulgaria is excluded from the geographical scope of permits issued to cultivate GMOs in the EU. However, the country does not yet have a strategy on how to benefit from GMO-related restrictions.

No illegal transboundary movements of GMOs have been detected by Bulgarian authorities. Improving border control for detection of GMOs is needed.

Bulgaria ratified the 2010 Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (Nagoya–Kuala Lumpur Protocol) in 2012. The Supplementary Protocol is implemented through the 2004 Genetically Modified Organisms Act and Liability for Prevention and Remedying of Environmental Damage Act.

Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization

In 2016, Bulgaria ratified the 2010 Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol). Amendments to the Biological Diversity Act were introduced to designate competent authorities and to include rules on penalties applicable to infringements of obligations of the users of genetic resources.

Convention concerning the Protection of the World Cultural and Natural Heritage

Bulgaria has been a party to the 1972 Convention concerning the Protection of the World Cultural and Natural Heritage since 1974. Since 1983, Bulgaria has had two natural properties inscribed onto the World Heritage List – Pirin National Park and Srebarna Nature Reserve. Bulgaria has several natural sites included in the tentative list.

Pirin National Park

The Pirin National Park World Heritage property covers an area of around 40,000 ha in the Pirin Mountains, south-west Bulgaria, and overlaps the undeveloped areas of Pirin National Park. Mountain landscapes of the property include over 70 glacial lakes. The property includes a range of endemic and relict species.

Pirin National Park has been on the agenda of the World Heritage Committee (WHC) for more than a decade, mainly because of the desire of local authorities and businesses to develop ski resorts within the property and the active engagement of environmental NGOs in watching over developments there.

In 2009, following recommendations of the WHC and the International Union for Conservation of Nature (IUCN), Bulgaria submitted a proposal for the extension of the property. In 2010, the WHC (Decision 34 COM 8B.5) approved the extension of the property and the establishment of a buffer zone to strengthen the integrity and management of the property, transformed Bansko and Dobrinishte ski zones into a new buffer zone of the property, concluded that the Outstanding Universal Value of the property has been repeatedly and significantly impacted by the development of ski facilities and ski runs, to the extent that the property may be considered for inscription on the List of World Heritage in Danger, and requested Bulgaria to strictly ensure that no further ski

development will take place within the property and its buffer zone.

In 2010, two additional development proposals were approved by the Ministry of Environment and Water in the property's buffer zone (Bansko ski zone), in contradiction to Decision 34 COM 8B.5. These were the replacement of an existing four-seat ski lift with a six-seat ski lift from Banderishka poljana to Kolarski pat and the replacement of two existing ski drags with a four-seat lift at Platoto. Bulgaria noted that the above-mentioned replacements were motivated by safety concerns. In October 2011, a joint World Heritage Centre/IUCN reactive monitoring mission concluded that the property appeared to be in a relatively good state of conservation as a whole, and that the two replacements and capacity upgrades carried out in 2010 could not be viewed as adversely affecting the Outstanding Universal Value of the property.

In 2012, in its Decision 36 COM 7B.18, the WHC allowed future development of facilities and ski runs in the buffer zone (Bansko and Dobrinishte ski zones) after the necessary assessments had been carried out by the competent authorities. The WHC also urged Bulgaria to ensure, including through provisions in the new management plan for the park, that no further areas within the property, outside the already excluded areas, would be permitted for ski or other similar high-impact developments.

In 2016, the WHC again examined the case due to concerns raised by NGOs about the revision of the concession contract for the Bansko ski zone and about some projects within the buffer zone of the property and the related cumulative effect. The WHC, in its Decision 40 COM 7B.93, noted with concern the conclusion of the Ministry of Environment and Water that the first draft of the new management plan did not comply with the requirements set out by the Ministry and was sent back for revision. It requested Bulgaria to submit the draft management plan and the results of its evaluation through SEA and appropriate assessment (AA) for review by IUCN and to provide information on other ongoing processes that might affect the Outstanding Universal Value of the property. The Committee requested Bulgaria not to approve any further developments within the property or its buffer zone until the draft management plan has been subject to SEA and AA.

Srebarna Nature Reserve

Srebarna Nature Reserve World Heritage property protects the Srebarna Lake and wetland ecosystem of 638 ha. The integrity of the lake was disturbed before its designation as a World Heritage site. In 1948, the lake was isolated from the river by a dyke, preventing the inflow of river water. This triggered a quick process of drying up and degradation of the ecosystem. In 1979, the connection between the lake and the Danube River was restored. Regretfully, this was achieved at a very high natural terrain elevation – 13.6 m – which does not provide for a regular water exchange between the river and the lake, and consequently, to substantial improvement of the site's conservation state.

In 1983, the lake was inscribed onto the World Heritage List. Continuous lack of good connection with the river resulted in the lake's swallowing and drastic increase of eutrophication. The worsened oxygen conditions in the lake's waters resulted in drastic reduction of biodiversity. The protective arrangements against seasonal floods and the use of adjacent lands for agricultural purposes also exercised their effect on the lake, resulting in the water's drastic reduction. The conservation state of the lake worsened mostly in the period from 1990 to 1992, as a result of which it was included on the List of World Heritage in Danger. In 1993, a Ramsar procedure was opened for an endangered wetland and the lake was included in the Montreux Record, where it remains.

During the period from 1992 to 1998, the Government developed a programme of measures aiming to restore the natural or close-to-natural state of the ecosystems in the reserve. The most significant measure was the construction in 1994 of a channel with sluice gates which connected the lake with the Danube River. The channel provided the inflow of fresh water from the Danube River during the spring months and thus contributed to the maintenance of the water level and prevented the wetland from shallowing. As the integrity and conservation state of the property significantly improved, in 2003, the WHC took it off the List of World Heritage in Danger. In 2008, the WHC approved the creation of a 673 ha buffer zone in order to strengthen the integrity of the property. In 2009, the WHC adopted the Statement of Outstanding Universal Value for Srebarna Nature Reserve. However, according to environmental NGOs, the connection with the Danube River still does not function properly and the lake suffers from unsustainable water management practices.

Biosphere Reserves

The network of biosphere reserves in Bulgaria was established in 1977 and currently includes 16 sites. Bulgaria is in the process of revising the current network of biosphere reserves. The zoning of biosphere reserves does not correspond to

requirements of the 1998 Seville Strategy for Bioshpere Reserves and the Statutory Framework. In January 2016, UNESCO's Advisory Committee recommended that Bulgaria consider the withdrawal of all but one biosphere reserve and encouraged the country to submit new proposals based on the Statutory Framework's criteria. Since most of the current sites will not gain the status of new biosphere reserves, the withdrawal is not supported by NGOs, which are concerned that the loss of the status would result in reduced protection of these territories. In September 2016, Bulgaria submitted nomination files for declaration of four post Seville biosphere reserves to UNESCO's Man and the Biosphere Programme (MAB) secretariat (chapter 9).

Water

Convention on the Protection and Use of Transboundary Watercourses and International Lakes

In 2003 Bulgaria ratified the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) and in 2012 accepted the amendments to the Convention. Bulgaria has participated in the Second Assessment of Transboundary Rivers, Lakes and Groundwaters (2011) prepared under the Water Convention. At the Seventh Environment for Europe Ministerial Conference (Astana, Kazakhstan, 2011), Bulgaria submitted a commitment in the framework of Astana Water Action to invest in environmentally friendly sanitation and wastewater treatment, and appropriate operation and maintenance – an action still in progress as of early 2016. Bulgaria implements the Water Convention through cooperation in the framework of the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River and through bilateral cooperation on its transboundary waters.

Bulgarian–Romanian cooperation on transboundary waters is governed by the 2004 Agreement between the Ministry of Environment and Water of Bulgaria and the Ministry of Environment of Romania for Cooperation in the Field of Water Resources Management. The Agreement covers both surface water and groundwater. The joint body, envisaged by the Agreement, is a bilateral commission that meets once every several years. Working groups meet annually. In 2016, a new working group – on flood risk management – was established, in addition to three existing ones (on river basin management, the Danube drainage basin and the Black Sea drainage basin). The achievements of bilateral cooperation include detailed agreements on exchange of information from joint monitoring of Danube River Basin waters and from coastal water monitoring and the designation of transboundary groundwater bodies, and focused activities on implementation of the Marine Strategy Framework Directive.

Cooperation on transboundary waters between Bulgaria and Serbia is taking place on the basis of the ICPDR. There are ongoing efforts to develop a bilateral transboundary water agreement. In 2015, a formal proposal with a draft text of an interministerial agreement was made by Bulgaria.

Cooperation between Bulgaria and the former Yugoslav Republic of Macedonia is based on a general environmental cooperation agreement (2000 Agreement between the Ministry of Environment and Water of Bulgaria and the Ministry of Environment of the former Yugoslav Republic of Macedonia on Cooperation in the Field of Environmental Protection), which also covers water issues. Annual programmes of cooperation are developed on the basis of this Agreement. No joint body is in charge of implementation of the Agreement. The need for enhancing cooperation on transboundary waters with the former Yugoslav Republic of Macedonia is explored but is not regarded as an urgent priority.

Cooperation on transboundary waters between Bulgaria and Greece takes place on the basis of the 2010 Joint Declaration of the Minister of Environment and Water of Bulgaria and the Minister of Environment, Energy and Climate Change of the Hellenic Republic on Understanding and Cooperation in the Field of Use of Water Resources on the Respective Territories of the Shared River Basins. A Joint Expert Working Group is in charge of implementation.

As of early 2016, this group has had four meetings. There is also a technical group which has had three meetings. Cooperation focuses on implementation of the Water Framework Directive and the Floods Directive and covers the waters of the Struma, Mesta and Maritsa Rivers. Groundwater is also discussed. According to Bulgaria, it complies with the obligation to deliver to Greece 29 per cent of the average run-off of the Mesta River generated on Bulgarian territory under the 1995 Agreement between the Government of the Hellenic Republic and the Government of Bulgaria for the Waters of the River Mesta/Nestos. Through the Joint Declaration it was agreed to pursue the exchange of information on possible effects in the field of water management and use under the Convention on Environmental Impact Assessment in a Transboundary Context.

Cooperation on transboundary waters between Bulgaria and Turkey is developing on the basis of the 2012 Joint Declaration of the Minister of Environment and Water of Bulgaria and the Minister of Forests and Water Affairs of Turkey on Cooperation in the Field of Water Resources. The name of the joint body is not specified in the Declaration but bilateral meetings involving representatives of the competent institutions are held. The meetings have entailed the provision by Bulgaria of information on implementation of the Water Framework Directive, Floods Directive and Marine Strategy Framework Directive.

Protocol on Water and Health

In 1999, Bulgaria signed the Protocol on Water and Health to the Water Convention; however, until now this step has not been followed by ratification. The issues covered by the Protocol are in the competence of various ministries: the Ministry of Health (drinking water quality), Ministry of Environment and Water (protection of water sources), and Ministry of Regional Development and Public Works (infrastructure). The 1998 National Programme on Environment and Health, updated in 2002 and 2008, describes the responsibilities of each ministry. There is no coordination structure in place on water and health issues. In last two years, no outbreaks of waterborne diseases were registered. Some settlements, especially rural ones, have problems with regularity of water supply, and, in some regions dominated by agriculture, contamination of water with nitrates and magnesia is an issue.

The OP "Environment 2014–2020" is expected to provide resources to address the water supply and sanitation issues in small settlements (as of early 2016, calls for proposals are being issued under the OP, so major infrastructural investments are expected only from 2019 onwards). Bulgaria is also facing issues with financial sustainability of water services, with the challenge of raising the cost recovery of water supply and sewerage tariffs while ensuring affordability of water services for all (chapter 2).

There has been no discussion among governmental authorities about the costs and benefits of ratification, which NGOs advocate. There is an opinion held by government officials in Bulgaria that, as an EU Member State with EU legislation in place, Bulgaria would not receive additional benefits from becoming party to the Protocol. However, the Protocol is a useful tool for EU Member States also, as evidenced by participation of 16 EU Member States in this instrument. With regard to the key obligation under the Protocol – the obligation to set targets – there is no comprehensive overlap between the scope of the EU directives and the provisions of the Protocol. Some target areas are in line with the EU directives (drinking water, bathing waters, urban wastewater and water framework directives). However, other potential target areas of the Protocol (enclosed bathing waters, equity and affordability aspects, safe management of water supply and sanitation, water-related diseases, provision of information to the public, and remediation of contaminated sites) are, rather, complementary to the EU legislation. The Protocol therefore provides EU Member States with a platform for defining and addressing national priorities that are beyond the scope of the EU legislation. EU Member States can also benefit from the Protocol as a tool for phasing implementation (via defining intermediate targets, targets dates and indicators) in order to fulfil existing obligations. Furthermore, the Protocol can also aid the setting of other, more ambitious, objectives to improve the situation regarding water and health.

Convention on Cooperation for the Protection and Sustainable Use of the Danube River

Bulgaria ratified the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River in 1999. It actively participates in the activities of the ICPDR. Cooperation in the framework of the ICPDR greatly benefited Bulgaria as it helped the country to prepare to implement relevant EU legislation. The country also applied the experience gained in the Danube basin to other transboundary basins. The monitoring network and monitoring programmes for the entire river basin, Joint Danube Surveys, and outreach activities by the ICPDR have been very valuable for Bulgaria's work on the Danube.

Convention on the Law of the Non-navigational Uses of International Watercourses

Bulgaria is not a Party to the 1997 Convention on the Law of the Non-navigational Uses of International Watercourses and there is no process on accession occurring. There seems to be no interest in accession since the country is actively occupied with implementation of relevant EU legislation and is already a party to the Water Convention.

Protection of marine environment

Convention on the Protection of the Black Sea Against Pollution

In 1993 Bulgaria ratified the 1992 Convention on the Protection of the Black Sea Against Pollution and its original protocols. In 2004, it ratified the Black Sea Biodiversity and Landscape Conservation Protocol.

The country did not ratify the 2009 Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities and there is no ongoing process towards ratification.

The results for Bulgaria of cooperation in the framework of the Convention have included: the implementation of the Black Sea Integrated Monitoring and Assessment Programme, approved in 2006, although the Programme now requires updating; the activities under the 2009 Strategic Action Plan on the Protection and Rehabilitation of the Black Sea; and exercises held at sea. Bulgaria considers as an achievement the elaboration in 2004 of the Draft Legally Binding Document on Fisheries and is in favour of its adoption in the form of a separate agreement or protocol to the Convention.

In 2015, the Black Sea Commission supported the Bulgarian proposal to develop an action plan on marine litter and included this task in the working programme of the Commission.

At the Ministerial Meeting in 2009, Bulgaria and Romania jointly put forward a proposal to amend the Black Sea Convention to allow accession to this Convention by the EU. The initiative was not successful at that time.

Convention on the Prevention of Pollution from Ships

Bulgaria is a party to 1973/1978 Convention on the Prevention of Pollution from Ships (MARPOL) with all annexes. The Executive Agency "Maritime Administration" under the Ministry of Transport, Information Technology and Communications is responsible for MARPOL implementation and enforcement. All port reception facilities are under the supervision of this Agency. The Agency oversees the management of ships' waste until waste is delivered for disposal and maintains the register of companies dealing with waste from ships. The Agency provides annual reports to the International Maritime Organization (IMO) on implementation of the Convention and takes part in the sessions of the IMO's Marine Environment Protection Committee. In the framework of AQUAPOL (the association of maritime and inland navigation-related law enforcement authorities from EU Member States and from Switzerland), in 2014–2015 the Agency's inspectors participated in exchanges of experience with other countries to improve the organization of ship inspection activities under Annexes V (with the Netherlands) and I and II (with Germany).

The MARPOL Convention is directly applicable and its implementation is supported by two national legal acts, regulating protection of the marine environment from ship-sourced pollution: the Merchant Shipping Code and the Maritime Spaces, Inland Waterways and Ports Act. In 2008, Bulgaria was subject to a voluntary audit by IMO on implementation of several conventions, including the MARPOL Convention. In 2010, the implementation by Bulgaria of the Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues was reviewed by the EU.

As part of its efforts to prevent pollution from ships, Bulgaria applies an indirect fee that is paid by every ship for visiting the port. The indirect fee serves as an incentive to deliver waste to the port rather than discharge it into the sea. Since the introduction of the indirect fee in 2007, the quantities of garbage, sludge and bilge delivered to Bulgarian ports has increased (table 4.2), which is a positive sign for reducing pollution of the sea.

Table 4.2: Ship-generated waste delivered to port reception facilities in Bulgaria, 2007–2015, m^3

	MARPOL Annex V				MARPOL Annex I			
Year	Plastics	Food	Other garbage	Total	Bilge water	Sludge	Other/ballast water	Total
2007	428	311	1 642	2 381	5 916	1 587	0	7 503
2008	568	494	1 936	2 998	5 415	2 506	61	7 982
2009	442	262	1 381	2 085	4 277	2 677	23	6 977
2010	463	288	1 223	1 974	4 005	2 203	0	6 208
2011	603	356	1 561	2 520	5 240	2 516	0	7 756
2012	583	440	1 300	2 323	6 680	3 695	8	10 383
2013	1 153	623	2 494	4 270	7 027	4 302	1 338	12 667
2014	983	624	2 315	3 922	5 893	4 367	3 067	13 327
2015	1 113	595	2 501	4 209	7 458	5 165	1 194	13 817

Source: Executive Agency "Maritime Administration", 2016.

Convention for the Control and Management of Ships' Ballast Water and Sediments

Bulgaria does not participate in the 2004 Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention), which enters into force in September 2017. A National Task Force, with the participation of public authorities, port operators and other stakeholders, was established and worked in the period from May 2014 to September 2015 to study the possibility of ratification of the Ballast Water Convention by Bulgaria, to assess the compliance of the national legislation with the international regulations for control and management of ballast water and sediments and to propose concrete steps towards implementation of the Ballast Water Convention. A number of uncertainties related to interpretation and further proper implementation of the Convention provisions (e.g. related to the efficiency of treatment ensured by different types/models of ballast water management systems) were identified, along with the lack of experience in certain fields (e.g. lack of approved methods for indicative and detailed sampling and analysis as part of ship inspections).

As a result, a decision was taken at national level that Bulgaria shall join the Convention to introduce internationally effective measures to control bio-invasion in order to protect the marine environment. However, due to the challenges listed above, the ratification steps would be undertaken after the entry into force of the Convention as it is expected that, by that time, a lot of problematic issues would be resolved and the relevant practical solutions would be developed. There is also an intention to further discuss with the Black Sea countries the possibility of using in the Black Sea the provisions on exemptions from the Ballast Water Convention for those ships which are "on a voyage(s) between specific ports or locations" or which "operate exclusively between specified ports or locations".

Air protection, ozone layer protection and climate change

Convention on Long-Range Transboundary Air Pollution

Bulgaria ratified the Convention on Long-Range Transboundary Air Pollution (CLRTAP) in 1981. It is a party to all the Convention's protocols. Bulgaria's reporting obligations to the CLRTAP are being administered by the Ministry of Environment and Water, while the Executive Environment Agency is the responsible organization for preparation of the air pollutants inventory. The legal, institutional and procedural arrangements within the Bulgarian National Inventory System (NIS) were implemented in 2010. In general, reporting under the Convention has been timely and regular. In recent years the country has participated regularly in the meetings of the Executive Body, EMEP Steering Body and Working Group on Strategies and Review but, for financial reasons, has not been able to participate in the meetings under the different CLRTAP instruments. The 2007 National Programme to Reduce Total Annual Emissions of Sulphur Dioxide, Nitrogen Oxides, Volatile Organic Compounds and Ammonia in the Air, valid until 2020, guides the national efforts to reduce air emissions in line with the Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants (NEC Directive). The Programme includes measures needed in various sectors. As the new NEC Directive (2016/2284/EU) has recently been adopted to establish new national emission reduction commitments in line with the amended Gothenburg Protocol, Bulgaria envisages developing a new national programme.

The country has not yet taken steps towards acceptance of the amendments to the CLRTAP Protocol to Abate Acidification, Eutrophication and Ground-level Ozone and the Protocols on Heavy Metals and on POPs. Steps towards acceptance of the amendments will be taken after the entry into force of the new NEC Directive. Bulgaria does not expect to have difficulties with implementation of the amended Protocols as the new ceilings have been subject to extensive national consultations with sectoral ministries and seem to be realistic. The major challenge is the reduction of PM emissions, whereas other pollutants do not represent an issue for Bulgaria.

WHO Framework Convention on Tobacco Control

Bulgaria has been a party to the 2003 WHO Framework Convention on Tobacco Control (FCTC) since 2005. The Ministry of Health is the coordinating institution on implementation of the FCTC, but competent institutions also include the Ministry of Economy, Ministry of Finance, National Customs Agency and Ministry of Agriculture and Food. In 2013, 36.8 per cent of the population (41.6 per cent of men and 25.4 per cent of women) aged 15 years or more were current smokers. Only 42.5 per cent of children were living in a smoke free home. Also, in the same year, 45.7 per cent of fathers and 30.0 per cent of mothers were smokers.

After a series of attempts to introduce a comprehensive ban on smoking in public places, largely advocated by Smoke Free Life Coalition –

Bulgaria, in 2012, smoking was finally prohibited in indoor public places and also in some open public places (such as pavements adjacent to schools and kindergartens, playgrounds, places where events for children and pupils are organized, sports facilities).

The actual implementation and enforcement of the ban is a challenge. According to Smoke Free Life Coalition – Bulgaria, the ban works in Sofia but is ignored outside the capital. According to the Ministry of Health, the vast majority (97 per cent) of non-compliance cases refer to restaurants and cafes, while non-compliance in other public spaces (government buildings, schools, hospitals, etc.) is rare. The difficulties with enforcing the ban include the limited staff capacity of the Ministry of Health in terms of inspectors; in this regard, it is planned to introduce amendments into the Health Act in order to allow other authorities such as the Food Safety Agency to also carry out relevant inspections. Another difficulty reported by the Ministry of Health is that health inspectors can only sanction legal entities (i.e. restaurants), not individuals, for smoking in public places.

In April 2016, the provisions were introduced into the legislation to require the health warning to occupy 64 per cent of tobacco product packaging. However, Bulgaria made no progress with regard to introducing a comprehensive ban on tobacco advertising, promotion and sponsorship in line with the requirements of the FCTC.

Ozone layer

Bulgaria has been a party to the 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer since 1990. It is a party to all amendments to the Montreal Protocol. Since Bulgaria joined the EU, data on the quantities of ozone-depleting substances (ODSs) imported and exported by the country have been reported by the EU. Bulgaria's participation in the Meetings of the Parties and in the meetings of the Open-ended Working Group of the Parties to the Montreal Protocol is not regular, due to budgetary constraints.

The Ministry of Environment and Water is responsible for coordination of activities on ODSs, reporting obligations and preparation of national legislation and guidelines. Its RIEWs are responsible for implementation of legislation at the local level, including control of the prohibition of placing on the market and the use of ODSs, as well as of products and equipment containing ODSs, and for the dismantling and disposal of equipment that contains ODSs, in their respective regions. The National Customs Agency controls the prohibition on the import and export of ODSs and products containing them. The Regional Prosecutors' Offices investigate crimes involving infringements of ODS legislation. The Bulgarian Branch Chamber – Machine Building issues certificates to personnel involved in the recovery of ODSs from stationary refrigeration, air conditioning and heat pump equipment that contains ODSs.

As far as the legal framework is concerned, the provisions of Regulation (EC) No 1005/2009 on substances that deplete the ozone layer apply directly but their implementation is ensured by the Clean Ambient Air Act and by the 2010 Ordinance on establishing of measures regarding the implementation of Regulation No. 1005/2009. The full prohibition on the placing on the market and the use of ODSs, including recycled and reclaimed substances, entered into force on 1 January 2015. In the period 2009–2014 there was no significant consumption of ODSs, since most operators preferred switching to non-ODSs, which were cheaper. A 2010 GEF project resulted in the document "National Survey and Development of a National Strategy Outline of HCFC Phase-Out for Consumption Sectors in the Republic of Bulgaria", which provided recommendations to the Ministry of Environment and Water and the Government on possible strategies and actions regarding the HCFC phase-out.

As a result of the implementation of obligations under the Montreal Protocol, Bulgaria has ceased the trade (import, export), use and production of ODSs, with the exception of the critical use of reclaimed halons, which is sporadic.

The main challenge currently is the destruction of ODSs as part of the decommissioning of ODS-containing equipment. There is no proper destruction facility in Bulgaria, so operators have to pay for destruction in Germany and other EU Member States, which is rather expensive. Another problem is the obsolete mobile gas analyzers that are used to identify the substances during customs control of imported/exported refrigerants. Due to budgetary constraints, these analyzers are not replaced by new ones. In 2013, Serbian customs officers seized ODSs that were being illegally transported from Bulgaria to Serbia.

In 2015–2016, Bulgaria received support in the implementation of the EU regulations that intend to reduce emissions of fluorinated GHGs (F-gases) and ODSs through a project of the Advisory Assistance Programme of the German Federal Ministry for Environment, Nature Conservation, Building and

Nuclear Safety and the German Federal Environment Agency. The project focused on refrigerants in equipment for refrigeration and air conditioning and consisted of two parts.

The first part resulted in the development of several guidelines to support the country's officials in refining legislation and administrative regulations, inspection and certification processes, education and training programmes, as well as the reporting system for monitoring emissions. This part also allowed the sharing of information about replacing technologies that use alternatives to F-gases. The second part addressed the control of import and export of F-gases and ODSs, including products and equipment containing these substances, as well as the cooperation of environmental and customs authorities.

Climate change

Bulgaria has been a party to the 1992 United Nations Framework Convention on Climate Change since 1995 and the 1997 Kyoto Protocol since 2002. Bulgaria ratified the 2015 Paris Agreement in late 2016.

Bulgaria has submitted six National Communications and regularly submits biennial reports and national inventory reports. In 2010, the enforcement branch of the Compliance Committee of the Kyoto Protocol found Bulgaria to be in non-compliance with national system requirements for countries with 2012 targets (Annex B parties) and, as a consequence, Bulgaria was declared not eligible to participate in the market mechanisms of the Kyoto Protocol. The country took steps to improve the national system involved in the inventory development process and, in February 2011, its eligibility to participate in the market mechanisms was restored.

Since 2007, the important legal developments include the amendment introduced in 2010 to the Environmental Protection Act to create the legal framework for the Bulgarian National Green Investment Scheme and empower the NTEF to administer and implement the scheme. In 2014, the Climate Change Mitigation Act was adopted as an overarching document on climate change issues. The policy framework includes the 2012 Third National Action Plan on Climate Change and there is an ongoing process to develop a national adaptation strategy.

The most important result of implementation of the national climate change policies is the overachievement of Bulgaria's emission reduction target for the first commitment period of the Kyoto Protocol, between 2008 and 2012 (the target was 8 per cent reduction compared with 1988), by reducing emissions by 49.9 per cent compared with the base year. In 2012, Bulgaria's GHG emissions totaled 61,045.63Gg CO_2 eq. without reporting of sequestration from the LULUCF sector. The net emissions including reporting of sequestration from the LULUCF sector were 52,838.14Gg CO_2 eq.

Bulgaria was among the first Annex I countries in the world to host Joint Implementation (JI) projects. The national guidelines for approval of JI projects under Track 1 and Track 2 were adopted and a procedure for approval of JI projects has been set. As a result, 28 JI projects were approved (26 on Track 1 and 2 on Track 2) and transactions of verified emission reductions were made for 21 of the projects. The implementation of the projects led to GHG emission reduction of around 10 million tons CO_2 eq. up until 2012. Currently, Bulgaria is not implementing JI projects, since the issuance and transfer of emission reduction units is technically not possible.

Waste management and hazardous chemicals

Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

Bulgaria acceded to the 1989 Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) in 1996 and ratified the 1995 Ban Amendment in 2000.

The legal framework for implementation includes the Waste Management Act and the Regulation (EC) No 1013/2006 on shipments of waste. All the restrictions on export and import of hazardous wastes and other wastes for final disposal and for recovery, as well as the restrictions on their transit, are in place in accordance with Regulation (EC) No 1013/2006.

There has been a decrease in the total amount of generated hazardous waste over the last few years. The data on export and import of hazardous waste for Bulgaria have remained more or less the same in recent years because there were no changes to the hazardous waste treatment infrastructure in Bulgaria. Industrial hazardous waste is exported for disposal, mostly to Germany, Austria, Greece and Turkey. Imports include waste streams used by the metallurgic plants in Bulgaria; the major import item is waste lead acid batteries, which are imported for recycling.
Difficulties with implementation of the Convention arise from the lack of information on how parties to the Convention understand transit transboundary movements of hazardous wastes and other wastes – an

issue currently under discussion in the framework of the Basel Convention.

Convention on Persistent Organic Pollutants

Bulgaria ratified the 2001 Convention on Persistent Organic Pollutants (Stockholm Convention) in 2004. The Third National Report was submitted in 2014. The obligations on implementation of the Convention are introduced into the EU law through Regulation (EC) No 850/2004 on POPs. The national measures for implementation of Regulation (EC) No 850/2004 are introduced in the Protection Against the Harmful Impact of Chemical Substances and Mixtures Act, as last amended in 2015.

Bulgaria submitted its first National Implementation Plan (NIP) for the management of POPs to the Convention's Secretariat in 2006. It submitted an updated NIP in 2012, addressing amendments from the Fourth and Fifth Conferences of the Parties (COPs). The updated NIP, covering the period 2012–2020, includes measures and activities for 12 initial POPs and for 10 new POPs included in the Convention.

The priorities include *inter alia*: final disposal outside the territory of the country of the available obsolete POP pesticides (DDT, heptachlor and lindane) and obsolete firefighting foam containing perfluorooctane sulfonic acid (PFOS); improving the laboratory infrastructure for testing and monitoring of the new POPs in environment matrices, in articles and waste and in raw materials, products and food of plant and animal origin; and monitoring of POPs in soils, surface and groundwater, in articles and waste and in raw materials, products and food of plant and animal origin.

According to the available data, Bulgaria has never produced any POP pesticides, or industrial POP chemicals in the form of individual substances, or in mixtures, or in plant protection products. National restrictions have been introduced as regards the placing on the market and use, import and export of POP substances in mixtures and products. The export of POPs is permitted solely for the purposes of environmentally sound disposal.

There are about 161 tons of obsolete POP pesticides (DDT and wheat treated with DDT, heptachlor and lindane) in the country. Activities are envisaged in respect of the final disposal of these POP pesticides abroad and external financing is provided through the Swiss Programme on export and disposal of obsolete pesticides out of the territory of Bulgaria. Approximately 82.5 tons of other obsolete pesticides "of unknown composition", which could have been contaminated with POPs, have been exported and disposed of in Germany up until the end of 2010. No samples of these obsolete pesticides were tested for POP content.

In the period 2007–2015, more than 19,600 pieces of equipment (transformers and capacitors) and waste containing polychlorinated biphenyls (PCBs), with a gross weight of more than 1,600 tons, were exported and disposed of. By the end of 2015, all PCB equipment had been phased out, exported and destroyed in incinerators in Germany, the Netherlands, Italy, France and other EU Member States, given the lack of a hazardous waste disposal plant in Bulgaria.

In respect of the new industrial POP chemicals (HBB, PBDE, PFOS), the results of preliminary research on their placing on the market and use (January–March 2012) have been reported and a preliminary evaluation has been performed as to the possible content of PBDE and PFOS in articles and waste electrical and electronic equipment (WEEE) and end-of-life vehicles (ELVs). The performance of a detailed book inventory is envisaged for identification of these compounds in articles and waste, for the purpose of determining the necessary measures, especially as regards the option of their recovery and/or disposal abroad.

The next update of the NIP is planned for 2017 and will include POPs addressing COP6 and COP7 amendments (hexabromocyclododecane (HBCDD), pentachlorophenol (PCP), polychlorinated naphthalenes (PCNs) and hexachlorobutadiene (HCBD)).

Financial constraints represent a major difficulty for implementation of the Convention.

Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

Bulgaria's accession to the 1998 Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention) took place in 2000.

Regulation (EU) No 649/2012 concerning the export and import of hazardous chemicals implements the Rotterdam Convention in the EU. The national measures for implementation of the Regulation in Bulgaria are introduced in the Protection Against the Harmful Impact of Chemical Substances and Mixtures Act. Since Bulgaria joined the EU in 2007, the EU has been in charge of preparation and submission of export notifications and import responses.

Once a year, the Ministry of Environment and Water carries out training for the RIEWs on the implementation and enforcement of the EU Prior Informed Consent Regulation (No 649/2012). In 2008 and 2014, training was carried out for the customs authorities on the use of the European database on export and import of certain dangerous chemicals and the e-PIC interface and functionalities, for the purposes of border control of exported hazardous chemicals.

Convention on the Transboundary Effects of Industrial Accidents

Bulgaria ratified the 1992 Convention on the Transboundary Effects of Industrial Accidents in 1995. In 2012, the Governments of Bulgaria and Turkey signed a cooperation agreement in the field of emergency situation prevention, preparedness and response. A cooperation agreement with Romania in the field of civil protection in peacetime dates back to 1996.

Biannual reports on implementation of the Convention are regularly provided. In the report for the period 2008–2009, Bulgaria reported three establishments identified as hazardous activities with possible transboundary effects and its intention to notify a neighbouring country of these hazardous activities. There is no indication that the notifications were submitted. As of the following reporting period, 2010–2011, Bulgaria reports to have undertaken extensive risk analysis that showed no hazardous activities with possible transboundary effects, since a number of sites have decreased the quantities of hazardous substances present and others have substituted hazardous substances with less hazardous ones.

The legal framework for implementation of the Convention is ensured through transposition of the EU Seveso III Directive (2012/18/EU) into the national legislation (Title VII, Chapter I of the Environmental Protection Act and the 2016 Ordinance on prevention of major accidents involving hazardous substances and limitation of their consequences). According to the 2012 amendments to the Environmental Protection Act, the lower tier sites are no longer subject to permits but have to submit notifications to the competent authorities demonstrating that all necessary measures for prevention of major accidents and limitation of their negative effects have been taken.

Minamata Convention on Mercury

Bulgaria did not take part in the sessions of the Intergovernmental Negotiating Committee on Mercury. In September 2016, the Bulgarian Parliament ratified the 2013 Minamata Convention on Mercury. Bulgaria plans to develop its NIP in accordance with the Convention. Currently, the Ministry of Environment and Water is in charge of implementation of Regulation (EC) No 1102/2008 on the banning of exports of metallic mercury and certain mercury compounds and mixtures and the safe storage of metallic mercury.

Environmental assessment

Convention on Environmental Impact Assessment in a Transboundary Context

Bulgaria ratified the 1991 Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) in 1995. In 2009, Bulgaria ratified the 2008 Multilateral Agreement among the Countries of South-Eastern Europe for Implementation of the Convention on Environmental Impact Assessment in a Transboundary Context. The relevant national legal framework includes the Environmental Protection Act and the EIA Ordinance. Transboundary procedures are the responsibility of the Minister of Environment and Water.

Since 2007, Bulgaria has accumulated extensive experience in applying transboundary EIA procedures, both as a party of origin (with Austria, the former Yugoslav Republic of Macedonia, Greece, Romania and Ukraine) and as an affected party (with the former Yugoslav Republic of Macedonia, Romania and Serbia), as well as in joint (cross-border) projects. In the period 2013–2015, all cases of applying transboundary EIA procedures were related to nuclear activities; previously, however, other activities (relating to oil refineries, mining, navigation, etc.) were also subject to such procedures. According to the EIA Ordinance, the EIA procedure is determined by discussion between the concerned parties on a case-by-case basis.

Bulgaria does not have experience with post-project analyses in the meaning of the Espoo Convention, although there is follow-up to transboundary EIA procedures in the form of monitoring the implementation of conditions and remediation measures.

With regard to the issue of translation (which is regulated not by the Espoo Convention but by the 2008 Multilateral Agreement), Bulgaria, as a party of origin, sends the EIA documentation in English but the non-technical summary and the transboundary segments of the EIA report in the official language of an affected party. For example, in case of the Investment proposal

for "Construction of new nuclear power of the latest generation of NPP Kozloduy" on Site 2, Bulgaria sent the notification to Romania and Austria in English, but sent the terms of references, the non-technical summary and the chapter "Transboundary assessment" of the EIA report to Romania in Romanian and to Austria in German.

Major challenges for Bulgaria as a party of origin include keeping up with domestic deadlines when there is a lack of reply or delay in reply from affected parties.

Protocol on Strategic Environmental Assessment

Bulgaria ratified the 2003 Protocol on Strategic Environmental Assessment to the Espoo Convention in 2007. The relevant national legislation includes the 2002 Environmental Protection Act and the 2004 Regulation on the conditions and procedures for environmental assessment of plans and programmes.

Since 2007, Bulgaria has gained further experience with SEA. SEA procedures were conducted, for example, for the 2011 Energy Strategy of Bulgaria until 2020 (in 2010), National Renewable Energy Action Plan (in 2012) and 2014 National Plan for Waste Management 2014–2020 (in 2014). SEA procedures were not conducted for the 2015 National Strategy for the Development of the Mining Industry, 2014 National Strategy for Sustainable Development of Tourism in Bulgaria for the period 2014–2030, 2010 National Strategy for the Development of the Transport System in Bulgaria for the period until 2020 or 2012 National Strategy for the Management and Development of the Water Sector, for the reason that these documents did not determine the framework for development of specific investment proposals/projects listed in Annex 1 or 2 of the Environmental Protection Act.

Bulgaria has experience in participating as an affected party in four transboundary SEA procedures. In 2012, Bulgaria participated in the SEA procedure with Romania for the Master Plan "Protection and Rehabilitation of the Romanian Coastal Zone". In 2014–2015, it participated in a transboundary SEA procedure with Romania for the General Transport Masterplan of Romania. As of early 2016, two transboundary SEAs with Serbia, which had started in 2015, were ongoing: for the Water Management Strategy of Serbia and the Strategy on Development of Waterborne Transport 2015–2025 of Serbia. In 2013, Bulgaria was notified for the SEA procedure for the Energy Sector Development Strategy of Serbia for the period until 2025 with projections until 2030; however, a decision was taken at national level that there was no need for the participation of Bulgaria in the SEA procedure.

Bulgaria has never initiated a transboundary SEA procedure as a party of origin, although some strategic documents have been elaborated since the country became a party to the Protocol. The governmental sources explain that no transboundary SEA was initiated for the 2011 Energy Strategy of Bulgaria until 2020, 2013 National Action Plan for Renewable Energy Sources, and 2014 National Plan for Waste Management 2014–2020, because there were no assumptions of significant transboundary environmental and health effects.

Among the challenges it faces, Bulgaria names the lack of clarity in the Protocol about the language of the documentation to be provided for public consultation and what part of the documentation is deemed sufficient to be translated into the national language of an affected party in a transboundary SEA procedure. As an affected party, Bulgaria receives all SEA and draft plan/programme/strategy documentation in English, and the Ministry of Environment and Water ensures translation of the documentation; however, this step usually prolongs the SEA procedure.

Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters

Bulgaria ratified the 1998 Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) in 2003.

With regard to the access to information pillar of the Convention, there is a tendency to seek and provide access to environmental information on the basis of general access to public information legislation (Access to Public Information Act and regulations) rather than specific legislation on access to environmental information (Environmental Protection Act, Directive 2003/4/EC on public access to environmental information and the Aarhus Convention). The NGO community promotes requests for environmental information on the basis of general access to public information legislation. The Ministry of Environment and Water and its RIEWs make reference to general laws in their replies.

When access to information decisions are challenged in the courts, the latter rarely oblige the public authority to provide information and prefer to send a case back to the public authority for a new decision. This delays the process and therefore prevents the

public from receiving the information at an early stage to prevent a possible violation. In the Supreme Administrative Court there is a backlog with respect to appeals of decisions on access to information (e.g. for cases filed in April 2016, the court hearings are scheduled for late 2016 or early 2017).

So far, Bulgaria has not established or designated a national node of the Convention's clearing-house mechanism as recommended by Decision II/3 of the Convention's Meeting of the Parties. Such website could include information related to the nationwide implementation of the Convention and would improve the use of the electronic information tools to provide access to environmental information.

With regard to the public participation pillar, the procedures for public participation in EIA and SEA are in place and generally followed. However, local experts and NGOs report that public participation often does not bring meaningful results, as the quality of EIA and SEA reports is often questionable and the public does not always manage to influence the quality. The developers look for experts who prepare those EIA reports that are convenient for them. In the case of SEAs, the SEA study is ordered by an interested party and is also often below the standards.

The 2016 report by BlueLink entitled "Participation for Nature: Representation of Nature Protection Organizations in Councils and Other Bodies of National and Local Administration" analyses the statutory documents and practical experience of 24 environment-related councils with the participation of civil society representatives. It points out the issues decreasing the efficiency of civil society participation in such bodies, including the irregularity of functioning of some councils, low proportion of civil society representatives in the total composition of the councils, absence of NGO representatives' right to vote in some councils, very formal rather than qualification-based criteria for selection of NGO representatives, and several other issues.

While provisions for public participation in law-making are in place, they work only up to a certain point, so public pressure in the form of street protests and public actions is often used as a final recourse. For example, in mid-2012, following public protests, the President returned the Forestry Act just voted by the Parliament back to the Parliament for revision. In early 2012, public protests in 16 towns against fracking, a technique designed to recover gas and oil from shale rock, resulted in the Parliament imposing a moratorium on fracking. In early 2016, public protests led the Parliament to repeal the recently adopted law that banned "wild" camping on Bulgarian beaches.

With regard to the access to justice pillar of the Convention, in small municipalities and villages there are no strong civil society groups and local people are generally afraid to bring cases to courts. They prefer signaling violations to well-established NGOs who bring cases to the courts. However, NGOs are now much more cautious in doing so, due to the increasing costs of litigation. The other side's legal costs, to be paid in the event of a loss in court, often reach €3,000–7,000, which may represent a high amount for NGOs. At the same time, various NGOs concur that the courts are currently the best mechanism by which to achieve progress in environmental cases, compared with administrative appeal processes. The number of cases brought to the courts by environmental NGOs and activists is not high: the rough expert estimate is about 20–25 cases per year for the entire country. NGOs explained that, due to their limited capacity, they tend to appeal in court only the most arrogant decisions. Overall, about 10 lawyers in the country bring environmental cases to courts.

Another issue is that some public associations that are environmental NGOs in the meaning of Article 2(5) of the Convention are denied the opportunity to bring cases to courts. There are two types of NGOs in Bulgaria: public interest NGOs and NGOs that protect private interests. Although the legislation does not differentiate between these two in terms of access to justice, the judges tend to interpret the laws as allowing only public interest NGOs to go to court.

There is also a lack of clarity with regard to opportunities for the public to challenge in courts the omissions by public authorities that contravene the provisions of the national environmental legislation (Article 9(3) of the Convention). For example, the public cannot go to court when construction is taking place in a protected area and the Ministry of Environment and Water and its RIEWs fail to act.

Two public communications (ACCC/C/2011/58 and ACCC/C/2012/76) brought by Bulgarian NGO "Balkani Wildlife Society" to the Aarhus Convention Compliance Committee outline other systemic problems with the implementation of the access to justice pillar of the Convention. Following communication ACCC/C/2011/58, Bulgaria has been subject to Decision V/9d of the Meeting of the Parties (2014). The Decision endorses the findings of the Compliance Committee that Bulgaria failed to comply with several paragraphs of Article 9 of the Convention by barring members of the public, including environmental organizations, from access to justice with respect to General Spatial Plans and Detailed Spatial Plans and by barring members of the public concerned, including environmental organizations,

from access to review procedures to challenge the final decisions permitting the activities listed in Annex I to the Convention.

As of early 2016, the Committee is following up the case. According to the Ministry of Environment and Water, the adoption of relevant amendments to the legislation lies within the competence of the Ministry of Regional Development and Public Works, which is not moving forward to make the requested amendments.

With regard to the communication ACCC/C/2012/76, the Aarhus Convention Compliance Committee, in its findings adopted in October 2015, found the failure of Bulgaria to comply with Article 9(4) of the Convention. The Committee found, with respect to appeals of orders for preliminary enforcement challenged on the ground of potential environmental damage, that a practice in which the courts rely on the conclusions of the contested EIA/SEA decision rather than making their own assessment of the risk of environmental damage, does not ensure that such procedures provide adequate and effective remedies to prevent environmental damage.

Protocol on Pollutant Release and Transfer Registers

Bulgaria ratified the Protocol on PRTRs in 2010. The Executive Environmental Agency maintains the national PRTR through the National Information Reporting System on the European Pollutant Release and Transfer Register (http://pdbase.government.bg/forms/public_eprtr.jsp). For Bulgaria, the first reporting year under the Protocol was 2011. However, as an EU Member State, Bulgaria has also reported PRTR data for 2009 and 2010. Bulgaria is maintaining a more extensive PRTR than is required by the Protocol. According to Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register, information on six additional pollutants is reported and more stringent thresholds exist for another six pollutants.

Reporting obligations of operators are stipulated in the Environmental Protection Act. Operators report each year by 31 March the data for the previous year. No later than 1 June, information reported by operators becomes publicly available after verification by the RIEWs in the national PRTR system. To ensure the quality and credibility of data, the RIEWs make a comparison between the reported values and those reported in other reporting mechanisms (self-monitoring data, data in the GHGs inventory, data reported by the same site in previous years, etc.).

Until and including 2011, the Agency used to organize an annual meeting for operators, industry organizations and RIEWs in conjunction with PRTR reporting. By now the system is known to the operators and individual requests for clarifications are dealt with on a case-by-case basis. It is believed that all or practically all operators that are required to report under PRTR do report. In total, about 500 sites (with some operators having more than one site) are covered by PRTR reporting. This includes all holders of IPPC permits and additional installations. The Agency encourages operators to also report on a voluntary basis in those years when no exceedances of the thresholds identified for PRTR reporting are recorded.

There are cases of large differences in the values of air emissions produced by measurement as opposed to calculation methods; in such cases, usually, the measurement data are considered more reliable and have to be reported. Another challenge is defining specific annual emissions of pollutants to be reported under the PRTR based on measurements, where the measured values are below the minimum or above the maximum limit of detection of the methods, which potentially risks the reporting of overestimated data.

Also, there is a lack of a methodology for calculating the emission load in water, and both operators and the RIEWs would welcome methodological guidance in this area. Another challenge is the lack of methodology to calculate emissions from diffuse sources.

4.3 Bilateral cooperation on the environment and sustainable development

Bilateral cooperation on the environment takes place on the basis of:

- Intergovernmental agreements/conventions/memoranda on cooperation on environmental protection with the People's Republic of China (2000), Denmark (1999), Germany (1993), the Russian Federation (1998), Turkey (2004), Romania (1991) and Azerbaijan (2014);
- Interministerial agreements/memoranda on cooperation on environmental protection with Austria (2002), the Czech Republic (2000), Georgia (2014), Greece (2002), Hungary (2001), the former Yugoslav Republic of Macedonia (2000), Mongolia (2003), Poland (1997), Slovakia (1995), Ukraine (2003), the Republic of Korea (2013) and Serbia (2007);
- Memoranda of understanding/cooperation agreements aimed at JI cooperation with Austria,

Belgium, Denmark, Finland, France, Japan, the Netherlands, Sweden, Switzerland and the Prototype Carbon Fund at the World Bank (since the adoption of the national guideline for approval of JI projects under Track 1 in April 2010, memoranda of understanding/cooperation agreements are no longer a necessary condition of approval of new projects).

Most bilateral agreements are framework ones. They have a broad scope that includes waste, water, biodiversity, protected areas, EIA and other issues. Most provide for cooperation in the form of bilateral meetings, exchange of experience, organization of conferences, etc. Some agreements establish a bilateral commission or working group as a body in charge of implementation. Not all bodies established hold regular meetings; rather, meetings are organized as necessary. Also, in considering resource efficiency, Bulgaria tries to use other opportunities (e.g. international events with participation of high-level governmental officials or intergovernmental visits) to advance bilateral cooperation. Not all bilateral cooperation agreements are equally active. Selected outcomes of bilateral cooperation activities are described in box 4.1.

4.4 Legal, policy and institutional framework

Legal framework

The conclusion of international agreements is regulated by the 2001 International Treaties Act. The preparatory process preceding the conclusion of international treaties involves coordination with the Ministry of Foreign Affairs and other ministries and central government bodies concerned. International treaties that have been ratified in accordance with the constitutional procedure, have been promulgated and have come into force with respect to Bulgaria, are part of Bulgarian legislation and have primacy over conflicting provisions of the domestic legislation.

Policy framework

International cooperation on the environment is, in a general sense, guided by the National Development Programme Bulgaria 2020 and the Government Programme for Stable Development for the period 2014–2018. Bulgaria's development cooperation is based on the 2005 European Consensus on Development, 2007 Concept for Development Aid and 2016 Midterm Programme on Development Aid and Humanitarian Assistance for the period 2016–2019.

Each year, the Minister of Environment and Water approves the annual plan for international cooperation activities on the environment. The plan includes a list of bilateral meetings and activities, meetings and activities in the framework of the EU, and meetings and activities under MEAs. A report is submitted annually to the Minister of Environment and Water, accounting for implementation of the plan and containing information on implementation of planned and additional activities.

The Ministry of Environment and Water also prepares an annual plan for Bulgaria's financial contributions to MEAs. The largest contributions are provided under the 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River (€98,500 in 2016), the 1992 Convention on the Protection of the Black Sea Against Pollution (US$90,000 in 2016) and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (US$95,000 in 2016). Contributions to other MEAs range between US$500 and US$5,000

Institutional framework

Ministry of Environment and Water

The Ministry of Environment and Water is responsible for all MEAs. Its International Cooperation Department has six staff positions, of which four were filled as of early 2016. The number of staff positions in the International Cooperation Department has not increased since 2007, although the workload has increased as participation in developing coordinated EU positions was added to the existing tasks.

Staff from other departments of the Ministry act as focal points of the various MEAs. Focal points are appointed for all MEAs to which the country is a party, and in general they are well aware of their roles and responsibilities, although in some cases a lack of continuity from outgoing to new focal points can be observed. Focal points submit reports after every meeting attended. These reports are available on a shared drive to other staff in the Ministry and are also shared with the Ministry of Foreign Affairs.

The Ministry of Environment and Water tries to ensure the participation of Bulgaria in all Meetings/Conferences of the Parties to MEAs. With some exceptions, this has been rather successful. An effort is made to also ensure the country's participation in working groups created under various MEAs, though this has been more difficult in view of financial constraints.

Box 4.1 Selected examples of bilateral cooperation activities on the environment

In 2011 and 2012, Bulgaria and Austria signed agreements for the sale of surplus Assigned Amount Units (AAUs) under the National Green Investment Scheme of Bulgaria (NGIS). The proceeds of the sale of AAUs have been channeled into energy efficiency projects totaling 23,768,034 leva in 29 municipalities of Bulgaria (28 kindergartens, 30 schools, 2 universities, 5 medical centres, 9 cultural and sports institutions and 3 administrative buildings).

A number of bilateral cooperation projects between Bulgaria and Germany were supported in the framework of the Advisory Assistance Programme of the German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety and the German Federal Environment Agency, to provide technical advice on transfer, implementation and enactment of the EU environmental acquis. The projects covered chemicals, water management, nature conservation, air pollution and other topics. Examples include projects on the transfer of knowledge on the development, implementation, evaluation and adjustment of air quality plans, on the reduction of F-gases and ODS, on the implementation of the Marine Strategy Framework Directive and on the exchange of experience in the implementation of the Waste Framework Directive, the Landfill Directive and the POPs Regulation in Bulgaria.

Bulgaria has longstanding cooperation with France in the field of the environment and water, although there is no bilateral cooperation agreement. The integrated water resources management system and the river basin management bodies in Bulgaria were established with French expert support and follow the French model. The first generation RBMPs have also been developed with French expert support. In 2016, the contest "Ecoobshtina" (Ecomunicipality) is being organized by the French Embassy together with the Ministry of Environment and Water, the Ministry of Regional Development and Public Works and other partners, to award Bulgarian municipalities for the best projects in sustainable water management, sustainable waste management, sustainable mobility and energy efficiency.

A lower priority is given to such meetings as workshops. In general, priority is given to meetings organized in Europe and therefore less costly to attend, and to meetings with binding outcomes rather than processes which do not involve the adoption of binding decisions.

National reports on implementation of MEAs are generally submitted on time. National reports are prepared by focal points, i.e. not by external consultants. The Ministry of Environment and Water maintains a web page devoted to international cooperation. It includes a list of bilateral agreements on environment and water and the texts of MEAs to which the country is a party, along with contact details of the focal points, basic information about the treaties and links to treaty websites.

Other ministries and institutions

In the Ministry of Foreign Affairs, MEAs are followed by two staff in the United Nations Directorate. Sometimes, Bulgarian embassies are requested to represent the country at meetings under MEAs when participation from the Ministry of Environment and Water is not possible. The Ministry of Foreign Affairs also does a regular assessment of development cooperation, including on the environment.

With regard to international cooperation on renewable energy issues, the Ministry of Energy coordinates relevant issues with the Climate Change Directorate of the Ministry of Environment and Water.The Ministry of Transport, Information Technology and Communications is responsible for international cooperation on road, railway, air and water transport, including international cooperation issues related to the Black Sea and the Danube River, and has been leading Bulgaria's participation in the Transport, Health and Environment Pan-European Programme. The Ministry of Health is responsible for international cooperation on health issues, in particular in the framework of WHO. Priorities for joint work are set out in the biennial collaborative agreement between WHO/Europe and Bulgaria.

The Nuclear Regulatory Agency carries out international cooperation on behalf of Bulgaria in the fields of safe use of nuclear energy and ionizing radiation, and safety of radioactive waste management and spent fuel management.

The National Museum of Natural History is the scientific focal point for EUROBATS. The Ministry of Environment and Water is responsible for coordinating the implementation of CITES. The Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences and the National Museum of Natural History are the scientific authorities for CITES. The National Customs Agency, the Supreme Prosecutor's Office, the Executive Forest Agency and the Ministry of Interior's National Policy Service are the enforcement authorities for CITES.

The Pirin National Park Directorate is in charge of the management and control of the Pirin National Park World Heritage property. The RIEW for the town of Rousse is in charge of the management and control of another World Heritage property, the Srebarna Nature Reserve.

The local authorities are involved in implementation of some international cooperation projects related to the environment.

Synergies in implementation

There are several bodies aimed at promoting synergies between the implementation of various MEAs. For example, the Interinstitutional Working Group on Synergies was established in 2013 under the Minister of Environment and Water to coordinate implementation of the Stockholm, Rotterdam and Basel Conventions, as well as the Minamata Convention on Mercury and the Protocol on POPs to CLRTAP; in fact, the group existed earlier but was then formally institutionalized under the name of the Working Group on Synergies. The group includes representatives of several directorates of the Ministry of Environment and Water, as well as the Executive Environmental Agency and the National Food Safety Agency under the Ministry of Agriculture and Food. Another example is the Standing Interinstitutional Working Group on Biodiversity which aims to facilitate the implementation of the Convention on Biological Diversity. It is chaired by the Deputy Minister of Environment and Water. The working group was established by the Minister of Environment and Water in 2011 and its mandate was updated in 2015. All focal points of conventions related to biodiversity are members of the working group.

Public participation in development of the Bulgarian position for decision-making in the framework of MEAs and implementation of MEAs

There are several strong environmental NGOs and NGO coalitions in Bulgaria that work mostly in the area of biodiversity conservation. They participate in implementation of projects funded primarily by EU funds and in this way contribute to implementation of some MEAs. Also, they use the implementation and compliance mechanisms under various MEAs: the compliance procedures with regard to Bulgaria under several biodiversity conventions, the Convention concerning the Protection of the World Cultural and Natural Heritage and the Aarhus Convention were initiated and are followed up by NGOs. Since Bulgaria joined the EU, non-EU funding for NGOs has significantly decreased, which had an impact on small NGOs that do not have the experience and resources to compete for EU funds.

There are several formal ways in which the Government ensures public participation in development of the Bulgarian position for decision-making in the framework of MEAs and in implementation of MEAs. NGOs participate in the working groups of the national Council for European Affairs where the position of Bulgaria is discussed. They are also part of the Public Council to the Minister of Environment and Water and the Advisory Councils to the Minister, which sometimes discuss issues arising from MEAs (e.g. the National Biodiversity Council often discusses issues related to implementation of biodiversity conventions).

Consultations with NGOs are sometimes organized prior to important MEA meetings, e.g. prior to the United Nations Conference on Sustainable Development (Rio+20), an ad hoc working group coordinated by the Ministry of Foreign Affairs was operational and NGOs were part of this group. Representatives of NGOs have sometimes been included in national delegations to MEA meetings, for example to the GEF Assembly (Uruguay, 2010), to the United Nations Framework Convention on Climate Change (UNFCCC) COP (Qatar, 2012) and to several biodiversity conventions' COPs; however, there is no systematic policy in this respect. Some national focal points involve NGOs in the preparation of national reports on the implementation of MEAs, e.g. the 2015 national report on the implementation of the Ramsar Convention names five NGOs that provided input to the report. In many cases, draft national reports are published with an invitation to the public to submit comments, e.g. the draft 2013 national implementation report on the Protocol on PRTRs was published for public comments on the websites of the Ministry of Environment and Water and the Council of Ministers.

However, in general, the practice of involving the public in the preparation of national reports is not uniform, which results in their low actual involvement. For example, only two NGOs commented on the 2014 Aarhus Convention national implementation report, and no public comments were received on the 2013 Protocol on PRTRs national implementation report; in other countries, national implementation reports for these treaties usually receive many public comments.

Development cooperation

The ODA target set for Bulgaria as a newly acceded EU Member State is 0.17 per cent of gross national income (GNI) in 2010, and 0.33 per cent of GNI in 2015. Bulgarian ODA, including in the field of environment, is part of the country's foreign policy and is aimed at the implementation of global commitments, including the 2030 Agenda for Sustainable Development. Bulgarian development cooperation projects in the environmental area approved for 2015 amounted to €547,126 and mostly covered projects on energy efficiency, GHG reduction and water management (table 4.3).

Table 4.3: Development cooperation projects of Bulgaria active in 2015

Country	Project	Approved Initiative		Effect on the Environment
		Leva	€	
Albania	Construction of the "Kniaz Boris" Street in Ballsh	295 246.00	151 096.86	Tree planting, reduction of GHG emissions, improvement of air quality
Bosnia and Herzegovina	Renovation of the joinery and lighting at the reception ground floor and the entrance, creation of an exhibition space – "G.S. Rakovski" School, in 2015–2016	40 000.00	20 470.64	Energy efficiency, reduction of GHG emissions
	Renovation of the joinery of the buildings of the secondary schools in the town of Trebinje, in 2015–2016	47 384.77	24 249.91	Energy efficiency, reduction of GHG emissions
	Building of a "Friendship Park" between Bulgaria and Bosnia and Herzegovina at "Republic of Bulgaria" Street in Sarajevo , in 2015–2016	23 040.27	11 791.23	Tree planting, reduction of GHG emissions, improvement of air quality
Former Yugoslav Republic of Macedonia	Reconstruction of a school building in Beranci Village, Mogila Municipality	20 000.00	10 235.32	Energy efficiency, reduction of GHG emissions
	Opening of a new kindergarten in the village of Peštani, Ohrid Municipality	12 714.00	6 506.59	Construction according to high environmentally friendly and energy efficiency standards
Republic of Moldova	Eight facilities for water treatment (purification) and reparation of the roof of the dormitory to the Gregory Tsamblak University in Taraclia	537 853.00	275 254.88	Improved water quality management, energy efficiency
Serbia	Reconstruction of the "Detko Petrov" Public Library in the city of Dimitrovgrad	42 189.00	21 590.90	Energy efficiency, reduction of GHG emissions
	Repairs and equipment for the "Tsaribrod" Cultural Centre to expand the network of cultural, informational and literary activities in Serbia, as well as for development of the cultural and linguistic diversity and intercultural dialogue in the area of Nis	39 517.00	20 223.46	Energy efficiency, reduction of GHG emissions
	Children's Olympic Vacation, Bosilegrad 2015	11 260.00	5 762.49	Environmentally sound education
Total		**1069 204.04**	**547 182.27**	

Source: Ministry of Environment and Water, 2016.
Note: Exchange rate: 1 lev = €0.511766.

4.5 Conclusions and recommendations

Bulgaria is party to the vast majority of MEAs. Nonetheless, a few gaps remain.

As of early 2016, the country has not yet taken steps towards acceptance of the amendments to the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, the Protocol on Heavy Metals and the Protocol on POPs to the Convention on Long-range Transboundary Air Pollution, although Bulgaria does not expect to have difficulties with implementation of the amended protocols.

Bulgaria does not participate in the 2004 Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) which enters into force in September 2017. A decision was taken at national level that the ratification steps would be undertaken after the entry into force of the Convention.

Bulgaria signed the 1999 Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes but has not ratified the treaty. Although the situation with access to water supply and sanitation has significantly improved in recent years, there are remaining issues with contamination of water with nitrates and magnesia in some areas, regularity of water supply, wastewater treatment and access to sanitation in small settlements. There has been no discussion among governmental authorities in the country about the costs and benefits of ratification, which NGOs advocate. There is an opinion held by government officials in Bulgaria that, as an EU Member State with EU legislation in place, Bulgaria would not receive additional benefits from becoming party to the Protocol. However, the Protocol is a useful tool for EU Member States also – which fact is supported by the participation of 16 EU Member States in this instrument. With regard to the key obligation under the Protocol, that of setting targets, there is no comprehensive overlap between the scope of the EU directives and the provisions of the Protocol.

Rather, the Protocol provides EU Member States with a platform for defining and addressing national priorities that are beyond the scope of the EU legislation.

Recommendation 4.1:
The Government should start the necessary preparatory work and proceed with:

(a) Acceptance of amendments to the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol), the Protocol on Heavy Metals and the Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution;
(b) Accession to the 2004 Convention for the Control and Management of Ships' Ballast Water and Sediments;
(c) Ratification of the 1999 Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

Implementation of MEAs is a priority for the Ministry of Environment and Water and other governmental institutions. Good efforts are applied and clear criteria for prioritization of meetings exist to ensure the participation of Bulgaria in all important meetings under MEAs, given financial constraints. National implementation reports are generally submitted on time. Focal points are appointed for all MEAs to which the country is a party. In general, focal points are well aware of their roles and responsibilities, although in some cases a lack of continuity from outgoing to new focal points is observed. Focal points submit reports after every meeting attended.

The implementation and compliance cases against Bulgaria in various MEAs (two cases in the Bern Convention; the implementation review process under the AEWA; the Pirin National Park process under the Convention concerning the Protection of the World Cultural and Natural Heritage; two cases under the Aarhus Convention, and the non-compliance found in 2010 under the UNFCCC), indicate some systemic issues with MEA implementation, e.g. for biodiversity treaties, such an issue is the rapid development of wind energy in the absence of strong nature protection legislation. The number of implementation and compliance cases against Bulgaria also indicates a problem with communicating the importance of addressing MEA implementation and compliance issues from focal points to the leadership in the Ministry of Environment and Water and further, to other ministries.

Recommendation 4.2:
The Ministry of Environment and Water should:

(a) Continue efforts to ensure the participation of Bulgaria in the meetings and activities under multilateral environmental agreements (MEAs) and implementation of reporting obligations under MEAs;
(b) Ensure that guidance and training is provided to MEAs' focal points to enable early identification of and effective communication within the Ministry on potential issues with implementation and compliance.

There are several formal ways in which Bulgaria ensures public participation in the development of the Bulgarian position for decision-making in the framework of MEAs and in implementation of MEAs. There are examples of consultations with NGOs having been organized prior to and after important MEA meetings. There are cases of representatives of NGOs having been included in national delegations to MEA meetings. Some national focal points involve NGOs in the preparation of national reports on MEA implementation. In many cases, draft national reports are published with an invitation to the public to submit comments. However, in general there is no systematic policy on how to involve the public and NGOs in development of the Bulgarian position for decision-making in the framework of MEAs and in implementation of MEAs.

Recommendation 4.3:
The Ministry of Environment and Water should review the current practice of ensuring public participation in development of the Bulgarian position for decision-making in the framework of MEAs and in implementation of MEAs and provide guidance to the focal points on the issue.

Two public communications with regard to Bulgaria in the Aarhus Convention Compliance Committee outline the systemic problems with the implementation of the access to justice pillar of the Aarhus Convention. In addition, some public associations that are environmental NGOs in the meaning of Article 2(5) of the Convention are denied the opportunity to bring cases to courts. Also, there is a lack of clarity with regard to opportunities for the public to challenge in courts the omissions by public authorities that contravene the provisions of the national environmental legislation (Article 9(3) of the Convention). NGOs are cautious to bring cases to courts due to the increasing costs of litigation. Bulgaria has not yet established or designated the Aarhus Clearinghouse national node.

Recommendation 4.4:

In line with its obligations under the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention), the Government should:

(a) Bring the legislation into line with the Convention regarding access to justice;

(b) As part of training programmes for judges and prosecutors, raise their awareness and capacity to deal with cases initiated by members of the public, including environmental organizations, on the basis of environmental legislation and the Convention;

(c) Consider to establish the Aarhus Clearinghouse national node to provide the public with full up-to-date information about the implementation of the Aarhus Convention with the possibility to subscribe to RSS Feeds.

Chapter 5

CLIMATE CHANGE

5.1 Current and foreseeable economic and environmental impacts from climate change

Bulgaria is situated in one of the regions that are particularly vulnerable to climate change (mainly through temperature increase) and to related extreme events, such as flash floods and droughts. Climate-related risks are expected to increase in the next decades. The following trends are notable:

- There has been a tendency towards warming up in Bulgaria since the late 1970s; the winters were milder in the second half of the 20th century;
- Since 1989, 20 of the last 23 years have positive anomalies of the average annual air temperature compared with the previous thirty years (1961–1990);
- The average annual temperature in 2011 was 0.4°C higher than the climate standard; this is the 14th year in a row with temperatures higher than typical temperatures for the country;
- The longest periods of drought occurred in the 1940s and, during the last two decades of the 20th century, there were more and longer periods of drought followed by severe storms and heavy floods incurring damage and casualties;
- There has been increased frequency of extreme weather and climate phenomena, such as: a significant increase in the average number of days with overnight volume of precipitation above 100 mm – by about 30 per cent for the period 1991–2007 compared with the baseline period (1961–1990); an increased number of instances of heavy rainfall registered on the meteorological network; more frequent cases of cloudiness typical of spring and summer with rainfall, thunderstorms and hailstorms during winter months such as January and February; higher frequency of the average number of days with thunderstorms and hailstorms in April and September in the period 1991–2006 compared with the baseline period;
- The annual amplitude between the maximum and the minimum air temperature is decreasing – the minimum temperature is rising faster than is the maximum;
- The snowy months in the mountains are decreasing and the thickness of the snow cover shows a steady trend towards thinning;
- The upper forest limit of deciduous forests has shifted to higher elevations;
- Data from phenological observations indicate advanced development by 7–15 days in different climatic regions, which represent clear evidence of the warming process over the past 30 years compared with previous periods.

The results from studies of water resources in Bulgaria, based on current trends in air temperature and precipitation as well as on simulation models and climate scenarios, show that the annual river runoff is likely to decrease during this century. The main reasons for this – the observed trends of warming and rainfall deficit – are expected to persist over the coming decades as well.

In early June 2014, the Ministry of Environment and Water finalized a framework document entitled "National climate change risk and vulnerability assessment for the sectors of the Bulgarian economy". The indicator-based document assesses the risk of climate-change-related natural disasters for the period until 2035. According to the document, the main dangerous phenomena and processes related to climate change, which can generate different levels of risk for socioeconomic and natural systems, are extremely high temperatures (heat waves), drought, floods, forest fires, rising sea levels, rising temperature of surface waters, invasive species, etc.

The vulnerability of the country in terms of its sensibility to the impact of hydro-climatic risk is moderate in the current climate state, but there are preconditions to increasing this vulnerability after 2035. Table 5.1 summarizes results of the expert evaluation of the indicators regarding the vulnerability of the economics sector in Bulgaria to climate change. The estimated vulnerability index (Y) shows that the sectors with relatively low resistance to climate change are the water sector (0.41), followed by agriculture (0.42) and tourism (0.44). If the value 1 denotes the sector most resistant to impact, expert assessment for all sectors is that adaptation capacity is 3 ("insufficient").

Vulnerability to changes in air temperature in the time range 2016–2035 is the highest for the tourism sector (0.33), followed by the water sector (0.37) and agriculture (0.41). Vulnerability to changes in rainfall is highest in the sectors of tourism (0.39), agriculture (0.42) and aquaculture (0.44). Vulnerability to

extreme events and related disasters is highest in the construction sector (0.33), followed by the water sector (0.37), agriculture and ecosystems and biodiversity (0.41) and transport (0.44). With the exception of health-care and tourism, all other sectors showed an increased vulnerability to extremes.

Agriculture

Warming generally has a negative impact on agriculture in the country; for instance, the cultivation of some crops under irrigated conditions is under threat. On the other hand, rising temperatures allow the cultivation of early agricultural products outdoors or in greenhouses, where energy costs decrease. The overall conclusion is that there will be a shift in the dates of maturity of different cultures, shortening their growing periods and changing their yields. Livestock production is also expected to be affected by heat stress and changes to feed and pasture resources. Rising temperatures can shorten the reproductive cycle of many pests, which will also increase their risk to agricultural plants.

Transport

In general, Bulgaria's transport system was designed, built and operated on the basis of the country's own specific geographic conditions, including those related to climate factors. Because of the diverse peculiarities of the weather in the different parts of the national space, the transport system is relatively flexible, recognizing both the normal atmospheric conditions and local characteristics and manifestations of extreme meteorological phenomena that directly or indirectly affect the functioning of the transport sector.

On the predictions of different climate scenarios, the period up until 2030 seems relatively stable for the road transport sector, without any significant or drastic increase in temperature levels or rainfall amounts; therefore, there should not be significant additional costs for maintenance of the road infrastructure in the short term. For the period 2040–2070, cost reductions (2.4 per cent annually) are expected for winter maintenance of the road infrastructure as a consequence of the mitigation of weather conditions during the winter months.

Climate changes will affect road and railway transport development and costs most significantly in the mid- and long term. The expected impact is mainly related to increased costs for infrastructure maintenance due to the expected increase of "thermal stress" on the road and railway infrastructure. Problems resulting from the thermal stress require strict adaptation expenses – an annual increase of adaptation costs by 0.4 to 0.6 per cent for road surfaces until 2070 and up to 83 per cent for railway infrastructure.

Forestry

Since approximately 61 per cent of forests in Bulgaria are in the zone below 800 m altitude, the majority of Bulgarian forests would be affected by climate change. There are four zones in the Bulgarian forest according to their vulnerability to climate change:

Zone A includes forests highly vulnerable to carbon sequestration, as there is a permanent reduction in the accumulation of carbon. In the realistic scenario to 2020, this area includes floodplain and riparian forests in a substantial part of Miziian forestry district, especially in the region of the Dobrudzha coast. In 2050, Zone A will also cover low sub-belt forests of durmast, beech and fir in the Balkan Mountains, Eastern Rhodope and Pirin subregion.

Table 5.1: Index of vulnerability of systems to climate change (2016-2035) (T–temperature, P–precipitation, Ex–extreme events, V–vulnerability)

Sectors	ΔToC	ΔP (%)	Ex	V
Agriculture	0.41	0.42	0.41	0.42
Forestry	-	-	-	-
Water sector	0.37	0.55	0.37	0.41
Water management	0.74	0.44	0.48	0.51
Urban environment	0.72	1.33	1.44	0.87
Energy	1.00	0.78	0.47	0.63
Transport	0.72	0.50	0.44	0.53
Construction and infrastructure	0.56	0.78	0.33	0.47
Ecosystems and biodiversity	0.53	0.70	0.41	0.53
Human health	0.66	0.66	0.66	0.66
Tourism	0.33	0.39	1.00	0.44

Photo 5: Construction of ski runs in Pirin National Park, 2005

Zone B includes forests with a high degree of vulnerability. By 2020, it is expected to cover areas at an altitude from 200m to 600-700m. This area includes the northern half of the Danube Plain, southern Dobrudzha, part of the Upper Valley and the Black Sea coast except for Strandzha Mountain. In 2050, Zone B will reach 600–800 m above sea level and include areas of the Danube Plain, Dobrudzha, Fore Upper Valley, much of the Middle forest Strandja Sofia field.

Zone C includes forests with moderate vulnerability. By 2020, it is expected to cover small areas in the southern border region and sub-belt highland forests of beech, fir and spruce. This area includes mountain pastures that are expected to undergo significant changes in the accumulation of carbon if there is no change in land use.

Zone D includes forests with low vulnerability. It is the optimal zone for capture and accumulation of carbon from forests and other vegetation. It is assumed that, in 2020, this zone will be located in the belt of spruce forests in mountainous areas of the country over 1500 m.

The most vulnerable to climate change is Zone A, which is characterized by a sustained deficit of watering. It is estimated that forest area falling into Zone A; in the other three zones, forests areas will persist, but the area of the optimal zone, Zone C, will be reduced at the expense of an increase in the area in Zone B.

In a realistic scenario to 2020, Zone A is expected to cover a part of north-eastern Bulgaria (the region of Dobrudzha Black Sea). Forecasts of the realistic scenario in 2050 increase the range of Zone A, as it incorporates parts of the Danube valley, parts of the Upper Valley of Tundzha hilly plain and the Struma valley and parts of the Black Sea coast and Dobrudzha.

On average, 11,000 ha are affected by forest fire; there were, on average, 550 fires annually between 2004 and 2014.

5.2 Impact of economic sectors on climate change

Industry

Of total emissions in 2013, the industrial processes sector accounts for about 7 per cent, according to the 2015 National Inventory Report. In 2013, the most significant emitting category was mineral industries (mainly clinker production), which accounted for 44 per cent of the total industrial processes sector emissions. The second most significant category was

chemical industries (ammonia and nitric acid production) (33 per cent), followed by consumption of halocarbons and SF_6 (20.8 per cent) and metal production (steel) (0.81 per cent).

The mineral and chemical industries are the main sources of CO_2 emissions in the industrial processes sector. Data from 10 cement and lime producing companies are included in the projections.

Nearly half of the emissions from the mineral industries part of the sector (about 46.8 per cent in 2013) originate from cement production. Other sources of CO_2 emissions are lime production, soda ash use, glass production and brick production. GHG emissions from the chemical industries part of the sector originate from ammonia, nitric acid, carbide production, calcium carbide production, soda ash and methanol production, but activity data are confidential. This is the reason that emissions projections are made for the chemical industries as a whole.

The third largest source of GHGs in the industrial processes sector is consumption of HFCs as substitutes for ODSs. The consumption of HFCs in Bulgaria depends on domestic production and manufacturing for domestic consumption – the filling of newly manufactured products and refilling of equipment – or on precharged equipment. Smaller quantities of GHGs originate from the sectors non-energy products from fuels (CO_2) and solvent use (NMVOCs), and other product manufacture and use (SF_6 and N_2O).

A trend towards emission reduction in the industrial processes sector is observed since 1988 (figure 5.2). The emissions in 2011 had decreased by 67 per cent compared with 1988. In 2011, 6.01 per cent of total national GHG emissions (without LULUCF) originated from industrial processes, compared with 9.81 per cent in 1988. In 2011, GHG emissions from industrial processes were 3,977.93 Gg CO_2 equivalent, compared with 11,959.94 Gg CO_2 equivalent in 1988.

Agriculture

The reduction of GHG emissions is a direct consequence of the overall decline of farming since 1988. The reduction of emissions from stock breeding follows the decrease in the number of livestock. The overall emission reduction in the sector has amounted to 69.6 per cent since 1988 (figure 5.3). In 2011, the agriculture sector contributed 9.3 per cent of Bulgaria's total GHG emissions (without LULUCF).

The emission reductions were mainly driven by systematic declines in the agricultural land area, due to the abandoning of arable lands and reduction in the livestock population. Another driver for the emission reduction was the decline in the use of fertilizers.

Figure 5.1: Burnt forest areas, 2005-2015, ha

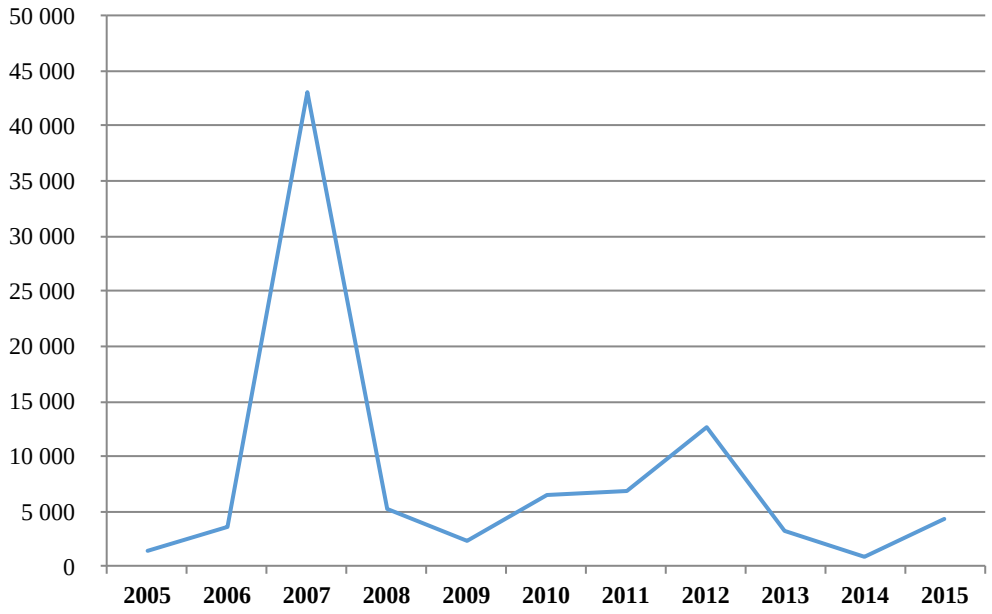
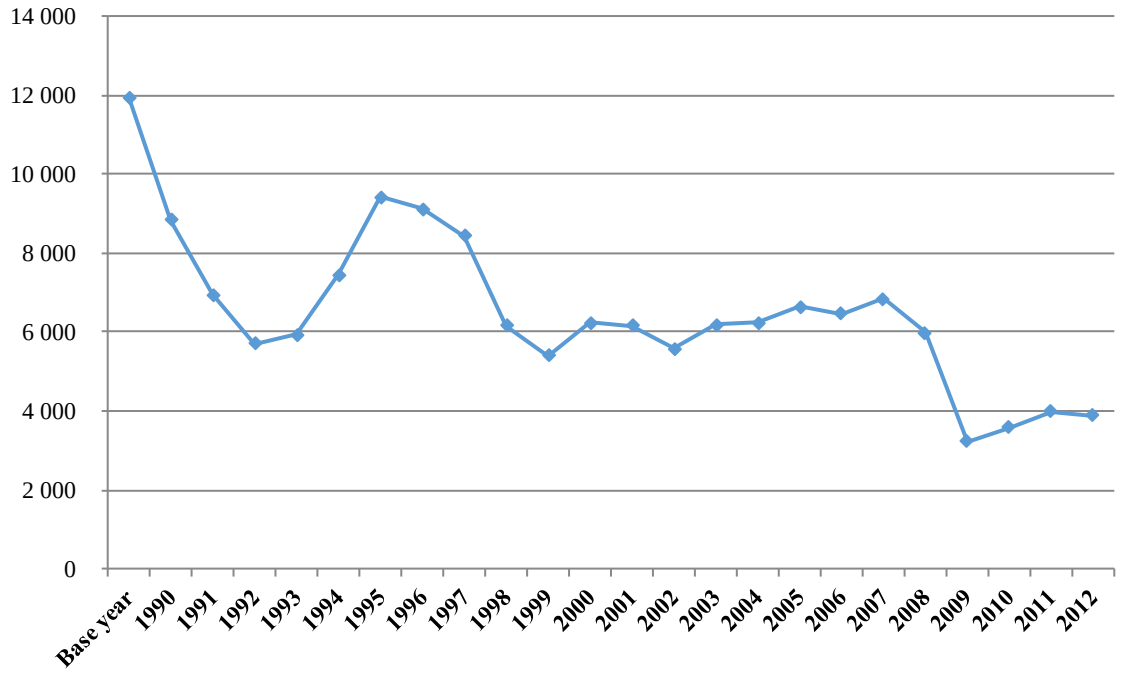


Figure 5.2: GHG emissions from the industrial processes sector, 1988 – 2012, Gg CO_2 eq.



Source: Bulgarian National Inventory Report, 2013.

GHG emissions from the agriculture sector in 2014 were mainly due to several sources, as follows:

- Agricultural soils (60.2 per cent): Emissions include the following main categories that produced N_2O emissions:
  - Direct emissions, resulting from soil fertilization with synthetic nitrogenous fertilizers, nitrogen input from manure applied to soils (excluding manure from pasture animals), decomposition of waste from N-fixing crops, decomposition of vegetable waste from other cultures and cultivation of histosols;
  - Emissions from pasture animals, resulting from excretion onto pasture range and paddocks;
  - Indirect emissions, resulting from the release of ammonia and nitrous oxides into the ambient air after nitrogen fertilization and from the drawing of water;
- Enteric fermentation (20.8 per cent), resulting from fermentation in the digestive system of ruminant animals (e.g. cattle, sheep, goats). Non-ruminant livestock (e.g. horses, mules, asses) and monogastric livestock (swine) produce lower methane emissions. The amount of methane that is released depends on the age and weight of the animal, and the quality and quantity of the feed consumed;
- Manure management (17.1 per cent), producing methane and nitrous oxide emissions during the storage and treatment of manure, and from manure deposited on pasture (CH_4), and treatment of manure before it is applied to land (N_2O);
- Agricultural residue burning (0.6 per cent): despite field burning being prohibited in Bulgarian law, this "tradition" continues and is an emission source, not only of the main GHGs but also of GHG precursors;
- Rice cultivation (1.4 per cent), a traditional Bulgarian agricultural activity. During the structural reforms, rice crop areas decreased from 14,100 ha in 1988 to 1,417 ha in 1999. There has been a restoration of rice crop areas since 1999, reaching 10,214 ha in 2013. In Bulgaria, rice is produced under the continuously flooded water regime with a season length of 103 days and one harvest per year.

Waste

Emissions from the waste sector in 2013 were about 4425.74 Gg CO_2 eq.; this accounts for around 9 per cent including LULUCF and around 8 per cent excluding LULUCF of the total national GHG emissions.

During the period 1988–2013, the share of emissions from the waste sector grew from 5 per cent to 9 per cent. In absolute terms, the GHG emissions from the waste sector decreased by 36.9 per cent compared with the base year. The reduction is significant in view of the fact that changes in the quantities of municipal waste and wastewater have been estimated conservatively, a function of the number of

inhabitants, living standards and public attitudes towards measures to reduce waste generation. Sudden changes in input values from year to year are not to be expected.

Energy

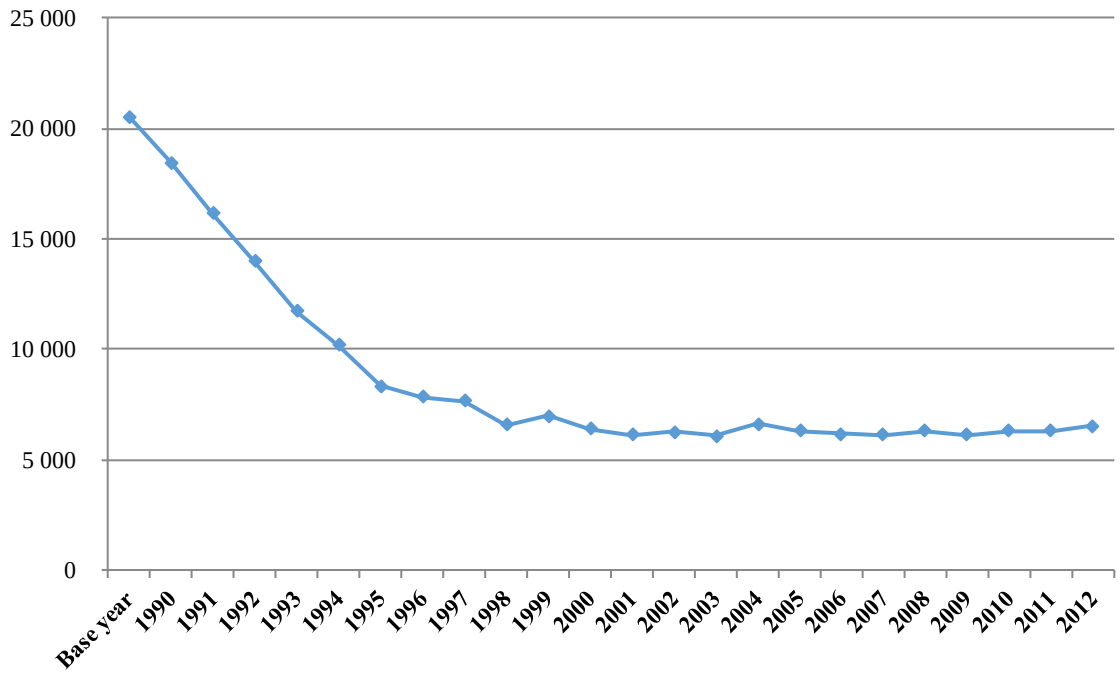
Emissions from the energy sector in 2011 (figure 5.4) decreased by 37.17 per cent compared with the base year (51,072 Gg CO_2 eq. in 2011 compared with 83,081 Gg CO_2 eq. in 1988), although there was an increase of 12 per cent compared with the previous year. The main source of emissions in the energy sector is fuel combustion of solid fuels, which is responsible for 65.8 per cent of the emissions.
The main reasons for the decreasing trend of GHG emissions in the energy sector are the transition from a centrally planned economy to a market-based economy, reconstruction of the economy and the subsequent economic slowdown. This led to a sharp drop in demand for electricity production from thermal power production. The trend of GHG emissions between 1988 and 2011 was defined by a substantial decrease in emissions from fuel combustion in energy industries (13.7 per cent) and energy use in manufacturing industry and construction (79.1 per cent) and in other sectors (64.9 per cent), as well as a clear increase in GHG emissions from transport (10.1 per cent).

Transport

In period 1988–1991, fuel consumption decreased by 47 per cent. However, since 1991, fuel consumption increased by 110 per cent, mainly due to road transport (figure 5.5).

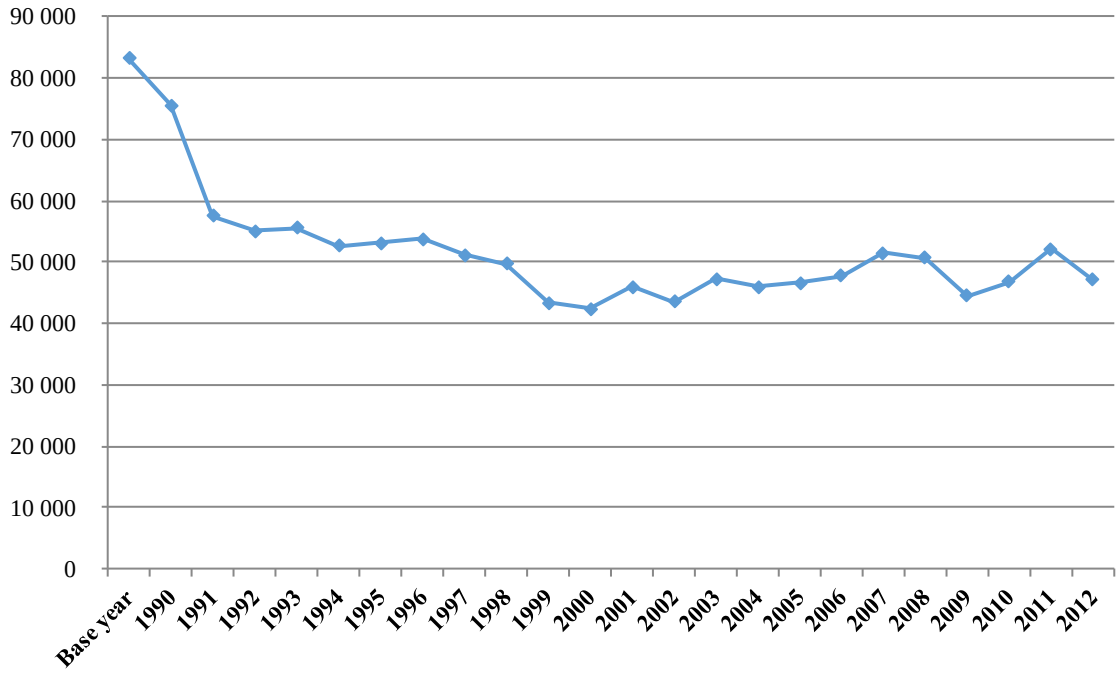
Following a steep decline in 1989 as a result of the political and economic crisis, a distinct upward trend of GHGs emissions can be observed from 2000 to the present. The main contributing gas is CO_2, followed by CH_4 and N_2O. The CO_2 emission trend reflects fuel consumption and therefore shows a decrease in the period 1990–2000. However, with the reviving economy, CO_2 emissions grew constantly until 2006. From that point, there was a period of stabilization until 2009 when there was a slight drop in emissions, mainly related to the economic crisis and the consequent decline in transportation. Overall, GHG emissions from road transport increased by 4.9 per cent compared with 1988 levels: 7,169.5 Gg CO_2 eq. in 1988 and 7,521.3 Gg CO_2 eq. in 2011. However, growth from 1991 to 2011 is calculated at 114.1 per cent.

Figure 5.3: GHG emissions from the agriculture sector, 1988–2012, Gg CO_2 eq.



Source: Bulgarian National Inventory Report, 2013.

Figure 5.4: GHG emissions from the energy sector, 1988–2012, Gg CO_2 eq.



Source: Bulgarian National Inventory Report, 2013.

This sudden change coincided with the economic recovery, preceded by the introduction of a currency board regime in 1997 and rigorous economic and political reforms. The most significant contributor to GHG emissions is passenger cars, followed by heavy-duty vehicles, light-duty vehicles and motorcycles and mopeds. As can be observed in figure 5.5, in 2011, passenger cars and heavy-duty vehicles accounted for 61.7 per cent and 19.9 per cent of total GHG CO_2 eq. emissions respectively, a consequence of the intensification of passenger and goods transportation. The remaining 18.4 per cent was shared among light-duty vehicles, buses and mopeds and motorcycles.

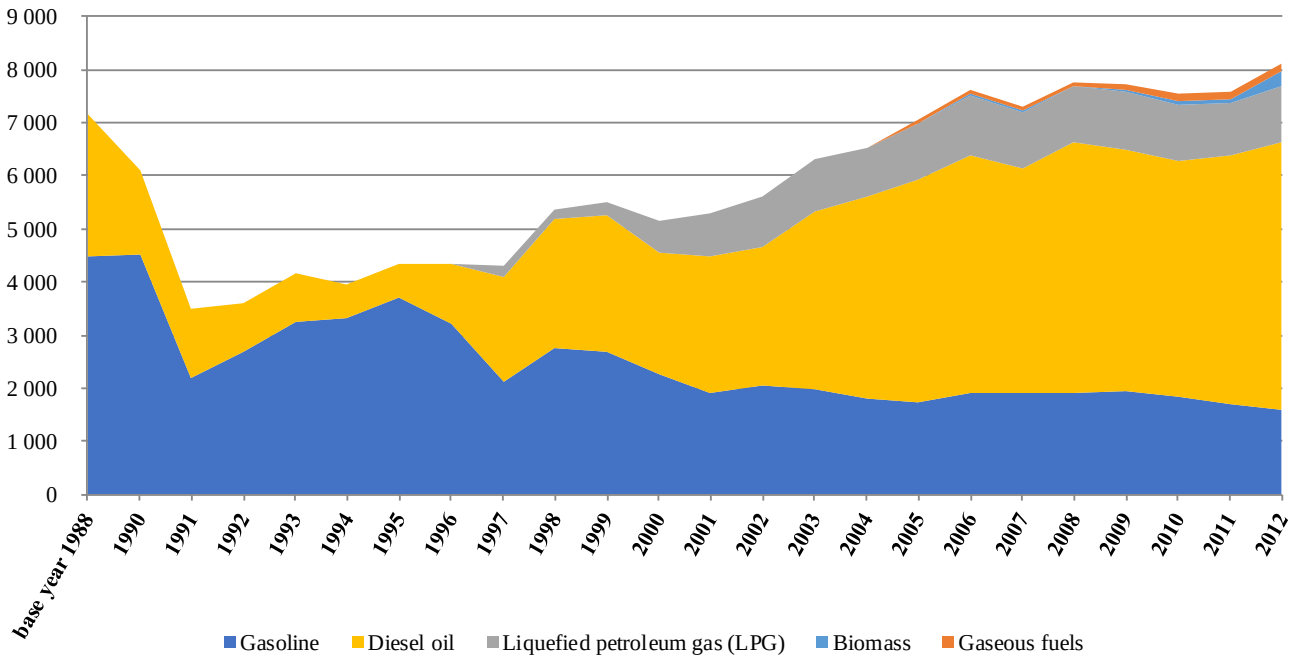
Forestry

LULUCF serves as a GHG sink for Bulgaria (figure 5.6). The two categories "Forest land" and "Grassland" result in removal of CO_2. All other categories are sources of CO_2 emissions. Net CO_2 removals (CO_2 eq.) from LULUCF show a decrease of 44 per cent compared with the base year, to reach the lowest point in 2007. The reason for the decrease of uptakes of CO_2 emissions is mainly the reduction in wood stock in the 2000s as compared with the 1990s. Total CO_2 removals show an upward trend after 2007, due to the increase in net removals from forest land and a slight decrease in emissions from croplands. The net changes of the carbon stock in the biomass cause the greatest effect on the final results obtained for the whole sector. Over the period 1990–2011, a permanent trend is observed of increasing the tree biomass stock (by 30 per cent for coniferous species and 26 per cent for deciduous species). In spite of the decrease in emissions observed, the share of the removals in the total GHG emissions (in CO_2 eq) is still remarkable. The reason for this is that the emissions in the other sectors have dropped dramatically. The share of the removals in the base year was –11.8 per cent of total GHG emissions in CO_2 eq, while in the inventoried year the share was –13.05 per cent.

Residential sector

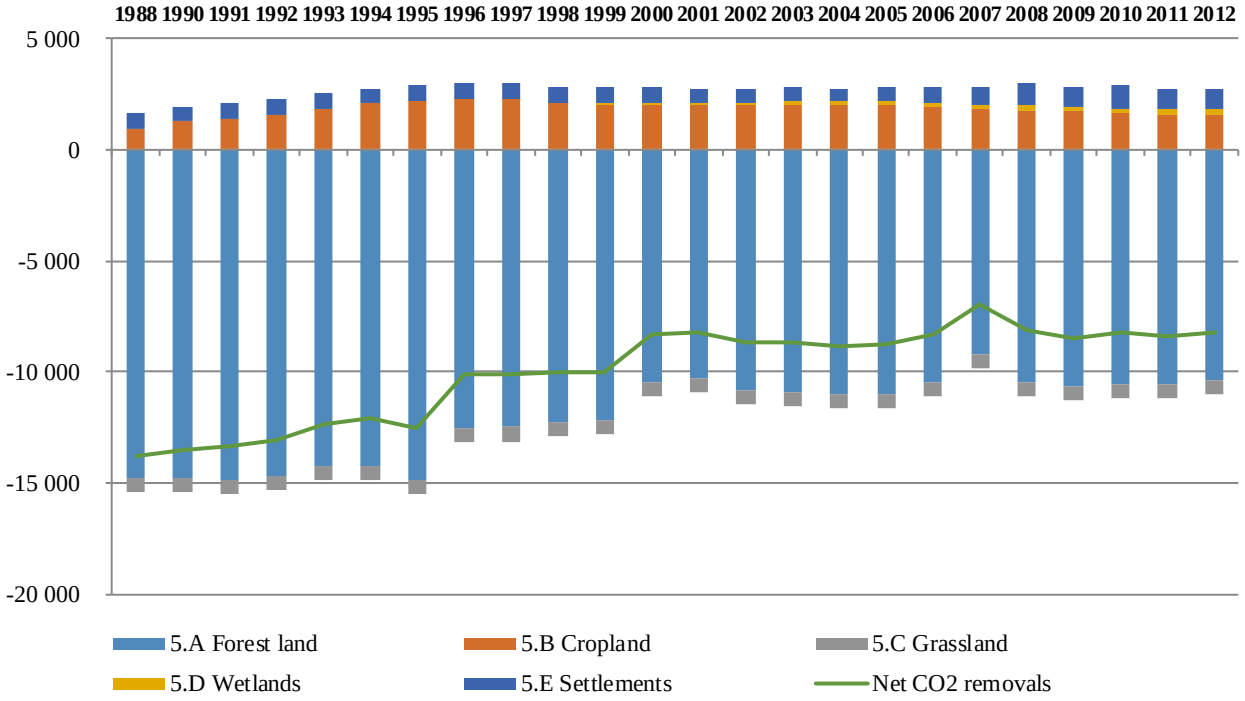
The emissions from the residential sector decreased by 70.6 per cent compared with the base year (Figure 5.7). There are two separate trends contributing to this decrease. At the beginning of the period, for economic reasons there was a transition from liquid fuels, which were previously used for heating, to electricity. Some societal groups also drastically reduced their use of energy for heating, due to their very low income. The second trend is the increase in the use of biomass. In 2012, four times more biomass was used by the residential sector than in 1988. This trend is also supported, although to a much smaller extent, by the increasing gasification of households.

Figure 5.5: GHG emissions from the road transport sector, 1988, 1990-2012, Gg CO_2 eq.



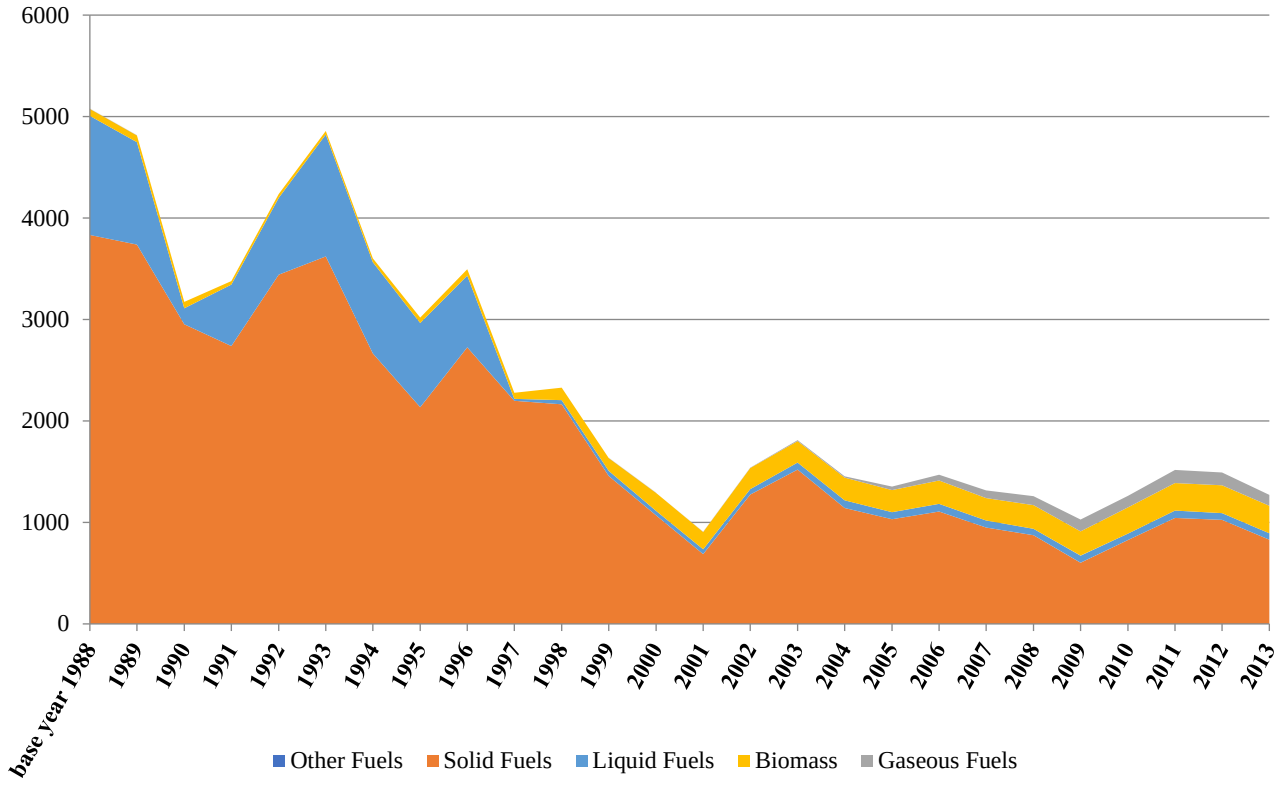
Source: Bulgarian National Inventory Report, 2013.

Figure 5.6: LULUCF emissions and removals, 1988–2012, CO_2 eq.



Source: Bulgarian National Inventory Report, 2013.

Figure 5.7: GHG emissions from the residential sector, 1988-2013, Gg



Source: Executive Environment Agency, 2015.

5.3 Legal, policy and institutional framework

Legal framework

The 2014 Climate Change Mitigation Act lays down the principles of the state policy in the climate sector, the procedures for issuing GHG emissions permits, the responsibilities for organizing national inventories, the rules for operation of the emissions trading mechanism and procedures for financing green projects. The principal objectives of climate-related policy are the development of a highly efficient and green energy sector and establishment of a single internal energy market, while overcoming the high energy and carbon intensity of the economy and dependency on energy imports. The 2014 Climate Change Mitigation Act covers:

- The implementation of the government policy on climate change mitigation;
- The implementation of mechanisms for fulfilment of Bulgaria's obligations under the UNFCCC and the Kyoto Protocol;
- The functioning of the National Green Investment Scheme;
- The functioning of the national system of inventories of emissions of harmful substances and GHG into the atmosphere;
- The implementation of the EU Emissions Trading Scheme (EU ETS);
- The administration of the national registry for GHG emission allowance trading;
- The measures to reduce GHG emissions from liquid fuels and energy for transport;
- Fulfilling the obligations ensuing from Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the efforts of Member States to reduce their greenhouse gas emissions to meet the community's greenhouse gas emission reduction commitments up to 2020;
- The functioning of the National Voluntary Emissions Reduction Scheme.

The Environmental Protection Act defines the measures related to climate change and regulates horizontal mechanisms for the management of activities related to environmental impacts and the effects of GHGs – EIA of specific investment proposals, environmental assessment of plans and programmes, and access to information on the environment.

The 1996 Agricultural Land Conservation Act codifies the protection against deterioration, and the rehabilitation and fertility enhancement of agricultural land, as well as the terms and conditions whereby such land may change its type of use.

The burning of stubble and other plant residues on agricultural lands is prohibited. The users of agricultural land are held responsible for the burning of stubble and other plant waste on agricultural land and must participate in extinguishing it. The owners and the users of agricultural land are entitled to tax and credit preferences when implementing the mandatory limitation on agricultural land use, as well as when implementing projects to restore and improve the fertility of agricultural land. The Act contains a legal framework covering some of the activities envisaged for the agriculture sector in the National Action Plan on Climate Change (NAPCC), such as counteracting the burning of stubble and plant waste and promoting agricultural practices aimed at reducing GHG emissions.

Policy framework

The 2000 First NAPCC contained a coherent set of actions to help the country fulfil its commitments assumed by the ratification of the UNFCCC (1995) and the signing of the Kyoto Protocol. The economic growth of Bulgaria after 2000, along with changes in international and domestic policy and the respective regulatory framework, required an update and extension of the First NAPCC by the Second NAPCC for the period 2005–2008. The following four categories of actions were included in the updated Plan:

- Actions to implement mitigation policies and measures that result in GHG emission reductions in the different economic sectors in Bulgaria;
- Actions to create the necessary conditions for implementation of the mitigation measures, for instance institutional arrangements and awareness-raising; Fourth National Communication on Climate Change;
- Actions related to the monitoring and registration of GHG gases and the systematic evaluation of emission trends and projections, including the evaluation of policies and measures;
- Actions for the implementation of the Joint Implementation and Emissions Trading Schemes.

The Second NAPCC included a set of "backup" measures that can be implemented in the event that GHG emissions grow faster than expected or when the economic situation in Bulgaria allows the Government to participate more actively in this field.

The 2012 Third NAPCC for the period 2013–2020 outlines the framework for action to combat climate change and to focus the country's efforts on actions leading to reduction of the negative impacts of climate change and implementation of the commitments undertaken under the UNFCCC and the Kyoto Protocol. It provides specific measures for reduction of GHG emissions across all sectors and these measures are consistent with both the national policy on climate change and the potential of the national economy to reduce emissions. The overall effect of the measures will ensure the implementation of the commitments taken and the achievement of the legally binding European objectives.

The Third NAPCC provides specific measures for reduction of GHG emissions in the following sectors – Energy Sector, Household and Services Sector, Industry Sector, Waste Sector, Agricultural Sector, Land Use, Land Use Change and Forestry, Transport Sector, Education and Science. According to the monitoring and reporting mechanism within the Third NAPCC, review of the implementation status of those measures is envisaged as being undertaken every two years. In that respect, during 2015, a report containing information on the current status of implementation of the measures in all sectors covered by the Third NAPCC was prepared.

Sectoral documents

At the sectoral level, there are a number of documents relevant to adaptation policy. Bulgaria has elaborated several national and sectoral mid-term and long-term programming documents, envisaging measures and activities for the adaptation of specific sectors (e.g. water, agriculture, forestry) to climate change, including the following:

- National Strategy for Water Sector Development and Management in Bulgaria for the period until 2015;
- Flood risk management programme of RBMPs – the Basin Directorate for Water Management – East Aegean District; Basin Directorate for Water Management – West Aegean District; Basin Directorate for Water Management – Danube River District; and Basin Directorate for Water Management – Black Sea District – are the regional water management departments of the Ministry of Environment and Water. They have been undertaking measures to tackle climate change as defined in their respective management plans, along with measures for the period 2010–2015;
- Strategy for the Protection of Forests Against Fire;
- National Strategy for Sustainable Development of Forestry in Bulgaria for the period 2006–2015
- National Strategy for Development of the Forestry Sector for the period 2013–2020;

- Programme of measures for adaptation and mitigation of the negative climate-change-related effects on forests;
- 2014 National Strategy for Disaster Risk Reduction, which provides analysis of the current situation with regards to specific risks, including earthquakes, floods, landslides, forest fires, storms, snowfall and extreme temperatures;
- National Programme for Disaster Protection for the period 2014–2018, as well as national and regional risk assessments in a national and regional plans for disaster protection;
- National Forest Strategy for the period 2013–2020, which includes measures to strengthen the resilience of forest ecosystems to climate change;
- 2010 Strategy for Development of the Transport System until 2020, which outlines the most important aspects for the development of the transport system of Bulgaria. The strategic document is based on analysis of the existing situation, development trends, internal and external factors and SWOT analysis;
- 2012 National Action Plan for Promoting the Production and the Accelerated Uptake of Ecological Vehicles, including Electric Mobility, for the period 2012–2014, which lays out the main activities and measures that should be fulfilled in order to stimulate production and demand for/use of environmentally friendly vehicles. The main obstacles for large-scale deployment of electric vehicles in the country are their relatively high price and limited mileage capacity. The construction of electric vehicles charging infrastructure in Bulgaria is in its initial phase. Individual projects for building recharging stations are implemented mainly by private investors at the municipality level.

As a party to the Kyoto Protocol and in accordance with Article 10 paragraph b, Bulgaria is committed to developing a national adaptation strategy. The same commitment also arises from the Climate Change Mitigation Act. The Ministry of Environment and Water initiated a process towards developing a national adaptation strategy, which should comprise the period up to 2030. As a first step, in 2014, the Ministry of Environment and Water prepared a framework document entitled "National climate change risk and vulnerability assessment for the sectors of the Bulgarian economy". Another important element to be integrated into a national adaptation strategy is insurance.

In 2014, the Ministry developed the document entitled "Financial disaster risk management and insurance options for climate change adaptation in Bulgaria" with the financial and technical support of the World Bank. The purpose of the document is to analyze the role and importance of the insurance business for the prevention of risks that occur as a result of climate change and support the development of adaptation measures.

Institutional framework

The Climate Change Policy Directorate of the Ministry of Environment and Water was established in 2009. The Directorate consists of two departments, the International Negotiations and Adaptation Department and the Implementation of European Climate Change Policy Department, which together have 13 staff. The Climate Change Policy Directorate is in charge of the coordination, elaboration and implementation of the national policy on climate change (mitigation and adaptation) the participation of Bulgaria in the international negotiations regarding the UNFCC, in coordination with the Ministry of Foreign Affairs; coordinates reporting and compliance with the international commitments regarding the UNFCCC, the Kyoto Protocol and EU legislation; carries out and coordinates activities, related to the European policies on climate change and the implementation of the EU Emissions Trading Scheme in the Republic of Bulgaria.

The Executive Environmental Agency within the Ministry of Environment and Water monitors the implementation of climate-change-related measures. The Agency is responsible for the preparation of the GHG inventories. It carries out the procedures for issuing GHG emission permits. The Agency is the National Administrator of the National Registry for GHG Emission Allowance Trading.

The Ministry of Environment and Water is responsible for the design and implementation of climate change policy and the Executive Environment Agency for the coordination of the National GHG Inventory.

Along with other responsibilities, the Bulgarian Academy of Sciences carries out research and development activities on climate change, examining fluctuations and adaptation by the individual sectors.

Climate change is monitored by the National Institute of Meteorology and Hydrology at the Bulgarian Academy of Sciences. The Institute has several weather stations included within the Regional Basic Synoptic Network and Regional Basis Climatological Network in RA VI (Europe) – about 40 synoptic and more than 90 climatic stations across the country. There are no Global Surface Network and Global UpperAir Network stations in Bulgaria. There is only

one Global Atmosphere Watch station in the country (Rojen). Among the main activities of the Institute are the monitoring, analysis and forecasting of atmospheric and hydrospheric processes; study of the spatial-temporal characteristics of climate and water resources; and the Hydrometeorological Service for the territory of the country and the Black Sea, for the state authorities, the general population and a wide range of users of specialized information.

Coordination bodies

The Interinstitutional Committee on Climate Change (set up in 2000) and the Interinstitutional Working Group for Development of the National Allocation Plan (set up in 2005) coordinate climate-related measures in key sectoral policies such as energy, households and services, industry, transport, agriculture, forestry and waste management.

The most recent Interinstitutional working group, established in 2015 by the Ministry of Environment and Water, is tasked with coordination of the implementation of the Third NAPCC for the period 2013–2020.

In 2014, the National Expert Council on Climate Change was established as an advisory body with the Ministry of Environment and Water for the purpose of supporting activities related to the overall implementation of government policy on climate change. The Council includes representatives of the governmental sector (ministries, agencies), National Association of Municipalities, regional governmental authorities, Bulgarian Academy of Sciences, environmental NGOs and branch organizations (the Bulgarian Chamber of Commerce and Industry and others, such as the Bulgarian Association of the Cement Industry, Branch Chamber of the Iron and Steel Industry, Branch Chamber of the Chemical Industry, Association of Producers of Ecological Energy, Bulgarian Wind Energy Association, Hydropower Plants, Wind Power Plants, Photovoltaic Plants, etc.).

Raising public awareness on climate-change-related issues

Publications in connection with climate change can be found on the website of the Ministry of Environment and Water, e.g. the national climate change risk and vulnerability assessment entitled "Financial disaster risk management and insurance options for climate change adaptation in Bulgaria", the European legislation (directives, communications, decisions), etc. The website also contains advice on green issues, campaigns, competitions and games directing children's and adults' attention and interest to environmental issues, opportunities for green business and grant programmes, and information on OP "Environment 2007–2013" and OP "Environment 2014–2020".

A range of activities was conducted to popularize the Third NAPCC the period 2013–2020. This included two workshops for stakeholders, which were covered by the national media, five consultative meetings to discuss the proposed measures, a training session for representatives of the local authorities, posting of the document for public discussion before its adoption and a video broadcast by Bulgarian National Television.

In the period 2012–2014, initiatives were also taken to raise public awareness about the national adaptation strategy, including three workshops on "Preparation of the national adaptation", "The role of insurance and financial instruments to manage the risk of climate change in Bulgaria" and "Interaction between science and policy on adaptation to climate change".

The NTEF, with the support of the German Ministry of Environment, Water, Nature Conservation, Building and Nuclear Safety, implemented a project to raise public awareness of climate change. The project focuses its activities on educational institutions. Interactive educational activities were organized in several Bulgarian schools and kindergartens.

Data collection and use

Data on climate change in Bulgaria is collected and analyzed under the established national system for reporting on policies, measures and projections under Article 13(1)(a) of Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting GHG emissions and for reporting other information at national and Union level relevant to climate change, and Article 20 of implementing Regulation (EU) No 749/2014.

The responsibility for overall collection and use of data on climate change lies with the Ministry of Environment and Water and Executive Environment Agency. The Agency coordinates data supply and data collection activities for the preparation of the GHG inventory. The sectoral experts manage the collection of data, choice of methods, data checking and compilation of estimates that conform to the data quality objectives of the historical time series. The Agency ensures adequate resources for the collection and use of the data. The Ministry of Environment and Water compiles the required outputs necessary for Bulgaria's projections reporting. The institutional arrangements between the Ministry of Environment

and Water and the main data providers for the GHG inventory were signed off in 2010:

- National Statistical Institute (RD No. 21-35/12.02.2010);
- Ministry of Agriculture and Food and its Executive Forest Agency (No. 04-00-517/26.02.2010 and RD No. 50-47/15.03.2010);
- (Former) Ministry of Economy, Energy and Tourism (14/06/2010);
- Ministry of Interior (08/06/2010).

The agreements ensure the support of these organizations regarding the choice of activity data, EFs and methods in the compilation of emission estimates, and quality assurance and quality control of these estimates. The information is collected on an annual basis by letters to every information source requesting provision of the necessary activity data, with a response deadline. All data types, as well as the deadlines for submissions to the Executive Environment Agency, are regulated by the above-mentioned official agreements, as well as by the Regulation of the Council of Ministers No. 261/28.08.2014 (S.G. 74/2014).

Projects and financial mechanisms

As an Annex I party of the UNFCCC and a country whose economy is in transition, Bulgaria accepts financial and technological support, mainly within the framework of the Joint Implementation (JI) mechanism, under Article 6 of the Kyoto Protocol. Twenty-eight projects have been approved in Bulgaria, 21 of which have already been achieved and have verified emission reductions. The execution of those projects led to GHG emission reductions of around 8 million tons of CO_2 eq. for the period 2008–2012.

In 2010, an amendment to the Environmental Protection Act created the legal framework of the Bulgarian National Green Investment Scheme (NGIS) and allowed the Bulgarian Government to participate in the International Emission Trading mechanism. The Act defines the entire process, from the selling of AAUs to the greening of the revenues. The Act empowers the NTEF to administer and implement the NGIS. The NTEF elaborates rules for the selection, assessment and approval of projects that would reduce emissions and would be reimbursed by the NGIS. The NTEF is authorized to operate with the proceeds of the sale of AAUs, as a result of which the NGIS was established. It aims at including the broadest possible range of potential environmental projects in the areas of energy, transport, agriculture, forestry, water and waste management, industry and other sectors of the national economy. This objective to cover diverse project areas will lead to the reduction of GHG emissions while significantly improving the quality of the environment, and in particular reducing air, water and soil pollution. Since the beginning of its operation, the NTEF has been implementing four programmes.

The funds for financing projects are generated within the framework of two agreements between Bulgaria and Austria for the sale of AAUs pursuant to Article 17 of the Kyoto Protocol. Energy efficiency projects for 77 public buildings (kindergartens, schools, universities, cultural community centres, theatres, sports halls, medical centres and administrative facilities) in Bulgaria, amounting to 27 million leva, have been implemented under the programme during the period 2011–2014. Partial financing (based on the *de minimis* principle under the state aid regulations) has been provided to two corporate projects for energy production from renewable sources.

Projects financed within the Investment Climate Programme are implemented by the NTEF. The Programme started in 2015 and is financed by the revenues from so-called "early auctions" of GHG emission allowances by installations, which were paid into the budget of the Ministry of Environment and Water by 31 December 2012. The funds are designated to be used for financing projects aiming at improving the energy efficiency of state and municipal public buildings (in 2015 and 2016), as well as for promoting the use of electric and hybrid vehicles by public institutions (in 2016).

Various projects on water management, waste management and ambient air quality related to climate change issues were financed by OP "Environment 2007–2013".

OP "Environment 2014–2020" provided a separate Priority Axis 4, "Prevention and Flood Risk Management", which is directly linked to climate change. Among the activities envisaged for funding is the creation of the National Centre for Real Time Water Management, as well as studies related to Second Plans for Flood Risks Management for the period 2021–2027. Measures envisaged under Priority Axis 4 are aimed at providing resistance to disasters, prevention of risk to human health and the environment, and mitigation of the consequences of floods. The implementation of some of the measures of Priority Axis 3, "Natura 2000 and Biodiversity", will also contribute to adaptation to climate change. For the next programming period, 2014–2020, there are new requirements concerning the mainstreaming of environmental policy and climate change policy in EU funds programming, and, as a result,

environmental actions are included in the different programmes, bearing in mind their priority for the implementation of environmental and/or climate change policies.

The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) was jointly established by the European Bank for Reconstruction and Development (EBRD), the Bulgarian Government and the EU. It offers industrial companies loans of up to 5 billion leva and grants of up to 15 per cent of energy efficiency investments (in CHP generation, optimization of processes, reconstruction of energy infrastructures) or renewable energy projects. In total, BEERECL provided €155 million of EBRD funds, which were on-lent to eight participating banks with a €35.2 million grant fund from the Kozloduy International Decommissioning Support Fund. With sustainable energy lending increasingly seen as a core business line, competitive pressure led nine Bulgarian banks to sign up for the facility. Financing was provided to these banks on market terms, with a medium-term tenor.

The grant funding was dedicated to project preparation and incentives for banks and sub-borrowers, to overcome barriers to sustainable energy investments. After 10 years of successful work, BEERECL concluded its operations at the end of February 2014. While at first the credit line had served the renewables market almost exclusively, increased marketing efforts later enabled significant expansion of the energy efficiency lending portfolio. By the conclusion of BEERECL in 2014, almost 300 projects had been signed with a total investment value of €230 million. These received more than €150 million in financing through the facility. Of financed projects, 195 focused on energy efficiency and a further 98 on renewable generation. Energy efficiency loans ranged from €11,000 to €2.5 million, with an average sub-loan of €310,000.

Eligible projects identified by the consultants included upgrades or replacements for machinery, co-generation of heat and power, and thermal insulation of production halls in industries such as pulp and paper plants, sugar mills, chemical plants, bakeries, farms, parts manufacturers and metals processors. Renewable energy loans varied from €30,000 to €2.5 million, with an average size of €877,000. Investments included in biogas, biomass, hydropower, and solar electric, solar heat and wind projects. The portfolio of BEERECL projects achieved the following estimated results: annual electricity savings of 1,078,502 MWh (equivalent to the residential electricity use of 893,600 Bulgarians) and annual CO_2 emission reductions of 710,000 tons (comparable to the emissions from 390,275 cars). These savings are equivalent to the generation capacity of a 165 MW power plant, or 9.5 per cent of the capacity that had been shut down at Kozloduy Nuclear Power Plant.

A similar scheme, the Bulgarian Energy Efficiency for Competitive Industry Finance Facility (BEECIFF), set up by the Ministry and the EBRD, offers grants to SMEs for energy efficiency projects (up to 2 million leva, i.e. US$1.3 million). Grants can cover up to 30 per cent of the eligible cost of technology-driven projects and 40 per cent in the case of energy audits. Moreover, an additional 10 per cent bonus grant can be awarded for projects involving CHP or fuel switching, up to a maximum of 50 per cent of the project cost. Industrial companies can also benefit from loans from the Bulgarian Energy Efficiency Fund to finance investments in high-efficiency industrial processes, building rehabilitation, and heat source and distribution system improvements.

In 2005, following the successful launch of BEERECL, the EBRD, in cooperation with the Government of Bulgaria and Kozloduy International Decommissioning Support Fund, launched another €50 million credit line for the residential sector – the Residential Energy Efficiency Credit Line (REECL). Through this facility,€46 million in loans have been signed with six Bulgarian banks. An extension of REECL, with a volume of €40 million, was launched in July 2011 and signed with six Bulgarian banks – four repeat clients from the first REECL facility and two new banks. Following the introduction of legislation allowing associations of apartment owners to undertake building investments, the REECL extension contained an amended incentive mechanism for sub-borrowers. This allowed them to focus on comprehensive building improvements, energy-efficient technologies and the introduction of first-loss insurance cover for registered associations.

At the end of 2013, the combined REECL portfolio exceeded €73 million, with 47,184 sub-loans financed. The majority of these loans are for individual dwelling measures, with an average sub-loan size of €1,550. More than 100 loans for whole-building refurbishments have been made available under REECL. Bulgarian housing stock is often characterized by poor insulation of the building envelope, so whole-building refurbishments have great potential for energy savings and CO_2 emission reductions. REECL projects financed to date are estimated to have:

- Saved 220,501 MWh of electricity per year, equivalent to the residential electricity consumption of 180,000 Bulgarians;

- Reduced CO_2 emissions by 321,000 tons per year – the amount of CO_2 that a forest of 11 million trees would absorb annually.

In response to demand from banks for further funding, in 2007, the EBRD launched the regional Bulgarian EU–EBRD Energy Efficiency Finance Facility (EUEEFF). This was supported by the EU and involved two Bulgarian partner banks – UniCredit Bulbank (UCB) and United Bulgarian Bank (UBB), with credit lines of €15 million and €5 million respectively. EUEEFF provided loans to private sector companies for industrial energy efficiency sub-projects.

The new facility ran in parallel to the second phase of BEERECL. It focused exclusively on industrial energy efficiency, but with higher technical and financial requirements for the eligibility of sub-projects.

By the end of 2012, when it was closed, EUEEFF had successfully financed 39 companies with loans totaling €19.8 million. EUEEFF sub-projects are estimated to have saved the energy equivalent of 95,205 MWh per year and avoided GHG emissions equivalent to almost 48,000 tons of CO_2 per year.

5.4 Conclusions and recommendations

The Bulgarian Government has made an effort since 2000 to develop climate change policies. After Bulgaria joined the EU in 2007, the context of climate policy in the country changed considerably because, apart from its international commitments under the UNFCCC and the Kyoto Protocol, the country was aligned with the existing and newly adopted European legislation in this area. The results of this effort were the overachievement of the country's commitment under the Kyoto Protocol regarding mitigation policies.

At the same time, as a party to the Kyoto Protocol, Bulgaria is committed to developing a national adaptation strategy. The same commitment also arises from the Climate Change Mitigation Act. However, Bulgaria is at an early stage of developing a national adaptation strategy, which should comprise the period up to 2030.

Recommendation 5.1:
The Government should adopt and implement a national adaptation strategy to climate change building on the national climate change risk and vulnerability assessment and on the insurance options for climate change adaptation in Bulgaria, elaborated both in 2014.

PART III: INTEGRATION OF ENVIRONMENT INTO SELECTED SECTORS/ISSUES

Chapter 6

WATER MANAGEMENT

6.1 Water resources

River basins

The Bulgarian climate results from the country's being positioned at the meeting point of the Mediterranean and continental air masses and the barrier effect of its mountains. Northern Bulgaria registers 200 mm more precipitation annually than the regions south of the Balkan Mountains. Across the country, precipitation averages about 630 mm per year, and varies from 500 mm in Dobrudja to more than 2,500 mm in the mountains.

The country has a dense network of about 540 rivers, most of which are relatively small and with little water flow. The longest river located solely in Bulgarian territory, the Iskar, is 368 km long. Other major rivers include the Mesta, the Struma and the Maritsa in the south, all of them transboundary watercourses of which Bulgaria is the upstream country. The country is divided into four river basin districts for water management and administration purposes, each with a river basin directorate in charge.

Danube River Basin District

The total area covered by the Danube River Basin District is 47,235 km^2, representing 42.5 per cent of the country's territory. The basin is divided into 11 river sub-basins: Danube, West of Ogosta, Ogosta, Iskar, Vit, Osam, Yantra, Rusenski Lom, Dobrudja Danube, Erma and Nishava.

From north to south, rainfall increases from 550 mm in Svishtov to 650 mm in Veliko Tarnovo. On the northern slopes of Rila in the Upper Iskar, annual rainfall reaches 1,200–1,300 mm. The snow cover in the Danube valley is of varying duration, but most often lasts between 40 and 50 days. The highest river runoff modules, exceeding 20–25 l/s/km^2, can be found in some parts of Stara Planina. The northern slopes of Rila exceed 35–40 l/s/km^2 and Montana–Lovech–Omourtag is in the order of to 4–5 l/s/km^2.

The module runoff in Pridunavski is limited to 0.5–1 l/s/km^2 and in the Sofia valley 2– l/s/km^2 module runoff is reached. In the Danube region high runoff is concentrated in the alpine regions in the months of April and May, and low runoff occurs during the summer and autumn months, from June–July to October–November, as the minimum is most common from August–October.

Black Sea River Basin District

The total area covered by the Black Sea River Basin District is 16,567 km^2 of land territory plus the territorial waters of Bulgaria (12 nautical miles) along the 378 km coastline, which have an area of 6,360 km^2. This represents 14.9 per cent of the country's territory and 100 per cent of its territorial sea area. The land territory of the basin is divided into nine river basins: Dobrudja Black Sea, Provadiiska, Priselci – Chernomorec gullies, Kamchia, North Bourgas, Mandra, South Bourgas, Veleka and Rezovska.

Most of the runoff capacity of the Black Sea basins is situated at the southern border. There, the combination of Strandja Mountain and geographical location in the path of a significant number of Mediterranean cyclones sets high autumn–winter rainfall and consequently high runoff in fall and winter. The annual rainfall in Strandja Mountain varies from 550 mm in the foothills to 900 mm around Malko Tarnovo. Accordingly, these precipitations generate average runoff modules varying between 5 and 15 l/s/km^2.

The second more water-productive zone is the Balkan Mountains in the south-western Kamchia valley. In the highest parts of the Kotel Balkan, rainfall reaches more than 750–800 mm and the runoff module up to 10 l/s/km^2. In the lower parts of the Kamchia valley precipitation falls to 550 mm per year, and the runoff module drops to 2 l/s/km^2 on the Kamchia River and to 1–2 l/s/km^2 on the Great Kamchia River. In the Bourgas valley and its lower slopes rainfall is 500–550 mm and the runoff module below 3–4 l/s/km^2.

East Aegean River Basin District

The total area covered by the East Aegean River Basin District is 35,230 km^2, representing 32 per cent of the country's territory. The district is divided into four river sub-basins: Maritsa, Toundja, Arda and Biala.

Rainfall in this region is characterized by its large spatial variation, from a relatively small annual rainfall of 450–500 mm in the western part of the

Thracian lowland to over 1,000–1,200 mm in the high mountainous areas.

West Aegean River Basin District

The total area covered by the West Aegean River Basin District is 11,965 km^2, representing 11 per cent of the country's territory. The district is divided into three river sub-basins: Struma, Mesta and Dospat. Rainfall in this region varies from 500–550 mm in the river valleys to over 1200 mm in the high parts of Rila and Pirin Mountain.

In the high Rila and Pirin Mountain the average runoff module reaches and even exceeds 35–40 l/s/km^2 and the density of the river network is 2.0–2.5 km/km^2. In the region with precipitation from 900–1,000 mm the runoff module reaches 15–20 l/s/km^2 and the density of the river network is 1.5–2 km/km^2. In the Mesta River valley, the runoff modules reach their lowest values, of 2 l/s/km_2. In the Struma River valley, at the lower parts, runoff modules reach their lowest values, of 0.5–1 l/s/km^2.

Surface and groundwater bodies

Surface waters

The assessment of water quality is carried out according to the specifications of the Water Act. Ecological status and chemical status assessments have been regularly monitored in recent years, even if not exactly according to need. In 2012, almost 40 per cent of all surface water bodies in Bulgaria were assessed as being of good ecological status and nearly 5 per cent were of excellent status (table 6.1). One fourth of the surface water bodies were of poor or bad status. There were differences across river basin districts, the highest proportion of water bodies of poor and bad status being in the East Aegean River Basin District.

The RBMPs prepared in 2016 present an evaluation in terms of assessment of ecological status, with a significant percentage of basins being of unknown ecological status. This evaluation allows better assessment of monitoring needs, which will in the future lead to a better understanding of the ecological status of water bodies. The high percentage of water bodies of unknown status, notably in the Danube and East Aegean Basins, is mainly due to the lack of analysis of priority substances. The number of water bodies of lower than poor quality has decreased.

In 2012, more than three quarters of Bulgaria's surface water bodies were of good chemical status and only 2 per cent were of poor chemical status. However, there were strong differences across the river basin districts: three quarters of surface water bodies in the Black Sea River Basin District and one third of the surface water bodies in the West Aegean River Basin District were of unknown status at that time (table 6.2). The percentage of water bodies of unknown status in 2016 is high in all but the Black Sea Basin. The reason for this is because monitoring was not sufficient, mainly the monitoring of priority substances. The increase in monitoring campaigns is critical to allow for a correct assessment of the chemical status of the water bodies.

Groundwater

In 2012, more than two thirds of groundwater bodies were of good chemical status while 30 per cent were of poor status. There were large differences across the river basin districts: for example, all groundwater bodies in the West Aegean River Basin District were of good status whereas 42 per cent of the groundwater bodies in the Black Sea River Basin District were of poor status (table 6.3).

Table 6.1: Ecological status of surface water bodies, 2012, 2016, percentage

	Danube Basin		Black Sea Basin		East Aegean Basin		West Aegean Basin	
Condition/potential	**2012**	**2016**	**2012**	**2016**	**2012**	**2016**	**2012**	**2016**
Excellent	1.8	7.0	10.2	2.0	7.3	6.0	4.6	6.0
Good	51.4	37.0	44.4	33.0	31.7	34.0	44.4	56.0
Reasonable	31.5	23.0	33.3	40.0	33.7	36.0	34.3	28.0
Bad	9.0	9.0	11.1	13.0	15.6	8.0	10.2	4.0
Very Bad	6.3	4.0	0.9	11.0	11.7	4.0	6.5	3.0
Unknown	0.0	20.0	0.0	1.0	0.0	12.0	0.0	3.0

Source: Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans – Bulgaria, 2012. Danube River Basin Management Plan 2016–2021; Black Sea River Basin Management Plan 2016–2021; West Aegean River Basin Management Plan 2016–2021; East Aegean River Basin Management Plan 2016–2021.

Table 6.2: Chemical status of surface water bodies, 2012, 2016, percentage

	Danube Basin		Black Sea Basin		East Aegean Basin		West Aegean Basin	
Condition/potential	**2012**	**2016**	**2012**	**2016**	**2012**	**2016**	**2012**	**2016**
Good	98.2	61.0	25.0	25.0	95.6	16.0	63.9	34.0
Bad	1.8	2.0	0.0	5.0	3.9	2.0	0.0	2.0
Unknown	0.0	39.0	75.0	70.0	0.5	72.0	36.1	64.0

Source: Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans – Bulgaria, 2012. Draft Danube River Basin Management Plan 2016–2021; Draft Black Sea River Basin Management Plan 2016–2021; Draft West Aegean River Basin Management Plan 2016–2021; Draft East Aegean River Basin Management Plan 2016–2021.

Table 6.3: Chemical status of groundwater bodies, 2012, 2016, percentage

	Danube Basin		Black Sea Basin		East Aegean Basin		West Aegean Basin	
Condition/potential	**2012**	**2016**	**2012**	**2016**	**2012**	**2016**	**2012**	**2016**
Good	64.0	56.0	57.5	57.0	60.4	58.0	100.0	97.0
Bad	36.0	44.0	42.5	43.0	39.6	42.0	0.0	3.0
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans – Bulgaria, 2012. Draft Danube River Basin Management Plan 2016–2021; Draft Black Sea River Basin Management Plan 2016–2021; Draft West Aegean River Basin Management Plan 2016–2021; Draft East Aegean River Basin Management Plan 2016–2021.

Of a total 176 groundwater bodies - 169 were assessed in 2016 (monitoring data from 2010-till 2014), 111 were of good chemical status (65.7 per cent) and 58 of poor chemical status (34.3 per cent). Groundwater bodies of good chemical status can be found primarily in mountainous regions, where there are no sources of pollution and the exceedance value is considered as being from a natural source. Comparing 2012 and 2016 data, there is a slight deterioration of the chemical quality of groundwater.

According to monitoring data from physico-chemical parameters in groundwater wells located in upper layers, the threshold values were mostly exceeded for the following recorded indicators: ammonium, chloride, sulphate, nitrates, iron, orthophosphate and manganese.

6.2 Pressures and impacts on water bodies

Overview of the situation

Surface water bodies

Major changes in Bulgaria's inland water bodies result from anthropogenic activity leading to loss of biodiversity, including: construction and operation of HPPs; construction of hydraulic structures, including dams and dikes; maintenance dredging of the Danube River for navigation; sand and gravel extraction in river beds; surface water abstraction; and felling of riparian vegetation. Hydro-morphological alterations and regulation of the water flow are the main reasons for surface waters not achieving good ecological status.

Under the second cycle of RBMPs (2016–2021) there are risks of non-achievement of the proposed targets (table 6.4). The percentage of water bodies at risk increased from 56 per cent in 2012 to 61 per cent in 2016

Groundwater bodies

The main pressures on each of the groundwater bodies by river basin district are presented in table 6.5.

Water abstraction

The total abstracted fresh water for the period 2010–2014 is estimated to average 5,781 billion m^3 per year (table 6.6). The highest level of abstraction was recorded in 2011 (6,385 billion m^3), due to increased demand of water for agriculture in that dry year, and the lowest level in 2014 (5,376 billion m^3), when it was relatively wet. A reduction in the total volume of water abstracted was observed from 2000 to 2014, the main reductions occurring between 2000 and 2005. The dominant use of water is for energy – on average, 59.4 per cent of fresh water abstracted each year is for cooling processes..

Table 6.4: Surface water bodies at risk after assessment of the anthropogenic pressures, 2012, 2016

River Basin Directorate	Water basin not at risk		Water bodies possibly nat at risk		Water basin at risk		Water basin possibly at risk		Total	
	2012	2016	2012	2016	2012	2016	2012	2016	2012	2016
Danube	31	83	..	..	28	121	177	52	**236**	256
Black Sea	89	55	..	..	50	101	132	22	**271**	178
East Aegean Sea	86	7	..	165	82	61	157	79	**325**	312
West Aegean Sea	354	56	..	..	22	124	74	3	**450**	183
Total	**560**	**201**	**..**	**165**	**182**	**407**	**540**	**156**	**1 282**	**929**
Total per cent	**44**	**22**	**..**	**18**	**14**	**44**	**42**	**17**	**..**	**..**

Source: Central and Eastern European Network of Basin Organization. Draft Danube River Basin Management Plan 2016–2021; Draft Black Sea River Basin Management Plan 2016–2021; Draft West Aegean River Basin Management Plan 2016–2021; Draft East Aegean River Basin Management Plan 2016–2021.

Table 6.5: Main pressures on groundwater bodies, 2016

	Quantitative Status Pressures		Quality Point Pressures		Quality Diffuse Pressures	
	Types	Groundwater bodies at risk	Types	Groundwater bodies at risk	Types	Groundwater bodies at risk
Danube Basin	Public water supply, Cooling, Industry, Agriculture, Own supply to households	9	Warehouses for fertilizers and pesticides, Industrial plants, Urban wastewater, Landfills	7	Agriculture (arable land, perennial crops, pastures, heterogeneous agriculture), Settlements without sewerage, Mines, Quarries, Places with a high degree of susceptibility to erosion	28
Black Sea Basin	Public water supply, Agriculture, Industry	6	Urban wastewater, Operators of IPPC industry, Operators of non-IPPC industry, Landfills, Mines, Quarries, Contaminated places, Warehouses for pesticides	1	Agriculture (arable land, perennial crops, pastures, heterogeneous agriculture), Settlements without sewerage, Mines, Contamination from past activities	19
East Aegean Basin	Public water supply, Agriculture, Cooling	7	Operators of IPPC industry, Operators of non-IPPC industry, Warehouses for pesticides, Landfills, Mines, Quarries, Urban wastewater	5	Agriculture (arable land, perennial crops, pastures, heterogeneous agriculture), Pastures, Grasslands, Settlements without sewerage, Mines	13
West Aegean Basin	Public water supply, Own supply to households, Industry, Agriculture	13	Urban wastewater, Operators of IPPC industry, Operators of non-IPPC industry, Warehouses for pesticides, Landfills, Mines, Quarries, Contaminated places	1	Agriculture (arable land, perennial crops, pastures, heterogeneous agriculture), Settlements without sewerage, Mines, Contamination from past activities	9

Source: Draft Danube River Basin Management Plan 2016–2021; Draft Black Sea River Basin Management Plan 2016–2021; Draft West Aegean River Basin Management Plan 2016–2021; Draft East Aegean River Basin Management Plan 2016–2021.

In 2010, the total volume of fresh water abstracted for economic purposes was estimated at 5,960 billion m^3, of which 5,403 billion m^3 was surface water and 557 million m^3 was groundwater. About 44 per cent of fresh waters in 2010 were from the Danube River and used mainly for cooling in energy production. Since 2006, water abstracted from the Danube River has been reduced and substituted by water from dam reservoirs and other surface waters. The ratio between fresh water abstracted and available freshwater resources determines the water exploitation index. For the period 2000–2010, the index was estimated in the range of 5.4–6.5 per cent (in 2010 it was 5.6 per cent).

In 2014, water abstraction for public water supply systems amounted to 879 million m^3, or 95.2 per cent of the volume in 2013. The reduction was determined by the lower water consumption by households and services, which constitute 84 per cent of total water billed. The volume of total water losses in the public water supply systems decreased, but the share in 2014 was the same as in 2013 – 58 per cent of the water supplied.

Table 6.6: Water abstraction, 2000, 2007-2014, million m^3

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Total gross fresh water abstraction[1]	6 132	6 202	6 425	6 121	5 960	6 385	5 715	5 468	5 376
Fresh surface water	5 338	5 560	5 810	5 536	5 403	5 840	5 149	4 910	4 829
of which:									
from artificial reservoirs	1 886	2 435	2 370	2 357	2 253	2 544	2 290	2 349	2 164
Fresh groundwater	795	642	616	584	557	545	566	558	547
Returned water[2]	22	2	30	6	9	30	20	9	16
Net fresh water abstraction[3]	6 111	6 200	6 396	6 115	5 951	6 355	5 695	5 459	5 359
Non fresh water abstraction[4]	246	2.36	0.56	0.40	0.34	0.35	0.54	0.52	0.44

Source: National Statistical Institute, 2016.
Notes:
1) Abstracted water is calculated as a sum of water abstracted for water supply and self-supply of enterprises (excluding water for hydropower generation). The data source is an exhaustive survey on water supply (irrigation systems and public water supply) and self-supply – a partial statistical survey covering the larger water users (with more than 36 thousands m^3 of water annually). Household self-supply is not included.
2) Returned water is the water abstracted from any source and discharged back into it without use (primarily in mining and quarrying, and construction activities).
3) Net freshwater abstraction is the difference between the gross abstraction and returned water.
4) Including waters that up to 2005 were considered to be transitional waters. According to the classification for characterization of surface water bodies' types in conformity with the Water Framework Directive, in Bulgaria no transitional waters are identified.

Structure of water used by purpose in 2014 is: Agriculture, forestry, fishing – 6.4 per cent, Industry (including cooling waters) -86.3 per cent, Domestic sector (Services and Private household) 7.3 per cent (table 6.7). The common water resources' exploitation index for the period 2010–2014 is 5.3–6.3 per cent, which, according to the accepted limits, means that in Bulgaria there is no stress on aquatic ecosystems. One part of water abstraction is used for final consumption, the other is lost (through leaks, evaporation and other physical means). The estimated losses in the water supply sector (water supply and irrigation systems) in 2014 are 16.1 per cent of net freshwater abstraction in the country, or 1.9 per cent less than the annual average for the period 2010–2013.

At the same time, abstracted water is used for mining and manufacturing industries (production of food products, beverages, paper, paperboard and other paper articles). In absolute volume, the most significant increase was in the water used for cooling processes in energy production, which was obtained through self-supply.

In addition, in 2014, a total of 24.5 billion m^3 raw water (44 per cent more than in 2013) was processed for hydropower production.

In 2014, 0.6 per cent of the population suffered from restrictions in their access to water (mainly in the Severozapaden region), and the amount of drinking water supplied to households was reduced, from 99 l/day/inhabitant in 2013 to 96 l/day/inhabitant in 2014. Regional data show that, in 2014, the highest consumption of water was registered in households in southern Bulgaria – an average of 101 l/day/inhabitant, while in northern Bulgaria it was 15 litres less. Households living in the villages consumed 87 l/day/inhabitant, and those in the cities, 12 litres more.

There has been a reduction in water consumption by manufacturing industry, probably because there has been a reduction in industrial activity. On the other hand, there has been an increase in water consumption for agriculture and some water consumption in other industrial activities is beginning to occur.

Water use for hydropower

The amounts of water used to generate electricity through HPPs is not real consumption, since these waters flow back into the river. However, hydropower stations constitute serious pressures on the hydrological regime, expressed in a significant reduction in the volume of water/runoff in the river stretch between abstraction and discharge at the HPP, the violation of continuity of the river, change of the water level in the river, changing velocity/impounding upstream of the site of abstraction and change of the flow regime downstream (seasonally and interannually).

Table 6.7: Water used by economic activity, total for the country, 2000, 2007-2014, million m^3

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Total water used1	4 817	4 933	5 168	4 911	4 821	5 178	4 559	4 477	4 506
Agriculture, forestry, fishing	235	258	291	326	309	348	296	296	289
Industry - total	4 178	4 323	4 530	4 245	4 180	4 497	3 927	3 841	3 887
of which									
a) Mining and quarrying	56	42	55	21	35	29	30	31	32
b) Manufacturing industry	527	354	328	239	220	210	210	194	199
c) Production & distribution of electricity, heat and gas	3 591	3 925	4 143	3 964	3 897	4 244	3 667	3 578	3 625
d) Construction	4	3	3	4	5	3	3	2	2
e) Other industrial activities	0	0	1	17	24	11	17	36	29
Services	111	74	76	68	68	66	66	80	79
Private households	294	277	271	271	264	266	271	261	251
Public water supply2	468	402	398	385	371	370	375	388	366
Self- and other supply3	4 349	4 531	4 770	4 525	4 450	4 808	4 184	4 090	4 139

Source: National Statistical Institute, 2016.
Notes:
1) Source of data: NSI – exhaustive survey on water supply (irrigation systems and public water supply), and partial statistical survey covering larger water users (of more than 36 thousand m^3 of water annually). Water used for hydropower generation as well as self-supply of households is excluded. The allocation by industrial activity is based on reported data and balance calculations.
2) Data calculated by industrial activities – based on the structure of economic activities of surveyed users.
3) "Other supply" includes water delivered by irrigation systems and raw and wastewater transferred between enterprises.

In the Danube River Basin, the water used for the cooling operation of the Kozloduy NPP constitutes a relatively high proportion of all the water used for cooling in the production of electricity. Most of these waters are discharged back into the river and their negative impact on the water body is expressed mainly in an increase in temperature downstream of the point of discharge.

The greatest burden on rivers from HPPs is found in the upper and middle reaches of the Iskar River, the upper reaches of the Augusta, Vit, and Osam Rivers and the upper and middle reaches of the Yantra River. There is no pressure from hydropower in the river valleys of the Ruse Lom and Danube Rivers. Since the introduction of restrictive measures in the RBMPs and Water Act, there is a significant reduction in the number of permits issued for construction of new HPPs. The East Aegean RBMP 2016–2021 shows that there are 42 rivers affected by pressure from HPPs on surface water bodies in the district and the length of the river affected varies between 3 per cent and 94 per cent.

Municipal wastewater

According to the 2011 Population Census, as of 1 February 2011, the total population was 7,634,570 inhabitants, of which 5,339,001 (72.50 per cent) were in urban areas and 2,025,569 (27.50 per cent) in rural areas.

The whole territory of the Danube River Basin and Black Sea River Basin were declared as a sensitive area. Accordingly, in those regions, all municipalities with more than 10,000 population equivalent (PE) must ensure a wastewater infrastructure with more advanced (tertiary) treatment. Action plans for municipalities have been prepared, together with an assessment of the current wastewater infrastructure and investments in this field.

By the end of 2010, the requirements for the collection of wastewater were fully implemented in 86 per cent of the agglomerations with more than 10,000 PE and 51 per cent of those with 2,000–10,000 PE. Sixty-seven per cent of wastewater in agglomerations with more than 10,000 PE, and 13 per cent in those with 2,000–10,000 PE, was treated in WTTPs.

In 2014, around 442 million m^3 of wastewater was generated from point sources and 3,003 billion m^3 from cooling processes (together accounting for nearly 76 per cent of the water used). The total volume of wastewater discharged by enterprises, urban WWTPs and public sewerage systems (including by rain and from other non-point sources) into water bodies in 2014 is estimated at 768.5 million m^3 (without cooling water). About 70 per cent of water volume is treated in WWTPs with predominantly secondary and tertiary treatment (67 per cent in 2010).

In the period 2010–2014, 23 new and modernized urban WWTPs were put into operation with a total capacity of 1,116,000 PE. In 2014, 89 urban WWTPs were operating, of which 56 had secondary treatment and 24 had more stringent treatment than secondary. The population connected to WWTPs increased from 47.8 per cent in 2010 to 56.8 per cent in 2014. The share of the population connected to wastewater discharge services increased from 70.6 per cent in 2010 to 74.9 per cent in 2014 (table 6.8). Wastewater generated from households in 2014 represented 61.6 per cent of total wastewater. Most of it was collected in public sewers and 72.4 per cent of this was treated in WWTPs.

Sludge from wastewater treatment plants

In 2013, the quantity of sludge resulting from WWTPs was nearly 52,500 tons of dry matter and this is estimated to grow to between 95,000 and 125,000 tons of dry solid sludge in 2020. Disposing of the sludge into landfills is the usual solution applied by WTTPs in many regions to date. A major problem with this is that with the sludge a huge amount of water also gets transported and that some of the landfills at regional level are not designed to handle large amounts of sludge safely. In 2011, 32 per cent of the sludge produced was disposed of in landfills, 61 per cent was sent for use in agriculture and 7 per cent was temporary stored in facilities.

Most of the WWTPs investigated process up to 15 per cent of industrial wastewater (mainly from restaurants and from the food industry), which can have strong negative effects on the sludge quality.

Industrial wastewater

The volume of wastewater discharged without treatment decreased from 329 million m^3 in 2000 to 146 million m^3 in 2014 (table 6.9).

Table 6.8: Population and wastewater services, 2000, 2007-2014, percentage

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Population connected to WWTP1	36.9	42.3	43.9	45.3	47.8	55.8	56.1	56.4	56.8
Primary treatment	0.8	2.6	2.6	2.6	2.7	2.2	2.2	1.9	2.0
Secondary treatment	36.1	39.1	40.8	42.2	18.3	19.2	19.2	19.3	20.4
More stringent treatment	0.0	0.5	0.5	0.5	26.8	34.5	34.7	35.3	34.4
Population connected to urban wastewater collecting system without treatment	29.8	27.4	26.0	25.1	22.9	18.3	18.3	18.3	18.1
Population connected to urban wastewater collecting system – Total	66.7	69.7	70.0	70.4	70.6	74.1	74.3	74.7	74.9
Independent wastewater treatment[2]	33.3	30.4	30.0	29.6	29.4	25.9	25.7	25.3	25.1
Total connected to wastewater treatment	**70.2**	**72.6**	**74.0**	**74.9**	**77.1**	**81.7**	**81.7**	**81.7**	**81.9**

Source: National Statistical Institute, 2016.
Notes:
1) Included are WWTPs (urban and other) treating wastewater from settlements. WWTPs are classified according to the available technology of treatment. Since 2010, WWTPs with removal of nitrogen and phosphorous integrated into secondary treatment have been classified as performing more stringent treatment. The population whose wastewaters are periodically transported by truck to WWTPs is not included.
2) Population using own/independent treatment facilities (septic tanks, cesspools) is calculated as the difference between total population and population connected to public sewerage systems.

Table 6.9: Generation and discharge of industrial wastewater, 2000, 2007-2014, million m^3

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Total wastewater generated	329.0	219.0	204.0	172.0	172.0	154.0	147.0	154.0	146.0
of which:									
Mining and quarrying	23.0	23.0	19.0	16.0	19.0	12.0	11.0	14.0	13.0
Manufacturing industries	248.0	150.0	135.0	99.0	101.0	91.0	85.0	88.0	87.0
Production and distribution of electricity, heat and gas	56.0	44.0	48.0	55.0	50.0	47.0	34.0	26.0	24.0
Construction	0.9	2.0	1.2	1.3	2.1	0.6	1.0	0.7	0.9
Wastewater discharged into water body	246.0	183.0	174.0	146.0	147.0	131.0	125.0	110.0	105.0
of which:									
Wastewater discharged without treatment	104.0	74.0	75.0	74.0	72.0	69.0	64.0	44.0	40.0
Discharged to WWTP	142.0	109.0	99.0	72.0	75.0	61.0	61.0	66.0	65.0

Source: National Statistical Institute, 2016.

Photo 6 : Tramway in Sofia

Nutrient pollution

The results of monitoring of water bodies in the periods 2004–2007 and 2008–2011 show a steady and stable improvement of water quality and lowering of nitrate concentration. The last reports, dating from 2013, show a rise in nitrate concentration in surface waters compared with 2012. The concentrations in groundwater persist at above 50 mg/l. In some places in the Danube Basin area concentrations of up to 140 mg/l have been measured, while in the East Aegean Basin in unconfined aquifers they reach as high as 230 mg/l. Worst of all is that in the lower layers of the groundwater the nitrate concentration extends up to 120 mg/l. These aquifers are the only sources of drinking water in a hazardous situation, and emergency measures should be taken to improve the situation.

Degradation of surface and groundwater bodies is due to the insufficient number and capacity of WWTPs, environmentally outdated land use and industrial activities. However, WWTPs that remove nitrogen and phosphorus serve only about 34.7 per cent of the population and 29.4 per cent of the population uses septic tanks only. The use of septic tanks is considered to fit into the narrow definition of sanitation in rural areas.

Overall improvement in the monitoring of nitrate in groundwater has been attained by the extension of the network from 139 to 413 monitoring points where the nitrates are measured and analyzed four times per year.

Hydromorphological alterations

Hydromorphological pressures affect a large proportion of watercourses in the river basin districts. These pressures come from reservoirs, embankments, river regulation works, water diversion, and large-scale water abstraction and restitution. It is mainly dams that interrupt longitudinal continuity. The reservoirs were built to serve multiple purposes: for industrial water supply, energy production, flood protection, irrigation and fisheries.

Water abstraction and restitution produces significant morphological alterations, which are reflected in variations in the characteristics of the watercourse where water intakes and discharges of water are positioned. One significant impact is navigation on the Danube River, which changes the morphology of the riverbed. Navigation, especially the dragging of the riverbed, produces a number of significant hydromorphological impacts on this ecosystem.

Navigation

At this stage, the Danube River Basin Directorate does not have sufficient information to assess the extent of the impact made by shipping on the ecological and chemical status of the river. A programme is in place

to monitor the concentrations of oil products and other potential pollutants from shipping in the river but no data are available on the deterioration of the ecological and chemical status of the river due to pollution from shipping. Typically in the Black Sea, the introduction of invasive species through ship ballast water from other ecological regions has already seriously changed the ecosystem and continues to be one of the main threats to the Black Sea (chapter 9).

The cumulative effect of the entry of these species into the Black Sea ecosystem, and the gradual displacement or disappearance of other native plant and animal species due to their deployment, should be kept in mind. Such alien (invasive) species imported into the Black Sea include: *Mnemiopsis leidyi* (*Mnemiopsis Lady* jellyfish), detected in 1900; *Mya Arenaria* (white clam), detected in 1973; *Anadara inaequivalvis* (*Anadara* clam), detected in 1984; and *Rapana venosa* (*Rapana*), detected in 1956.

Landfills

Existing landfills that do not meet legal environmental requirements still create a risk of contamination of surface waters and are considered to contribute diffuse pressures on them. These landfills are subject to closure, enabling technical and biological recovery of the waters (chapter 8).

Mines, quarries, contaminated places

There is a significant number of mines and quarries: 10 metal ore mines, two further metal ore mines in liquidation, three coal mines, one uranium mine in liquidation and six other mines and quarries. In the East Aegean Basin, extraction of inert materials has affected 1.34 per cent of the total number of affected water bodies. In the country overall, water bodies affected by extraction of inert materials represent 16 per cent of the total.

Warehouses for pesticides

Generally speaking, the RBMPs 2016–2021 contain information on the number and capacity of warehouses storing pesticides. For example, the West Aegean RBMP identifies a total storage capacity of 837 tons of pesticides. The Danube RBMP does not specify the geographical location of such warehouses in the territory, which is why data cannot be linked precisely to the status of surface water bodies.

Other diffuse pressures

The Danube RBMP 2016–2021 analyses pressures from diffuse sources, including agriculture, agglomerations without sewerage systems, mining (mines, quarries, gas fields) and land with a high degree of susceptibility to erosion. After analyzing the diffuse pressure on each groundwater body it was found that 32 groundwater bodies (64 per cent) are impacted upon by diffuse sources. The main drivers that give rise to diffuse pollution are agriculture and agglomerations without sewerage systems.

6.3 Water supply to households and drinking water quality

By European standards, Bulgaria has a high rate of access to piped water (99 per cent of the population) (table 6.10). More than 5,000 towns and villages are covered by centralized water supply systems, with a total pipe length of more than 75,000 km. Only two districts in Bulgaria have less than full coverage from centralized piped water. Variations in the quality of drinking water supplied in some regions of the country are mainly due to the lack of water treatment plants and modern facilities for disinfection, obsolete water supply networks, and water sources affected by pollution from anthropogenic sources or of natural origin. While the microbiological problems can be solved immediately when they occur, the contamination of drinking water with nitrates, manganese, arsenic and chromium requires significant investment and more time.

Variations in the parameters of drinking water quality and the introduction of seasonal water regimes are common in rural areas, which occupy 54 per cent of the territory of Bulgaria and serve 37 per cent of the population. Public water utilities reported relatively high losses of water, which include physical losses during transport, unauthorized consumption and measurement errors. From 2000 to 2014, total losses decreased from 731 million m^3 to 513 million m^3, but perceptually total losses only decreased from 61.0 to 58.3 per cent of total water input to the system (table 6.11). In the period 2000–2009, drinking water treatment was, on average, 57 per cent disinfection only, 1 per cent precipitation and disinfection, and 42 per cent in drinking water purification plants. In the period 2010–2014, it was, on average, 53 per cent disinfection only, 3 per cent precipitation and disinfection, and 43 per cent in drinking water purification plants.

Table 6.10: Population and water supply, 2000, 2007-2014, percentage

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Population connected to public water supply	98.6	99.0	99.0	99.0	99.1	99.2	99.3	99.3	99.3
Population connected to drinking water purification plants	41.2	44.7	45.5	46.0	46.3	47.3	47.6	47.9	48.1
Population with water supply regime	21.8	6.3	4.6	3.3	1.0	3.0	4.5	2.9	0.6
of which:									
Seasonal (less than 180 days)	18.3	4.3	4.6	3.2	0.9	3.0	4.3	2.8	0.5
All year (more than 180 days)	3.5	2.0	0.1	0.1	0.1	0.0	0.2	0.2	0.2

Source: National Statistical Institute, 2016.

Table 6.11: Water losses, 2000, 2007-2014

	2000	2007	2008	2009	2010	2011	2012	2013	2014
Million m^3	732	641	626	601	572	564	572	536	513
Per cent	61	61	61	61	61	60	60	58	58

Source: National Statistical Institute, 2016.

Table 6.12: Drinking water quality compliance rates for selected indicators, 2010

	Large Zones	Small zones			
	(> 1 000 m^3/day)	**III**	**II**	**I**	**0**
Arsenic	100.00	94.40	100.00	98.93	100.00
Nitrates (source)	98.41	89.95	90.94	90.03	97.05
E. coli	98.01	96.39	95.80	92.41	88.95
Turbidity	95.47	98.87	99.17	98.54	96.81

Source: Strategy for Development and Management of the Water Supply and Sanitation Sector in the Republic of Bulgaria 2014–2023.

Nevertheless, in 2013, Bulgarian tap water quality generally met the requirements for safe drinking water. For the larger drinking water zones, typically with more than 5,000 inhabitants or more than 1,000 m^3 of water supplied per 24 hours, Bulgaria meets the tap water quality criteria in more than 95 per cent of cases for microbiological, physical, chemical and organoleptic indicator parameters. Notwithstanding this success, there are quality issues in some, mainly smaller, drinking water zones, where microbiological non-compliance exceeds 5 per cent (table 6.12). In some of the larger, as well as smaller, drinking water zones non-compliance relates to nitrates, manganese, organoleptic indicators such as turbidity and colour, as well as some of the microbiological indicators. This type of non-compliance typically occurs in small water supply systems that do not have full treatment facilities, and where water is supplied to the population directly after only disinfection.

6.4 Protection of the Black Sea

The environmental status of the Black Sea depends to a large extent on pollutant inputs from upstream countries (particularly for N and P loads). Diffuse agricultural sources, especially from chemical fertilizer use in upstream countries, along with inadequate operation of WWTPs, represent a major input. Future economic development in the Danube River Basin District would increase nutrient loads from agriculture, industry and settlements and will produce a risk of failure to attain environmental objectives unless effective measures are taken.

The Convention on the Protection of the Black Sea Against Pollution, which entered into force in 1994, provides a regional cooperation framework to protect the Sea against pollution (chapter 4). In 2009, an updated Black Sea Strategic Action Plan for the Rehabilitation and Protection of the Black Sea was adopted by all littoral countries. The Plan aims to resolve transboundary environmental problems. It contains realistic targets, including legal and institutional reforms, as well as suggestions as to the necessary investments to solve the main environmental problems identified by the Black Sea Transboundary Diagnostic Analysis report published in 2007. The key transboundary challenges of the Black Sea region are: eutrophication/nutrient enrichment; changes in marine living resources; chemical pollution (including oil); and biodiversity/habitat changes, including the introduction of alien species. In order to reduce the pressure on the littoral and territorial waters,

additional measures, linked mainly to reducing the introduction of waste from land-based sources, are planned for the period 2016–2021.

The Marine Strategy of the Republic of Bulgaria was adopted in December 2016 Its development follows the provision for phased implementation of the requirements of the Marine Strategy Framework Directive by providing the necessary information, including funding mechanisms and management decisions.

The Programme of measures to the Marine Strategy brings together measures focused on topics such as eutrophication, preventing the spread of the invasive alien species, reduction of contaminants, protection of the biodiversity, reducing the impact of human activities on the seabed, stimulation of the sustainable use and management of marine resources (connection with the stocks of the Black Sea fish / shellfish), reducing the amount of marine litter on the beaches and in the marine environment, prevent and reduce potential noise pollution influencing the Black Sea mammals. The Programme of measures also include measures concerning:

- Development of innovative biotechnology marine aquaculture production or extraction of economically valuable species;
- Review of areas for dredging and disposal of dredge;
- Restricting generation of underwater noise and energy into the marine environment from offshore installations.

6.5 Bathing zones

During the bathing season, water samples are taken and analysed for two bacteria: escherichia coli and intestinal enterococci, which indicate the presence of pollution, usually originating in sewage, livestock waste or bird faeces. The results of the analysis are used to assess the quality of the bathing waters and to provide information to the public on the quality of water at the bathing sites concerned. The monitoring requirements are taking a preseason sample (shortly before the starting of the bathing season), a minimum of four samples per season and a minimum of one sample per month.

In 2015, of 94 bathing waters that have been reported, 90 are coastal and four inland. Almost 97 per cent of all existing coastal bathing waters met at least sufficient water quality standards and 100.0 per cent of all existing inland bathing waters were of at least sufficient water quality.

6.6 Legal, policy and institutional framework

Legal framework

Water Act

The 1999 Water Act regulates the ownership and management of waters and the ownership of the water development systems and facilities. It also regulates registration of water supply and sewerage associations and water supply and sewerage companies and utilities.

According to the Act, waters, water sites and water development systems and facilities are managed on the basis of RBMPs. These plans are open to public inspection and shall be consistent with other plans within the scope of the relevant territorial level, including functional regional development plans, spatial development, forest management, park management and other such plans.

The municipality's mayor shall be responsible for the implementation of policy related to activities involving the operation, construction, remodelling and modernization of water development systems and facilities constituting municipal property. The programmes of measures included in the RBMPs and flood risk management plans (FRMPs) shall be implemented on a priority basis.

The Act regulates activities related to the abstraction of mineral waters. Basically, abstraction facilities for mineral waters may be constructed by the State or by persons whereon a right to abstraction of mineral waters has been granted through conduct of an open procedure, by means of a new facility according to the procedure established by the Act or an extraction concession for mineral water according to the procedure established by the Concessions Act. Concession royalties, which are adjusted annually, are due.

The Act regulates the issuance of licences and permits for water abstraction, wastewater discharge and construction of infrastructure, as well as the responsibilities of the municipalities and the districts on water and wastewater services. A system of permits for performance of the relevant activities in relation to the use of the waters has been established, the activities being performed on the basis of a written contract in which the conditions for performance and the compensations due are stipulated.

Water abstraction and wastewater discharge are managed under the system of permits and are subject to the payment of a fee fixed by a rate scheduled by

the Council of Ministers. No permit is needed for construction of a well for individual gratuitous groundwater abstraction, subject to the condition that the owner has given advance notice to the relevant basin directorate. A system of permits is also required for the use of water sites and the construction of any facilities that result in an impact on the water site.

The beneficiaries of permits shall annually provide the relevant river basin directorate and, in the case of an integrated permit, the relevant RIEW as well, with the results of the self-monitoring carried out during the preceding year within the framework of the report on compliance within the terms and conditions of the permits.

The fees collected for water abstraction, for the use of water sites and for pollution, as well as the fines and pecuniary penalties imposed for violation of the Water Act, are credited to EMEPA, to be expended on the construction of the networks and the implementation of programmes for water monitoring; the production and updating of the RBMP and the FRMP; activities comprehending protection of biodiversity, control of waters, water sites and water development systems and facilities; and investigations and applied scientific research on topics within the scope of this Act and the Environmental Protection Act.

Some of the amendments to the Water Act from 2015 concern the clear inclusion of the principles of economic regulation such as the principle for the recovery of the costs for water services, including these for the environment and for the resources, and the polluter pays principle. The fees set in compliance with these principles are for water abstraction, for water use and for pollution, as an element from the recovery of resource cost and for the environmental cost and securing the contribution of the different water users to the recovery of the costs for water services.

Water Supply and Sewerage Services Regulation Act

The Water Supply and Sewerage Services Regulation Act regulates tariffs, accessibility and quality of water supply and sewerage services provided by the WSS services operators, and provides for the establishment of a national information system of WSS services. The Act is complemented by several pieces of secondary legislation including: (i) a methodology to regulate the WSS service tariffs; (ii) the long-term target levels for WSS service quality indicators; (iii) terms and procedures to set annual target levels for the quality of such services and the accounting methods for them; (iv) elements and business plan parameters and control procedures for their execution; and (v) methodology and the rules to exercise control over the state of water supply systems in urban territories and analyze the situation thereof, including the total water losses.

Secondary legislation concerning the development and management of the water supply and sewerage sector is in the process of preparation. Priorities are an ordinance on the requirements and criteria for WSS services operators, an ordinance on the procedures for establishment and maintenance of a unified information system and of a register of WSS associations and WSS services operators, and terms of reference of the WSS associations.

Protection Against the Harmful Impact of Chemical Substances and Mixtures Act

The Protection Against the Harmful Impact of Chemical Substances and Mixtures Act regulates the rights and obligations of individuals and legal entities manufacturing, releasing on the market, using, storing and exporting chemical substances on their own, in mixtures or in articles for the purpose of protecting human health and the environment, and the powers of the state authorities exercising control over these activities. It targets the avoidance of contamination of waters with such substances, among other objectives.

Other relevant acts

Other relevant acts that should be referred to, even if they are not as effective in matters concerning water management, are: the 1996 Municipal Property and State Property Act, No. 44, in relation to ownership of water and sanitation assets, the Biological Diversity Act, in relation to activities that may impact on the environment, namely with the issuing of integrated permits and the maintenance or improvement of the water regime; the Environmental Protection Act; the Concessions Act, in relation to the procedures for mineral water abstraction, works concession or service concession for water development systems and facilities and for related water sites, as well as for hydraulic engineering, hydropower, irrigation, water supply and sewerage systems; the 2006 Disaster Protection Act, No. 102, in relation to flood risk protection and protection of groundwater; the 2008 Fisheries and Aquaculture Act, No. 36, in relation to the rights to engage in commercial fishing and other fishery activities and aquaculture; the 2012 Public–Private Partnership Act, No. 45; and the 2013 Spatial Development Act, No. 66, in relation to water sites and flood risk protection (chapter 1).

Most relevant ordinances

Surface water quality assessment was carried out in accordance with the 1986 Ordinance No. 7 on criteria and standards for determining the quality of surface waters, until the entry into force of the 2013 Regulation No. H-4 on characterization of surface waters.

The 2000 Ordinance on emission standards for dangerous substances in wastewaters discharged into water bodies, No. 6, aims at reduction of the harmful and dangerous substances released with sewage. It sets emission values of admissible content of harmful and dangerous substances in sewage discharged into water bodies. The individual emission restrictions provided for in the discharge permits cannot be less strict than those given in the Ordinance. In cases of transboundary waters subject to international conventions or agreements, stricter emission values apply in the permits.

All discharges of sewage into groundwater fall under the scope of the Ordinance. Hence, it provides for emission values for discharges from certain industrial activities and after treatment in urban areas. It also provides provisions for monitoring for compliance with its requirements. In accordance with the Ordinance, all agglomerations of more than 2,000 PE must construct a centralized sewerage network for collection and direction of sewage for biological treatment. The sewerage system may be designed for joint acceptance of domestic, industrial and rainwater or for acceptance of domestic and industrial or domestic sewage only. The 2000 Ordinance No. 7 regulates the conditions and procedures for discharge of industrial wastewater into the sewerage systems of settlements in order to protect the receiving water bodies from contamination with toxic, harmful and dangerous substances.

The 2004 Ordinance No. 8 regulates construction and operation of landfills and other facilities and installations for waste disposal and recovery.

The 2007 Ordinance No. 2 on the protection of waters against pollution caused by nitrates from agricultural sources regulates the procedure and method for identifying vulnerable zones, limits and prevents water pollution by nitrates from agricultural sources and specifies the rights and duties of the competent authorities in this regard. Waters that are polluted or threatened by pollution are identified as vulnerable zones (i.e. areas where seepage or runoff waters are polluted or likely to be polluted by nitrates from agricultural sources). The Ordinance foresees voluntary or compulsory application by farmers of the rules of good agricultural practice to reduce and prevent pollution by nitrates from agricultural sources, which are part of the programme of measures included in the RBMPs.

The 2011 Ordinance No. 1 on water monitoring defines the requirements for the monitoring of water and areas of water protection. It defines the requirements for quantitative water monitoring, lays down technical specifications for chemical analysis and monitoring of water status, and establishes minimum criteria for methods of analysis applied by accredited laboratories in carrying out monitoring of water, sediment and biota, as well as rules for demonstrating the quality of analytical results. The 2011 Ordinance No. 2 regulates requirements for the issuing of permits for discharge of wastewater into water bodies and setting of individual emission limits of point sources of pollution.

Other ordinances are the 2000 Ordinance No. 3 on the definition of protection zones for waters intended for household and drinking water supply, 2000 Ordinance No. 4 on the protection of the quality of waters for support of fish life and shellfish, 2001 Ordinance No. 8 on the quality of coastal waters for their use and normal development of marine and costal ecosystems, 2001 Ordinance No. 9 on the quality of water intended for drinking purposes, 2002 Ordinance No. 12 on the quality requirements for surface water intended for drinking water supply, 2002 Ordinance No. 11 on the management of the quality of bathing waters, amended by the 2008 Ordinance No. 5, and 2007 Ordinance No. 1 on the exploration, use and protection of groundwater from contamination and deterioration.

Policy framework

National Strategy for the Management and Development of the Water Sector

The 2012 National Strategy considers three scenarios (optimistic, realistic and pessimistic) and its forecasts were prepared for three terms: the short term (2013–2015), medium term (2016–2021) and long term (2022–2037). The Strategy analyses the state of the water sector, presents the results of a SWOT analysis, sets goals, develops alternatives and selects a development strategy and an action plan, together with a mechanism to monitor implementation.

Prioritization of issues related to institutional capacity identified the following as problems: the state of the regulatory framework, with its weaknesses and contradictions; relatively low pay in public institutions; a lack of trained professionals with the appropriate profile for the needs of the institutions

managing the water sector; and the unsatisfactory state of the system for vocational education and training of employees in the water sector. As a consequence, there is a quantitative shortage of personnel in key institutions, and there are adverse qualitative and structural characteristics of the staff and poor institutional coordination, especially in the strategic management of the water sector.

Strategy for Development and Management of the Water Supply and Sanitation Sector 2014–2023

The 2014 Strategy for Development and Management of the Water Supply and Sanitation Sector sets out the main objectives and priorities for the water supply and sanitation sector in the country, as well as proposals for the implementation and financing of policies to achieve these objectives within a 10-year horizon. The Strategy integrates findings of consultations and intermediate analyses, including a regulatory review, public expenditure review, and strategic financing plan, produced and discussed with stakeholders. Considering that many WSS assets have a long lifetime, both the expenditure needs assessment and the strategic financing plan were prepared for a 25-year time horizon.

The vision in the Strategy for the WSS sector is to have a financially, technically and environmentally sustainable sector that provides value for money and services that are affordable to consumers, with substantial gains in public health, in the quality of surface and groundwater resources, and in improved public perception of WSS services. The Strategy intends to achieve this vision by balancing interventions aimed at these objectives, well fitted to the sector's situation in Bulgaria.

With the exception of systems in the smaller water supply zones, the water supply systems' coverage is high and drinking water quality typically meets standards, but investment in water supply is far below the level needed to sustain good quality and uninterrupted service in the long run. It is estimated that 40 per cent of the total length of the water transmission and distribution network dates to prior to 1970 and water losses are considered to be high. Renewal and replacement tend to take place in response to breakages rather than according to a proactive system for preventive maintenance. Combined with a low level of investment, this will lead to a water supply system crisis at some point in the future unless maintenance levels and practices are enhanced.

It is considered that EU funds will finance 30–40 per cent of the total WSS capital investments required over the current Strategy period (2014–2020). The remaining 60–70 per cent will have to come from central government sources and own financing by utilities. Limited financial viability and the lack of economies of scale make it difficult for WSS companies (WSSCs) to finance and implement large capital investment programmes. A number of WSSCs do not cover their operating costs. In addition, small WSSCs find it difficult to attract qualified personnel and generate sufficient resources to secure modern technology for the operation and maintenance of WSS assets. This problem is exacerbated when companies have to operate complex WWTPs to meet pollution discharge norms.

Generally, the institutional set-up conforms to good European practice. However, in practice, a number of issues create obstacles to WSS sector development. These include: (i) the complexity and uncertainty surrounding infrastructure asset ownership and management; (ii) a lack of predictability and transparency in regulation of service levels and tariffs, including a tariff setting methodology that assumes that financing is easily available at low or no cost to WSSCs, which is not the case; (iii) political pressure to influence the day-to-day operations of both WSSCs and the Energy and Water Regulatory Commission (EWRC).

At less than 2 leva per m^3, average water and wastewater tariffs are lower than in most other European countries. Taking into account the lower purchasing power of incomes in Bulgaria, however, water prices are closer to the average price in the EU.

National Development Programme Bulgaria 2020

The NDP BG 2020 is the leading strategic and programming document detailing the objectives of the development policies of the country to 2020 (chapter 1). Its vision, objectives and priorities are defined on the basis of a socioeconomic analysis drawn up for this purpose, as well as on the submissions received as result of the public discussions undertaken at each stage of the drafting of the document. The formulated objectives of the government policies are expected to ensure the achievement of accelerated economic growth and raising of the standard of living of Bulgarian citizens in the medium and long terms.

The purposes of (i) achieving sustainable development of the regions and the municipalities and (ii) assessing their influence on environmental matters as a result of the investment and anthropogenic activity, represent an integral part of the policy for integrated regional

and local development. The water-related target areas, as well as the corresponding measures, are:

- Improving the quality and efficiency of water supply services for business enterprises and the population in the regions and aiming at the European standards in this area;
- Sustainably managing water resources in the regions by means of constructing and modernizing sewerage systems and treatment;
- Preventing the risk of floods, disasters and accidents on the territory of the regions;
- Preventing and adapting to the negative impacts of climate change on the water resources and the ecosystems;
- Improving the environment of the Black Sea and the Black Sea coast.

Partnership Agreement for Bulgaria 2014–2020

The Partnership Agreement is the strategic document outlining the framework for the management of European structural and investment funds (ESIFs) in Bulgaria for the period 2014–2020, submitted by Bulgaria and accepted by the European Commission.

It was considered that the water sector needed good governance, achievable by strengthening the capacity of the state water regulator and transferring local authority for implementing regional integrated water projects from municipalities to regional WSS operators. This has already been done with regard to the regulator, but Bulgaria lags behind with regards to the regional WSS operators, as not all are fully functional. The Agreement expresses Bulgaria's commitment to implementing the Action Plan of the Strategy for Development and Management of the Water Supply and Sanitation Sector 2014–2023, allowing investments in the water sector to go ahead.

Support for sustainable exploitation of marine waters and coastal zones, and integrated coastal zone management and maritime spatial planning, including related capacity-building activities as part of a comprehensive national maritime strategy, is also considered a priority.

The Agreement points to the need for Bulgaria to improve the assessment of significant pressures for the second cycle of RBMPs (2016–2021) by developing standard criteria (as opposed to the expert judgements used for the 2010–2015 cycle) specifically addressing the significance of pressure from navigation.

The Agreement allocates almost €450 million to the thematic objective 5 (TO5), "Promoting climate change adaptation, risk prevention and management" and €2,237 million to TO6, "Preserving and protecting the environment and promoting resource efficiency".

Operational Programme "Environment 2014–2020"

As priorities, the OP "Environment 2014–2020" aims at contributing to Europe 2020, the European Commission's strategy for smart, sustainable and inclusive economic growth, and achieving economic, social and territorial cohesion and EU and national legislation in the water and waste sectors, together with supporting actions targeted at the protection of species and habitats included in the National Prioritized Actions Framework for Natura 2000.

Two of the six priority axes are relevant for the water sector. Priority Axis 1 (Water) is about the construction of WSS infrastructure and optimization of water monitoring systems. This includes the purchasing of modern equipment and updating of existing, or drafting of new, strategic documents related to water management. Priority Axis 4 is related to flood and landslide risk prevention and management. It foresees the establishment of a National Real-Time Water Management System and six centres to increase the preparedness of the population for an adequate response to floods; developing or implementing measures related to flood risk prevention and management, including ecosystem-based solutions and measures for landslide risk prevention and management; and organizing campaigns to sensitize the population on flood and landslide risk prevention and management.

The OP earmarks funds for addressing one of the specific challenges mentioned in the Partnership Agreement 2014–2020 – "improving wastewater treatment and drinking water quality and management, in a strategic and cost-efficient way". This would be done through interventions for construction of WSS infrastructure focused on agglomerations of more than 10,000 PE and prioritized in the RBMPs and regional master plans, in order to contribute to the achievement of the objectives of Bulgaria's Strategy for Development and Management of the Water Supply and Sanitation Sector for the period 2014–2023 and National Strategy for the Management and Development of the Water Sector. The OP is also expected to contribute to achieving the objectives of the EU Strategy for the Danube Region, Priority Areas 1 (to restore and maintain the quality of water), 2 (to manage environmental risks) and 3 (to preserve biodiversity, landscapes and the quality of air and soils), as well as the EU Strategy on Adaptation to Climate Change, to name just the most relevant.

Thus, 67.57 per cent of the total EU support for the OP "Environment 2014–2020" are earmarked for investment in WSS infrastructure directed to agglomerations of more than 10,000 PE and for further development of the water monitoring systems, and 4.44 per cent of the total will be used to build adequate infrastructure for flood protection, capable of handling large volumes of water formed in a short time (floods), and infrastructure that could guarantee landslide prevention.

Many of these objectives are not new, as they had been targeted in the OP "Environment 2007–2013", albeit their realization being insufficient as infrastructure projects are time- and funds-consuming. The financial and physical progress of OP "Environment" 2007-2013 is accounted in the end of 2015. According to the final results in the water sector, the physical progress is as follows: 1) Population served by water supply and waste water network or will be served by reconstructed / rehabilitated water supply and sewerage network – 1 205 474 inhabitants with target at the programme level of 1 455 000 inhabitants; 2) New and rehabilitated WWTP – 50 WWTPs with target at programme level of 44 WWTPs.

River basin management plans

The first RBMPs were developed for the period 2010–2015. A second generation of RBMPs for the period 2016–2021 is under way, which consider the accomplished targets and the failures of the first generation Plans.

The status of surface and ground waters is examined at the level of basin management districts, taking into account the information from monitoring of the implementation of the RBMPs 2010–2015 and the preliminary flood risk assessments published on the websites of the river basin directorates. An overview of the results of the monitoring shows that, in practice, they do not provide the necessary amount of information to explicitly determine the status of water bodies. It was established that, if not absent altogether, real measures taken and implemented to improve the status of waters were very limited. In short, there was no deterioration of the status of water bodies but improvements were very limited, far short of the targeted objectives.

Data on the quality of bathing waters along the Black Sea coast point to the insufficient number and capacity and poor maintenance of plants and equipment for wastewater treatment as the main reasons for unregulated discharges and discharges of untreated wastewaters.

The review of the available information on the status of surface and ground waters is very indicative and makes it possible to summarize the existing problems for the entire territory of the country, as follows:

- The implementation of the previous RBMPs has been evaluated for the preparation of the RBMP 2016–2021 and the conclusions about the status of the waters are relatively reliable. The review of the Plans shows that there is a lack of effective methodologies for the characterization of water status, especially as regards surface water bodies;
- Delimitation of water bodies was updated taking into account remarks on RBMP 2010–2015 made by the European Commission, and the register of protected areas was also updated. Areas at considerable risk of flooding were delimited as part of the first stage in preparing FRMPs;
- There are difficulties in determining reference points constituting a basis for comparison for assessment of water status, and a lack of data on some water bodies;
- There are different degrees of coverage of water bodies by the monitoring networks; significant differences in the dimensional characteristics require a specific approach to specification of the monitoring networks for each specific water body.

The current water monitoring regime is more informative in nature and there is no analysis of reasons, causes and sources and no measures for solving the problems. Overall review of the results from the monitoring conducted shows that, in practice, the monitoring does not provide the necessary volume of information for definitively determining the status of the water bodies.

This is mainly because the monitoring network does not cover all the surface and groundwater bodies and all the coastal and seawaters analogously. The monitoring network does not receive information on the parameters required under the 2011 Ordinance No. 1 on water monitoring. The monitoring of hydromorphological quality elements, including data on river flow, fell short of what is needed for a comprehensive assessment of the ecological status of surface waters and the definition of minimum flow needs. The monitoring of priority substances in sediments and biota is lacking. The same applies to an emissions inventory and losses of priority substances and other relevant pollutants. Very frequently, especially when it comes to the development of the RBMP, the "expert assessment" approach is used for assessing the status of water bodies, and this "expert assessment" is not subsequently confirmed, which can be interpreted as deterioration of the status of the water body. The programmes for self-monitoring by water

users do not always contribute, if at all, to determining the emissions contribution of the site. The use of automated monitoring points is very low. The periodic sampling, especially of surface waters, is not consistent with the quantitative data for the respective monitoring point, as a result of which the data obtained from the analyses can be interpreted wrongly. The scope (the number of the monitoring points) of the monitoring network changes frequently.

The risks for the status of water bodies consist primarily of:

- Point sources discharging pollutants in a concentrated manner, in a small segment and in an intense manner (even if these pollutants are limited in term of type and amount). These are primarily discharge points from WWTPs, discharge points of collectors without a WWTP or with an inappropriate technical solution, or discharge points from industrial sources with or without a permit;
- Diffuse (surface) sources, which are difficult to identify in time or, to be more accurate, are identified too late (especially in the case of groundwater) and, consequently, the measures for surmounting them cannot be implemented over a brief time period – even if the source is stopped, the pollution continues to exert an impact on the status of the water for a long time afterwards. These diffuse sources are the fertilization process in agriculture, the lack of sewerage networks in populated settlements, the old landfills without insulating anti-filtration screens and the mining industry.

Flood risk management plans

A preliminary assessment of the risk of flooding from all relevant sources was undertaken. Records show that flooding from rivers and surface water flooding from heavy rainfall are the most common in Bulgaria, going back to the mid-19th century, with hundreds of significant flood events being recorded since 2000. There are fewer records on flooding from seawater and from reservoirs (e.g. dam failures). Floods are one of the main risks that could affect the whole of the national territory and are considered in the National Disaster Protection Plan and the Analysis and Assessment of the Risk and Vulnerability of the Economic Sectors with regard to Climate Change. About 30 per cent of the disasters in the period 1974–2006 were floods. Landslides are another natural disaster which causes serious affects. In the period 1972–1991 there were five catastrophic landslides, mainly originated by heavy rainfall.

The main activities undertaken in the past century to mitigate flooding were connected with river engineering works within urbanized areas and with river engineering works and construction of dikes in agricultural areas. The aim was to achieve more room for cities and more agricultural uses for the developing economy and to protect the nearby territories from floods. Nowadays, many of these facilities are not properly exploited and maintained and they cannot accomplish flood protection aims.

Flood hazard and risk maps are completed for three river basin directorates, the exception being the Danube River Basin. The maps of the Danube River Basin will be elaborated by the end of 2016. The relevant authorities for elaboration of FRMPs are basin directorates; however, they lack methodological support and coordination. For implementing coordination with neighbouring countries, bilateral agreements have been signed and working groups for implementation have been established.

A total of 116 areas in Bulgaria, with a common border length of 3,889 km, have been identified as being at significant potential risk of flooding. This includes 11 areas that have a common border length of 267 km at risk of flooding from the sea and 472 km at risk of flooding from the Danube River. The risk level is assessed using different parameters and is defined in the maps for each area.

Location and risk of future floods were predicted using computer models with data from past flood events. Future floods with a probability of occurrence of 1 per cent or greater were modelled. The potential effects on flood risk of spatial planning policies such as those on land use and infrastructure development have been considered. A national catalogue has been elaborated for selection of priorities, objectives and measures. In the catalogue, for five priorities are identified 17 objectives and 154 possible measures, 115 of them non-structural and 39 structural. A national methodology for cost–benefit assessment has been elaborated and with its implementation the optimization of measure selection will be achieved. When elaborating FRMPs, all plans and programmes connected with spatial planning and land use have been taken into account.

Based on the identified threat and risk for individual flood-prone areas, the following priorities to help solve the problems identified are: protection of human health; a higher level of protection of critical infrastructure and business; enhancing the protection of the environment; improving the preparedness and responses of the population; and improving administrative capacity for flood risk management.

In the context of national priorities and objectives, the choice of a measure is determined by the effect which is expected in the categories "Human Health", "Business", "Environment" and "Cultural Heritage", while avoiding new risks, reducing existing risks, improving endurance and increasing awareness.

The following areas of significant potential flood risk were identified: 104 rivers, 12 areas of surface water flooding from heavy rainfall, 11 coastal zones and 12 dams and reservoirs. Flood hazard and flood risk maps and FRMPs are now under public consultation.

As for flood early warning systems, forecasting information and floods alerts services are organized on two levels:

- National level – collecting daily operational data from some hydrometric stations. Evaluation of modification trends for the next 24 hours. Trends and forecasts are prepared based on expert opinion and they are published as written text;
- Basin level – Flood early warning systems are functioning for the Tunja and Mariza Basins and Arda River.

The planning, designing and establishing of a National Centre for Water Management in Real Time is being considered. The Centre will be a web-based system for monitoring and forecasting rainfall and river flows, including the exploitation of dams, aimed at optimizing dams' discharging for different purposes, as well as ensuring better management of high water and drought periods. The system will be established based on the existing hydrological information system for real time data, which will be duly optimized and modernized with telemetry automatic devices providing the necessary information in real time on the water quantity to the relevant stakeholders and the public. The Centre will provide short-, medium- and long-term hydrological forecasts for the water resources. It will assess the flood and drought risk and will perform activities related to water management and protection from their negative impact, to assist the competent authorities to make timely decisions and to undertake adequate measures. The National Real-Time Water Management System will help to improve flood risk prevention and management, increase the security of the population and prevent human health and environment risks. The OP "Environment 2014–2020" is expected to finance the project.

The implementation of measures to restore floodplains that contribute to the mitigation of floods, as well as building protective infrastructure that contributes directly to enhancing the population's security from floods, are foreseen in the plans. These include activities on restoration of floodplains, activities related to the improvement of water retention, activities related to biological fortification of the banks of water bodies and activities related to risk prevention in urban areas. It is foreseen that OP "Environment 2014–2020" will fund the investment in the required infrastructure.

Regional master plans for water supply and sewerage systems and facilities

The main objective of the regional master plans for water supply and sewerage systems and facilities is to include the development of WSS infrastructure in both short- and long-term planning. Implementation includes the assessment of water supply and sewerage systems, identification of investment needs, and proposal of the most suitable technical options and economically feasible and acceptable opportunities for the development of WSS systems by 2035. Analysis of the price and quality of the WSS services rendered has been worked out and their development forecast, in order to achieve consumer satisfaction, reduce water losses and guarantee good quality of the services at a socially affordable price.

There are 51 regional plans developed simultaneously, which cover the whole of Bulgaria except for the City of Sofia. The project is being implemented by the Ministry of Regional Development and Public Works with a loan from the International Bank for Reconstruction and Development, co-financed by the state budget.

The regional master plans contain a thorough examination of the type and status of the WSS systems, and a WSS services development forecast to satisfy users, reduce water loss and ensure good quality service at a socially affordable price. They identify priorities for the development of WSS systems and facilities in their respective territory, taking into account demographic and socioeconomic development.

The short-term investment programmes contained in the master plans focus on measures that help achieve conformity with the national legislation on drinking and household water supply and the collection, discharge and treatment of wastewaters. The measures identified in the sewerage part have been planned for implementation of the commitments made by Bulgaria with regard to agglomerations of more than 2,000 PE, and the measures in the water supply part aim at achieving full compliance with the legislation concerning drinking water supply.

The elaboration of the master plans started in December 2011. Preparation of the master plans included public consultations with the affected parties to guarantee transparency and protection of the public interest.

All regional master plans have been already developed and adopted in 2014 and 2015.

Other

The National Sludge Management Plan for Bulgaria 2013–2020 foresees the following options for sludge treatment up to the year 2020: 13 per cent co-combustion in cement kilns, 19 per cent co-combustion in power plants, 30 per cent used in agriculture and 38 per cent used to cultivate derelict land.

Institutional framework

Ministry of Environment and Water

The Ministry of Environment and Water is in charge of water management at the national level, assisted by the Supreme Advisory Water Council. Its mission is to preserve the natural resources and to provide a healthy environment for the population. It develops and implements national policy on environment and waters. The Ministry proposes the RBMPs and FRMPs for adoption by the Council of Ministers and develops national programmes in the sphere of protection and sustainable use of waters. It elaborates the state policy for bilateral and multilateral cooperation on the use and protection of waters.

In respect of facilities for abstraction of mineral waters in the public domain, the Ministry approves the exploitation of mineral water deposits and grants the concessions. It designates the sanitary protected areas of abstraction facilities for mineral waters, abstraction facilities located within the boundaries of national parks, the dam complexes and significant dams used for drinking water and household water supply. It also designates vulnerable zones for protection of waters against pollution caused by nitrates from agricultural sources and by nutrients, and drafts the list of priority substances and priority hazardous substances.

The Ministry manages programmes and projects on the environment and water, financed by pre-accession funds, structural funds, the Cohesion Fund and other financial instruments of the EU and other international financial institutions and donors, and is reponsible for providing efficient and proper management of these programmes and projects. The Ministry is the competent authority in implementing the OP "Environment 2014–2020", whose main strategic goal is to improve, preserve and restore the natural environment and develop environmental infrastructure.

Ministry of Regional Development and Public Works

The Ministry of Regional Development and Public Works implements the state policy related to activities involving the operation, construction, remodelling and modernization of WSS systems and facilities in respect of protection against water-related damage and loss within the limits of nucleated settlements. For this purpose, the Ministry drafts a strategy for WSS development and management and submits it to the Council of Ministers. The last such strategic document was approved in April 2014 for the period 2014–2023. The Ministry coordinates and monitors the implementation of the Strategy. It drafts statutory instruments related to WSS management and development for approval of the Council of Ministers.

The Ministry coordinates the management of WSS systems at the national level. It coordinates changes in the boundaries of the designated territiries and ensures the consolidation of the regional master plans for water supply and sewerage systems and facilities into a combined document at the national level to meet the needs of management of the WSS sector.

The Ministry approves programmes for the restructuring of WSS utilities. These are commercial corporations of which the State is the sole owner of the capital and proposes programmes for their restructuring for approval by the respective General Assemblies.

The Ministry determines key benchmarks for the performance of the WSS utilities in accordance with the business plans approved by the EWRC, and monitors their implementation according to the 2003 Regulations Establishing a Procedure for the Exercise of the State's Rights in Commercial Corporations in the Capital Whereof the State Holds a Participating Interest, No. 51.

Ministry of Agriculture and Food

The Ministry of Agriculture and Food implements the state policy related to activities involving the operation, construction, remodeling and modernization of water development systems and facilities in respect of irrigation and land reclamation systems and facilities, and in respect of protection against water-related damage and loss beyond the limits of nucleated settlements.

The Ministry drafts a strategy for the development of irrigation and protection from harmful effects of waters (drainage and protection equipment, and maintenance of riverbeds). This includes the management of dams that have been built for purposes other than those under the control of the (former) Ministry of Economy, Energy and Tourism and the municipalities. The Ministry will take over the management of dams whose municipal owners refuse to or cannot operate them properly and dams whose ownership is not identified.

The Ministry creates and maintains a register of all equipment for irrigation and protection from harmful effects of waters, and approves the proposals for annual and long-term investment programmes and the annual integrated plan for the development of water infrastructure of the irrigation sector.

Ministry of Energy

The Ministry of Economy, Energy and Tourism implements the state policy related to activities involving the operation, construction, remodeling and modernization of water development systems and facilities in respect of hydropower systems and projects.

Functions relating to the implementation of the powers of the Ministry are assigned to the "Dams and Cascades Enterprise", which is a subsidiary of the state-owned "National Electric Company, EAD". The Ministry is the shareholder and exercises the rights of the State in these companies pursuant to regulations on the procedure for exercising the rights of the state in commercial companies with state participation in the capital. The "Dams and Cascades Enterprise" carries out its activities on a contractual basis with the Ministry. The contract regulates the long-term goals of the operator. The Ministry approves the annual programme of the "Dams and Cascades Enterprise".

Ministry of Health

The Ministry of Health monitors the impact of the elements of the environment and the working environment on human health and determines the state policy for health prophylactics, the quality of drinking water and air in the populated areas, noise management, and ionizing and non-ionizing radiation and food safety.

The Ministry acts through its territorial structures, the regional health inspectorates, which participate in the preparation and implementation of strategic planning documents at national and regional levels related to improving the quality of drinking water and bathing waters and the use of mineral waters. The Ministry also has an important role in the development of strategic documents concerning the use and full utilization of mineral waters.

The Ministry prepares reports to the European Commission on the results of ongoing quality monitoring of drinking and bathing waters, as well as measures taken to eliminate disparities and improve quality. As a competent body that performs multifaceted quality control of water for drinking purposes and for the hygienic state of water supply projects, the Ministry maintains an extensive database on the monitoring of drinking water and bathing waters and the state of water supply facilities and networks in the country.

The Ministry periodically makes available to the river basin directorates information about the implemented monitoring and control of surface waters intended for household and drinking water supply and of bathing waters, and on cases where deviation in the quality of water used for human consumption is detected, where there is reason to assume that this is due to the changed status of the water body from which the water is abstracted.

Supreme Advisory Water Council

The Supreme Advisory Water Council ensures coordination of the activities involving the production and implementation of the RBMPs and FRMPs, and the financing and implementation of the programmes of measures, and considers reports from the regional governors on the status of the water infrastructure and the results of control activity in their regions.

It includes representatives of the Ministry of Environment and Water, the Ministry of Regional Development and Public Works, the Ministry of Agriculture and Food, the Ministry of Economy, Energy and Tourism, the Ministry of Transport, Information Technology and Communications, the Ministry of Health, the Ministry of Finance, the Ministry of Interior, the Bulgarian Academy of Sciences, municipalities, NGOs and other not-for-profit legal entities directly involved in water issues. The Board is presided over by the Minister of Environment and Water.

River basin directorates

The river basin directorates implement the state policy for water management at river basin level, based on the 2011 Rules of procedure, work organization and composition of the directorates, No. 7. The directorates are in charge of the development and

implementation of the RBMPs, as well as all permitting procedures and public involvement in water management. Each directorate is assisted by basin councils, which comprise representatives of the state administration, the local administration, water users and not-for-profit legal entities within the scope of the basin, as well as representatives of research organizations concerned with water issues.

The directorates establish the boundaries of waters and water sites jointly with the technical services of the municipalities, map and notify the competent authorities on the location and extent of flood plains and flood risk and promote programmes of measures to reduce the adverse consequences of flooding, develop and update the RBMPs and develop programmes of measures to improve, protect and maintain water status, issue licences under the Water Act and collect the requisite fees, monitor and report on the water bodies and collect fees for the licences issued, and participate in the inventory of emissions, discharges and losses of priority substances and other pollutants at river basin level.

These activities are performed in coordination with the municipal authorities (when spatial planning is concerned) and regional directorates responsible for health (waters intended for drinking water supply) and other authorities, according to the issue at stake.

The directorates participate in the municipal or district councils for spatial planning, submitting a written statement on investment projects for water-related infrastructure for which permits have been issued. They cooperate with the competent authorities for basin management and for flood risk management of other countries in accordance with the state policy for bilateral and multilateral cooperation, and on the statutorily established procedure in international river basin management districts.

The Basin Directorate for Water Management – Black Sea District is in charge of planning, developing, updating and reporting on the implementation of the Marine Strategy and the programme of measures to achieve the good status of the marine environment.

Executive Environment Agency

The Executive Environmental Agency performs the laboratory-analytical work and field tests related to sampling and analysis of environmental samples to ensure the activity of the National Environmental Monitoring System, on request from the river basin directorates, RIEWs and external customers, as well as in response to signals and complaints from citizens, governmental and non-governmental organizations. These analytical works include analyses related to air quality, surface and groundwater, drinking water quality, quality of soil, waste characterization and control of the radiation situation in the country (chapter 3).

The Agency prepares an annual report on the status of waters and publishes a periodic bulletin on the status of water resources on the basis of the monitoring data on the ecological and chemical status of waters and the data on water quantity, and creates and maintains selective databases, maps, registers and a water information system.

Regional inspectorates of environment and water

The RIEWs are administrative structures of the Ministry of Environment and Water in charge of implementation of the state policy for environmental protection at regional level. Their operation is coordinated by the Environmental Policies Directorate of the Ministry (chapter 1).

Within their territorial boundaries, the inspectorates implement wastewater monitoring; control installations generating wastewaters, including the treatment plans of nucleated settlements, and the parameters and implementation of the conditions and requirements in the wastewater discharge permits as issued and the integrated permits issued according to the procedure established by the Environmental Protection Act; control emergency releases of wastewaters; maintain a database of the monitoring data, including self-monitoring of the holders of permits as issued, on the quantitative and qualitative characteristics of wastewaters; control the status of wastewaters; and maintain up-to-date lists of installations that generate emissions of priority and priority hazardous substances, general and specific pollutants. They draft or participate in the drafting of documents on environmental protection and sustainable use of natural resources and implement activities related to national policies at regional level, such as participation in committees, municipal and regional expert councils.

Executive Agency for Exploration and Maintenance of the Danube River

Located in Ruse, the Executive Agency for Exploration and Maintenance of the Danube River under the Ministry of Transport, Information Technology and Communications, carries out the monitoring of the water quantity in the Danube River. It maintains and develops the monitoring network, maintains a database on the Danube River, processes

and controls the information, calculates water and sediment quantities and elaborates operational hydrological forecasts, studies the hydro-morphological and hydrological regime and creates selective databases and maps for the river.

The Agency performs waterway maintenance works, and works on the water areas of ports and winter camps, to ensure the safety of navigation in the Bulgarian stretch of the river. It coordinates all projects and works related to the use of the Danube River and informs the relevant departments and organizations to take precautions when there is danger of flooding, icing and erosion of the banks. It issues permits for dredging and extraction of alluvium deposits from the riverbed if no adverse impact on the conditions for shipping are expected, and also to permit the construction of facilities to ensure the maintenance of conditions for shipping, including the protection of banks and islands in the river.

Energy and Water Regulatory Commission

The EWRC regulates the prices and quality of the services provided by WSS systems operators, regardless of the forms of ownership and management of the WSS systems.

WSS operators develop business plans for five-year periods, which contain production, repair, investment and social programmes, with a technical and economic part for achieving the proposed quality of the WSS services, including reduction of water losses. The business plan shall contain analysis of the expected level of consumption of WSS services for the period, the investment programme, sources and conditions of financing of the investment programme, analysis of the existing and estimate of operational expenditure, depreciation plan, prices and revenues from the WSS services and analysis of the social acceptability of the proposed price of the WSS services. When construction of new, or reconstruction and rehabilitation of existing, networks and facilities of the sewerage system of the settlements is included in the business plans, they shall comply with the Water Supply and Sewerage Services Regulation Act, as well as with the decisions of the respective municipalities.

The Commission approves the business plan proposed by the WSS operator within three months of receiving it, if it meets the Act's requirements. If the proposed business plan, prepared according to the approved guidelines and the previous decisions of the Commission, does not meet the requirements in the technical or the economic part, the Commission gives instructions for respective changes and the WSS operator revises the business plan in compliance with them. The Commissions' decisions may be appealed following the procedure in the Administrative Procedure Code. Once approved by the Commission, the business plan becomes mandatory for the operator and is made public. Consumers may then propose different conditions to the WSS operator, which, if accepted, shall be reflected in their contracts.

The Commission regulates prices through determining the upper limit of prices (price cap) or revenues (revenue cap) upon a regulatory asset base (RAB) and an accepted rate of return, taking into consideration the social acceptibility of the price of the WSS services, the requirements for future capital expenditures and the indices for capital stability. To do so, the Commission determines unified indices for efficiency, which have to be applied at the price formation by the WSS operators. A public hearing preceding the decision by the Commission is part of the procedure. The Commission's decision is subject to appeal before the Administrative Court. Guidelines for the formation of prices of water supply and sewerage services under price regulation by rate of return on capital and the form and content of information needed for pricing was adopted by EWRC Decision No. 54/18.05.2006, and a document model relating to the instructions for the formation of prices of water supply and sewerage services under price regulation by price cap was adopted by its Decision No. 197/01.11.2007. The Commission makes its decisions public on its website.

The methods for regulation of prices, the rules for their formation, reflecting the expense structure, the order for submission and approval of price proposals, as well as the order for provision of information, are determined with an ordinance, approved by the Council of Ministers upon proposal by the Commission (Instructions for the Formation of Prices of Water Supply and Sewerage Services). When an unpredicted or unpreventable event of extraordinary character occurs, a procedure for reconsidering prices shall be opened by the Commission officially or upon the request of the WSS operator, which substantially changes the revenues and the economically driven expenses of the operator.

The WSS operators publish the prices they apply in the newspapers and on their websites. The Commission prepares an annual report on its own activities and the status of the WSS sector and publishes it on its website. The report contains a comparative analysis of the activities of the WSS operators according to the basic parameters of the business plans, the prices of WSS services, the key performance indicators defined by the Commission and their fulfilment (benchmarking).

Enterprise for Management of Environmental Protection Activities

EMEPA is a state funding organization (chapter 2). Its main activity is the provision of financial assistance for the implementation of environmental protection projects in line with national and municipal environmental strategies and programmes. It allocates financial resources to operations and activities in realization of Ministry of Environment and Water policy for protection of the environment. In particular, EMEPA funds operations in waste management, establishment of WWTPs and sewerage networks, and operations for biodiversity protection and restoration.

National Institute of Meteorology and Hydrology

The National Institute of Meteorology and Hydrology within the Bulgarian Academy of Sciences carries out fundamental and applied research, operational activities and development of technologies in the sphere of water quantity and sediment outflow monitoring, including *inter alia* observations of precipitation and water quantity, flood and drought forecasting, sediment transport and hydrological forecasting.

It also provides meteorological forecasts, and forecasts of precipitation, snow melt and floods in connection with water management and protection against water-related damage and loss, undertakes an assessment of the tendencies and develops scenarios for climate change and its influence on surface water and groundwater resources at the national level, undertakes an assessment of water quantity in surface water and groundwater bodies, compiles the national water balances and water development balances, and provides the information and assessments of water quantity required to honour Bulgaria's commitments to report to the European Environment Agency according to the requirements of the relevant reporting guidance. This operational information is to be provided on a daily basis to the Ministry of Environment and Water and to the river basin directorates.

Municipal councils

The municipal councils adopt a programme for the development of WSS services within their territory in accordance with the Strategy for Water Supply and Sewerage Development and Management, the municipal development plan, the programme for implementation of the municipal development plan, RBMPs, and the regional master plans for water supply and sewerage systems and facilities that cover the whole country.

They also adopt programmes for the restructuring of WSS utilities –each of which is a commercial corporation owned solely by the municipality – and express an opinion on their business plans.

The capacity of most of the municipalities is rather insufficient for effective management of WSS services.

Other institutions

The Institute of Oceanology carries out the monitoring of the ecological and chemical status of marine waters.

Water-related information system

According to the Water Act, a single information system on WSS services shall be developed and shall ensure public access of consumers to information on the development and regulation of WSS services, as well as information on the prices of the services provided by WSS utilities, on the benchmarks for reduction of water losses and on the other key benchmarks approved with the business plans of the WSS utilities.

So far, such a system has not yet been developed. Financing for the development of the system, together with the Information System for Water Supply and Sewerage Systems and Facilities (see article 176-179 from the Water Act) has been provided to MRDPW under OPE 2014-2020. The tender documents for the information system elaboration have been prepared and brought in line with the latest changes in the Electronic Governance Act. The public tender shall be launched in 2017.

6.7 Conclusions and recommendations

Bulgaria has one of the highest rates of water abstraction per capita and relies mainly on surface water sources due to the large volumes of water used for cooling in energy production. A continuing trend towards improving the quality of surface waters is reported. Likewise, a gradual improvement in groundwater quality, on most indicators, is being observed. But the status of many water bodies is not yet well aligned with the requisites of the Water Act and water-related legislation. The situation appears to be worse in 2016 than in 2012 but, thanks to recent monitoring campaigns, a more correct assessment of the status of the water bodies has become possible.

The current water monitoring regime has more of an informative nature and there is no analysis of reasons, causes, sources or measures for solving the problems. The results from the current monitoring show that, in practice, this monitoring does not provide the necessary volume of information to definitively determine the status of water bodies. The same situation applies with respect to an inventory of emissions and losses of priority substances and other relevant pollutants, and the programmes for self-monitoring by water users do not always contribute, if at all, to determining the emissions contribution of the site.

Recommendation 6.1:
The Government should continue to reinforce the monitoring of water bodies, in line with the findings of the River Basin Management Plans for the period 2016–2021 and other strategic plans, and predominantly resort to direct methods for the evaluation of the pressures, by systematically using the self-monitoring information, agricultural and industrial statistics, and data provided by municipalities, and by resorting to inquiries to water users.

Probably because there has been a reduction in industrial activity, manufacturing industry has been registering a reduction in water consumption. On the other hand, there has been an increase in water consumption by agriculture and some water consumption in other industrial activities has begun to occur. Public water supply represents a relatively small share of total abstraction (on average, 16 per cent of freshwater abstraction), but focuses the attention as it provides drinking water to 99 per cent of the population.

Recommendation 6.2:
The Government should prioritize water-related investments to improve efficiency of water supply systems and reduce water losses.

The Danube River Basin and Black Sea are of great concern to all riparian states, including Bulgaria. At this stage, the Danube River Basin Directorate does not have sufficient information to assess the extent of the impact of shipping on the ecological and chemical status of the river. A programme is in place for monitoring the concentrations of petroleum products and other potential pollutants from shipping in the river but no data are available on the deterioration of the ecological and chemical status of the river due to pollution from shipping.

Bulgaria has adopted the updated Black Sea Strategic Action Plan. In order to reduce the pressure on the littoral and territorial waters for the period 2016–2021, additional measures are planned, linked mainly to reducing the introduction of waste from land-based sources.

Recommendation 6.3:
The Ministry of Environment and Water should continue monitor closely the ecological and chemical status of the Danube River and adopt measures aiming at the implementation of the Marine Strategy and the Black Sea Strategic Action Plan, including reduction of pressure on these waters, from both economic activities such as navigation and fishing and in-land sources of pollution.

No National Centre for Water Management in Real Time, for monitoring and forecasting rainfall and river flows, including the exploitation of dams, has been established. The Centre would provide hydrological forecasts for the water resources, and assess the flood and drought risk and perform activities related to water management and protection from their negative impact, which would assist the competent authorities to make timely decisions and to undertake adequate measures, increase the security of the population and prevent risks to human health and the environment. Similarly, no centres to increase the preparedness of the population for an adequate response to floods are established.

Recommendation 6.4:
The Government should:

(a) Establish the National Centre for Real-Time Water Management and regional centres to increase the preparedness of the population for an adequate response to floods;
(b) Implement the measures related to flood risk prevention and management, including ecosystem-based approach.

A number of issues create obstacles to WSS sector development. These include the complexity and uncertainty surrounding infrastructure asset ownership and management; a lack of predictability and transparency in regulation of service levels and tariffs, including a tariff-setting methodology that assumes that financing is easily available at low or no cost to WSSCs, which is not the case; and political pressure to influence day-to-day operations of both WSSCs and the EWRC. While it is considered that EU funds will be able to finance 30–40 per cent of the total capital investment in WSSCs required over the current Strategy period (2014–2020), the remaining 60–70 per cent will have to come from central government sources and own financing by utilities. Poor financial viability and the lack of economies of scale make it

difficult for WSSCs to finance and implement large capital investment programmes. A number of Bulgarian WSSCs do not cover their operating costs.

Recommendation 6.5:
The Government should:

(a) Remove the obstacles identified in the strategic plans for water management and water supply and sewerage (WSS) services that are referred to here, namely in regard to tariff-setting methodology;

(b) Allow WSS service operators to recover all costs or have access to subsidies in order to fund capex and opex, including replacements and repairs capex;

(c) Encourage WSS service operators to adopt asset management best practices.

Chapter 7

AIR PROTECTION

7.1 Trends in emission levels

Significant reductions have been achieved in recent decades for most emissions of air pollutants. Emissions from large industrial sources have been reduced by more than 80 per cent for SO_2 and halved for NOx. This is partly the result of the shutting down of obsolete industrial installations, and predominantly the result of applying modern emission abatement techniques and control measures to reduce emissions. NOx reduction was partly compensated for by increased emissions due to the growth of road transport. Emissions of ammonia (NH_3) have decreased although the economic output of the agricultural sector was more or less stable. Other emissions are more or less stable or slowly declining. Emission data are presented in annex III.

Figure 7.1 shows that emissions in Bulgaria have decreased since 2000. The emissions can be linked to economic development, represented by GDP. Over the period 2000–2014, GDP has more than tripled, while emissions of CO_2 have more or less stabilized, and emissions of the major pollutants NOx and SO_2 have decreased. Emissions of dust and particulate matter were more or less stable.

Emissions of POPs such as PCDD/F, PCB, HCB and PAHs have decreased (figure 7.2). This is the outcome of several types of measures, including installing emission abatement techniques in industrial installations, management of waste, and prohibiting the use of chemical substances.

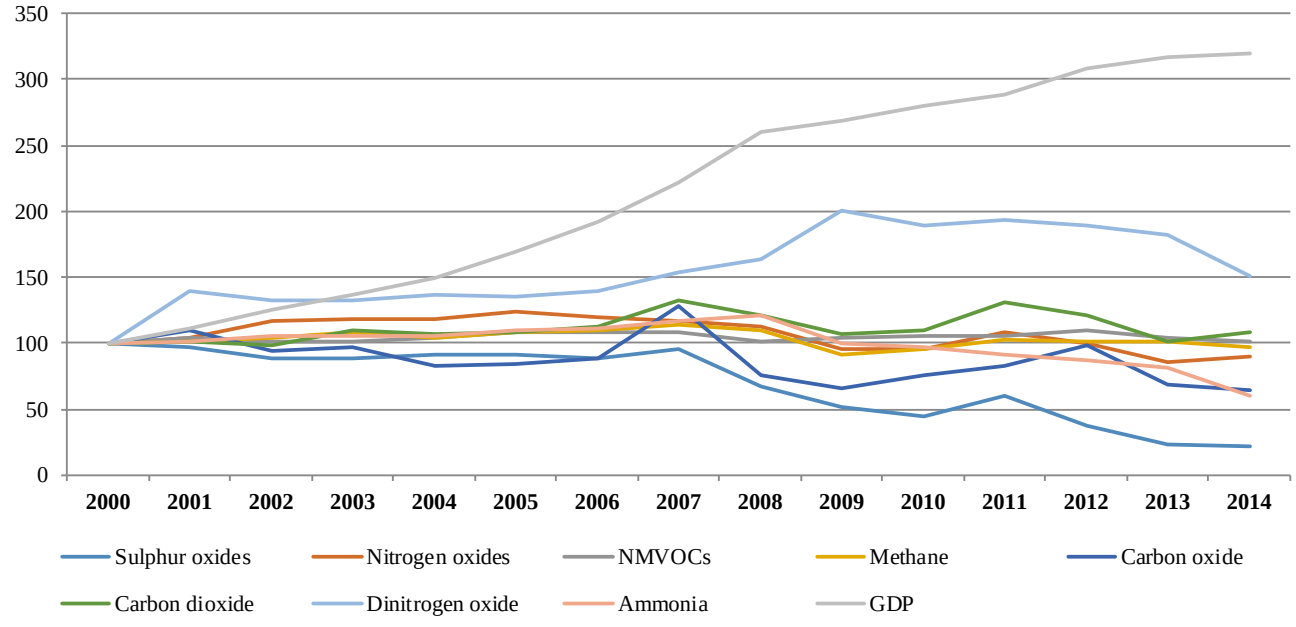
Emissions of particulate matter have more or less stabilized over the last decade (figure 7.3). Emission reductions from industrial activities have been balanced by emission increases from traffic and small scale burning of fossil fuels.

Emissions of the heavy metals lead, cadmium and mercury have decreased. This is the result of applying emission abatement techniques on industrial installations, improved management of waste, and using alternative substances instead of heavy metals.

7.2 Pressures on air

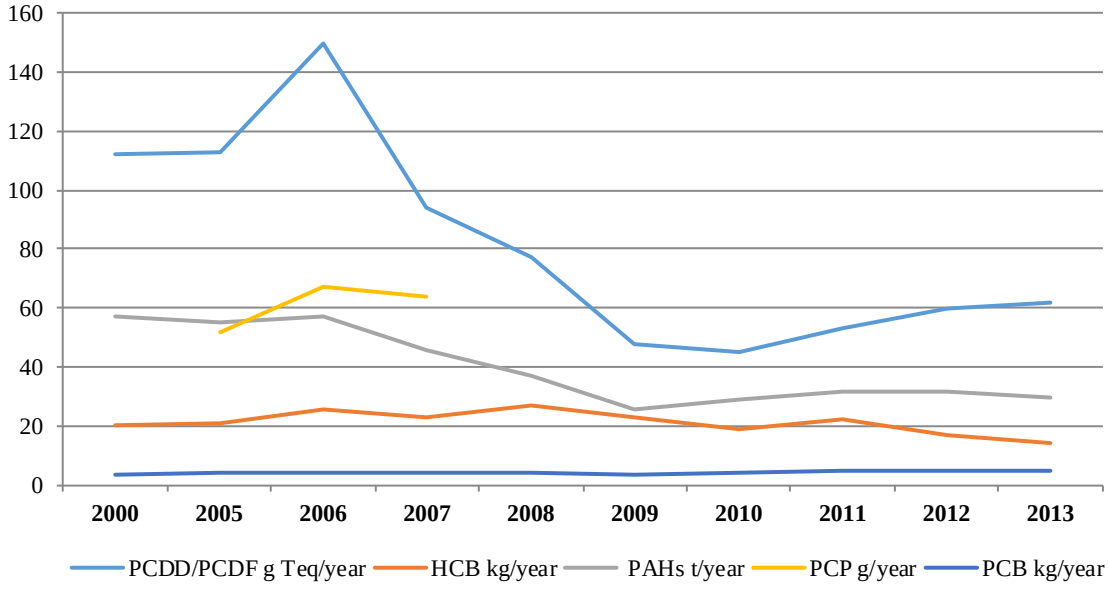
Table 7.1 provides an overview of the emissions in 2014, as reported by the NSI. The table shows that every pollutant has one or two main source categories. It also shows that natural emissions can contribute to overall emissions, especially of NMVOCs and CO_2.

Figure 7.1: Emission trends, 1990, 2000, 2005-2014, kt



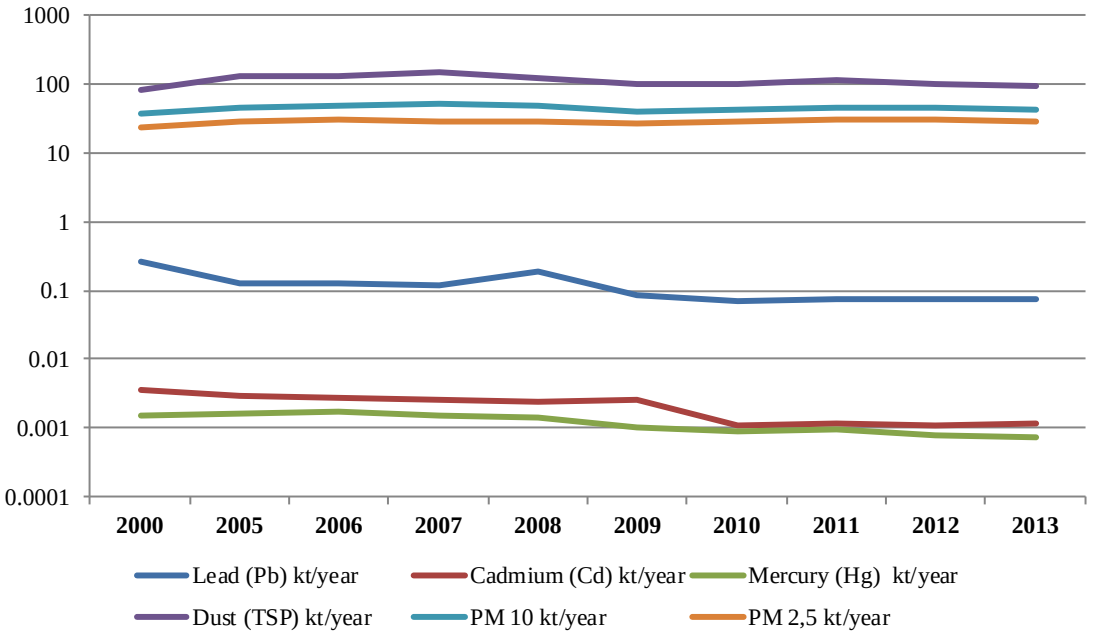
Source: European Monitoring and Evaluation Programme DAB reports to 2013. Source for 2014 and for CH_4 and CO_2: National Statistical Institute, 2016.

Figure 7.2: POPs trends, 2000, 2005-2013



Source: European Monitoring and Evaluation Programme DAB reports to 2013.

Figure 7.3: PM and HM trends, 2000, 2005-2013, kt/year



Source: European Monitoring and Evaluation Programme DAB reports to 2013. For PM and Dust data: National Report on the Status and Protection of the Environment in Bulgaria, 2014.

Agriculture

Agriculture is the biggest source of emissions of ammonia. These emissions have decreased over the period from 2010 till 2013 (table 7.2). Agricultural production was more or less stable over this time. According to the Ministry of Environment and Water this decrease was the outcome of measures to reduce emissions taken for large agricultural installations for livestock farming. The most effective measures include improved handling of manure.

Energy

The production of electric power and industrial power is the main source of emissions of SO_2, NO_x and NMVOCs (table 7.3). Data about emissions of dioxins are not available but it can be estimated that power production using solid fuels is an important source of dioxins.

Table 7.1: Source apportionment of emissions, 2014, kt

	SOx	NOx	NMVOC	CH_4	CO	CO_2	N_2O	NH_3
Combustion process	139.86	42.13	0.08	0.40	1.72	30 805.09	6.53	..
Industrial processes	41.42	31.25	17.77	426.57	26.09	4 103.21	0.09	2.95
Household heating	5.72	3.10	31.11	10.88	188.21	699.19	0.13	0.12
Road transport	0.11	38.83	12.82	1.13	70.64	7 945.24	0.23	0.90
Other mobile sources	0.13	2.73	0.07	0.00	0.68	37.37	0.01	0.00
Solid waste	0.00	0.01	0.10	134.93	0.00	11.26	0.02	0.04
Agriculture	..	3.78	23.87	84.17	1.97	4 535.81	15.26	27.79
Nature	..	0.58	188.89	6.48	26.38	465.60	14.52	..
Total	**187.24**	**122.41**	**274.71**	**664.56**	**315.69**	**48 602.77**	**36.79**	**31.80**

Source: National Statistical Institute, 2016.

Table 7.2: Emissions from agriculture, 2000, 2005-2014, kt

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx											
NOx	3.23	3.62	3.62	3.62	3.42	3.84	3.84	3.35	3.54	3.79	3.78
NMVOCs	18.26	25.49	26.78	28.12	26.68	35.37	32.56	30.61	31.04	31.61	23.87
CH_4	102.77	117.41	126.04	128.97	127.55	94.21	93.38	91.51	89.13	90.77	84.17
CO	1.68	1.88	1.88	1.88	1.78	2.00	2.00	1.74	1.84	1.97	1.97
CO_2	3 877.31	4 344.88	4 344.88	4 344.88	4 099.40	4 608.50	4 608.50	4 024.64	4 246.04	4 551.00	4 535.81
N_2O	5.20	13.54	14.12	15.72	18.28	27.70	24.61	23.55	23.76	23.21	15.26
NH_3	38.96	43.68	45.85	47.97	48.90	38.28	36.37	35.12	34.44	32.49	27.79

Source: National Statistical Institute, 2016.

Table 7.3: Emissions from combustion process, 2000, 2005-2014, kt

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx	834.00	745.00	725.00	795.00	537.00	404.00	345.00	467.00	283.00	142.00	140.00
NOx	49.00	54.00	54.00	63.00	62.00	52.00	50.00	60.00	54.00	40.00	42.00
NMVOCs	0.30	0.30	0.30	0.20	0.10	0.07	0.07	0.08	0.10	0.90	0.08
CH_4	0.40	0.40	0.40	0.40	0.40	0.30	0.30	0.60	0.50	0.40	0.40
CO	2.00	2.00	1.80	2.00	1.60	1.10	1.10	1.50	2.10	1.90	1.70
CO_2 (Mt/year)	29.00	30.00	31.00	35.00	35.00	31.00	31.00	40.00	35.00	29.00	31.00
N_2O	5.20	5.20	5.60	6.50	6.50	5.90	6.30	8.30	7.20	6.10	6.50
NH_3	0.007	0.006	0.005	0.004	0.002	-	-	-	-	-	-

Source: National Statistical Institute, 2016.

The Executive Environmental Agency reports that emissions of dust from power production were 4.8 kt in 2013, which is about 10 per cent of total emissions of primary aerosols in Bulgaria. The formation of secondary aerosols, from the precursors SO_2, NOx and NH_3, is not taken into account. When the formation of secondary aerosols is attributed to power production, it can be estimated that power production is one of the major sources of PM_{10}.

The total consumption of fuel and the fuel mix for electricity production were more or less stable in the period 2000–2015. The use of coal and lignite for power production in 2014 is on the level of 2001, and the use of natural gas decreased by 10 per cent from 2001 to 2014.

Emissions of SO_2 from power production are about 80 per cent lower in 2014 than in 2000. Emissions of other pollutants were more or less stable over this period. The main cause of the reduction in emissions of SO_2 is the application of flue gas desulphurization in the power plants using coal and lignite. The emission limits are based on the EU standards in the Industrial Emissions Directive (2010/75/EU).

Industry

Emissions from industrial activities have been more or less stable over the last 15 years, with the exception of SO_2 and CO_2. Emissions of SO_2 have slowly increased. Emissions of CO_2 have slowly decreased. It could not be established what caused these developments.

Industrial production in Bulgaria in 2014 is on the same level as in 2005 (table 7.4). Emissions of some pollutants (e.g. ammonia and methane) have more or less stabilized. SOx emissions have increased, while emissions of other pollutants (CO and NMVOCs) have decreased sharply.

Reduction of emissions of CO and NMVOCs can be attributed to the use of improved emission abatement techniques. The source of the increased SOx emissions is unclear. The use of sulphur-containing fuels for industrial activities has decreased by more than 50 per cent since 2000, according to NSI data. The SO_2 emissions from industry are relatively small compared with SO_2 emissions from power production. Therefore, the rise in industrial emissions of SO_2 is more than compensated for by the reductions at power plants, and overall emissions of SO_2 in Bulgaria are still decreasing.

The constant level of NOx emissions indicates that technical measures to reduce formation and emission of NOx have not been introduced in industrial power production and processes. Introduction of Best Available Techniques according to the EU Industrial Emissions Directive will require using primary (low NOx burners) or secondary (SCR/SNCR) emission abatement techniques for many source categories.

Transport

Transport is a big source of emissions of NOx and particulate matter. Emissions from the transport sector have decreased over the last decade, with the exception of CO_2 emissions. This indicates that the amount of fuel used remained stable and that the performance of the transport sector remains constant. Reduction of emissions of SO_2, NOx and lead can be attributed to improved fuel quality and the improved quality of vehicles and engine management.

The main emissions from road transport are shown in table 7.5. Road transport is also an important source of emissions of PM. Data on PM emissions from road transport are not available on a year-by-year basis. Monitoring of air quality shows that traffic is an important source of emissions of dust and PM during summer. Over the course of a year, the emissions of particulate matter from household heating is about 10 times the emissions from traffic, according to the National Report on the Status and Protection of the Environment. During summer, when there is no residential heating, road traffic is the most important source of PM emissions. This is confirmed by data from the monitoring network.

A large proportion of emissions from transport occur at surface level in urban locations, which results in high exposure levels for the public. For this reason, emissions from transport have a high impact on public health.

Households

The main source of emissions from households (table 7.6) is residential heating. Other domestic activities that can cause emissions of volatile organic carbons (VOCs) are the use of paints, detergents and cosmetics. Data on these activities are not available.

The most relevant pollutant from residential heating for air quality is particulate matter produced from the use of solid fuels (coal, wood). In the National Report on the Status and Protection of the Environment in Bulgaria, the Executive Environmental Agency estimates that the emissions of particulate matter PM_{10} from domestic combustion were 24 kt in 2014. This makes domestic heating the major source of primary emissions of PM_{10} in Bulgaria. Data from the energy balance 2014 show that the most commonly used fuel for residential heating is renewables (approximately 33 per cent), in particular wood.

Table 7.4: Emissions from industrial production, 2000, 2005-2014, kt

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx	20.94	31.80	34.21	26.70	29.53	29.70	33.33	36.93	35.76	44.15	41.42
NOx	31.60	49.74	45.94	32.71	32.15	22.78	26.13	35.13	26.51	29.06	31.25
NMVOCs	32.91	40.92	37.10	15.76	16.18	17.05	18.11	17.09	17.33	16.97	17.77
CH_4	391.09	454.40	452.93	468.31	458.17	371.47	394.33	449.91	441.69	443.59	426.57
CO	105.28	98.10	100.77	69.92	46.49	21.17	32.33	27.06	24.93	23.51	26.09
CO_2	5 134.58	6 454.72	6 912.39	7 266.07	6 531.34	4 377.50	4 997.97	4 791.27	3 698.12	3 743.55	4 103.21
N_2O	0.13	0.15	0.19	0.11	0.12	0.09	0.08	0.09	0.10	0.10	0.09
NH_3	2.43	2.91	2.70	2.83	2.68	1.82	3.29	3.11	2.69	2.74	2.95

Source: National Statistical Institute, 2016.

Table 7.5: Emissions from road transport, 2000, 2005-2014, kt

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx	1.44	0.85	0.31	0.19	0.31	0.38	0.13	0.12	0.13	0.10	0.11
NOx	46.46	54.12	53.11	47.60	47.69	44.58	41.66	40.14	41.65	36.00	38.83
NMVOCs	30.33	21.09	19.48	18.29	17.45	17.14	15.39	14.88	14.92	12.89	12.82
CH_4	1.41	1.32	1.38	1.34	1.28	1.32	1.31	1.15	1.11	1.02	1.13
CO	188.50	123.76	123.00	109.59	103.78	102.47	92.07	82.02	76.45	65.26	70.64
CO_2	4 955.98	7 081.86	7 497.87	7 223.77	7 681.28	7 646.51	7 429.89	7 463.42	7 769.89	6 858.76	7 945.24
N_2O	0.36	0.22	0.24	0.23	0.25	0.22	0.22	0.21	0.22	0.20	0.23
NH_3	0.30	0.59	0.71	0.73	0.76	0.83	0.81	0.74	0.74	0.77	0.90

Source: National Statistical Institute, Emissions of pollutants in the air from industrial combustible and production processes – Road transport, June 2016.

Table 7.6: Emissions from household heating, 2000, 2005-2014, kt

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx	9.39	9.46	10.12	8.70	8.13	6.72	8.36	9.70	9.49	7.82	5.72
NOx	2.66	3.05	3.27	3.03	3.07	2.97	3.34	3.61	3.63	3.38	3.10
NMVOCs	23.72	27.99	29.69	27.86	28.80	28.56	31.67	33.65	34.11	32.86	31.11
CH_4	9.15	10.48	11.14	10.32	10.54	9.94	11.35	12.39	12.45	11.80	10.88
CO	153.90	178.19	189.21	175.84	180.06	175.74	196.83	210.78	212.99	202.48	188.21
CO_2	1 034.19	1 055.70	1 155.68	1 022.59	960.09	745.24	939.08	1 166.33	1 137.61	933.84	699.19
N_2O	0.10	0.12	0.12	0.12	0.12	0.12	0.13	0.14	0.14	0.14	0.13
NH_3	0.08	0.10	0.10	0.10	0.10	0.11	0.12	0.12	0.12	0.12	0.12

Source: National Statistical Institute, 2016.

The second most important fuel for heating is coal (approximately 7 per cent). The use of solid fuels in small and old heating appliances will cause high emissions of particulate matter. The resulting high levels of air pollution during the heating season are reported by the air quality monitoring network. Based on information from other large urban areas with high levels of PM_{10} from combustion processes, it can be expected that poor air quality during the heating season will have a severe impact on public health. To make a more accurate assessment of the impact of the use of solid fuels for residential heating, more detailed data are needed. It is necessary to have data about the appliances used for heating (individual or district heating, old or new systems), the fuel (waste wood or fresh wood, clean or treated wood) and the location of the emission points of the appliances. These data can be used to feed a dispersion model to calculate the resulting air pollution and to predict the impact of measures to reduce pollution.

Waste

Emissions from treatment and storage of waste make a small contribution to air pollution (table 7.7). The biggest pollutant is methane (CH_4), caused by degenerative processes in landfill sites. The impact of these emissions on air quality is low. However, as a greenhouse gas, CH_4 contributes to global warming.

Nature

Emissions from natural processes can make a significant contribution to air pollution (table 7.8). This mainly concerns emission of VOCs from wood, especially pine trees, and methane from anaerobic processes in soil. These emissions can be reduced by certain measures but in general these measures have a low cost effectiveness compared with measures at other source categories.

7.3 Air quality

For some pollutants, the levels of air pollution in urban areas in Bulgaria are exceeding the national and European standards for shorter and longer periods. According to the National Report on the Status and Protection of the Environment by the Executive Environment Agency, the levels of NOx, lead, CO, benzene, nickel and arsenic are below the air quality limits. For cadmium and SO_2, only a small number of local exceedances have occurred, and for ozone and PAHs the number of exceedances is limited. The overall trend for all pollutants shows a decrease in their levels.

Table 7.7: Emissions from waste, 2005-2014, kt,

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
NOx	0.16	0.18	0.12	0.14	0.10	0.13	0.12	0.20	0.02	0.01
NMVOCs	1.49	1.66	1.15	1.28	0.98	1.25	1.10	1.76	0.25	0.10
CH_4	153.95	151.40	149.57	147.51	148.72	146.40	146.38	144.38	141.06	134.93
CO	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.00
CO_2	54.83	51.57	34.22	42.39	33.28	13.45	9.71	20.09	40.86	11.26
N_2O	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.03	0.04	0.02
NH_3	10.06	8.80	9.53	10.75	10.95	9.73	8.22	7.43	5.95	0.04

Source: National Statistical Institute, 2016.

Table 7.8: Emissions from natural processes, 2000, 2005-2014, kt

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SOx											
NOx	0.86	0.20	0.30	5.93	0.79	0.36	1.02	1.87	3.60	0.97	0.58
NMVOCs	167.07	177.92	179.03	202.32	186.04	185.81	188.35	191.86	198.64	190.19	188.89
CH_4	7.68	5.06	5.07	24.05	6.93	5.47	7.89	10.85	16.55	7.78	6.48
CO	39.04	9.27	13.40	268.91	35.79	16.19	46.31	84.83	163.03	44.00	26.38
CO_2	688.87	163.51	236.56	4 745.46	631.55	285.72	817.32	1 497.00	2 877.00	776.40	465.60
N_2O	13.33	13.54	13.54	14.63	14.69	14.71	14.72	14.70	14.68	14.52	14.52

Source: National Statistical Institute, 2016.

The major remaining topic for air pollution quality management is particulate matter. In almost all regions the threshold values for daily average levels of PM_{10} are exceeded. In about half of the regions and cities yearly average limits are exceeded. The Executive Environment Agency states that the percentage of the population in Bulgaria exposed to excessive levels of PM_{10} (17–41 per cent for the period 2000–2013) is significantly above the European average, reaching 97 per cent of the population. The level of the population exposed is calculated using the EEA methodology. It should be noted, however, that Bulgaria considers that results, particularly with regard to the PM10, do not give a very correct picture of the real situation in the country. For the purposes of determining urban population exposure to polluted air only places with stations for air quality monitoring are used. The percentage of affected population is estimated based on the number of inhabitants, whilst in Bulgaria's case the estimation for PM10 has been prepared for only 26 cities across the country. The position of Bulgaria is that this approach does not take into consideration the majority of the settlements. In addition – the modeling data from the municipal ambient air quality programs show that even in these 26 municipalities not the whole population is exposed to excessive levels of PM10.

In 2010, the European Commission started an infringement procedure against Bulgaria because of high levels of PM_{10} in ambient air in urban and rural areas. The Commission states that: "In Bulgaria, despite a number of measures taken and some reductions in PM_{10} emissions registered at most monitoring points since 2011, the data show persisting non-compliance with the annual and/or daily limit values for PM_{10} in all the country's six zones and agglomerations other than in Varna, which complied with the annual limit value once – in 2009." (http://europa.eu/rapid/press-release_MEMO-15-5162_en.htm).

Air pollution by particulate matter is exceeding the limit values for air quality during the winter period (i.e. the limit value of 50 micrograms/m^3 average per 24 hours). Monitoring data indicate more than 100 days of exceedance each year in the cities, whereas only 35 days are allowed. During the summer, levels of pollution can be high for short periods, but in general the limit values are not exceeded.

Several scientific studies have indicated that most of the occurring high levels of pollution are caused by an unfavourable meteorological situation in combination with high levels of emissions of particulate matter during winter.

Particulate matter, especially PM_{10} and $PM_{2.5}$, can have a severe impact on public health. It was not possible to find information on the costs for society of the impact of air pollution on public health in Bulgaria. Nevertheless, based on cost–benefit studies in other European countries, health and economic benefits of improving air quality are likely to far outweigh the

costs of measures to reduce the levels of particulate matter in ambient air.

Urban areas

The European Environment Agency has estimated that 100 per cent of the inhabitants of urban areas in Bulgaria were exposed to levels of PM_{10} above the EU standards for air quality over the period 2009–2011. The NSI reports that air quality limits are exceeded on half the days of the year in the two largest cities in Bulgaria. Tables 7.9 and 7.10 show that, in the years before 2010, air quality limits for PM_{10} were exceeded in these two cities on many days. This is suspected to have serious impacts on public health.

The Ministry of Environment and Water stated that the situation for some monitoring stations for PM10 had improved in 2015..

The causes of urban air pollution are not fully identified. Domestic heating with solid fuels is suspected to be the largest source of emissions of particulate matter during winter in urban areas. The Ministry estimates that domestic heating is the predominant cause of high levels of PM_{10} in the winter in Bulgarian cities, in combination unfavourable weather conditions.

Along with emissions from domestic heating in winter, it has to be taken into account that traffic can be an important source of emissions in urban areas. Diesel is the predominant fuel for road transport in Bulgaria. The amount of diesel sold annually for road transport is four times the amount of gasoline sold annually, based on sales figures.

The age of vehicles using diesel fuel is important because the diesel engines of cars produced before 2009 (before Euro 5) are not equipped with a diesel particulate filter (DPF) system. Also, trucks built before 2008 before Euro 4) do not have a DPF. The average age of cars in Bulgaria is more than 10 years.

The National Report to the UNFCCC on GHG emissions states that a special feature of the Bulgarian vehicle fleet is its age structure. In 2013, more than 84 per cent of vehicles were more than 10 years old. New vehicles (1 to 5 years old) comprised 4 per cent and 5- to 10-year-old vehicles 12 per cent of the fleet.

According to Executive Environmental Agency data, by 2014, 2,083,640 cars were more than 15 years old and 1,116,747 were more than 20 years old. There are only 78,703 up to 5 years old.

It can be assumed that the situation in 2016 is more or less the same. Thus, more than 80 per cent of the vehicles were built before 2006, meaning that the diesel vehicles do not have DPF systems. The DPF is checked during a vehicle's annual test. It is not clear whether this check includes an emissions test. It is concluded that road transport vehicles using diesel fuel can be an important source of emissions of PM.

Table 7.9: Exceedance of daily average limit value, Sofia, 2005-2009

	2005	2006	2007	2008	2009
Total Resident Population	1148 429	1154 010	1156 796	1162 898	1165 503
Number of days PM_{10} concentrations exceed 50 µg/m3	162	167	195	199	160

Source: Urban Audit City of Sofia.

Table 7.10: Exceedance of daily average limit value, Plovdiv, 2005-2009

	2005	2006	2007	2008	2009
Total Resident Population	341 873	343 662	345 249	347 600	348 465
Number of days PM_{10} concentrations exceed 50 $\mu g/m^3$	149	165	204	208	175

Source: Urban Audit City of Sofia.

Photo 7: Banderitsa River after the illegal catchment for Bansko Ski Resort – polluted and with changed hydrological regime, 2015

Local traffic can be reduced by traffic management in intelligent transport systems (ITS). Traffic management is applied on a small scale in large cities. Emissions by cars driving in urban areas can be reduced by using petrol instead of diesel for small vehicles. Financial instruments are already applied to support the use of cars with high fuel efficiency. The diesel powered vehicles in use can be equipped with a DPF. The use of DPFs can be promoted by implementing environmental zones in cities, by increased use of financial instruments and by strict admission testing of individual vehicles.

Vehicle testing is part of transport policy in Bulgaria. The periodical technical inspection of all road vehicles has been mandatory for more than 30 years. The 1999 Ordinance No. H-32 of the Ministry of Transport, Information Technology and Communications specifies the periodical mandatory technical and emission control of vehicles. The control takes place at public Centres for Technical Control. Public transport vehicles are subject to control every six months and other vehicles annually. The inspection includes proper maintenance of the engine, transmission, etc. and exhaust gas emissions. If the vehicle does not correspond to requirements it is not permitted to be used on the roads.

Scientific research gives support to the view of the Ministry of Environment and Water regarding domestic heating being the most important source of emissions, but also points to other sources of pollution. A study conducted in Sofia by the National Institute of Meteorology and Hydrology shows that levels of PM_{10} are relatively high during winter compared with summer. In this study, the levels of air pollution were combined with meteorological data about wind speed and precipitation.

The measurements in Sofia clearly show that pollution levels are very high on winter days without precipitation and with very low wind speeds. They also illustrate the difference between the summer and winter periods, which can, for the most part, be attributed to the use of solid fuels for residential heating (annex III).

The local climate in western Bulgaria combines low temperatures with low wind speeds. The location of mountain ranges west of Sofia directs air flows from the east towards the urban areas. This causes very low dilution of pollutants that are released in urban areas in Bulgaria.

During cold winter periods, residential heating is, for the most part, based on solid fuels. This causes high emissions of particulate matter, including high levels of PAHs from coal-based fuels. The combination of high emissions and low dilution leads to high levels of pollutants in ambient air.

Along with local sources of emissions of primary particulate matter, other sources can also play a role. Local levels of particulate matter can also be influenced by the formation of secondary aerosols and by long range transport from the north-east.

Air quality data can be used to feed a dispersion model to calculate local air quality. These calculations can be used to predict the impact of measures and actions on the levels of air pollution. In Bulgaria the dispersion models SELMA GIS (Lohmeyer Consulting Engineers) and AERMOD (US EPA) are used by consultants. Municipalities and operators of installations apply air quality modelling.

A dispersion model describing the flow of air for all of Bulgaria could help to define and control sources of PM emissions in Bulgaria and in neighbouring states. The Government does not use models to calculate and predict air pollution on a national level.

In 2015, a study was performed for the EU Joint Research Centre on air quality in the Danube region. This showed that the main source of particulate matter in winter in Sofia is secondary aerosols. These secondary aerosols are the result of chemical reactions in the air between gaseous compounds, mainly SO_2 and NOx or NH_3. According to this study, secondary aerosols contribute about 40 per cent of the PM_{10} concentrations during winter. The sources of SO_2 for the formation of secondary aerosols and of dust can be located several hundreds of kilometres from Sofia.

To prevent the formation of secondary aerosols, the background levels of precursors SO_2, NO_x and NH_3 are to be reduced. This can be achieved by further reductions of emissions from industrial installations, agriculture and traffic. This implies increasing the current effort to implement the EU standards for Best Available Techniques in industrial installations, by fast implementation of emissions standards for vehicles and by measures to further reduce emissions of NH_3 from agricultural activities.

The current policy of the Ministry of Environment and Water is aimed at implementation of the EU standards for emissions from industrial installations. This will lead to further reductions of these emissions and will help to reduce the background levels of pollutants that cause the formation of secondary aerosols.

Road dust contributes about 27 per cent of the PM_{10} concentrations during winter, and biomass burning about 15 per cent.
High levels of PM_{10} during winter can be due to meteorological episodes with temperature inversion in the lower atmosphere and low wind speeds, in combination with the geomorphological situation of cities in Bulgaria. Many cities are enclosed by mountain ranges, which can cause pollution to accumulate in certain areas. In summer, urban air quality is mostly affected by emissions from traffic, mainly from diesel fueled vehicles.

Rural areas

Air quality in rural areas is affected in the same way as in urban areas. Because of the lower population density, the emissions from domestic heating per km^2 are lower, and traffic densities are lower than in urban areas. This results in somewhat better air quality than in urban areas during winter..

Air monitoring and emission inventories

The Executive Environmental Agency operates the national air quality monitoring network of 44 monitoring stations in rural, urban and urban background areas in accordance with the EU Air Quality Directive 2008/50/EC, Annex III (chapter 3). Urban background stations are monitoring stations that are located so that their pollution level is influenced by the integrated contribution from all sources upwind of the station.

Information on certain key parameters, fine particulates (PM_{10}), sulphur dioxide, nitrogen dioxide, carbon monoxide and ozone are used to inform the public on actual air pollution levels. The website of the Executive Environment Agency publishes a daily newsletter containing information in relation to air quality in the country (http://eea.government.bg/airq/bulletin.jsp). This information is also made available on the AQICN website.

The preliminary data from the automatic stations are received in real time in the National Database for Air Quality Control in the Executive Environmental Agency and regional databases in the RIEWs. After checking for accuracy and verification, the final data are published in the quarterly bulletins and the National Report on the Status and Protection of the Environment.

Information on the levels of total dust, PM_{10}, $PM_{2.5}$, benzene, lead aerosols, arsenic, cadmium, nickel, polyaromatic hydrocarbons and some country-specific pollutants such as ammonia, phenol, carbon sulphide and others is presented in the quarterly bulletins and the National Report on the Status and Protection of the Environment.

The data are also used to report to the European Environment Agency, the EU and other international institutions about air quality in Bulgaria.

The emissions from large industrial installations are reported by the operators to the regional inspectorate. These are reported to the Executive Environment Agency, the EU and the ECE, and used for modelling and monitoring of the efficacy of the environmental policy.

Emission inventories are compiled by the NSI. The NSI uses the data from the Executive Environment Agency and the Ministry of Transport, Information Technology and Communications. The NSI uses standard values, calculations and estimates to determine the emissions data for small sources and fugitive sources. It applies emission factors and calculation methods from Corinair. The aggregated data are published by the NSI on its website.

7.4 Legal, policy and institutional framework

Legal framework

Environmental Protection Act

The legal framework for air quality management in Bulgaria is based on the 20026 Environmental Protection Act (chapter 1). Section VI of the law gives the overall framework for air quality management. The Environmental Protection Act specifies the tasks and responsibilities of the national and local administration. The Ministry of Environment and Water is responsible for air quality monitoring, setting limits for emissions and for emission inventories.

The law demands the issue of an integrated permit for large-scale industrial activities, in line with the EU directives. This permit should contain measures according to Best Available Techniques (Art. 123). This provides an important foundation for measures to protect air quality. The law specifies provisions for the monitoring of emissions and environmental quality, and a system of legal penalties.

Clean Ambient Air Act

The Clean Ambient Air Act sets standards for air quality and emission limits, regulates emissions and describes procedures and responsibilities of the administration and stakeholders.

The Act contains a list of pollutants for which the national administration has to set standards. In Article 20 it states the obligation to monitor air quality by measurements. Article 23 also allows the use of dispersion modelling to assess air quality. The law also places monitoring obligations on operators.

The Act obliges the national administration to make plans and programmes and to issue legislation for the implementation of EU directives. Examples are the provisions for fuels that are placed on the market and the obligation for the national administration to make a law to implement the EU Paint Directive (2004/42/EC) that controls placing on the market of certain products containing VOCs.

The Act provides a framework for issuing permits for stationary installations. It describes a system for the application for a permit, the issuing of a permit and inspection and enforcement by the competent authorities. The Act also specifies the obligations and responsibilities of the national and local authorities regarding air quality management. It provides a system of penalties and fines for breaching the rules of the law.

Other legal acts

As the production of electric power and of heat is a major source of air pollution, the 2015 Energy Efficiency Act is also of importance for air quality management. This law aims at improving energy efficiency through financial instruments and through planning and programming of energy savings schemes. This includes a system of issuing energy certificates for buildings, including residential buildings.

The environmental laws are supplemented by regulations and ordinances that give more detailed limits and rules to control emissions and air quality.

Along with ordinances based on environmental laws, other parts of Bulgarian legislation are also important for air quality management, e.g. Ordinance No. H-32 of the Ministry of Transport, Information Technology and Communications (last amendment 14.12.2012), which specifies the periodical mandatory technical and emission control of vehicles.

Policy framework

In the National Development Programme Bulgaria 2020 (NDP BG 2020), a major goal is defined for Bulgarian air quality policy: improving air quality. The NDP BG 2020 has been translated into many national and local programmes and action plans.

As a result of the 1998 National Programme to Phase out the Production and Use of Leaded Petrol, the use of leaded petrol ended in 2004.

The 2007 National Programme for Reduction of Total Annual Emissions of SO_2, NO_x, VOC and NH_3 into the Air implements the Gothenburg Protocol under the LRTAP Convention and the EU National Emission Ceilings Directive (2001/81/EC). Implementation of the programme resulted in substantial reductions of emissions, and emissions of all four pollutants were far below the ceilings in the Directive in 2010 (table 7.11).

The 2011 Second National Energy Efficiency Action Plan aims at promoting energy efficiency. It aims to reduce energy demand, which might have a positive impact on air quality. However, in line with the Energy from Renewable Sources Act, the Plan also promotes the use of renewable energy for domestic heating, including the use of fuel wood. This could lead to emissions of PM_{10}. The Plan also recognizes the problem of burning fuel wood for residential heating. It aims at meeting 15 per cent of the energy demand by other renewable sources such as solar or geothermal, for new buildings. The Plan does not present recommendations or policy options for tackling the use of solid fuels for residential heating in existing buildings.

The Strategy for the Development of Transport Systems until 2020 has a section on ITS. Forty-one municipalities have made plans and programmes aimed at reducing the number of exceedences of the air quality limits. In most cases, this concerns PM_{10}.

The 2014 National Waste Management Plan 2014–2020 tackles emissions from landfills. The Plan presents the ambition to minimize the risk from landfilling to the environment, by discontinuing short-term operations in municipal landfills that do not meet the legal requirements.

By 2020, GHG emissions should be reduced through the closure of and rehabilitation of environmental standards for all landfills. The Plan envisages prevention of the emission of 3,309 million metric tons of CO_2 equivalent by 2020, representing 2.5 per cent of current GHG emissions. It also plans the production of 315 GWh/year of energy generated from the utilization of landfill gas and 36 MW installed capacity by 2020.

The updated NIP for the management of POPs, 2012–2020, presents the policy goals for reduction of emissions of POPs to air. The goal of the Plan is inclusion of conditions for the prevention of POP emissions, including emission limitations, based on Best Available Techniques in integrated permits for combustion installations, metallurgical installations, chemical installations and installations for production of cement clinker.

The Plan also foresees several measures in waste management that can have an impact on air quality: prevention and reduction of the formation of hazardous waste containing new POPs and increasing the percentage share of recycled and recovered waste; reduction and/or total prevention of POP emissions from unintentional production; raising community awareness of the effects of new POPs on human health and the environment; and provision of publicly available information on the risks of POPs.

The National Health Strategy 2014–2020 recognizes the importance of air pollution prevention for public health. However, it does not contain proposals for policy development or measures aimed at improving environmental quality.

Institutional framework

The Air Protection Directorate of the Ministry of Environment and Water is responsible for development and implementation of air quality policies and legislation. The Directorate coordinates the development and implementation of national programmes to improve air quality and of regional and municipal programmes and action plans. The Directorate is involved in setting emission limits for stationary and mobile sources and the fulfilment of obligations in international agreements, e.g. the LRTAP Convention and its underlying protocols.

Table 7.11: Commitment of Bulgaria to reduce emissions of harmful substances, kt

	Emissions	Directive 2001/81/EC ceiling	Gothenburg Protocol ceiling	Objectives under the National Programme adopted by 2007 Decision No. 261 of the Council of Ministers		
	2014	2010	2010	2010	2015	2020
SO_2	189	836	856	380	300	250
NOx	133	247	266	247	247	247
NMVOCs	99	175	185	175	175	175
NH_3	31	108	108	108	108	108

Source: National Report on the Status and Protection of the Environment, 2014.

The Executive Environmental Agency operates a system for issuing warnings of high levels of pollution. Relevant information is provided on the Agency's website. It is based on data from the national monitoring network, which the Agency operates. These data are provided to the Ministry of Environment and Water, the NSI and the municipalities.

The 16 RIEWs have a role in the implementation, execution and enforcement of environmental legislation regarding air quality. They are responsible for the issuing and enforcement of environmental permits and for providing the public, operators and the government with information on air quality.

The municipalities are responsible for drafting action plans and programmes to prevent the exceeding of air quality limits. They are also responsible for traffic planning and public transport, which can have a strong impact on local air quality. The municipalities are responsible for enforcement of general legislation on polluting activities and installations.

The Ministry of Transport, Information Technology and Communications is responsible for vehicle testing and for the admission of vehicle types onto public roads.

Poor air quality has a severe impact on public health. Therefore, good air quality is a very important prerequisite for reaching the goals of the Ministry of Health. However, the Ministry is not actively involved in development of measures to improve air quality or to reduce exposure of the public to air pollution. The National Health Strategy recognizes the relevance of air quality for public health, but there is no link between the National Health Strategy and the plans and programmes for air quality management.

The analysis made by the Ministry of Environment and Water indicated that measures taken so far at the local level would be insufficient. This requires measures to be taken at national level. In this regard, a thorough analysis of the problem in all its aspects is required - environmental, social, financial, technical, legislative and the planning of appropriate, targeted, effective and feasible actions / measures to achieve regulatory requirements. In 2016 an agreement was signed for the provision of advisory services between the Ministry of Environment and Water and the International Bank for Reconstruction and Development on support for the management of air quality.

The purpose of the Agreement is to provide assistance to the Ministry to develop a National Programme for air quality and National Programme to reduce total annual emissions of sulfur dioxide, nitrogen oxides, volatile organic compounds, particulate matter and ammonia into the air, through which to steer the country's efforts to improve air quality, reducing negative effects on human health and achievement of the targets around the emission of harmful substances into the air within the context of the EU policy package on Clean Air.

7.5 Conclusions and recommendations

Air pollution by particulate matter is exceeding the limit values for air quality during the winter period. Most of the occurring high levels of pollution are caused by a combination of an unfavourable meteorological situation and high levels of emissions of PM during winter.

Particulate matter, especially PM_{10} and $PM_{2.5}$, can have a severe impact on public health. However, information on the costs for society of the impact of air pollution on public health is not easily available in Bulgaria.

Recommendation 7.1:
The Ministry of Environment and Water and the Ministry of Health should:

(a) Carry out a cost–benefit study to assess the health and social benefits in the event of a reduction of air pollution by PM in urban areas;
(b) Raise the awareness of the population of the impact of air pollution on health and of the costs induced to health care due to bad air quality.

A dispersion model describing the flow of air for all of Bulgaria could help to define and control sources of PM emissions in Bulgaria and in neighbouring states. This model can be used to predict the impact of measures and actions on the levels of air pollution. However, the Government does not use models to calculate and predict air pollution at a national level. Some tools exist such as AirQ+: software tool for health risk assessment of air pollution.

Recommendation 7.2:
The Government should develop a national air quality model, based on emission and monitoring data, and use it to estimate future trends in air quality.

The composition of particulate matter in Sofia during winter points to domestic heating being an important source of PM_{10}. The composition of dust during winter could be related to the composition of biomass fuels used for domestic heating. To prevent local emissions during the winter, the use of solid fuels for residential

heating is to be reduced. This can be achieved by reducing energy demand, starting with improving the thermal insulation of houses, and by improving the efficiency of heating equipment. Along with better use of solid fuels, a fuel switch is needed. Use of natural gas is an option, but renewable energy can be an alternative. Geothermal energy is well suited for low temperature applications such as residential heating.

Recommendation 7.3:
The Government should:

(a) Promote the use of better heating appliances and the switch to clean fuels;
(b) Improve thermal insulation of houses, starting in large urban areas, to reduce the consumption of fuel during winter.

The main source of particulate matter during winter in Sofia is secondary aerosols, which result from chemical reactions in the air between gaseous compounds, mainly SO_2 and NOx or NH_3. Secondary aerosols contribute about 40 per cent of the PM_{10} concentrations during winter. An effective measure to prevent the formation of secondary aerosols is to reduce the background concentrations of SO_2, NO_x and NH_3.

Recommendation 7.4:
The Government should increase efforts to reduce total emissions of SO_2, NOx, NH_3 and PM from industrial and transport sources in order to reduce the formation of secondary aerosols.

Chapter 8

WASTE MANAGEMENT

8.1 Waste generation and management

Municipal waste

The total amount of municipal waste generated decreased from close to 5 million tons in 2000 to slightly more than 3 million tons in 2014 (table 8.1). The amount of waste generated per capita decreased accordingly, from more than 600 to 442 kg/capita/year. The number of settlements and inhabitants served by collection services increased substantially. Nowadays, 99.6 per cent of the population is covered with waste services.

The number of landfills decreased due to regional cooperation and the closing down of 75 per cent of dumpsites. In addition, the area occupied by landfills reduced by almost half and temporary storage of municipal waste ceased to exist.

These data show a remarkable improvement in municipal waste management in the past 15 years. .

The closing down and rehabilitation of non-compliant landfill sites and the elimination of illegal dumpsites are still in progress. By the end of 2015, this process should have come to an end, since EU funding of the OP "Environment 2007–2013" was available only until the end of 2015. In line with the National Waste Management Plan (NWMP) 2014–2020, a system of 55 new and modern regional landfills together with pretreatment facilities is envisaged in Bulgaria. As of early 2016, 44 regional landfills have been established and 11 more are under construction or planned.

In 2010, the construction of open municipal sites started for the composting of separately collected "green" waste from parks and gardens. In 2011, construction of 23 regional biowaste composting facilities had begun, financed by the OP "Environment 2007–2013". As of early 2016, 29 pretreatment facilities (for separation of plastics, glass, metals, paper/cardboard) and composting facilities for "green waste" (from gardens, parks) have been established along with another six mechanical biological treatment facilities, which also stabilize organic matter before landfilling. As of mid-2016, 60–67 per cent of municipal waste goes into the regional managed landfills.

Packaging

In 2001, the collection of waste such as paper, glass, plastic and metals for recycling was limited to the buying back of separate collected waste from the population or collection of waste generated by different manufacturers. The collection was organized independently of the municipal systems for municipal waste collection on the basis of buying-back centres, and linked to periodic campaigns.

The formal system of separate collection of packaging waste was introduced in Bulgaria in 2004. At that time, only slightly more than one third of the generated packaging waste was recycled, and by 2014 this proportion had reached 61.7 per cent.

At present, four Producers Responsibility Organizations (PROs) for packaging waste are in operation (box 8.1). PROs have to report annually on goal achievement and recycling rates (including recycling rates realized outside the country). In order to get a licence to operate they need to show a minimum territorial coverage and number of inhabitants (500,000). PROs have to spend 5 per cent of their income on public awareness-raising.

The legal requirements are that all settlements with a population more than 5,000 inhabitants and all towns/cities have to be covered; a minimum of 60 per cent by weight of all packaging waste has to be recovered and 55 per cent recycled, with different targets for different materials. The Ordinance for packaging and packaging waste sets criteria for minimum volume and number of bins for source separation and the municipalities indicate the sites for them. So far, PROs are not able to collect sufficient materials themselves and buy additional quantities from private collection centres, where the informal collectors sell what they have collected.

According to the Ministry of Environment and Water, a new amendment to the Waste Management Act was submitted to Parliament to make scavenging of waste illegal. Some waste pickers are part of an organized commercial system. Whether this amendment will solve the issue is doubtful.

Table 8.1: Municipal and construction and demolition waste, 2000-2014

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Generated municipal waste															
Total generated municipal wastes, 1 000 tons [1]	4 998.40	4 772.62	4 714.79	4 690.03	4 619.00	4 501.85	4 387.24	4 172.04	4 485.81	4 442.80	4 067.74	3 572.15	3 248.67	3 135.22	3 192.53
Generated municipal wastes per capita of population, kg/year/per capita [2]	613.34	604.81	600.93	601.19	595.15	583.24	571.31	546.06	589.73	587.38	542.01	487.52	445.97	445.97	441.97
Served settlements															
Served settlements, number [3]	1 190.00	1 295.00	1 361.00	1 465.00	1 801.00	2 388.00	2 780.00	3 128.00	3 445.00	3 988.00	4 238.00	4 364.00	4 431.00	4 556.00	4 578.00
Population in served settlements, 1 000 [4]	6 402.15	6 360.06	6 363.52	6 395.98	6 551.18	6 794.06	6 932.76	7 086.14	7 192.76	7 330.93	7 394.98	7 247.95	7 228.81	7 229.32	7 191.33
Share of population served by municipal waste collection systems, %	78.56	80.21	81.11	81.95	84.19	87.78	90.05	92.51	94.35	96.65	98.15	98.92	99.23	99.51	99.56
Facilities sites for municipal waste															
Landfill sites for municipal waste , number [5]	619.00	663.00	677.00	706.00	633.00	537.00	482.00	435.00	349.00	278.00	172.00	164.00	157.00	144.00	147.00
Landfilled municipal waste, 1 000 tons	3 271.12	3 198.31	3 188.20	3 193.60	3 092.00	3 144.22	2 751.33	2 979.51	3 358.89	3 421.40	3 041.28	2 567.54	2 322.65	1 859.94	1 296.67
Temporarily stored municipal waste, 1 000 tons	.	.	.	.	.	92.72	351.23	343.83	10.53	264.86	0.00	0.00	0.00	0.00	0.00
Delivered for recycling municipal waste, 1 000 tons [6]	775.20	770.11	770.53	774.45	793.24	822.63	839.07	857.63	870.54	887.26	1 002.68	978.95	841.07	270.65	297.93
Submitted for preliminary treatment	.	.	.	.	.	.	.	.	.	.	.	.	.	1 004.58	1 597.93
Collected construction waste at municipal landfill sites, 1 000 tons [7]	.	.	.	.	.	.	.	.	410.02	395.94	379.95	507.66	554.11	998.91	534.08
Area occupied by the landfill sites, decares	7 244.50	7 249.10	7 456.20	7 899.80	7 795.00	7 668.70	23 012.00	6 383.70	6 198.04	5 307.75	4 930.18	5 045.97	4 884.88	5 125.89	3 934.59
Overcapacity of landfill sites, m^3	26 542.73	25 862.47	23 755.77	35 368.66	25 233.66	26 334.77	21 896.95	25 792.52	23 659.94	18 557.89	18 132.43	13 618.23	11 391.12	15 078.58	16 281.28

Source: National Statistical Institute, 2016.

Notes:

1) Data are the result of statistical estimation of the quantities of generated municipal waste from served and non-served settlements. Due to a change in methodology, revisions to the data for 2004–2008 have been made. Temporarily stored waste is excluded from the calculation.

2) For the calculation of generated waste per capita the total quantity of municipal waste from served and non-served settlements is divided by the average annual population.

3) Settlements served by organized municipal waste collection systems.

4) Due to a change in methodology, revisions to data for the period 2004–2008 years have been made. Annual average population has been used in calculating the indicators on municipal waste for 2004–2008 (up to 2003 the annual population at the end of the year has been used).

5) The landfill site in Sofia was closed in October 2005 but opened again in December 2007. The municipal waste collected from the capital city has been transported in an organized manner to sites for temporary storage.

6) The data on landfilled waste are not accurate, since unmanaged landfills do not have weighbridges; therefore, some of the data are estimates.

7) New indicator from 2008 reference year. The collected construction waste at the landfill sites for municipal waste also includes demolition waste.

Box 8.1: Examples of regional pretreatment facilities

The Mechanical Biological Treatment (MBT) facility located in Sofia started operation in September 2015 and has two locations: a composting plant and an anaerobic digestion plant for biodegradable waste, and a Herhoff MBT plant for mixed municipal waste. The MBT plant accepts around 1,000 t/day, adding up to 365,000 t/y. The plant sorts out recyclables and refuse-derived fuel (RDF) for cement plants. As soon as the new district heating plant of Sofia is constructed in 2019, the RDF will be used for district heating in Sofia and will deliver about 10 per cent of the energy of this plant.

A pretreatment facility, composting facility and landfill have been constructed in Pernik. Six municipalities form an association, with Pernik as the leading municipality. The total number of inhabitants is about 136,000 and estimated waste volume is up to 37,000 t/y. Only Pernik and Radomir use the composting plant. The facility has been running since January 2016 and realizes 45 per cent diversion from the landfill. Forty people are employed and the operation of the facility is contracted out to a private company for a period of five years.

Ecobulpack was established in 2004 and has 100 shareholders, who are the producers/importers of packaging, and seven subsidiaries. Ecobulpack serves 35 municipalities and is the second largest PRO for packaging waste. It provides containers for separate collection and sorting in own facilities. Only 10 per cent of its operations are contracted out. Before Sofia started its own pretreatment plant in September 2015, Ecobulpack sorted two thirds of the waste for the city. Ecobulpack employs 1,100 employees and exports recyclables to Belgium, Germany, Greece, Italy, Poland, Romania and Turkey.

The challenge Ecobulpack faces is the clash of two systems: the grey system and the official system. The separate collection bins, which it places on the streets, are not efficient. Hardly any recyclables are collected in them and there is residual waste. Citizens do not use the bins, and if there are recyclables in the bins they are "stolen" by informal waste pickers. In order to reach its targets, Ecobulpack has to buy packaging waste back from private collection shops. The level of citizen participation is very poor. Ecobulpack raised this issue several times, but no changes have been made in the system to date.

There seems to be low awareness and participation of citizens in separate collection schemes. At the regional pretreatment facilities, high percentages of recyclables are sorted out from the mixed municipal waste, without any involvement of the PROs. The Waste Management Act calls for ecostations, to which citizens can bring their bulky waste. These stations are mandatory for settlements larger than 10,000. But only a few municipalities have established these yet. For bulky waste, the municipalities only organize pick-ups during campaigns.

Waste electrical and electronic equipment

Collection targets in 2016 are 41 per cent of the weight of waste electrical and electronic equipment (WEEE) that was put on the market during the previous three years, increasing to 65 per cent (with different recovery and recycling rates for different categories) by 2020. PROs collect on demand, during campaigns jointly organized by municipalities and PROs, at collection sites (private or owned by themselves) and via retailers (old for new). Small WEEE is collected at all retailers. The private collection centres pay citizens and informal collectors for delivering the product. The PROs buy these materials from the private centres in order to meet their targets (box 8.2). Large retail chains issue gift cards to customers who return their old WEEE.

Batteries

Eight PROs are operating and there is one individual scheme just for lead batteries (automotive and industrial). All the PROs have contracts with municipalities. Municipalities determine where the collection bins are to be placed (in kindergartens, schools, retailers, public buildings) with a minimum of one bin per 1,000 citizens.

End-of-life vehicles

Three recovery organizations are mandated to collect and deliver end-of-life vehicles (ELVs) at the licensed centres for dismantling or sites for temporary storage. One individual scheme for ELVs is operating. Funding of organizations is done by collecting licence fees from producers and importers who place vehicles on the national market. The age structure of cars in the country was the same in 2014 as in previous years; more than two thirds of cars are more than 15 years old. In 2014, 81,932 ELVs were transferred to storage and dismantling centres. There is an increase over previous years in the number of ELVs collected. Recovery organizations (ROs) have signed agreements with municipalities for collection of abandoned cars. In cooperation with municipalities, they raise public awareness of environmentally sound management of ELV waste and conduct campaigns to collect abandoned ELVs.

In 2014, at national level, 95 per cent of materials and components of previously treated ELVs were recovered, 3 per cent were disposed of to landfills and 2 per cent were temporarily stored. Of recovered materials and components, 92 per cent were recycled, 2 per cent were reused and 1 per cent were used in other methods for recovery. Part of the temporarily

stored components are designed for reuse. The target reached was 95.04 per cent reuse and recovery and 94.07 per cent reuse and recycling of materials from ELVs.

Hazardous waste

Hazardous waste includes, among other matter, mining waste from offshore activities and hospital waste. One incinerator for hospital waste treats (by concession) all specific hospital waste. Large procurements of hazardous waste tend to have their own disposal or recovery facilities. The three existing cement kilns take hazardous waste and use it as a secondary fuel. Many companies treat hazardous waste on the basis of issued waste management permits or IPPC permits. Hazardous waste that cannot be treated in Bulgaria is exported under the requirements of the Basel Convention and Regulation (EC) No 1013 / 2006 on shipments of waste.

In 2014, 216 million tons of waste were generated, of which 94.41 per cent was non-hazardous waste and 5.59 per cent was hazardous waste. The increase in quantity of the hazardous waste generated compared to 2008 is due to data having been submitted for the first time by the reporting units.

In 2015, Bulgaria signed an agreement with Switzerland to implement two projects by 2019. The first envisages the implementation of five municipal waste collection centres for hazardous household waste and 17 mobile collection points in satellite municipalities. The experience gained in these pilots should be disseminated to the other municipalities to assist them to set up their own system. The second project envisages repackaging and exporting out-of-date biocides/pesticides to Switzerland for destruction. In 2011, the lowest quantities of reported hazardous waste were registered, which corresponded to a decrease of 69 per cent compared with 2010 (table 8.2). The main reason for the decline was the reclassification of "Fayalite waste" from the sector "Metallurgy and manufacture of metal products, excluding the manufacture of machinery and equipment". The decrease in the quantity of hazardous waste generated over the period 2009–2013 is also the result of implementation of the measures envisioned by the respective corporate programmes in relation to the prevention of waste generation and to decrease the content of hazardous substances in waste. The termination of the activities of several large industrial enterprises also influenced the total quantity of generated hazardous waste.

The main source of hazardous waste is the processing industry, with its share ranging between 90 and 99 per cent. Of the individual subsectors of the processing industry, Metallurgy comprises the largest relative share in hazardous waste generated, followed by the economic activities "Production of coke and refined petroleum products" and "Production of chemical products. Production of medicines. Production of products from rubber and plastic". The observed trend shows an increase in the share of hazardous waste for recovery, including for recycling (figure 8.1). Many activities contribute to this, including pretreatment of spent lead–acid accumulators, ELVs and WEEE.

Exports/imports of hazardous waste

Bulgaria has been a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal since 1996. The total amount of hazardous waste exported from Bulgaria fluctuated from 0.3 kt in 2007 to 9.4 kt in 2010 and was 3 kt in 2013, including off-specification medicines, contaminated packaging and absorbents, fluorescent lamps, spent portable batteries and waste chemicals, for which no treatment facilities are available in Bulgaria.

Box 8.2: WEEE PRO

Makmetal Holding JSC (which includes Eltech and Ecobattery) is the largest of the six collective schemes for WEEE and seven schemes for batteries. Its share of WEEE is 47 per cent, of portable batteries 70 per cent, of car batteries 33 per cent and of industrial batteries 20 per cent. Makmetal collects, sorts and recycles WEEE and batteries. Because of the large number of PROs there is stiff competition and low fees for the shareholders.

For batteries there is an obligation to have a minimum of one container per 1,000 inhabitants, and for WEEE at least one collection point per 10,000 inhabitants (usually a retail shop). PROs need to give a bank guarantee to the Ministry of Environment and Water, along with a programme showing their expected activities and overall system, forecasts of volume of waste to be recovered, and evidence of inspection, service and awareness-raising. The PROs have no right to distribute profits (dividends) but have to reinvest in the company or put profits into a fund for contingencies.

Makmetal started with three companies, but since the new amendment to the Waste Management Act one organization can combine these activities; however, it maintains the old structure. Makmetal collects 90 per cent of the materials directly from citizens with a door-to-door collection service organized through a national phone number. Citizens also can deposit their old devices with the retailer when purchasing a new one. Makmetal cooperates with a large chain of retailers that offers citizens vouchers for discarding their old products.

Table 8.2: Hazardous waste generation, excluding household hazardous waste, 2009-2013, tons

	2009	2010	2011	2012	2013
Total	**790 002.5**	**767 048.4**	**293 051.0**	**350 512.2**	**317 511.6**
of which,					
Recovered, incl. recycled hazardous waste	128 173.3	187 571.6	133 538.3	249 009.5	252 393.2
Disposed of hazardous waste	626 384.1	557 635.6	127 222.6	87 397.3	47 905.2

Source: Ministry of Environment and Water, 2016.

The total amount of hazardous wastes imported into Bulgaria in 2013 was 42.5 kt. The most commonly imported wastes are lead–acid accumulators to be recycled in the three accumulator recycling plants operating on the territory of Bulgaria.

Waste oil

Under the provisions of the Ordinance on waste oils and petroleum products, legal persons placing oil on the market provide quarterly information to the Executive Environmental Agency on the quantities marketed, exported and/or sent to the territory of another State. Legal persons are responsible for recovery of waste oils in the quantity of not less than 40 per cent of the quantity of oils put on the market of Bulgaria during the current year. During the 2014 reporting year, six recovery organizations for waste oils had permits and three entities had permits for individual performance of obligations, which means they are able to collect and treat the waste oil they themselves put on the market and therefore do not need to join a collective scheme or pay the EMEPA fee. Legal persons/entities who do not fulfil their obligations individually and are not members of a PRO, pay a product fee to EMEPA.

Organic waste

Bulgarian policy on organic waste is to reduce landfilling, especially of biodegradable organic waste. Construction of regional sanitary landfills is the first step to reducing the environmental burden of such waste (preventing contamination of the soil and groundwater and reducing methane emissions). Bulgaria has a target to reduce biodegradable waste on landfills to 35 per cent of the total quantity of organic waste generated in 1995 until 2020. The Ministry of Environment and Water has set a target of 25 per cent separate collection of municipal biowaste in 2016, 50 per cent in 2020 and 75 per cent in 2025.

The first MBT plant in Bulgaria started its pilot operation in 2009 in Plovdiv with a total capacity of 125,000 tons. By 2016, six MBTs were in operation to stabilize organic matter and thereby reduce the landfilling of biodegradable waste. Twenty-nine pretreatment facilities, to separate plastics, metals, paper/cardboard and glass before landfilling, have been constructed at the 44 regional landfills. Sixteen composting plants for green waste have also been established. Composting of municipal solid waste is only reflected in the 2011 reporting of municipal solid waste in Bulgaria. According to data from the NSI, the quantity of composted waste from municipal solid waste in the MBT plant of Plovdiv was approximately 90 kt. In 2011, the pilot operation of another MBT plant started in the region of Varna. Every five years, municipalities have to do a morphological analysis of their residual waste. By January 2014, all municipalities had to set up a system for biowaste from parks and gardens collection.

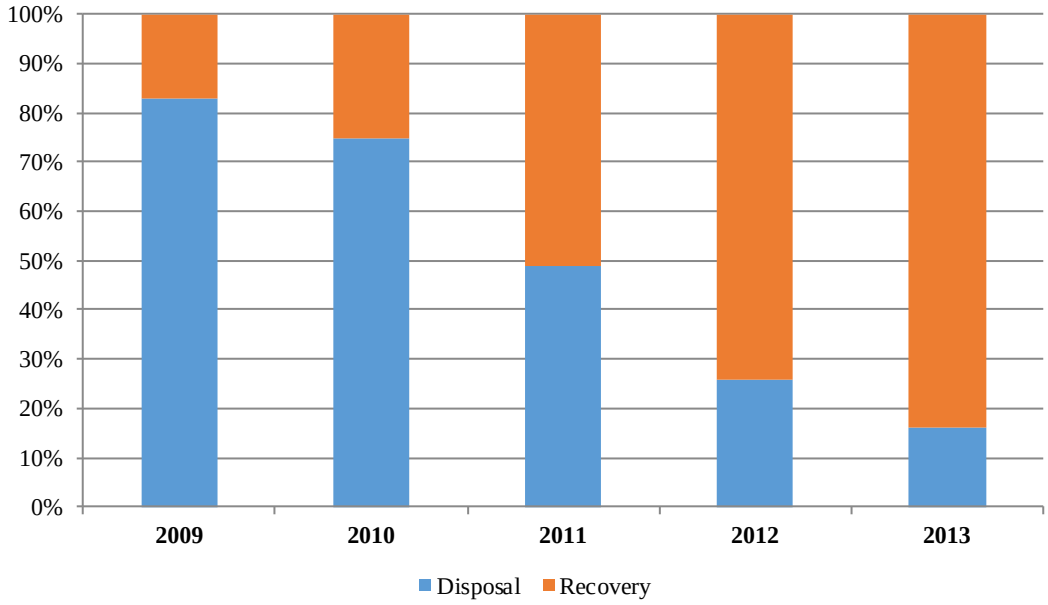
In the OP "Environment 2014–2020", municipalities will be the beneficiaries of €130 million for constructing composting plants, and another €62 million will be available for not more than 5 anaerobic digestion installations. The few composting installations in operation now sell their compost at €2/ton or donate it to citizens in 20-litre bags to stimulate participation in biowaste schemes.

Construction and demolition waste

Construction and demolition waste has been regulated since 2012. Therefore, there are no data on this waste before 2013. In 2013, 1,543.9 kt of this waste were officially reported as generated in Bulgaria. Data published by the NSI have been very variable since 2008: total amounts of this waste generated in 2010 and 2011 are five to ten times less than in other years. There is a 15 per cent decrease in the total volume of non-hazardous waste generated since 2008. This decrease is consistent with the slowdown of the construction sector in Bulgaria since 2008.

The amount of non-hazardous construction and demolition waste excluding soils was 198.5 kt in 2013. The amount of soil seems particularly high in comparison. This is partially due to the fact that a project to construct a subway metro system in Sofia is under way. The figures depict the high impact of public construction projects on the data, which is consistent with the current state of the sector, which is almost exclusively led by public investment in infrastructure projects.

Figure 8.1: Disposal vs recovery of hazardous waste, 2009-2013, percentage



Inconsistencies and incomplete data series are identified in national statistics. The process of reporting is as follows: the Executive Environmental Agency receives raw data from companies, agencies or legal persons whose activity generates, recovers, disposes of, collects or treats the waste. The NSI extrapolates the received data at national level, weighed by the number of employees or the revenues of the entities reporting the data. For reporting to Eurostat, the NSI processes and adapts data following the Waste Framework Directive (WFD) classification recommendations.

Data from the national statistics cannot be directly compared to data from the Eurostat database since the scope, treatment definitions and waste codes are different. Also, the amount treated, as published by national statistics, includes soils and it exceeds the amount generated if soils are subtracted directly. Moreover, when errors are identified, corrections are only applied to Eurostat data.

Used tyres

In 2016, five PROs have permits to deal with used tyres, and there is no common individual scheme. The achieved national target recovery was 77.69 per cent, while the legally binding rate was 65 per cent. The achieved national target for recycling and/or regeneration was 28.35 per cent, the legally obligation being 20 per cent.

8.2 Legal, policy and institutional framework

Legal framework

Waste Management Act

Prior to the entering into force of the Reduction of the Harmful Impact of Waste upon the Environment Act in September 1997, there was no special legislation in that field in Bulgaria. The 1997 version of the Waste Management Act, for the first time, regulates public relations in the waste management sector and introduces a series of basic requirements of the WFD 75/442/EEC, including the obligations of persons; the carrying out of waste-related activities; information relating to waste-related activities; waste management programming through the national, municipal and company programmes; approval and control over waste-related activities; export, import and shipping; and fees and sanctions for non-compliance. It also provides, for the first time, definitions of "waste", "polluter" and "owner" of waste. This law introduces the extended producer responsibility principle through the requirement for producers and importers of products, which, during the process of their manufacturing or subsequent to their end use, generate hazardous or widespread waste, to pay product eco-taxes. Several further regulations have been introduced as a means to detail the provisions of this law.

The Waste Management Act, which entered into force in September 2003, further develops the philosophy of the 1997 law and fully transposes WFD 75/442/EEC; together with the ordinances to the law, it introduces the requirements of all European directives in the waste management sector. At the time of Bulgaria's accession as a member of the EU in 2007, the legislation in the sector was harmonized with European law. Amendments to the law from 2010 introduced economic stimuli for specific actions on behalf of local authorities to decrease the amount of landfilled waste as well as to transition towards the regional household waste management principle.

The Waste Management Act, which entered into force in July 2012, introduces the requirements of WFD 2008/98/EC, including the polluter pays and extended producer responsibility principles and the hierarchy of waste management. For the first time, it introduces targeted operational goals for recycling of household and construction and demolition waste and requirements for the facilities and installations for waste management; if further introduces economic and regulatory mechanisms and instruments for application of the relevant legislation as well as rules for management of widespread waste. It settles the "end of waste" and "by-products" approaches and presents in detail the control functions of the institutions as well as the specific fines and sanctions for non-compliance with the law.

Quantitative goals are established for preparing, reuse and recycling of waste materials, including at the very least paper and cardboard, metal, plastic and glass from household and similar waste from other sources, which the municipalities need to meet within the following deadlines:

- Until 1 January 2016 – at least 25 per cent of their total weight;
- Until 1 January 2018 – at least 40 per cent of their total weight;
- Until 1 January 2020 – at least 50 per cent of their total weight.

The Act introduces a requirement for municipalities to limit, by 2020, the quantity of landfilled biodegradable household waste by 35 per cent compared with the total quantity of those wastes generated in 1995, and to meet the following staged goals for reuse, recycling and other forms of recovery of waste from construction and demolition of buildings, which is the responsibility of the contracting authorities for construction works, be they a public institutions or a business:

- Until 1 January 2016 – at least 35 per cent of the total weight of the waste;
- Until 1 January 2018 – at least 55 per cent of the total weight of the waste;
- Until 1 January 2020 – at least 70 per cent of the total weight of the waste.

Municipalities have to organize systems for separate collection of household waste from paper and cardboard, metals, plastic and glass, as well as to ensure the availability of conditions for separate collection of waste from packaging for all settlements with a population of more than 5,000 inhabitants and for the resorts. Municipalities have to, by the middle of 2014, ensure the availability of sites for free deposition of separately collected household waste, including bulky waste, hazardous waste and other forms of waste, in all settlements with a population of more than 10,000 inhabitants and, where necessary, in other settlements.

The users of commercial sites, manufacturing, business and administrative buildings in the settlements with more than 5,000 inhabitants and in the resorts are required, as of the beginning of 2013, to separately collect paper and cardboard, glass, plastic and metal wastes in compliance with the ordinances of the municipalities under the Waste Management Act. The ordinances need to be approved by the municipal councils by the middle of 2014.

The Act also introduces detailed rules and requirements for establishment of regional associations of the municipalities, with the aim of regulating household waste management at the regional level through regional facilities and organization, and economic instruments for covering future expenditures for foreclosure and post-operational activities at the sites of landfills and for stimulating the prevention of waste generation and the recovery of waste prior to landfilling.

The Act determines the national competent authorities within the framework of Regulation (EC) No 1013/2006, and the requirements for financial guarantees for cross-border shipment, as well as the feasible exceptions. The shipment to Bulgaria of waste, designated for incineration or co-incineration with energy recovery, is forbidden for each installation if the total quantities for the respective calendar year exceed half of the annual capacity of the installation. In cases when the National Plan for Waste Management formulates specific measures for the management of a given type of waste or a given stream of waste, the Council of Ministers may limit the import of these wastes.

Since mid-2014, the Waste Management Act brings a new obligation to the authorities for approval of a plan for management of construction and demolition waste. The plans for management of construction and demolition waste shall be approved, as follows:

- for construction works for which an approved investment project is required - as part of the procedure for coordination and approval of investment projects according to the procedure established by Chapter Eight, Section II of the Spatial Development Act, by the authority issuing such approval;
- for sites where an approved investment project is not required - by the mayor of the municipality within which the works will be effected or an official authorized thereby.

All authorities that procure public works contracts financed by public funds are required to include in the tender documents a requirement for use of recycled construction materials.

Secondary national legislation

The enforced secondary legal acts, which detail the requirements set forth by the Waste Management Act, can be divided into four groups:

1. Regulating the requirements for facilities and installations:
    - With regard to where the waste treatment facilities are located;
    - For construction and operation of landfills and other facilities and installations for waste treatment;
    - For construction and operation of installations for incineration and co-incineration of waste;
    - For treatment and transportation of industrial and hazardous waste;
    - For installations that produce titanium dioxide.

2. Regulating the management of specific waste streams:
    - For treatment of waste water via utilization in agriculture;
    - For construction and demolition waste and for incorporation of recycled construction materials;
    - Two separate ordinances for treatment and separate collection of biowaste;
    - For polychlorinated biphenyls;
    - For packaging and waste from packaging;
    - Out-of-use electrical and electronic equipment;
    - Out-of-use motor vehicles;
    - For waste from unusable batteries and accumulators;
    - For processed oils and waste petrol products;
    - For tyres.

3. Economic instruments:
    - For the financial provision and the expenditure of the accumulated resources for activities for foreclosure and post-operational activities for waste landfills and for the financial provisions for disposal of household and construction and demolition waste;
    - For payment of a product tax for products, the utilization of which generates widespread wastes (out-of-use motor vehicles, out-of-use electrical and electronic equipment, tyres, packaging, oils, unusable batteries and accumulators, polymer bags);
    - For financial guarantees and equivalent insurances for shipment of waste.

4. Horizontal issues:
    - For classification of waste;
    - For information provision in the accordance with guidelines for public registers of waste.

Landfilling

According to the Waste Management Act, for operations relating to the disposal of waste by landfilling, each landfill owner shall provide collateral covering the future expenses for closure and aftercare for the landfill site. The collateral is due for disposal of waste on landfills for non-hazardous waste, as well as for disposal of hazardous waste on landfills for hazardous waste. The collateral may be in the form of:

- Monthly deductions into a bank account for external resources of the RIEW within whose territory the landfill is located; or
- Monthly deductions into an escrow bank account blocked for the period ending with the completion and acceptance of the measures for closure and aftercare of the landfill site; or
- A bank guarantee in favour of the RIEW within whose territory the landfill is located.

Construction and demolition waste

The Ordinance on construction and demolition waste management and use of recycled building materials brought into force in 2012 defines more specific regulations regarding the objectives of collection and reuse of waste and the obligations of parties, and aims to:

- Prevent and minimize the generation of construction and demolition waste;
- Encourage recycling and recovery of this type of waste to reach targets in the Waste Management Act;
- Increase the use of recycled building materials;
- Reduce the quantities of landfilled construction and demolition waste.

Before starting construction works and/or removal of buildings, the contracting authority shall prepare a Plan for management of construction and demolition waste. The contracting authority is responsible for the management of the construction/demolition project, whether carried out by itself or assigned for fulfillment of the obligations related to waste management to a contractor by means of a written contract. The requirements for preparation of a Plan for management of construction and demolition waste has been in force since 2014.

With regard to the requirements of WFD 2008/98/EC, the systems for treatment of construction and demolition waste should ensure, no later than 1 January 2020, its reuse, recycling and other recovery of materials from non-hazardous construction and demolition waste, including backfilling operations, by replacing other materials in a quantity not less than 70 per cent of the total weight of waste, excluding unpolluted soil, excavated land and rock in their natural state. In the Waste Management Act there are two additional intermediate targets for 2016 and 2018. The targets for reuse, recycling and other recovery of materials from non-hazardous construction and demolition waste, including backfilling operations using waste to substitute for other materials, with the exception of excavated soil, land and rock in their natural state which do not contain hazardous substances, shall apply, as follows:

- No later than 1 January 2016 – as a minimum 35 per cent of the total weight of waste;
- No later than 1 January 2018 – as a minimum 55 per cent of the total weight of waste;
- No later than 1 January 2020 – as a minimum 70 per cent of the total weight of waste.

End-of-life vehicles

The 2005 Ordinance for the treatment of waste from vehicles regulates in practice the use of producer responsibility by requiring producers and importers to participate in the process of treatment of waste vehicles. It allows manufacturers and importers of vehicles to fulfil their obligations individually or through a collective system. Individual performance can be achieved in two ways, either by organizing all activities of the obligated person or by paying a product fee to EMEPA.

Waste oils

The 2005 Ordinance on requirements for treatment and transportation of waste oil and petroleum products defines the requirements for the marketing of oils and for separate collection, storage, transport, recovery and disposal of waste oils and oil products to regulate:

- Prevention and reduction of environmental pollution and risk to human health and the environment as a result of treatment and transportation of waste oils and oil products;
- The taking of measures by the persons placing oil products on the market for the separate collection, recovery and/or disposal of generated waste;
- Implementation and operation of an environmentally friendly system for management and control of the activities of transporting and treating waste oils;
- Informing end users about their role in the separate collection of waste oils and petroleum products and collection, recovery or disposal systems available;
- Measures that determine extended responsibility for manufacturers.

Photo 8a: Municipal solid waste collection containers in Sofia

The Ordinance regulates the hierarchy in the treatment of waste oils. The priority is the recovery of waste oils through regeneration. In cases where technical and economic conditions do not allow regeneration, waste oils are incinerated with energy recovery. If it is impossible to apply any of the above methods, used oils are stored and subsequently delivered for disposal.

Used tyres

The 2011 Ordinance on requirements for treatment of used tyres applies to all types of tyres placed on the market (external, internal and thick), regardless of their purpose. Legal persons who place tyres on the Bulgarian market are responsible for the collection, storage, transport, recovery or disposal of used tyres. They have to meet the following objectives:

- Not less than 65 per cent of the amount (in tons) of tyres placed on the market in the current year to be recovered;
- Not less than 50 per cent of the amount (in tons) of tyres placed on the market in the current year to be regenerated and/or recycled.

Healthcare waste

In 2015 Ordinance № 1 on the requirements for collection and treatment of waste within the healthcare establishments entered into force. The Ordinance lays down the requirements that the healthcare establishments have to follow in regards to healthcare waste.

Other

Local Fees and Taxes Act

The Local Fees and Taxes Act regulates the fees and taxes, which are determined by the municipalities, and the incomes, which enter the municipal budget, including the household waste tax. The Act regulates for which services the household waste tax needs to be paid by the user, the approach taken in its calculation, which municipal expenditures form the tax and the deadlines for its payment.

Spatial Planning Act

The Spatial Planning Act regulates spatial planning, requirements for investment design and construction in the country and the restrictions over ownership for spatial development purposes.

The facilities and installations for treatment of waste are classified as elements of the technical infrastructure. This creates additional administrative barriers and delays in their planning and construction as it requires the elaboration of a special feasibility study, even if the terrain is determined by a feasibility study to be for industrial purposes, i.e. it remains unclear why terrains that have via a spatial planning

plan been classified as industrial, and hence energy, chemical, metallurgical or other similar sites may be constructed as a means to initiate projects for waste management, for example for a composting or separation installation, need to undergo a procedure for a new feasibility study. From the standpoint of the characteristics, significance, complexity and operational risks, these installations are classified as second category constructions out of a total of six categories, where the first category includes the most complex and high-risk constructions and the six category contains constructions of insignificant risk and complexity.

The Act contains provisions in relation to the requirements, which stem from the Waste Management Act, regarding construction and demolition waste and waste from the demolition of buildings, such as:

- The assessment of the compliance of investment projects with the existing requirements for construction encompasses the verification of the compliance of these projects with a series of requirements, including the requirements for selective separation of waste, generated during the construction works and demolition activities with the aim of ensuring their subsequent recovery, including recycling and achieving the respective quantitative goals for recovery and recycling;
- The demolition of construction is carried out upon receipt of an approved plan for construction and demolition waste management, as required by the Waste Management Act;
- The construction permit specifies the measures for selective separation of waste, generated during the construction and demolition activities and ensuring their subsequent recovery, including recycling.

At the approval phase, a construction cannot be allowed to be put into operation when: i) the financial provisions per unit of disposed waste for the purposes of the subsequent foreclosure in compliance with Article 60 of the Waste Management Act have not been made; ii) no permit or registration document for waste-related activities, whenever such is required by the Waste Management Act, has been issued.

The 2011 Spatial Planning Act requires that municipalities ensure the availability of the terrains and the construction of facilities and installations for treatment of household and construction and demolition waste. This text formulates considerable requirements for the municipalities in comparison with the necessary competences stemming from the provisions of the Waste Management Act. With regard to construction and demolition waste on the territory of a municipality, the duties of the municipality used to boil down to organization of the collection, recovery and disposal of construction and demolition waste, solely from repair activities, generated by the households on the territory of the respective municipality, as well as the general requirements that are valid for all contracting authorities of investment projects.

Statistics Act

The Statistics Act regulates matters relating to the confidentiality of information and the conditions for provision of information from all economic stakeholders, including municipalities. Since the provision of these services on household waste are typical public services, paid for with public finances of the municipalities, accumulated from consumer taxes for these services, only the aggregated information, provided by the municipalities, is freely accessible to the public and the institutions.

Regulations of municipal authorities

Even the first law, from 1997, regulating waste management formulates the requirement for municipalities to elaborate regulations with which to detail the responsibilities of local authorities and specifically the individual municipalities. In practice, all municipalities have elaborated and, consequently, alongside the development of national legislation, updated their regulations. Currently, some municipalities have approved new regulations in compliance with the 2012 Waste Management Act, while in other municipalities they are in the process of actualization.

Policy framework

National waste management plans

The 1999 first NWMP for the period 1999–2002 set conditions for solving the pressing tasks related with the environmentally sound waste management.

National programmes for specific waste streams were elaborated during the period 2002–2003, including for end-of-life vehicles, WEEE, used batteries and accumulators, and packaging waste.

The subsequent national plans for management of waste-related activities are the second NWMP for the period 2003–2007, updated and expanded in 2008, and the third NWMP for the period 2009–2013, which set 10 strategic goals, including regarding the prevention and reduction of waste generation, increase in the

quantities of treated and recovered waste, and environmentally friendly disposal of waste.

The majority of the measures aimed at meeting the strategic goals are implemented, including the measures for the improvement of administrative capacity, introduction of economic instruments for stimulating recycling and prevention of the generation of waste.

In 2009–2010, within the framework of the NWMP 2009–2013, the Ministry of Environment and Water developed two strategic documents on management of specific waste streams, in which, for the first time, the situation was analysed, the main challenges were identified and measures for their management were planned.

The fourth NWMP for the period 2014–2020 aims at discontinuing the link between economic growth and waste by preventing the generation of waste and by setting specific quantitative targets for preparation of reuse, recycling and other forms of recovery for specific wastes. For the first time, within the scope of development of the NWMP 2014–2020, a National Waste Prevention Programme has been developed.

Specific measures aimed at improving hazardous waste management are foreseen in the NWMP 2014–2020:

- Increasing capacity of the competent authorities;
- Financial and technical support to individuals generating household waste and companies engaged in activities with household waste;
- Building sites for free delivery of separately collected household waste.

The Plan also envisages measures to improve the management hierarchy of other waste streams and to reduce the risk to the environment from landfills.

Other documents

Within the scope of the national system of programming documents, two further strategic documents formulate goals and determine measures relating to two specific fields of waste management.

The National Strategic Plan for the Stage-by-Stage Reduction of Biodegradable Waste for Disposal 2010–2020 is the first plan in the country to conduct an in-depth systematic analysis of the environmental problems resulting from the disposal of biodegradable waste. It defines the problems and identifies measures (administrative, legal, financial and others) for overcoming the problems and for meeting the goals for stage-by-stage reduction of the disposal of these wastes and for increasing amounts of recycled and recovered waste. It is anticipated that, as a result of the implementation of the Plan, the disposal of five million tons of biodegradable waste will be prevented by 2020. An additional effect is the substitution in agriculture of phosphate fertilizers with compost. The measures in the Plan are key for the achievement of the goals of the third National Action Plan for Climate Change for the period 2013–2020 to reduce GHG emissions from the waste sector.

The National Strategy for Waste Management of Construction and Demolition for the period 2011–2020 is also the first to be elaborated in the country for this field. The 2014 Plan for Management of Construction and Demolition Waste determines measures (administrative, legal, financial and others) for increasing the recycled and recovered quantities of this waste stream, which is mainly subject to disposal. The main strategic goal of the Plan is to decrease, by 2020, the negative impact of construction and demolition on the environment and to reach 70 per cent recycling of construction and demolition waste. Installations for recycling of construction materials are in the process of operationalization as part of the integrated regional municipal systems for waste management.

The National Plan for the Management of Sewage Sludge from Municipal Wastewater Treatment 2013–2020 is the product of cooperation between the German Federal Environment Agency and Bulgaria's Ministry of Environment and Water. Produced along with the Plan were a Technical Guide on the most recent technologies for sewage sludge management, and guidance to assist the operators of wastewater treatment facilities to develop their own concepts for sludge management in the context of local conditions, individual circumstances and potential. A new National Ordinance on sewage sludge, last amended in 2011, has been the first legislative act to result from the Plan.

Local level

Municipalities shall also adopt municipal waste management programmes as part of their environmental protection programmes. The municipality is responsible for the development of the programme, while the adoption and the control of the implementation of the programme is assigned to the municipal council. Municipal waste management programmes shall be developed in compliance with the structure and the objectives of the NWMP and coincide with its timeframe.

The legislation provides the option for several municipalities to participate in a regional waste management association in order to develop a common programme. In such a case, the programme shall include the clear distinction of measures for each municipality. In compliance with the provisions of the 1997 Limitation of the Hazardous Impact of Waste on the Environment Act, most municipalities developed their first municipal waste management programmes. Sunsequently, based on adopted amendments to the legislation and depending on specific local conditions, the municipalities either updated their programmes or adopted new programmes.

The survey carried out among the municipalities in Bulgaria during the process of developing the NWMP 2014–2020 reveals that, with respect to the implementation of their obligations for waste management, over 95 per cent of municipalities that responded to the survey have adopted waste management programmes, developed in accordance with the instructions for development of such programmes issued by the Ministry of Environment and Water in 2006.

Municipalities that did not respond to the survey or stated that they do not have such a programme are mostly small, while a few were of medium size. Some municipalities have already undertaken steps to update their programmes to comply with the 2012 Waste Management Act. In general, municipalities await the approval of NWMP 2014–2020, as the Waste Management Act requires municipal programmes to follow the structure of the NWMP. The Ministry of Environment and Water publishes instructions, with the purpose of providing methodological assistance to municipalities in this important process.

As regards the requirement to develop a municipal ordinance on waste management, almost all surveyed municipalities stated that they have adopted such an ordinance. In connection with the need to update the ordinance by mid-2014 in compliance with the new provisions in the Waste Management Act, the majority of municipalities (157) responded that they were in the process of updating the ordinance, 44 had already updated the ordinance and 46 had not taken action in this direction.

Institutional framework

Ministry of Environment and Water

The Ministry of Environment and Water is responsible for the development and implementation of the national waste management policy, including drafting and enforcement of the legislation, strategies and programmes, as well as regulation of activities in the public and private sectors (ETC/SCP, 2009).

The Ministry performs some of these activities via the Executive Environmental Agency and the network of regional competent authorities, the RIEWs, which control the implementation of the waste management legislation (ETC/SCP, 2009). The organization and treatment of waste within the territory of the municipalities is the responsibility of the municipalities. Commonly, municipalities assign those activities through the awarding of public procurements.

Local governments

Traditionally, the functions related to collection, transportation and treatment of waste are assigned to local authorities. The municipality organizes the management of household and construction and demolition waste formed on its territory. The obligations of the municipality cover numerous specific practical activities, including to ensure installations and facilities for household waste treatment and containers for household collection; organize separate collection of plastic, paper and cardboard, glass waste (except packages) and biowaste; provide sites for free transmission of collected household waste, including bulky and hazardous waste; cleaning of streets, squares, alleys, parks and other areas for public use in the settlements; and prevent dumping of waste in unauthorized places and/or creation of illegal dumps and organize their cleaning, if such exist.

Municipalities are also responsible for the cleaning of waste on the municipal roads and adjacent areas, and the provision of containers for waste collection and transportation to a treatment facility.

Since 2009, municipalities that build or use a common regional landfill or treatment facility with regional character, establish regional associations as legal entities or enter into agreements with each other on waste management on a regional basis. The leading municipality in the region owns the regional facility. There are no options for joint ownership. Until now, the regions did not take up other tasks and responsibilities, such as regional collection, transportation, contracts with PROs or the selling of recyclables.

Photo 8b: Municipal enterprise for waste treatment

Other

The Road Infrastructure Agency is responsible for the cleaning of waste on the state roads and adjacent areas, and the provision of containers for waste collection and transportation to a treatment facility.

Regulatory instruments

A permit or a registration issued under the Waste Management Act or an integrated permit issued under the Environmental Protection Act is required for carrying out activities of waste management.

The RIEWs issue permits and registrations. For activities relating to waste treatment sites located on the territory of two or more RIEWs, permits are issued and registration is performed by each RIEW separately for the premises on its own territory. An entity receives one permit for all waste treatment activities on the territory of one RIEW, regardless of the number of treatment sites it operates. For each treatment site, as many permits are issued as there are persons performing waste management activities on its territory. In the case of declaration of waste collection and transportation activities, the registration is performed by the RIEW on whose territory the applicant's registered office is located; if the applicant is a foreign person, registration is performed by the RIEW Sofia.

The deadline for the statement of the competent authority is two months with regard to a permit and 14 days with regard to registration. If the competent authority does not provide a statement before the end of the registration period, the activity is considered to be lawful/allowed/permitted/endorsed.

Taxes and fees related to waste management

As a means of deterrent against waste disposal, a landfill tax was introduced for municipal waste in 2011. The level of the landfill tax is doubled for the disposal of waste in non-compliant landfills. The levels of the landfill tax in leva per ton are set as follows: 15 leva in 2013, 22 in 2014, 28 in 2015, 36 in 2016; 47 in 2017; 51 in 2018; 78 in 2019 and 95 in 2020. The taxes are collected by the RIEWs. Municipalities can request reimbursement of the taxes paid to invest in prevention and recycling activities.

Each of the landfills has to build up a post-closure fund. The amount of money differs from landfill to landfill according to its capacity and lifetime, and local conditions. Because of the progress Bulgaria has made in establishing the regional landfills, the infringement case of 23 January 2014 over illegal landfilling was dropped in 2015.

A municipal waste tax will be in force from 2017. Methodologies have been developed and several methods for calculation of the fees are proposed: by

volume, number of persons per household, total built area or calculations based on water or electricity use. The municipalities will be entitled to choose their method.
At the moment, waste fees are calculated as a percentage of the property tax and companies pay an overly large share. There is a recent trend for municipalities to set up their own company responsible for the whole cycle: collection, transportation, post-sorting and landfilling.

Public consultations and provision of information to the public

Municipalities publish on their website and organize public hearings of the draft waste management ordinance and programme. The public consultations are open to all interested persons, bodies and NGOs. Once adopted, the two documents are published on the website of the municipality.

The Executive Environmental Agency maintains public records related to ordinary waste and permits for waste, and develops annual reports on ordinary waste. These are published on its website along with the annual National Report on the Status and Protection of the Environment (including waste management). The RIEWs also publish on their websites an annual report on the state of the environment, including on issues related to waste.

The authority that issues a permit for waste management activities informs the public through its website and in any other appropriate manner of any issued permit, as well as of amendments and/or supplements to permits issued within 10 days of the date of issuance through the register of permits for waste.

The legislation has no compelling texts to oblige the Ministry of Environment and Water or municipalities to conduct public awareness campaigns on waste management, nor are there national or local communication strategies to inform the public on waste management. Therefore, such campaigns are organized by municipalities or the Ministry on a particular occasion or in connection with a specific project or campaign at national or local level.

Legally binding obligations are imposed on organizations to inform the public and to conduct educational activities for children and the population in general regarding recovery of ordinary wastes. The Ministry controls the fulfilment of these obligations and the annual reports of the organizations to the Ministry contain details of their implementation.

8.3 Conclusions and recommendations

Municipalities are obligated to ensure the availability of terrains, facilities and installations for municipal and construction and demolition waste.

Moreover, facilities and installations for treatment of waste are classified as elements of the technical infrastructure. This creates additional administrative barriers and delays in their planning and construction as it requires the elaboration of a special feasibility study, even if the terrain is determined by a feasibility study to be for industrial purposes, i.e. it remains unclear why terrains that have via a spatial planning plan been classified as industrial, and hence energy, chemical, metallurgical or other similar sites may be constructed as a means to initiate projects for waste management, for example for a composting or separation installation, need to undergo a procedure for a new feasibility study.

From the standpoint of the characteristics, significance, complexity and operational risks, these installations are classified as second category constructions out of a total of six categories, where the first category includes the most complex and high-risk constructions and the six category contains constructions of insignificant risk and complexity. Many categories of waste facilities involve no or low risk for the environment and public health.

Recommendation 8.1:
The Government should initiate an amendment of the Spatial Planning Act in order to facilitate the establishment of waste treatment facilities and remove impediments.

Recommendation 8.2:
The Government should ensure that the elaboration of waste-related programmes is subject to more precise planning and realistic deadlines for implementation of the measures.

Formal systems of recycling and EPR are hindered by informal (but rather well-organized) waste collection of recyclables (especially packaging waste). PROs have to buy materials from these informal collectors to meet the recycling targets. Moreover, with the street containers for separate collection of packaging materials low results are reached. Despite that, reported recycling rates, especially of packaging waste, are quite high. However, large quantities of packaging waste are still found in residual waste in the materials recovery facilities (MRFs).

Recommendation 8.3:
The Ministry of Environment and Water should:

(a) Reconsider the collection system for packaging waste;
(b) Charge the packaging Producers Responsibility Organizations for the recyclables found in residual waste;
(c) Strengthen the supervision over the system of recycling and extended producer responsibility.

The new EU package on Circular Economy means higher targets for the recycling of municipal waste. It is already doubtful whether Bulgaria is able to meet present targets, for example for recycling, let alone the more ambitious targets in the Circular Economy package.

Recommendation 8.4:
The Government should align its policies on recycling with the European initiatives.

Chapter 9

BIODIVERSITY AND NATIONAL ECOLOGICAL NETWORK

9.1 Status and trends in biodiversity

Species

The Central European, Sub-Mediterranean, Mediterranean and Pontic floristic regions meet in Bulgaria, creating a particularly high biodiversity. As the southern mountains (Strandja, Rhodopes) were spared from the last glaciation, a large number of relict and endemic species can be found in the country; the richness in species is among the highest in all of Europe.

In particular, for birds, the Rhodopes Mountains as well as other mountain massifs are a European stronghold for birds of prey, with most of the European species, including the endangered and vulnerable species (e.g. Bearded Vulture) nesting here. Yet also the populations and numbers of Bulgaria's birds of prey occurring in habitats such as meadows and steppes (e.g. Greater Spotted Eagle, Lanner Falcon) are of great importance from an overall European perspective.

About 1,000 endangered species (574 vascular plants, 483 animal species) are protected. New action plans for the conservation of seven plant species and four animal species have been elaborated and adopted since 2000. With about 4,100 species of vascular plants, of which 270 are Balkan and 174 are Bulgarian endemics, almost 20 per cent of the national flora bears some kind of conservation importance and is threatened. The Bryophyte flora includes 719 species, with the mountain ranges of

Rila being the diversity hotspot. Approximately 40 per cent of all Bryophytes are threatened according to IUCN criteria and thus of conservation importance (Red Data Book Vol. 3) (table 9.1). Whereas the higher plants are reasonably well studied, for mosses, as well as fungi, the research conducted prior to the update of the Red Data Book, published in 2015, brought new conservation emphasis and resulted in the inclusion of about 215 fungi species into national red lists.

A census in 2007 registered over 30,000 species of animals from a large number of taxonomic groups, and estimations go even higher than that. Approximately 1,200 animal species are endemic to Bulgaria (790 Bulgarian and 410 Balkan endemics). The herpetofauna of the country is very rich with about 17 species of amphibians (20 subspecies) and 36 species of reptiles (45 subspecies), of which about 80 per cent are protected by the Biodiversity Protection Act.

All reptile and amphibian species of Bulgaria are included in the annexes of the Bern Convention. With about 790 vertebrates, of which about 90 species are mammals and about 400 are bird species, Bulgaria's faunistic diversity is very high within a European comparative framework. Bulgaria pays particular attention to the preservation of bat habitats (caves), which are of conservation priority for the country due to the rapid declines in abundance and diversity.

The second edition of the Red Data Book, published in 2015, comprises three volumes, on Plants (Vol. 1), Animals (Vol. 2) and Natural Habitats (Vol. 3). Beside the fact that all volumes are in English and also available on the website of the Bulgarian Academy of Sciences (http://e-ecodb.bas.bg/rdb/en/), sound scientific assessment has been conducted in advance of publication. Part of the volumes are distribution maps with an UTM[10]-square of 10x10 km, which summarize species information and are an important tool for conservation measures.

In regard to Vol. 2 (Animals), more than 400 species were considered to correspond to the criteria of the IUCN Red List. Of these, 287 species and subspecies are considered threatened and 87 species are Critically Endangered (CR), thus bearing the highest degree of threat. There are 70 Endangered species and 100 Vulnerable species. A dramatic change, when compared with the first edition of the Red Data Book of 1984, was experienced by the six sturgeon species – in 1985 they were still a valuable fish resource, today they are Extinct, Critically Endangered and Endangered.

[10] Universal Transverse Mercator

Table 9.1: Distribution of taxa with threat category by taxonomic group

	EX	RE	CR	EN	VU	**Total**
Algae	..	..	5	1	..	**6**
Bryophytes	..	..	27	52	33	**102**
of which						
Liverwortse	..	..	10	17	6	**..**
Mossses	..	..	17	25	27	**..**
Ferns	..	1	6	1	..	**8**
Gymnosperms	..	..	2	2	..	**4**
Angiosperms	2	11	196	292	38	**539**
Fungi			37	104	8	**149**
Total	**2**	**12**	**273**	**442**	**79**	**808**

Source: Red Data Book of the Republic of Bulgaria Vol. 1 - Plants and Fungi. Species of Least Concern and with data deficits are not included in the table although they are part of the Red Data Book. Bulgarian Academy of Sciences and Ministry of Environment and Water, 2015.

The 2015 edition of the Red Data Book includes invertebrates for the first time. As a result, 51 species of invertebrates, of which 12 species are listed in the category Extinct (EX) and 39 species in the category CR have been included. Having said this, in comparison with the first edition of the Red Data Book, which included a total of 157 animal species and subspecies, there is a significant increase in threatened species. However, this is mainly due to changed methodology and the enlarged scope of taxonomic assessment.

As for the status and trends of many plant and animal populations, only fragmented data are available. Birds remain the best studied, being regularly monitored by the Bulgarian Society for the Protection of Birds. With 38 species being part of the assessment, the common bird index for Bulgaria shows a decline in bird populations by 21 per cent between 2005 and 2013. Yet the highest proportion of species show uncertain trends, and the second highest proportion show a moderate decline, with farmland birds being a large group in these categories. The reasons for this are still unknown and require targeted research.

For other animal and plant groups, available data are much more scattered at the moment. However, the designation of Natura 2000 sites resulted in an intensive mapping programme between 2006 and 2013. As a consequence, a thorough set of baseline data on the status of species and habitats has been established, and the upcoming repetition of the exercise and monitoring of these sites in 2017 would reveal trends for birds and habitats. Yet, for some species groups such as the three endangered dolphin species population in the Black Sea, only data from opportunistic sightings from various surveys (2006–2013) have been published in 2015.

Data on invasive alien species show a sharp increase in particular of mussels such as *Corbicula fluminea*, as well as mussels from the genus *Dreissena* (*D. polymorpha* and *D. rostriformis bugensis*). The former today occupies the entire Bulgarian part of the Danube River, in parts with densities of 16,560 ind./m^2 (Zagrazhden village, in 2012), after the first sightings in 2001. Tributaries and other inland water bodies have been even more affected. *Dreissena* mussels have had a similar effect in reproduction and spread, which has increasingly changed the natural river ecosystems; more than 31 inland water bodies have been invaded by *D. polymorpha* in the period 2009–2013 alone.

The country is well aware of its role to maintain its very high level of genetic resources and its valuable agrobiodiversity, among other means by running the largest plant gene bank in South-Eastern Europe. Furthermore, breeding programmes are maintained for autochthonous breeds and, since 2000, have increased livestock numbers of particular sheep, horse, goat and cattle breeds.

Natural habitats

Almost all main habitat types represented in Europe can be found in Bulgaria, and 96 habitats occur only in Bulgaria. Independent of its natural diversity, Bulgaria has for long been a centre of human settlement and agricultural cultivation. Reflecting this fact is the prevalence of types in the Natura 2000 network – agricultural lands, cultivated lands, pastures and meadows. About 90 habitats are considered to be of community interest and thus require special attention, as they are part of Annex 1 of the Biological Diversity Act and also within Annex I of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive).

In particular, Vol. 3 of the 2015 Red Data Book (Natural Habitats) is a new qualitative stage for conservation, hardly found in other countries. The publication can be seen as a contribution to the EU habitat classification; the mapping and designation process of Natura 2000 sites also formed the basis for the habitats mentioned in the Red Data Book. The distribution of the habitats according to the main types of ecosystems and natural phenomena is presented in table 9.2.

According to the European Nature Information Systems (EUNIS) classification method, 166 habitats of conservation importance have been identified in the country and included in the Red Data Book, requiring specific conservation measures. Of these, 28 habitats are Critically Endangered (CR), 71 Endangered (EN), 47 Vulnerable (VU), and 20 Near Threatened (NT). The vegetation types of wetlands (coast, swamps, marshes) and also halophytic, hydrophytic and psammophytic coenoces (coastal regions, steppe) are particularly threatened and close to complete destruction due to infrastructural developments.

Additionally, Vol. 3 identifies a significantly increased threat to high mountain vegetation and habitats, where tourism development resulted in destruction of unique and valuable habitats.

Between 2009 and 2013, no changes in the habitat diversity of Bulgaria have been registered. However, the status of various habitats changed. Whether this is due to natural processes like succession of vegetation, or human influence like intensification of agriculture, remains to be seen. A repeated mapping, planned for the upcoming years, would clarify this.

9.2 Protected areas, Natura 2000 protected sites and the national ecological network

Spatial trends

Since 2000, there has been a 43 per cent increase in the number of protected areas, from 858 in 2004 to 1,012 in 2014, and a 25.56 per cent increase in the area covered by protected areas, from 544,394.9 ha in 2004 to 584 530 ha in 2015 (table 9.3).

At the end of 2015, the protected areas network included three national parks (Central Balkan, Pirin and Rila), 11 nature parks (Balgarka, Belasitsa, Persina, Rila Monastery, Rusenski Lom, Shumensko plato, Sinite Kamani, Strandja, Vitosha, Vratchanski Balkan and Zlatni pjasaci), 55 reserves and 35 managed reserves, 564 protected sites and 344 nature monuments.

The designation of Persina in 2000, Balgarka in 2002 and Belasitsa in 2008 are the main achievements for spatial nature conservation since 2000. However, the category "nature park" (IUCN category V) only to a limited degree stipulates a strict conservation approach. Rather, it stimulates the sustainable development of the region, seeking an appropriate balance between the protection of natural resources and economic development, and contributing to the improvement of living standards.

As a consequence, the nature parks are in an ambivalent position: on the one hand, they cover one third more area than national parks and thus are important for spatial nature conservation, while on the other hand, they bear a low conservation category (IUCN category V) and are considered to promote regional development.

Table 9.2: Area coverage of the natural habitats included in Natura 2000, ha

Natural habitat	ha
Coastal and halophytic habitats	13 312
Coastal sand dunes and continental dunes	1 892
Freshwater habitats	13 400
Moderate continental scrub	56 667
Sclerophilous scrub	13 794
Natural and seminatural herbaceous formations	350 636
Mires, bogs and fens	2 085
Rock habitats	41 732
Forests	1 216 898

Source: Red Data Book of the Republic of Bulgaria, Vol. 3, 2015.

Table 9.3: Protected areas, 2000, 2005, 2010, 2015, ha

	2000	2005	2010	2015
Total	**514 864**	**545 724**	**582 458**	**584 530**
Reserves	76 979	76 979	77 022	77 069
Natural monuments	23 405	16 547	16 876	16 834
Protected sites	26 292	52 596	77 231	79 303
National parks	150 362	150 362	150 362	150 362
Nature parks	180 274	244 723	256 456	256 441
Managed reserves	4 517	4 517	4 511	4 520

Source: National Statistical Institute, 2016.
Note: Nomenclature aligned with Ministry on Environment and Water publications.

Similarly, although the figure of more than 1,000 protected areas appears impressive, Bulgaria is still among the EU countries with the lowest percentage of terrestrial and marine areas that are nationally designated protected areas. This ambivalence is rooted in the state policy, which was directed towards expanding the network of protected areas, mostly by the designation of "protected sites" and "nature monuments". These sites, although large in number, are usually very small in area. Of Bulgaria's protected areas, 80 per cent are less than 100 ha (of which about 20 per cent are smaller than 1 ha) . An example is the establishment of "Chengene skele" marine protected area in 2007, an area of 191.19 ha, of which 50 per cent is marine.

Since 2000, there has been a substantial increase in the number of protected areas in the category "protected site": from 132 in 2000 to 564 in 2015. This increase is mainly determined by the fact that many sites that were established as "historic places" before 1998 were categorized as "protected sites" in the period 2002–2004.

Within the category of "protected sites", the subject of protection varies widely, from natural habitats and habitats of species of national importance to remarkable landscapes, including those that are the result of interaction between humans and nature. Furthermore, as requirements regarding the size and ownership of these territories are not set down, the category was used as a flexible instrument to gain legal status for a valuable site.

As a consequence, the net increase in strictly protected areas according to national categories remains limited, and with a total of 5.3 per cent of the country's surface designated as protected areas, Bulgaria is still in the lower reaches of coverage by protected areas. Taking into account that about half of this 5.3 per cent has rather weak conservation status, and sustainable development and management of monuments are key aspects within this area, the spatial ground for in-situ conservation of biodiversity and natural dynamics remains very limited.

Bulgaria is among the countries where Natura 2000 sites contribute the majority of territory in the protected area network. With a total area of Natura 2000 sites exceeding the nationally protected designated areas, the major parts of the protected area network are historically young, have been established in a very short time and do not have functioning management. Also, due to the speedy designation process, driven by NGOs, the social acceptance of the Natura 2000 sites is low on both the local and national levels. Aware that without adequate management, the opportunity arising from establishment of the Natura 2000 sites may turn into a burden and a permanent field of conflict, at present the Ministry of Environment and Water engages a project to find the most appropriate ways to manage Natura 2000 sites.

Consequently, the three existing national parks and 55 reserves and the 35 managed reserves are of high importance for the conservation and dynamics of natural diversity. However, protected areas in the categories of "reserve", "managed reserve" and "national park" have not been declared in the last decade.

The reason given for this is that those categories are exclusively state property and their declaration would require a change in ownership and compensation of the owners. Even the designation of nature parks is considered a challenging task due to their size and multiple ownership; owners have to participate in specialized commissions and agree for their lands to be included in a protected area.

Photo 9: New markings of Pirin National Park boundaries, 2015

Part of the "protected sites" designated in the period (2011-2015) aimed at conservatiohn of rare and threatened plant species of national importance were called "microreserves" and have been established within the EU's Life+ programme. The project to establish a "Pilot network of small protected sites for plant species in Bulgaria using the plant microreserve model" was one of Bulgaria's direct responses to preserve threatened plant species. Between 2010 and 2014, a network of 58 small protected sites covering around 1,000 ha in total was established to preserve isolated populations of 47 species of Bulgarian flora (44 vascular plants and 3 bryophyte species).

The development of a monitoring and action plan, as well as ex-situ breeding, also added to the intention to halt the decline of critically endangered or strongly fragmented populations. These protected areas are not reserves according to the Protected Areas Act since they are not covering the requirements for being reserves in terms of ownership and regimes. Still these are protected areas with quite strict regimes not allowing construction activities or other serious interventions.

As of 2016, the development of management plans for managed reserves as well as protected sites is in preparation by the Ministry of Environment and Water, with funding from OP "Environment" envisaged.

UNESCO World Heritage Sites and Biosphere Reserves

The tentative list of UNESCO World Heritage Sites in Bulgaria (the designation dates from 1984) was updated in 2010–2011. Despite this, Bulgaria actively participates only in the European beech forest serial nomination process.

In 2015, Bulgaria reviewed its entire UNESCO Biosphere Reserve Network (16 sites), which was established in the 1970s. Fifteen of the biosphere reserves are strict reserves and one (Srebarna) is a managed reserve; both categories are quite strict and do not allow human activities related to sustainable use of natural resources to be performed within their boundaries. Consequently, none of the 15 strict reserves correspond to the zoning and functional requirements of the UNESCO Seville Strategy and Statutory Framework of the World Network of Biosphere Reserves, and thus a revision of the biosphere reserve status is under way.

By doing so, Bulgaria followed the recommendation of UNESCO's Advisory Committee, which included drastic changes to be made to the spatial structure of the biosphere reserves, to include inhabited areas, to consider a new zoning scheme, and to build a shared common vision with diverse stakeholders and relevant management structures and management plans for the sites that will equally reflect all the three functions of a biosphere reserve.

At present, the national authorities are revising the current network of biosphere reserve sites. With cooperation between the Bulgarian Academy of Sciences, the national UNESCO MAB Commission, the Ministry of Environment and Water, the Ministry of Food and Agriculture and NGOs was carried out a project aimed at revision of the national network and renomination of one to three biosphere reserves, based on existing protected areas. Within this project, eight regions have been preliminary assessed, and the identification of readiness and support of the local communities and governments appears to be a key issue.

In September 2016 Bulgaria submitted to the MAB Secretariat the nomination files for declaration of four post Seville biosphere reserves (Parks) corresponding to the current requirements of the MAB Programme. These are the regions of Central Balkan National Park, Srebarna Managed Reserve, Chervenata Stena Reserve and Uzunbudjak Reserve. These new proposals cover seven of the old generation biosphere reserves. The nominations were developed after a project funded by the EMEPA under the Ministry of Environment and Water.

The proposals for the four new biosphere reserves were supported by the respective municipalities' councils and signed by the Minister of Environment and Water, the Executive Director of the Executive Forestry Agency, the chairman of the MAB National committee and the mayors of concerned municipalities. Besides, a Road map was also submitted to the Secretariat envisaging particular measures for development of the national network of biosphere reserves.

Natura 2000 network

The biological richness of Bulgaria's flora and fauna creates opportunities as well as challenges for the national conservation strategies. Due to the climatic and geographic conditions and variance found in the country, Bulgaria holds many habitats and species of European concern and importance. Becoming a member of the EU, the country automatically has to conserve and protect these species and habitats of community importance. As a consequence, Bulgaria is among the European countries with the highest territorial share of Natura 2000 sites. Whereas the average across the EU is 18 per cent coverage, Bulgaria has 34.4 per cent of its territory inscribed on the list. The total area of the network is more than 4 million ha, of which 56.47 per cent is forests, 32.35 per cent agricultural land and the rest is other types of land.

In preparation for the country's accession to the EU, the Government submitted proposals to the EU on the selection and designation of sites. Several rounds of revision based on requests from the EU and pressure from citizens, and after decisions of biogeographical seminars, took place and, by the end of 2007, Bulgaria finally submitted: 114 SPAs and 228 SCIs, which cover 20.3 and 29.5 per cent of the territory of Bulgaria, respectively. Many of these 342 sites overlap, and these overlapping areas account for 33.89 per cent of their total coverage. Within the submission process, the Government declined to submit some SPA sites or changed the size of the territory submitted, among them sites which still today create conflicts in regard to infrastructure and tourism development, for example Central Balkan, Kaliakra, Lomovete, Rila, Pirin and Western Rhodopes.

This resulted in complaints by NGOs and an infringement procedure initiated by the EU. But also, on the ground, resistance against Natura 2000 sites is still an issue to be taken into consideration as reflected by the fact that most orders for SCIs are still lacking and only five management plans are currently available for Natura 2000 sites; however, an integrated management plan for the SCIs and SPAs of Kaliakra complex is in preparation.

At the end of 2015, the Natura 2000 sites consisted of 340 sites, of which 119 were selected for the conservation of natural habitats (as SPAs) under Directive 79/409/EEC on the conservation of wild birds (Birds Directive), covering 22.7 per cent of the national territory, and 234 were selected for the conservation of habitats (as SCIs) under the Habitats Directive, covering 30 per cent of the national territory (table 9.4 and map 9.1). In 13 cases, SPA and SCI overlap completely.

In spring 2016, the process of designation is completely finished for all sites for the protection of wild birds and all 119 SPAs and 6 SACs are already designated by orders of the Minister of Environment and Water. For the 228 SCIs adopted by the Council of Ministers and the European Commission, the declaration as SACs by orders of the Minister of Environment and Waters is still pending. The reason

given for this significant delay is the differing procedure for declaration of SAC compared to the procedure for declaration of SPA and the consultation process on the local level, including public hearings, which is part of the formal declaration process but also represents an approach to gain acceptance for the sites via public participation.

Cultivated land, pastures and meadows are the prevailing types of agricultural land in the Natura 2000 network. Currently, the Natura 2000 network also includes 14 marine sites for conservation of wild birds and 17 marine sites for conservation of natural habitats and of wild fauna and flora, within which *Tursiops truncatus* and *Phocoena phocoena*, for example, are subjects of conservation.

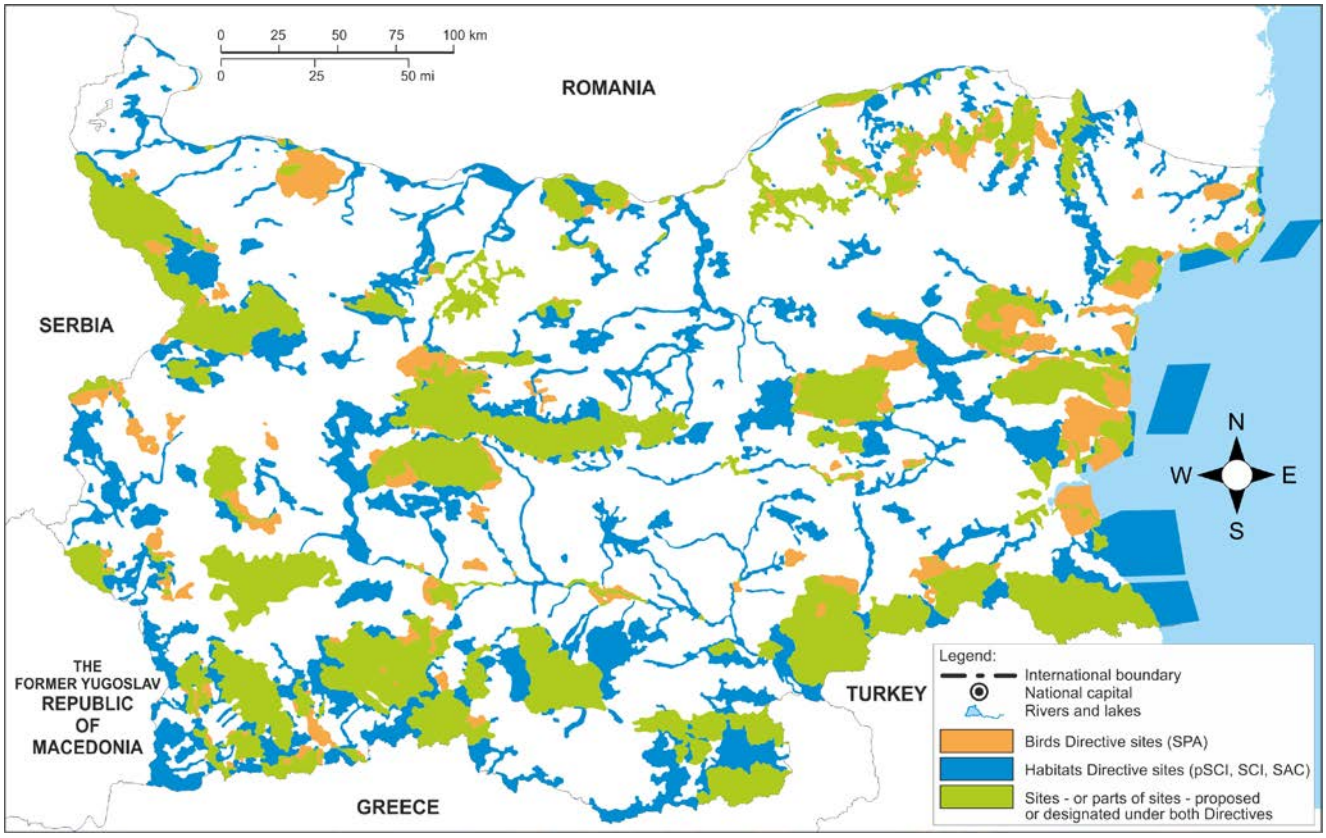
The Natura 2000 sites contribute to overall policy on nature conservation; in fact, they have been an approach and a tool to enlarge the spatial component of the country's protected area network. However, the procedure has not been without complications in Bulgaria.

Table 9.4: Natura 2000 Barometer, 2015

	Natura 2000	SCI	SPA
Sites, number	340	234	119
Total area, km^2	41 048	35 740	25 776
of which,			
Terrestrial area	38 222	33 258	25 226
Marine area	2 827	2 482	550
Land area covered, %	34.46	29.99	22.74

Source: European Environment Agency, 2016.

Map 9.1: Natura 2000: Birds and Habitats Directives in Bulgaria



Source: European Environment Agency, 2016.
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Ramsar transboundary initiatives

The country is a participant in MedWet and BlackSeaWet – regional initiatives of the Ramsar Convention to protect the Mediterranean and the Black Sea wetlands respectively. In 2013, the first cross-border shared management of a wetland complex (protected areas Srebarna–Yezerul Calarasi, Belene Islands Complex–Suhaia and Ibisha Island–Bistret) was established under the Ramsar Convention and between Bulgaria and Romania.

European Green Belt Initiative

Bulgaria participates in the European Green Belt Initiative. Having joined the Initiative in 1999, in 2013, the Ministry of Environment and Water, together with more than 20 European countries, signed a declaration of cooperation, by which the signatories intend to conserve and restore territories along the European Green Belt as a functional network of habitats. Examples are:

- Designation of Belasitsa Mountain as a nature park;
- Development of management plans for nature parks and nature reserves such as Belasitsa Nature Park, Gabra and Shabanitsa managed reserves, and Ali botush, Carna reka, Chuprene, Gornata koria, Kongura, Sokolata, Vitanovo and Uzunbudjak nature reserves;
- Supporting a project of the Bulgarian Biodiversity Foundation for "Strengthening the cooperation and possible establishment of transboundary protected area in Osogovo Mountain".

Management of protected areas

Large protected areas in Bulgaria face intensive pressure brought about by an apparent clash of interests. Plans to extend ski resorts and lifts in Pirin and Rila National Parks, as well as construction of large tourist resorts and facilities on the Black Sea coast, have been keeping the country and its society busy for several years already. Finding a balance between opposing interests is the biggest challenge in biodiversity conservation.

Consequently, major challenges to biodiversity conservation and protected areas relate to the future acceptance and management of its protected areas. The pending orders designating the SACs (i.e. SCIs becoming SACs), which have already been awaited for more than three years, are only another indication of the open-ended process. In addition, all protected areas in Bulgaria largely depend on EU funding and staff numbers in their administrative and managing bodies are stagnating. However, if economic interests and planned investment demand threaten the parts of Natura 2000 sites, they are not able to fulfil their main function, which is the preservation of nature.

Whereas nature and national parks are relatively well staffed, Natura 2000 sites have no dedicated administration, management or communications staff (at national or local level). While this is not particularly required, the serious local acceptance problems would justify investment in awareness-raising and establishing a specific management regime for Natura 2000 sites.

Nonetheless, management planning, including the management of Natura 2000 sites, is still under intensive discussion. With the Ministry of Environment and Water intending to develop a unified approach for SCIs and SPAs (the majority of which overlap), current government-funded projects are beginning to develop principle structures and procedures on the national management of the Natura 2000 system.

In practice, Natura 2000 sites do have a problem being accepted, in particular on the local level. Natura 2000 sites are seen as restrictive. As the Natura 2000 system intents to preserve the good ecological state of defined habitats or species, conflicts in land use schemes also arise. The elaborated National communication and information strategy have to face these problems. The compensatory payment scheme for restriction in agricultural practices due to the conservation regimes in Natura 2000 sites are also an adequate reaction.

Management of the nationally designated protected areas is shared between the Ministry of Environment and Water (with the National Nature Protection Service Directorate on the national level and the respective RIEWs and national park directorates at regional level) and the Ministry of Food and Agriculture with its Executive Forest Agency and its regional representations.

The Ministry of Environment and Water is in charge of reserves, national parks and managed reserves, which protected areas are exclusively state property. The MOEW is responsible for providing of control over observing of regimes of protected areas including by applying the procedures for EIA, Strategic Environmental Assessment and Appropriate Assessment for projects, plans, programs and investment proposals. In the course of these assessments is checked their admissibility in terms of the protected area’s regimes.

The Executive Forestry Agency under the Ministry of Agriculture and Food is in charge of the implementation of management plans of the nature parks. As for the protected areas from the categories of "nature parks", "protected sites" and "natural monuments" – where all kinds of land ownership are allowed, the regimes and norms for use, which are imposed by their orders for designation and management plans, are obligatory for all the owners and users in these territories.

The control over the activities, carried out by the owners and users of the protected areas is exercised by the corresponding Regional Inspectorate of Environment and Water, Nature Park Directorate (in case of nature park), municipalities and state forestry enterprises (under the Executive Forestry Agency). Interministerial control and coordination mechanisms are in place.

9.3 Threats to biodiversity

Due to the country's abundance of biological diversity and hosting of a large proportion of species that are threatened at European level, Bulgaria has a particular responsibility for biodiversity conservation. In this context, the mountain ranges and massifs holding a high percentage of endemism are particularly important. Pirin, Rhodopes, Rila, Stara Planina, Strandja and Vitosha are the regions with the highest conservation value.

However, a large proportion of the natural diversity, e.g. 20.5 per cent of the vascular plants, is threatened by various negative factors, such as deterioration, fragmentation and loss of habitats due to infrastructure development, competition with invasive alien species and intensive land use.

Habitat deterioration, fragmentation, loss and change

Habitat deterioration, fragmentation, loss and change is the biggest threat to biodiversity in Bulgaria. Almost 50 species are directly threatened. The major issue, and the cause of intensive debates, demonstrations, litigation in national and European law courts and infringement procedures, is the clash between economic development and nature conservation.

Bulgaria holds a high bat diversity, occurring in and around the numerous cave ecosystems of the country, and anthropogenic pressure and disturbance is reported to be an increasing danger to the bat colonies. Although qualitative data are yet not available, the 2015 Red Data Book notes a significant decline in the populations.

Tourism

A major threat to Bulgaria's natural resources is investment or planned investment in development of the tourism sector. The Black Sea coast and high mountain regions are affected. Both ecosystems hold vulnerable as well as sensitive species and habitats, which are exposed mainly to anthropogenic pressure. Tourism developers use the development of new management plans as an approach to try to remove the categorical ban on ski tourism development in conservation zones and by doing so to revise the zoning of the park, e.g. in Pirin National Park or Vitosha Nature Park.

Coastal development and fishing

The major threat to marine biodiversity is the physical loss and damage to habitats. Activities leading to physical harm include the building of hydraulic structures, shore protection construction, dredging and drilling for oil and gas. Physical damage to the bottom substrates and associated biological communities in the Bulgarian part of the Black Sea shelf is mainly caused by commercial fishing with active pelagic or demersal fishing gear. Fishing with bottom gear (beam trawling, permitted since 2012) leads to abrasion of the seabed and in particular the vulnerable biogenic substrates, e.g. it causes a decrease in the numbers of Mediterranean mussel (*Mytilus galloprovincialis*).

Energy

The construction and operation of wind and photovoltaic parks has already affected Natura 2000 sites, which resulted in an infringement procedure being issued by the EU, e.g. for Kaliakra and Balchik, both SPAs and IBAs. In fact, wind power development, particularly on the Black Sea Coast, is becoming a major threat for IBAs and their diversity. By 2011, more than 1,200 wind power turbines had been approved, constructed or planned in the vicinity of Kaliakra IBA (nine turbines in 2007), a trend which raises concerns. However, the National Renewable Energy Action Plan for the period 2010–2020 places clear restriction on the development of solar and wind power plants within or in the vicinity of Natura 2000 sites.

For freshwater species, the constructed – or planned – hydropower installations and dams in natural river ecosystems pose a significant threat. About 10 species are directly threatened in the country. With about 900 permits issued for construction of micro- to medium-sized HPPs, the majority of Bulgarian rivers and creeks could be dammed. Many power plants started operating in 2006/2007. Of these, more than 100 are

located within Natura 2000 sites. Technical advice on ecologically and biodiversity-friendly installation of HPPs, are lacking. With an amendment in the Water Act the restriction for HPP construction on water currents in Natura 2000 sites was imposed.

Agriculture

Two opposing trends are apparent in agriculture. First, agricultural expansion and intensification of land use, and conversion of grasslands into arable land, are reported, which is having a negative impact on the remnants of meadow and steppe vegetation. The main reason for this is agricultural policies that are geared more towards intensive farming than to good agricultural practices and the provision of more environmental public goods, such as biodiversity. Second, the opposite trend is reported. Abandonment of rural areas and land, limited employment and demographic changes lead to a decline in grazing and thus to succession of the herbaceous coenoses into shrub and even forest vegetation.

This too has a negative impact, especially as many valuable and species-rich habitats have been developed according to centuries-old extensive land use practices. In order to reduce the pressure from unorganized grazing on the national parks and also avoid the destruction of habitats as a result of grazing, from 2017 onward, subsidies will also be paid for organized grazing within the national parks. Thus, particular habitats that depend on grazing can be maintained and overgrazing reduced.

The over-abstraction of water for the agricultural sector (including aquaculture as well as in regard to the urbanization trend) and the increasing frequency of droughts put freshwater species under high pressure. Freshwater habitats of the lowlands are completely or almost completely dry, the riverbeds have been changed and many riverside habitats have been destroyed.

The intensification of agricultural production leads not only to increased agricultural output but also to the loss of local breeds and plant varieties. However, in the last few years there has been an increasing trend towards organic farming, which slows and eventually halts this intensification.

Excessive use of biological and genetic resources

According to WWF Bulgaria, the annual volume of illegal logging for the period 2006–2013 was 2.4 million m^3, which accounted for one quarter of all timber. The prevailing challenge is overexploitation/illegal output of between 20 and 40 per cent of the allowed logged volume. The fragmentation of large forests has occurred in the lowlands and riparian forests: the quality and structure of these forests are damaged and some of them have become shrub formations. Most of the deciduous forests have been turned into coppice forests.

Poaching, illegal collection of herbs and fungi, as well as trade (import and export) in endangered species (also of global concern) still takes place. Fish resources are decreasing due to overexploitation, the lack of a general programme for regular fish stocking and the lack of regular monitoring of fish and non-fish resources.

Air, soil and water pollution

Major soil pollutants are synthetic fertilizers, pesticides, waste deposits and industrial waste accumulation. There is an increase in the use of herbicides and pesticides: in 2004, about 750,000 ha of wheat and barley fields had been treated against weeds with herbicide; in 2013, 1,164,740 ha of winter crops had been treated. An even sharper trend is recognizable for fertilizer: in 2005, about 152,000 tons of nitrogen fertilizer had been applied; in 2013, about 260,000 tons had been applied, an increase of 70 per cent.

Major air pollutants are from industry, transport, urban areas and agriculture. As for forest ecosystems, the national maximum permitted levels of acidity, sulphur and nitrogen were not reached between 2009 and 2013.

Invasive species

During recent years and following international trends, research on invasive alien species has been intensified in Bulgaria, resulting in a set of government-funded projects between 2009 and 2013 and consequently a wide range of scientific publications.

The resulting data trends show the following: whereas between 1991 and 2011, 41 alien plant species were recorded for the first time in Bulgaria, in the four years between 2009 and 2012, another 45 alien plant species were added to that list. Not all of them exhibit invasive traits, and some remain poorly studied due to taxonomical challenges. Yet national scientific and political institutions consider this regionally valid list as guidance for monitoring and further research. The majority of the "top 10" worst invasive alien plant species in Bulgaria are widely distributed in Europe, e.g. *Acer negundo, Ailanthus altissima, Ambrosia*

artemissifolia, Amorpha fructicosa, Fallopia × *bohemica* and, recently, *Opuntia humifusa.* A project titled "Biology, Ecology and Control of the Invasive Alien Species in the Bulgarian Flora", funded by the National Science Fund of the Ministry for Education, Youth and Science, resulted in a compendium of about 60 invasive and potentially invasive alien plant species.

The greatest threat to biodiversity is seen in two species: the multi-coloured Asian ladybird *Harmonia axyridis* (which, after first being recorded in 2009, spread rapidly) and the chestnut leafminer moth *Cameraria ohridella*. Among the 29 alien species of marine invertebrates, nine are considered invasive with, for example, *Ficopomatus enigmaticus*, *Rapana venosa*, *Mya arenaria* and *Anadara inaequivalvis*, *Mnemiopsis leidyi* and *Beroe ovata* changing the entire ecosystem significantly. In the few years between 2009 and 2013, 31 alien species of terrestrial arthropods were newly recorded in the country. Naturally also for Bulgaria, riparian habitats and aquatic ecosystems, as well as anthropogenically influenced areas, are most vulnerable to the introduction and establishment of alien plant and animal species. The mass development of *Corbicula fluminea* or the invasive freshwater mussels from the genus *Dreissena* create a significant threat to native freshwater and marine habitats. The red-cheek turtle (*Trachemys scripta elegans*) can be considered a potentially invasive vertebrate species; it is an active predator and might compete with local species and have a negative impact on the ecosystems as a whole.

Bulgarian scientific institutions conducted several projects on data collection for distribution, abundance, and impact on native species and ecosystems, which revealed the recent negative trend (of an increasing number of invasive alien species in the country, their rapid spread and invasion of new territories, massive development and increasing size of their populations). The regional network, East and South European Network on Invasive Alien Species, was established with the active participation of Bulgaria. However, a national strategy and action plan on invasive alien species have not yet been developed. At present, the development of the National Strategy of Biological Diversity will contain a dedicated chapter on invasive alien species.

Climate change

Changes in the wintering water birds are used as an indicator to demonstrate the impact of climate change on biodiversity. The numbers have varied considerably over the last five years, e.g. in 2012 the number of birds was 46.87 per cent lower than in 2011. Whether this variation depends on climate change effects is still not yet demonstrated. However, the increased temperatures lead to more preferable conditions, for example for the drastic increase of invasive alien species such as the multi-coloured Asian ladybird *Harmonia axyridis.*

9.4 Legal, policy and institutional framework

Legal framework

Membership of the EU brought a number of difficulties and challenges associated with, for example, the lack of management plans for a number of protected areas, systemic problems in approving investment projects and plans, with gaps against the requirements of environmental legislation or funding constraints at national and municipal levels, and also due to the heavy dependency on EU OP "Environment" funds. Part of the governmental response to this was to update and amend laws and subsidiary legislation after 2007, namely the Environmental Protection Act, the Biological Diversity Act, the Protected Areas Act, the Plant Protection Act, the Forestry Act and their subsequent pieces of legislation. For example, the Environmental Protection Act had to be amended, e.g. for the regulations to apply to and coordinate with EU Life+ programmes or reporting schemes to the European Commission. Today, the legal framework is composed of over 100 rules, regulations and procedures to the relevant laws.

This high number, together with the frequent amendments and further development of the legislation, reflect the high development dynamic of the country but lead to a rather complex legal framework for conservation. In addition, for this reason, not all EU regulations have been transposed into standalone pieces of national legislation yet and discussion on the demand is still ongoing between various national institutions, e.g. on the EU Regulation 1143/2014 on Invasive Alien Species. Yet the EU regulations are seen as the overarching regulation for the underdeveloped national regulations and thus set the frame for national action.

One of the major legal amendments with EU accession has been the transposition of species and habitats of European concern (Habitats and Birds Directives) into national conservation legislation and policies. All of the species and habitats of the directives have been added (annexed) to the Biological Diversity Act with the accession. Yet, already during the preparation for the EU accession, transposition of the environmental acquis was hindered by limited administrative capacity to implement the legislation, insufficient

funding, and the lack of incorporation of the environment into the other sectoral policies that seemed to take priority (Hristova 2012). Following accession in 2007, the capacity problems and application of EU regulation remained a challenge for the country, signaled by the increasingly active Bulgarian environmental NGOs. Since 2009, more than 25 complaints have been filed by individuals and NGOs in regard to the humiliation of protected areas rules, regulations and legal aspects. As a consequence, three infringement procedures were initiated by the Commission: i) on reduction of the designation area of six SPAs (Central Balkan, Kaliakra, Lomovete, Pirin, Rila, West Rhodopes); ii) concerning authorization on Kaliakra IBA (Via Pontica) of wind-farm projects without adequate assessment of impact; and iii) concerning the authorization of numerous projects in all SPAs without taking into account the cumulative impact. To date, a decision of the Commission is only available on the second, which declares that Bulgaria failed to fulfil its obligation under nature protection directives.

Some of the national regulations have undergone practical updates and amendments since 2000. The "Regulation for elaboration of management plans for protected areas" was updated in 2012. In 2013, the regulation "Rules for Organization and Operation of the National Park Directorates" was updated to clarify: i) the role of national parks directorates as administrative structures to the Ministry of Environment and Water; ii) the role of the directors of the national parks as executive bodies and secondary budget officers to the Ministry of Environment and Water; and iii) coordination between the activities of the national parks directorates and the National Nature Protection Service Directorate. In 2016, the Council of Ministers adopted a new tariff for the fees to be paid for permitted uses of natural resources on state-owned land in protected areas, according to the current market price of the resource.

Policy framework

The 1998 National Strategy for Biodiversity Conservation is a strategic document without termination. An entirely new National Strategy with Action Plan is envisaged to be prepared for the period 2016–2022, including national strategies to reach the Aichi targets as well as the goals of the EU Biodiversity Strategy to 2020. Yet the funding for the development of this strategy is not secured at present. The second National Biodiversity Conservation Plan 2005–2010 is still in use. This document has not been updated since 2011, yet particular national priorities have been formulated such as the implementation of the Aichi targets of the Strategic Plan for Biodiversity 2011–2020. Bulgaria has developed a range of national strategies in regard to biodiversity conservation, such as the Strategy for Resource Mobilization, or the National Priority Action Framework for Natura 2000 in Bulgaria for the period 2014–2020, to define and determine necessary conservation measures and action to improve conservation. Also, biodiversity conservation has been included in various sectoral national strategies and programmes, including:

- National Strategy for Regional Development 2012–2022;
- National Strategic Plan and Programme for Agricultural and Rural Development 2007–2013;
- National Strategy for Sustainable Development of Agriculture 2014–2020;
- National Strategy for Development and Management of the Water Sector (2012);
- Strategy for the Development of Hunting 2012–2027;
- National Programme for Fishery and Aquaculture 2007–2013;
- National Strategy for Sustainable Development of Tourism 2009–2013;
- River Basin Management Plans 2010–2015.

The National Action Plan for Conservation of Wetlands of High Significance in Bulgaria 2013–2022 establishes the rational use of wetlands, long-term conservation of the ecosystem and its services, and wetlands restoration as priorities. Eleven Ramsar sites are prioritized in the Plan, and an additional 25 non-Ramsar sites that feature good restoration potential or high biodiversity value are also described and horizontal measures proposed for them. In Bulgaria, the strategic documents are not legally binding.

Institutional framework

Protected areas administration and management is shared between two ministries – the Ministry of Environment and Water and the Ministry of Agriculture and Food and their subordinated institutions. Their legal coordination mechanisms are reflected in the Biological Diversity Act and Protected Areas Act. Based on the ownership structure of land, the mandate over the protected areas is shared between these two ministries. Strict reserves, national parks, managed reserves and Narura 2000 sites are administrated and managed by the Ministry of Environment and Water, and its National Nature Protection Service Directorate on the national level, and the 16 RIEWs and three national park directorates at the regional level.

In nature parks, protected sites and natural monuments, all types of ownership are allowed, and administrative responsibility lies with the Executive Forest Agency under the Ministry of Agriculture and Food. The Nature Park Directorates are in charge of managing the 11 nature parks.

In nature parks, protected sites and natural monuments, all types of ownership are allowed. The owners and the users of these protected areas are obliged to keep the regimes and norms of use determined by their orders for designation and management plans. The control over the activities of owners and users in these protected areas categories is provided by the respective Regional Inspectorate of Environment and Water, municipalities, state forestry enterprises and Nature Park directorates (in case of nature park). The Nature Park Directorates under the Executive Forestry Agency are in charge of managing the 11 nature parks. The Nature Park Directorates are in charge also for the implementation of management plans for nature parks.

The division of responsibilities for explicitly protected areas such as nature parks leads to institutional challenges. Nature parks, being very close conceptually to the UNESCO Biosphere Reserve concept, already promote an integrated concept of sustainable development and nature conservation. By doing so, they fulfil the European Nature Park Declaration. The Ministry of Environment and Water wished to transform some of the nature parks into biosphere reserves. The Ministry of Agriculture and Food and its Executive Forest Agency, as the management body of the nature parks, were not supportive of the idea. However, an agreement was reached between the interested institutions and stakeholders on 4 territories chosen for nomination as post Seville biosphere reserves. In the boundaries of the newly proposed biosphere reserves were included many lands which are state or municipal forests and are managed by the respective forestry enterprises.

The Ministry of Environment and Water performs a controlling and coordinating role in biodiversity conservation among the different stakeholders in Bulgaria. In this sense, the Ministry and its regional structures carry out control functions in biodiversity conservation, including in nature parks, which are managed by the Executive Forest Agency.
Since 2000, the national authorities have established several inter-institutional working groups at the expert level, such as the Standing Interinstitutional Working Group on Biodiversity established in 2008, Interinstitutional Coordination Group for Implementation of the Convention on Biological Diversity– Climate Change and Biodiversity in 2009, Interinstitutional Coordination Group for Implementation of the Convention on Biological Diversity – Genetic Resources in 2011, and Working Group on Invasive Alien Species in 2011.

In order to enable the general public to participate in the management of protected areas (national and nature parks), advisory councils to the relevant park directorates have been established. The advisory councils include representatives of various authorities, ministries, public organizations, NGOs, citizens and others. One of the main functions of these bodies is to facilitate, coordinate and mitigate the different interests of various local, regional and national stakeholders. Whereas the first management plans for the Central Balkan and Rila National Parks were adopted in 2001 (and Pirin National Park in 2004), the adoption of the new management plans with a duration until 2023 is pending.

In 2010, an integrated research unit, the Institute of Biodiversity and Ecosystem Research, was established at the Bulgarian Academy of Sciences, for the purpose of scientific research at the national and supranational levels on theoretical and applied aspects of biodiversity, ecology, environmental protection and sustainable use of biological resources.

Funding

The financial situation of all the protected areas remains constrained and heavily dependent on EU funds. The budgetary spending for all protected areas remained more or less constant between 2008 and 2015, at €2.5–3 million annually, to total roughly €25 million. Without the additional European financial support to the protected areas (RIEWs and national park directorates), adding up to about €28 million (2008–2015), the protected areas would have hardly been able to fulfil their functions. As for the current OP "Environment", nature parks are not eligible to apply for funding; the OP "Regional Development" would be used for co-funding this category of protected areas.

EU funding (e.g. OP "Environment", Life+) more than doubled the funding available for biodiversity conservation across all sectors in Bulgaria. Whereas the annual budget for this was about €17 million in 2009 (without EU funds and only directly biodiversity related), it was about €35 million in 2013 (with EU funds and also taking into account indirect costs related to biodiversity conservation) and the annual biodiversity-related budget was up to €56 million in 2015.

Instruments and mechanisms for biodiversity conservation

At present, there are very few economic mechanisms for biodiversity conservation in Bulgaria; agri-environmental schemes, including the development trend of organic farming, are the only functioning form of payments for ecosystem services at present. The steadily increasing national and European demand currently fuels a trend to establish or increase organic agriculture in Bulgaria. Positive effects on biodiversity can be expected, yet there are no qualitative data on this. For the wood market, Forest Stewardship Council (FSC) certification is also no incentive, as FSC-certified timber does not currently lead to higher prices and thus results in a lack of implementation.

Nevertheless, the Government implements broad-scale public awareness and education measures, supports green "labelling of businesses" and takes sectoral measures to promote biodiversity conservation and sustainable use within productive sectors (agriculture, forestry, aquaculture, fisheries).

9.5 Conclusions and recommendations

At present, a range of national and thematic strategies, including cross-sectoral strategies, exists. The National Biodiversity Strategy and Action Plan was prepared prior to the accession to the EU and may be updated because of Natura 2000. The update would not only allow the inclusion of the Aichi targets in national planning documents but also offers the chance to address other important issues such as over- and underexploitation of resources (e.g. pasture, fish stocks), long-term funding schemes for biodiversity management, management of Natura 2000 sites, and invasive species.

Recommendation 9.1:
The Ministry of Environment and Water should finalize the new National Biodiversity Strategy and Action Plan.

Bulgaria has taken on a European responsibility by designating more than 30 per cent of the country's territory as Natura 2000 sites. Designation of Natura 2000 sites, and the required regulations associated with it, brought a general boost for conservation of biodiversity and habitats in Bulgaria.

Enlarging sites and securing strict conservation is not envisaged; national parks, and certainly also a set of Natura 2000 sites are not at all protected from economic interests. The financial and staff communications capacity in the administration is limited, making it difficult to improve the challenging task of stakeholder integration. Land acquisition and compensation schemes in favour of the protected area are not part of the negotiation tools between private and governmental stakeholders.

Recommendation 9.2:
The Government should strengthen the status, value and role of protected areas by:

(a) Enhancing their administrative, financial and information capacity, including management;
(b) Using land acquisition and compensation schemes;
(c) Increasing the percentage of strictly protected areas to achieve Aichi targets.

Natura 2000 sites do not exclude human activities, which in turn offers a chance to improve their public acceptance if the area is not off limits for any human activity. A definition on the long-term management of every Natura 2000 site has not yet been developed, discussed and moderated at local level.

In particular, special efforts are needed to develop management approaches for sustainable land use and conservation in Natura 2000 sites and social acceptance of the sites remains low.. The administrative, financial and communications capacity of the Natura 2000 division within the Ministry of Environment and Water is limited to complying with the national and European requirements.

Recommendation 9.3:
The Ministry of Environment and Water should develop appropriate administration, communications and management capacities for the Natura 2000 sites by:

(a) Developing appropriate management plans;
(b) Improving the general public's understanding of the concept of Natura 2000 and acceptance of the Natura 2000 sites.

Chapter 10

ENERGY AND ENVIRONMENT

10.1 Trends in energy balance

The primary energy production, gross domestic energy consumption and end consumption of energy all peaked in 2011 (table 10.1). The share of energy from renewables on gross domestic energy consumption has been on a steady rise and increased from 12.2 per cent in 2009 to 19 per cent in 2013.

The measures undertaken in the last few years to stimulate energy efficiency, increased energy generation from renewable energy sources (RES) and projects realized by the new capacities of local coal have shown a positive reflection in the energy dependence indicator. Bulgaria's energy dependence for the last few years is significantly lower than the average of EU member countries (table 10.2).

Maritsa Iztok-1 was the first large-scale power plant built in Bulgaria in the last 20 years.

There were several unsuccessful projects on major energy transit routes through Bulgaria, e.g. the Burgas–Alexandroupoli oil pipeline, the Burgas–Vlore oil pipeline, the South Stream gas pipeline and the Nabucco gas pipeline.

The Burgas–Alexandroupoli pipeline was a proposed oil pipeline project for transportation of Russian and Caspian oil from the Bulgarian Black Sea port of Burgas to the Greek Aegean port of Alexandroupoli. In December 2011, the project was suspended by the Bulgarian Government due to environmental and supply concerns.

The Burgas–Vlore oil pipeline envisions Caspian oil being shipped across the Black Sea and the Southern Balkans to Albania. If completed, it would be the first western energy route from Eurasia that is not under the direct control of either Russia or Turkey.

The South Stream gas pipeline was seen as a rival to the Nabucco pipeline project. The project was cancelled by Russia in December 2014 following obstacles being presented by Bulgaria and the EU, the 2014 Crimean crisis and the imposition of European sanctions on Russia.

The Nabucco pipeline would transport Caspian and Middle East gas through Turkey, Bulgaria, Romania, Hungary and Austria to Central Europe. However, in June 2013, the Shah Deniz Consortium had chosen a rival project, Trans Adriatic Pipeline, that has a Turkey–Greece–Albania–Italy route, and the future of the Nabucco project is unclear.

Table 10.1: Macro-energy parameters, 2009-2013, ktoe

	2009	2010	2011	2012	2013
Primary energy production	9 553	10 188	11 919	11 321	10 208
Gross domestic energy consumption	17 444	17 783	19 106	18 305	16 954
End consumption of energy	8 493	8 720	9 050	9 044	8 598
Share of energy from renewable energy sources in gross domestic energy consumption, %	12.2	14.1	14.3	16.0	19.0

Source: Bulletin on the State and Development of the Energy Sector in the Republic of Bulgaria, 2015.

Table 10.2: Energy dependence, 2009-2013, percentage

	2009	2010	2011	2012	2013
Average EU-28	53.7	52.8	54.0	53.4	53.2
Bulgaria	45.1	39.6	36.0	36.1	37.8

Source: Bulletin on the State and Development of the Energy Sector in the Republic of Bulgaria, 2015.

Reserves and production

Coal

The major local energy resource of Bulgaria is lignite coal. It is dominant in the coal production structure, accounting for 93.0 per cent in 2014 (table 10.3). Lignite coal is followed by brown coal at 7.0 per cent and black coal at 0.001 per cent (or 300 tons). The production of brown coal is mainly in the Bobovdol basin (43.3 per cent) and Pernik basin (48.9 per cent).

Similar to primary energy production, gross domestic energy consumption and end consumption of energy coal production and consumption peaked in 2011 (table 10.3). During 2012–2013 a negative trend was observed, which was reversed in 2014. Coal production in 2014 was 9.4 per cent higher compared with 2013. The total production of lignite coal in 2014 was 10.1 per cent more than in the previous year.

The reserves of lignite coal are estimated to be 4.5 billion tons. The reserves of brown coal are 800 million tons. The reserves of anthracite are slightly more than 1.2 billion tons, but more than 95 per cent of these are located at a depth of some 1.5 km and at this stage cannot be exploited.

Natural gas

The extraction of natural gas in Bulgaria is on a decreasing trend: 278 million m^3 in 2013, 179 million m^3 in 2014 and 82 million m^3 in 2015. The import of natural gas to Bulgaria in 2013 and 2014 was at almost the same level and increased by 12 per cent in 2015 to compensate for a decrease in extraction (table 10.4).

Bulgaria operates underground gas storage with a capacity of active gas of about 450 million m^3/per year. In 2014, 294 million m^3 of natural gas was compressed in this storage and the withdrawn quantity amounted to 273 million m^3. Proved reserves of natural gas in Bulgaria are 5.663 billion m^3.

Oil

Oil in Bulgaria is produced in insignificant amounts and oil demand is mostly covered by import (table 10.5).

Table 10.3: Coal, 2007-2014, thousand tons

	2007	2008	2009	2010	2011	2012	2013	2014
Primary production	28 633	29 050	27 279	29 427	37 128	33 427	28 624	31 300
of which:								
Production of Lignite	28 418	28 748	27 148	29 379	37 111	32 512	..	29 100
Consumption	33 529	33 145	30 206	32 601	40 166	35 215	30 478	..
Imports	5 115	5 523	2 853	2 846	3 362	2 323	..	..
Exports	2	33	14	90	125	116	..	..

Source: https://knoema.com/EIAIES2015Jun/international-energy-statistics-january-2016, accessed 1 June 2016.

Table 10.4: Natural gas, 2013-2016, million m^3 (15°C)

	2013	2014	2015	2016 (I-III)
Production	278	179	82	20
Imports	2 697	2 680	3 007	750

Source: http://www.nsi.bg/en/content/5024/production-and-deliveries-natural-gas, accessed on 1 June 2016.

Table 10.5: Crude oil, 2007-2013, thousand barrels per day

	2007	2008	2009	2010	2011	2012	2013
Consumption	105.4	104.3	98.5	90.3	83.6	91.0	94.0
Imports	143.0	147.0	125.0	125.0	..	..	..

Source: http://www.indexmundi.com/energy.aspx?country=bg&product=oil&graph=consumption, accessed 1 June 2016.

Uranium and nuclear waste

Bulgaria shut down its uranium mining facilities for environmental reasons in 1992; terrains were recultivated but recently there has been certain interest in resuming activities.

All front-end fuel cycle services in Bulgaria are provided by Russia's TVEL through Techsnabexport (Tenex).

The State Enterprise Radioactive Wastes (SE-RAW) is responsible for waste management. Under a 2002 agreement, Bulgaria has been paying Russia US$620,000 per ton of used nuclear fuel repatriated for reprocessing.

Used fuel was initially stored in pools at each reactor, but in 1990 a pool-type storage facility was constructed at Kozloduy to take fuel from all the units. This was upgraded and a new licence issued by the Bulgarian Nuclear Regulatory Agency (NRA) in 2001.

A new €49 million dry storage facility for 2800 VVER-440 used fuel assemblies has been built near this at Kozloduy, with finance from the Kozloduy International Decommissioning Support Fund. The facility, with capacity of 5,200 fuel assemblies in 72 casks, was officially opened in May 2011. It will accommodate used fuel from Kozloduy's four closed VVER-440 units, currently in pool storage, and will be subsequently enlarged to receive casks with fuel from VVER-1000 units 5 and 6. Also at Kozloduy there is a low- and intermediate-level radioactive waste treatment and storage facility.

Oil refining sector

With a primary processing capacity of 9.5 million tons of crude oil per year, "LUKOIL Neftohim Burgas" AD is the biggest company on the Balkan Peninsula in terms of crude oil processing capacities. The revamps and construction of the production capacities in the period 2003–2010 led to the reduction of sulphur dioxide emissions from the motor fuels produced, from 117 thousand tons to 7.4 thousand tons per year. The construction and commissioning of three units producing products as per European standard Euro 5 were completed – HDS/HDA Unit with a capacity of 1.7 million t/y, Prime G Unit with a capacity of 1.1 million t/y and Methyldiethanolamine Regeneration Unit with a capacity of 0.4 million t/y.

Electricity

Electricity production also peaked in 2011, was decreasing during 2012–2013 and then trended upward again in 2014–2015 (table 10.6).

The structure of electric power generation is dominated by thermal power plants (TPPs) using coal, followed by Kozloduy NPP. Major sources for the generation of electrical power are local coal and nuclear fuel.

The share of local energy resources in electric power generation in 2014 was 91 per cent, while that of imported resources was 9 per cent (nuclear energy was reported as a local energy resource). Generation of electrical power from RES accounts for 18.9 per cent of gross domestic consumption of energy in 2014.

Energy consumption

Consumption of coal is mainly for the purpose of electricity and heat generation (96.3 per cent), as well as for briquettes production (2.7 per cent). Consumption for own needs and other consumers is 0.7 per cent and for household heating, 0.3 per cent. In 2014, conventional thermal power and heat stations consumed 5.472 million tons of oil equivalent of coal, while industry consumed only 170,000 tons of oil equivalent and households 128,000 tons of oil equivalent.

Table 10.6: Electricity, 2007-2015, GWh

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gross production	42 875	44 423	42 789	46 011	50 330	47 406	44 040	47 193	48 416
Net production	38 991	40 028	38 486	41 659	45 401	42 904	40 055	42 939	43 934
Import	3 057	3 097	2 662	1 166	1 450	2 353	3 351	4 319	4 250
Export	7 534	8 441	7 735	9 613	12 110	10 661	9 532	13 773	14 697
Used for the internal market	34 514	34 684	33 413	33 212	34 741	34 596	33 874	33 485	33 487

Source: http://www.nsi.bg/en/content/5027/production-and-deliveries-electricity, accessed 1 June 2016.

Table 10.7: Electricity installed capacity, 2003-2011, thousand MW

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total electricity installed capacity	12.13	12.33	12.49	12.24	9.72	9.66	9.46	10.01	10.29
Nuclear electricity installed capacity	2.94	2.94	2.94	2.94	1.91	1.91	1.91	1.91	1.91
Total renewable electricity installed capacity	1.91	1.91	2.00	2.02	2.08	2.24	2.32	2.67	2.99
Hydroelectricity installed capacity	1.98	1.98	1.98	1.98	2.01	2.12	2.14	2.18	2.24
Total non-hydro renewable electricity installed capacity	0.01	0.00	0.02	0.03	0.04	0.12	0.18	0.49	0.74
Installed capacity solar, tide and wave electricity							0.01	0.02	0.21
Wind electricity installed capacity	..	..	0.01	0.03	0.03	0.11	0.17	0.46	0.53
Biomass and waste electricity installed capacity	..	..	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Source: https://knoema.com/EIAIES2014/international-energy-statistics-2014?location=1000580-bulgaria, accessed 1 June 2016.

Table 10.8: Electricity from renewables, 2007-2012, MWh

	2007	2008	2009	2010	2011	2012
Total renewable electricity net generation	2 897.00	2 952.53	3 675.40	5 730.24	3 893.74	5 305.83
Hydroelectricity net generation	2 841.00	2 788.00	3 427.00	4 999.00	2 876.00	3 205.00
Wind electricity net generation	47.00	122.00	237.00	681.00	861.00	1 221.00
Solar, tide and wave electricity net generation	..	..	3.00	15.00	101.00	814.00
Biomass and waste electricity net generation	6.00	15.53	7.40	35.24	55.74	65.83

Source: 2016NSI Annual Questionnaire 'Electricity&Heat'.

Primary energy generation meets about 60 per cent of gross domestic energy consumption in the country, with a relatively unchanged structure over recent years and dynamics resulting from the dynamics of consumption or according to data by the NSI.

About two thirds of fuels are used by power plants for electricity and heat generation, approximately one third is used in oil refineries to produce oil products and an insignificant part is used in briquette factories, blast furnaces and coking enterprises.

Inland consumption of natural gas in the country for 2014 was 2858 million m^3 (15°C), which was 1.85 per cent less than in 2013. The gas distribution grid in Bulgaria is currently under development and enlargement. In 2014, conventional thermal power and heat stations consumed 913,000 tons of oil equivalent of natural gas, industry consumed 781,000 tons, transport 100,000 tons and households 45,000 tons of oil equivalent of natural gas.

End consumption of electricity in the country in 2014 amounted to 29 TWh, which is 0.86 per cent more than in 2013, including the industrial and public sectors (18.3 TWh) and the household sector (10.6 TWh). Export of electrical energy in 2014 was 9.5 13.8TWh, which is 44.5 per cent more than in 2013 and represents 29 per cent of gross electricity generation.

In 2014, the total heat energy generated by heat production and supply power plants (HPSPPs), factory heat power plants (FHPPs) and Kozloduy NPP was 15 TWh, which was 2.19 per cent more than in 2013. In structural terms, the largest share of heat generation was accounted for by HPSPPs, followed by FHPPs and the NPP. The largest relative share of input fuels for heat production was of gaseous fuels (44 per cent), followed by imported coal (33 per cent), local coal (18 per cent) and biofuels (4 per cent). The other input fuels represent a minor share.

The share of imported energy input for heat generation is 76 per cent and that of local energy is 24 per cent; nuclear energy is accounted for as domestic.

Total end consumption of heat energy in 2014 amounted to 12.4 TWh, which is 0.78 per cent less than in 2013. In the structure of consumption of heat energy, the largest share belongs to industrial and commercial consumers (67 per cent), followed by households (28 per cent) and budgetary organizations (5 per cent).

The centralized heat supply in 12 big towns in Bulgaria is performed by co-generation heat and power plants. In 2014 they generated 6.6 TWh of heat energy. Total end consumption of heat energy generated by these power plants is 4.8 TWh, where 73.0 per cent is by households, 14.7 per cent by industrial and commercial consumers and 12.3 per cent by budgetary organizations.

10.2 Energy intensity and efficiency by end use

The energy intensity of the Bulgarian economy, according to Eurostat data for 2013, shows that Bulgaria ranks last among the 28 EU member countries, having the highest energy intensity rate of 610.6 kgoe/€1,000 (according to comparable prices for 2005) (table 10.9). The average European intensity is 141.6 kgoe/€1,000. The different parity purchasing powers within the EU mitigate this dramatic contrast without eliminating it.

Industry

During the period 2001–2009, the Industry sector persisted along a trend of rapid decrease in energy intensity. In 2009, energy consumption in the sector decreased by almost 30 per cent in just a year. After 2009, due to the crisis, the positive downward trend in energy intensity stalled and practically flattened out till 2014. In 2014, energy consumption and energy intensity in the Industry sector remained practically at their levels from the previous year.

Energy consumption showed only a marginal increase from 2 576 ktoe in 2013 to 2 606 ktoe in 2014. Energy intensity in the sector in 2014 remained at practically the same level as in the previous year, with 0.1376 kgoe/BGN of GDP in 2010 prices in 2013 and 0.1382 kgoe/BGN of GDP in 2010 prices in 2014.

Transport

Energy consumption by the transport sector had been growing steadily in the period 2000–2006, before stabilizing (2006–2010). Energy intensity was at constant rates during the period 2000–2010 and the value in 2010 was close to that in 2000. During the period 2000–2008, the share of the transport sector in final energy consumption (FEC) increased steadily, from 21.8 to 32.7 per cent, excluding 2010, where it was 31.4 per cent of FEC. Energy intensity in the sector decreased by 1.9 per cent over the period 2009–2010.

The modal shift from rail to road transport had an impact on the growth of energy intensity in the sector. During the period 2000–2010, the share of rail transport decreased steadily, and in 2010 it reached 1.5 per cent of total energy consumption in the sector. The share of road transport increased from 90.6 per cent in 2000 to 91.6 per cent in 2010.

Road transport has a leading role in energy consumption and energy intensity in the sector. In 2010, 84 per cent of the final consumption of liquid fuels was used by the transport sector. That is why energy efficiency measures have to be implemented in the sector. Other significant drivers of the deterioration of energy efficiency in the transport sector during the period 2000–2010 have been the strong modal shift from one type of road transport to another, the influence of congestion in cities and the high average age of vehicles.

During the period 2000–2010, rail transport was replaced by road transport, for both passengers and freight. Passenger transport by car increased from 26,900 million person/km in 2000 to 48,150 million person/km in 2010 with an average annual increase of 7.9 per cent.

Bus transport decreased by 2.7 per cent/year (from 14,587 to 10,613 million person/km) and rail transport decreased by 3.9 per cent/year (from 3,472 to 2,100 million person/km in 2010). Freight transport increased from 6,404 million ton/km in 2000 to 19,454 million ton/km in 2010, with an average annual increase of 20 per cent. Rail transport decreased by 8.1 per cent annually over the same period (from 5,538 to 3,064 million ton/km).

Statistical data for energy consumption by passenger transport (cars and buses) and freight transport are not available. The stock of passenger cars increased from 1.6 million in 2000 to 2.6 million in 2010. Car ownership rates have been around 350 cars per 1,000 inhabitants, still well below the EU-15 average of more than 500.

More than 87 per cent of the passenger cars are more than 10 years old. On the other hand, the renovation of the fleet is not producing the expected result, since new cars are bigger and have more powerful engines.

Table 10.9: Energy efficiency of the economy, 2009-2013, kgoe/€1,000

	2009	2010	2011	2012	2013
Average EU-28	149.0	151.7	143.9	143.4	141.6
Bulgaria	661.4	668.8	705.5	669.9	610.6

Source: Bulletin on the State and Development of the Energy Sector in the Republic of Bulgaria, 2015.

Photo 10: Valorization of biomass waste at Municipal enterprise for waste treatment

The only data available are the unit consumption per equivalent car, which increased from 0.57 toe in 2000 to 0.6 toe in 2010 with an average annual increase of only 0.4 per cent. There are two distinct periods: from 2000 to 2006 (when consumption rose) and from 2006 to 2010 (when consumption fell). The rapid drop from 2006 was probably caused by reduction of car usage because of the economic crisis. Another possible reason for that decrease was the improvement of infrastructure and development of the subway in the capital, where most cars are used.

The most adverse trend in 2014 is exhibited by the Transport sector. This sector accounts, almost entirely, for all of the unfavourable trends observed in final energy consumption in 2014. Compared to the previous year, transport showed considerable increases in:

- energy consumption, by 12.8 per cent, from 2,604 ktoe in 2013 to 2,937 ktoe in 2014;
- energy intensity, by 11.1 per cent, from 0.034 kgoe/BGN of GDP at 2010 prices in 2013 to 0.038 kgoe/BGN of GDP in 2010 prices in 2014. (Note: Energy intensity in the Transport sector is calculated against total GDP.)

These rates of increase in consumption and energy intensity in 2014 are the highest in the sector for the period under consideration. The increase in energy consumption in road transport is 13.7 per cent, and, in quantitative terms, fuel and energy consumption rose from 2,401 ktoe in 2013 to 2,729 ktoe in 2014.

The key factors behind this major increase in energy consumption in transport over a single year are:

- a decrease in the price levels of liquid fuels derived from oil, which began in 2014;
- an increase in the total work carried out by freight and passenger transport;
- an increase in the number and use of personal motor vehicles.

Transport is the only sector where the rate of increase in consumption significantly exceeds the growth in gross domestic product and hence, energy intensity, shown as the ratio between the growth in consumption and gross 16 domestic product, also went up.

This is the only sector where that indicator registered an increase, unlike almost all of the other sectors, where energy intensity has been on the decrease in recent years. The percentage of transport in final energy consumption grew from about 23.1 per cent in 2001 to 33.2 per cent in 2014. Road transport is a major consumer, accounting for 92.9 per cent of the total amount of fuel and energy in the sector in 2014.

Transport accounted for 88.3 per cent of the final consumption of petroleum products in 2014.

In early 2011, the Ministry of Transport, Information Technology and Communications (MTITS) produced a forecast for final energy consumption by 2020 by mode of transport. It used NSI data on energy consumption by the various modes of transport for the period 2006-2009, assuming a minor lead in the rate of increase of electricity consumption in rail transport, offset by the rate in road transport, in line with the EU transport and environmental climate change mitigation policies.

Residential

In the period 2000–2010, the energy consumption of Bulgarian households was almost constant. The average energy consumption of Bulgarian households was about half of the average for the EU-27.

The energy consumption of Bulgarian households is characterized by:

- A large share of electricity (40 per cent), as a result of the low level of household gasification;
- A large and increasing share of biomass (32 per cent), because of the wide availability and low price of firewood;
- A low share of natural gas (2 per cent);
- A relatively low and declining share of district heating (16 per cent).

The increase in household energy consumption is due to increased electricity and especially solid fuels consumption (74 per cent of the total increase). This is accompanied by an increase in purchases of more efficient air conditioners and boilers for burning solid fuels.

Compared to 2013, energy consumption in the Household sector decreased by 3.2 per cent, from 2 257 ktoe in 2013 to 2 184 ktoe in 2014. This is reflected in energy intensity which decreased by 5.8 per cent, from 0.047 kgoe/BGN of GDP in 2010 prices to 0.044 kgoe/BGN of GDP in 2010 prices.

The decrease in final energy consumption and energy intensity in the Household sector in 2014 from the previous year's levels was influenced by the following factors:

- a decrease in population;
- improved heating efficiency, including an increase in the use of heat pumps;
- an increase in the proportion of new residential buildings that conform to higher thermal insulation requirements.

Services

In the period 2005–2010, gross value added of services remained almost constant, while energy consumption increased by 7.8 per cent per year. Electricity consumption by the sector grew steadily over the period 2000–2010 (excluding 2004), at an average annual rate of 6 per cent. In the period 2008–2010 it grew even faster, with an average annual rate of 7 per cent, after the period of standstill (2006–2008). In the period 2009–2010, the share of electricity increased from 0.68 to 0.71 per cent. The consumption of liquid fuels and coal has been replaced by the consumption of electricity and natural gas.

The expectations for reduction in the consumption of heat energy have not been realized, despite the continuous improvement of energy performance in buildings owned by the State and municipalities. This effect is observed regardless of the implementation of energy efficiency measures for such buildings and the establishment of higher standards for new construction of public buildings (hotels, banks, etc). One reason for this is that the implemented measures do not lead to physical energy savings because they have simply reestablished the decline in energy comfort.

Since 2012, the Services sector has been showing a decrease in energy intensity which continued in 2013 and 2014. Compared to 2013, 2014 saw decreases in the following:

- energy consumption: by 4.1 per cent, from 966 ktoe in 2013 to 926 ktoe in 2014;
- energy intensity: by 5.9 per cent, from 0.0222 kgoe/BGN of GDP in 2010 prices in 2013 to 0.0208 kgoe/BGN of GDP in 2010 prices.

The main factors behind the 2014 decrease in energy intensity compared to the previous year are the following:

- the impact of the energy efficiency policies and measures that primarily targeted public buildings;
- the higher percentage of electricity and heat in the overall consumption in the Services sector;
- the use of heat pumps for heating purposes.

10.3 Alternative sources of energy

Bulgaria believes that broader use of RES and rational use of energy can help the country ensure security of energy supply, reduce its dependence on oil given fluctuations in oil prices, reduce the trade imbalance and encourage the creation of new jobs. At the same time, widespread use of renewables and the introduction of energy efficiency measures are

important driving forces of sustainable development and greening the economy. Bulgaria adopted the agreed EU objectives and large-scale package of measures on energy.

In 2004, Bulgaria's share of renewables in gross final energy consumption amounted to 9.6 per cent. Since then the country made remarkable progress and by 2012 had already achieved its 2020 renewable energy target: the share of renewables in gross final energy consumption stood at 16.3 per cent, against a target of 16 per cent for 2020.

In February 2015, Bulgaria's parliament scrapped preferential prices for new renewable energy installations and the public power provider NEK will not be obliged to buy power at preferential prices from heating power plants that cannot prove energy efficiency.

Wind energy

Beginning 2009 with a total installed capacity of 112.6 MW, the Bulgarian wind energy market was able to triple its installed capacity during 2009, with total capacity of 335 MW by the end of the year. During 2010, a more modest 153 MW was implemented, before a sharp decrease occurred during 2011, when a mere 28 MW was installed. The market saw some revitalization during 2012, when a total of 158 MW was commissioned. This development was short lived, however, and the market came close to a halt in 2013 when only a single 3 MW turbine was constructed.

Solar energy

Bulgaria did not start developing solar assets until 2006, with its first solar electric power plant going live late in 2008. At the time, the 1,250 MW complex was the largest facility in Eastern Europe. The rapid growth of solar power in Bulgaria uncovered a major concern, though. The electrical infrastructure of the country was not ready to handle all of this newly generated power and the system has suffered severe overload. In an effort to stem the problem, legislators have suggested suspending as much as 40 per cent of the solar power capacity.

Biomass

The development of the biomass and biogas electricity market in Bulgaria has been insignificant. Installed cumulative capacity grew from 1.1 MWel in December 2011 to 18 MWel at the end of 2012. Electricity produced from biomass installations depending on biomass source type is purchased at a minimum €93.49/MWh (82.86 leva/MWh) and maximum €238.15/MWh (472.43 leva/MWh) before the 20 per cent VAT. The preferential rates for biomass are guaranteed for 20 years (if the project is completed before 2015) and are fixed for the whole period.

Hydro

Hydroelectricity ensures 27.9 per cent of the country's entire installed capacity for electricity production (2,713 MW of a total of 9,728 MW).

The 15 largest HPPs are state owned. They account for 97 per cent of the country's hydropower installed capacity and produce 94 per cent of its hydropower. These power plants are arranged in four series, or "cascades", of between three and five reservoirs, and all are located in the Rhodope mountains in south-western Bulgaria. Three of the stations are pumped storage stations.

Geothermal

Direct use of geothermal water in the country is for balneology, space heating and air conditioning, greenhouse heating, ground source heat pumps, direct thermal water supply, bottling of potable water and soft drinks, and some technological processes (oil, food and soft drinks production). The largest uses of the thermal water are for balneology and water supply.

Two applications in balneology are dominant – relaxation and sanitary needs, and treatment and rehabilitation. Relaxation and sanitary needs are dominant at spa hotels located at mountain and seaside resorts.

10.4 Environmental pressures and responses

In the last decade, Bulgaria managed to substantially reduce the total amount of emissions of the main pollutants into atmospheric air from power stations and industrial fuel combustion. For example, emissions of sulphur oxides were reduced more than fivefold: from 795,071 tons in 2007 to 139,860 tons in 2014 (table 10.10). This remarkable achievement was reached by modernization of old TPPs and installation of desulphurization equipment.

Emissions of nitrogen oxides were reduced by half, thanks to improvements of the burning processes.

Table 10.10: Emissions into the air from industrial combustible and production processes – power stations and industrial fuel combustion[1], 2007-2014, tons

	2007	2008	2009	2010	2011	2012	2013	2014
Sulphur oxides (SOx)	795 071.2	536 887.9	403 548.1	345 306.6	466 936.9	283 131.3	141 767.4	139 859.9
Nitrogen oxides (Nox)	63 339.1	62 278.8	51 782.7	50 436.9	60 342.8	53 635.2	40 155.8	42 125.8
Non-methane volatile organic compounds (NMVOCs)	228.5	142.9	67.0	67.3	81.3	103.0	86.5	79.6
Methane (CH4)	417.1	408.6	337.1	308.5	605.7	542.2	437.4	399.5
Carbon oxide (CO)	2 015.1	1 585.9	1 095.9	1 081.3	1 458.1	2 115.5	1 884.5	1 721.6
Carbon dioxide (CO2)	35 320 759.0	34 811 269.0	30 652 535.0	30 988 166.0	40 307 440.0	34 739 998.0	28 882 988.0	30 805 094.0
Dinitrogen oxide (N2O)	6 524.2	6 461.2	5 900.1	6 284.3	8 287.0	7 208.5	6 133.8	6 533.5
Ammonia (NH3)	4.4	1.9	-	-	-	-	-	-

Source: http://www.nsi.bg/en/content/5084/emissions-pollutants-air-industrial-combustible-and-production-processes, accessed 16 June 2016.
Notes: '-'no case.
[1] Emissions are calculated using the latest edition of Corinair.

The Maritsa Iztok complex is the largest energy complex in South-East Europe. It is located in south-central Bulgaria. It consists of four lignite-fired thermal power plants. The complex is located in a large lignite coal basin, which includes several mines, enrichment plants, a briquette plant and its own railway system.

Coal mining

Mini Maritsa Iztok EAD[11]

Mini Maritsa Iztok EAD is the largest coal mining company in Bulgaria. It works the Maritsa Iztok lignite field and is of crucial importance for the national energy balance.

Mini Maritsa Iztok EAD mines soft brown lignite with a low level of organic matter coalification, high ash content (16–45 per cent), 50–60 per cent moisture and 1.95–2.4 per cent combustible sulphur content. As the long distance transportation of lignite is unprofitable it is used at the energy facilities located nearby.

In 2013, the company carried out technical reclamation of 15.877 ha for agriculture and the levelling of 2.26 ha for forestry at Staroselets dump, Troyanovo-1 Mine. At Troyanovo-North Mine, in the area of Gledachevo, forestation with acacia (*Robinia Pseudoacacia L.*) was carried out in the period 2012–2015. Some 500,000 m^3 of humus is collected during mining operations every year. This humus is used for agricultural reclamation of disturbed soils in lignite mining areas. Some 1.14 million leva were spent on such activity.

Mini Maritsa Iztok EAD holds two integrated permits for the exploitation of two dumps, which have the status of landfills for non-hazardous waste. The Mini Maritsa Iztok EAD Waste Management Programme 2011–2016 is being implemented. The company applies continuous monitoring of discharged mining water. When necessary, the wastewater is neutralized with hydrated lime before it is discharged.

Thermal power plants

Maritsa Iztok-1

In 1998, the old power plant with a capacity of 500 MW was privatized. In 2000, the owner and the Bulgarian grid operator NEK signed a 15-year tolling agreement, according to which the owner has an obligation to replace the old power plant with a new facility. In 2006, construction of the new 670 MW power plant started. The €1.2 billion station became operational in 2011. The new power plant consists of two pulverized coal boilers of 335 MW each, two steam turbines, two generators and desulphurization facilities.

The station was designed and operates in compliance with emission standards for sulphur dioxide (SO_2) not exceeding 400 mg/Nm^3 and a desulphurization efficiency rate of over 95 per cent, nitrogen oxides (NOx) not exceeding 200 mg/Nm^3 and dust less than 30mg/Nm^3. The plant applies requirements of the Directive 2010/75/EC and since 2016 the plant applies more strict emission limit values. The production process is expected to ensure compliance with relevant European environmental legislation and best practices.

The plant ensures a closed working water cycle and operates with zero wastewater discharge. Wastewater from all streams is treated and reused. The modern water treatment technology with reverse osmosis enables efficient and safe operation with minimal

[11] The AD or EAD is comparable with the UK plc (public limited company), German AG and French SA. The difference between the AD and EAD is that the EAD is a single member company.

chemical use and maximum cycles of concentration while no harmful chemicals are discharged into the environment.

The generated waste is collected, stored and treated in accordance with Bulgarian regulations and permits. The bottom ash (slag), fly ash and gypsum are temporary stored in closed silos equipped with dedusting systems. Then the waste is transported through a tube belt conveyor and by trucks to a specially constructed waste disposal facility 7 km away from the plant.

The waste disposal facility uses a tube belt conveyor to fully eliminate the risk of dust emissions during transportation. The facility has a system for active dust suppression at transfer areas. It has also special rollers with reduced noise emission and additional noise isolating cover in the residential areas it goes through. The facility has reliable lower and upper isolation systems as well as separate drainage systems for leachate and rain water.

Water management is performed via two basins – a contact water/leachate pond and a clean water pond. The leachate water is used for active dust suppression. The contact water pond is a sedimentation basin where all waters passing through the dumped waste are discharged. To protect groundwater from contamination, the facility uses a mineral screen and geomembrane and a leakage control system, which enables high precision in the localizing of any possible rupture in the membrane.

A lower isolation system is placed at the bottom of the cells of the disposal site. It prevents leachate infiltration in the soil and ensures effective groundwater protection. It consists of a compacted mineral layer, drainage layer, geomembrane, geotextile and protective soil cover. The upper isolation system is placed over the dumped waste upon reaching the cell capacity and consists of a compacted mineral layer, drainage layer and soil cover.

A continuous emission monitoring system for SO_2, NOx, CO, dust and process parameters is installed. Monthly and annual self-monitoring reports are submitted to the RIEW in Stara Zagora.

Maritsa Iztok-2

With a total installed capacity of 1,465 MW, the state-owned Maritsa Iztok-2 is the largest TPP in the Balkans. The plant consists of eight generating units and generates 30 per cent of Bulgaria’s electricity.

In 2005 the plant received an IPPC permit. The company is also certified on ISO 14001:2004.

Flue-gas desulphurization (FGD) plants were constructed and have been operating at all power units. The FGD desulphurization efficiency is above 96 per cent. The flue gases dust emissions are within the allowable norms, in conformity with the effective legislation and the optimal operation of the mounted electrostatic precipitators (ESPs). Since the end of 2006, through the common efforts of the three electric power plants in "Maritsa East" complex, an early warning system has been reporting ground layer pollution resulting from unfavourable meteorological conditions.

Since 1999, an automatic station for atmospheric air quality control (located at Polski Gradets village, 7.5 km to the south of TPP-2) has been operating. At all point sources, continuous measurement systems record the atmospheric air emissions in real time.

A fully closed cycle for water consumption was developed. Permanent water monitoring is also being performed. The "Ovcharitsa" Reservoir is used to cool down the wastewater from the plant. Every year up to 46,000 water birds of about 76 different species gather here. Sixty-five of these species are protected, as follows: 30 are included in the Red Data Book of the Republic of Bulgaria and 38 in Appendix 2 of the Bern Convention; 5 of the species are threatened worldwide. The reservoir is one of the important places in the world for survival of the Great Cormorant, the Dalmatian Pelican and the Big White Fronted Goose.

A Regulation for Wastes Movement and Control was elaborated in the plant, according to which collection, storage and transportation of wastes is performed. The company utilizes a modern depot for solid household, construction and hazardous wastes. A dust protective pipe and rubber-belt conveyor for ash transportation was constructed and operates in the plant. Despite all the above-mentioned measures, in November 2014, the European Environment Agency ranked the power station as the industrial facility that is causing the highest damage in terms of costs to health and the environment in Bulgaria and the entire EU.

Maritsa Iztok-3

With a total installed capacity of 900 MW, Maritsa Iztok-3 is Bulgaria’s third-largest power plant. In 1998, the power plant was partially privatized with an obligation to modernize it.

The investor was planning to invest €900 million in a new 700–800 MW coal-fired power plant next to the existing Maritsa Iztok-3 plant, but this has not yet been implemented.

After a major refurbishment of the plant from 2004 to 2009, the plant became the first TPP in South-East Europe to meet all of the current EU environmental standards.

Wind energy

Large-scale prospects for wind energy development have spurred the construction of numerous wind farms, making Bulgaria one of the fastest growing wind energy producers in the world. However, the country has added very little new wind energy capacity since 2012.

Saint Nikola Wind Farm

The name St. Nikola was given to the biggest wind energy park in Bulgaria, which is situated near the seaside resort of Kavarna. In 2007, the RIEW in Varna issued a positive decision on the EIA. The EIA report took into consideration the results of a three-year preliminary seasonal monitoring of birds and bats. The permanent systematic monitoring that has continued since the startup of the wind farm in March 2010 confirms the lack of any significant negative impact to the bird and bat populations occupying or passing through the territory of the wind farm.

The company ensures environmental controls and monitoring measures according to the Environmental Management and Monitoring Plan approved by RIEW Varna. The Plan includes permanent periodic surveys of the wintering birds, autumn migration, breeding birds and bats, and monitoring of bird mortality due to collision with turbines, birds' use of the wind farm area and its surroundings, and habitat/crop surveys. All monitoring reports are published online.

In March 2010, prior to the start of the operation of the wind farm, an operative turbine shutdown procedure was implemented to ensure cessation of the turbines in the event of increased risk of bird collision, aiming to reduce to a minimum the probability of bird collision with the turbine rotors during their operation. The shutdowns are executed based on verbal orders from field expert ornithologists to the duty engineer of the wind farm, who by means of the wind farm operation system executes the necessary shutdowns of turbines or, if necessary, of the entire wind farm.

Saint Nikola Wind Farm has a certified Integrated Management System for Safety and Environment (IMS) according to OHSAS 18001 and ISO 14001 respectively.

Wind park projects in the Kaliakra area

Thousands of wind turbines and some 500 other projects have been authorized without adequate assessments of their effect on Kaliakra's unique habitats and species, and on the thousands of birds and bats that fly over the site each year on their way to and from Africa. No account has been taken of the cumulative effect of the projects, which is also a requirement under the Birds, Habitats and Environmental Impact Assessment Directives.

10.5 Legal, policy and institutional framework

Legal framework

Energy Act

The 2003 Energy Act was amended for the last time in 2015 (SG No. 17/06.03.2015). The Act has a provision that the generation, import, export, transmission, distribution and trade in electricity, heat, natural gas, oil and oil products is carried out while guaranteeing protection of environment, among other things.

Another environment-related provision of the Act is that companies engaged in activities involving energy resource extraction, fuel processing and trade, conversion, transmission, distribution and trade in energy and natural gas prepare, at least once every two years, and submit to the Minister of Energy plans for rehabilitation, for measures to improve the efficiency of existing generating capacities and networks, and for the construction of new capacities and networks. The plans shall be accompanied, among other documents, by an environmental impact analysis as well as alternatives for energy saving.

According to the Act, energy companies have the right to request compensation of expenses resulting from public obligations imposed on them, including such related to environmental protection and energy efficiency.

The energy companies, under Article 38(a), paragraph 1, shall provide to their energy service customers information about the existing sources where information on the environmental impact, in terms of at least CO_2 emissions and the radioactive waste resulting from the electricity produced by different energy sources in the overall energy supplied by the supplier over the preceding year, is publicly available.

Energy Efficiency Act

The purpose of the 2015 Energy Efficiency Act is to improve energy efficiency as part of the national sustainable development policy by:

- using a system of energy efficiency improvement activities and measures in energy production, transmission and distribution, as well as in final energy consumption;
- setting up energy savings obligation schemes;
- developing the energy efficiency services market and encouraging the delivery of energy efficiency services;
- setting up financing mechanisms and schemes helping to reach the national energy efficiency target.

The EEA contains the way of defining of the national energy efficiency target until 2020. The national energy efficiency target is set as an amount of savings in primary and final energy consumption by the end of 2020 and is set up in the National Energy Efficiency Action Plan (NEEAP), developed according to the requirements of Energy Efficiency Directive 2012/27/EU. An energy savings obligation scheme is set up in order to help reaching the national energy efficiency target. The national energy efficiency target is split in the form of individual energy savings targets among the following obligated parties:

- End suppliers, suppliers of last resort, traders licensed for the business of trade in electricity, which sell more than 20 GWh of electricity annually to final customers;
- Heat transmission companies and heat power suppliers which sell more than 20 GWh of heat power annually to final customers;
- Natural gas end suppliers and traders which sell more than 1 million m^3 annually to final customers;
- Traders of liquid fuels which sell more than 6,500 t of liquid fuels annually to final customers, with the exception of fuels for transport purposes;
- Traders of solid fuels which sell more than 13,000 t of solid fuels annually to final customers.

Furthermore, in the EEA an obligation is introduced that in all heated and/ or cooled buildings, state or municipality owned, annually to take measures to improve the energy performance of at least 5 per cent of their total gross floor area.

The ensuring of energy audits for all end-users in all sectors is encouraged and it is provided that enterprises which are not SMEs to undergo energy audits at least every four years. The energy audits must be cost effective and shall be carried out by qualified experts, the team of legal entities registered at SEDA.

It is regulated the certificate issuance of parts in the building according to the types of buildings.

The EEA contains also the energy efficiency improvement activities and measures as follows:

- Reduction of energy expenditure in energy production, transmission and distribution, as well as in final energy consumption;
- Training and attainment of qualification in the field of energy efficiency of persons delivering energy efficiency services;
- Conformity assessment of development-project designs of buildings as regards energy efficient requirements;
- Energy efficiency audits and certification of buildings;
- Energy efficiency inspection of heating systems with hot-water boilers and air-conditioning systems in buildings;
- Energy efficiency audits of enterprises, industrial systems and outdoor lighting systems;
- Energy efficiency management;
- Delivery of energy efficiency services;
- Raising awareness among households.

The national Plan concerning nearly-zero-energy buildings (NZEBs) was adopted by the Council of Ministers in December 2015.

The Energy Efficiency Act requires the issuance of 10 ordinances, through which it specifies the activities and responsibilities of the state authorities and of bodies of local self-government and control on obligatory parties. The law comprises:

- Procedures for the issuance and administration of energy performance certificates for new and existing buildings, as well as for buildings under reconstruction;
- Procedures for issuance and implementation of energy performance certificates;
- The creation and maintenance of a national information system on energy efficiency in Bulgaria;
- other.

Energy from Renewable Sources Act

The 2011 Energy from Renewable Sources Act regulates production and consumption of:

- Electric energy, thermal energy and energy for cooling from renewable sources;

- Gas from renewable sources;
- Biofuels and energy from renewable sources in transport.

The primary objectives of the Act include:

- Promoting production and consumption of energy from renewable sources;
- Promoting production and use of biofuels and energy from renewable sources in transport;
- Creating conditions for integrating gas from renewable sources in the natural gas transmission and distribution networks;
- Creating conditions for inclusion of thermal energy and energy for cooling from renewable sources in heating transmission networks;
- Environmental protection and restricting climate change;
- Other.

With the adoption of the 2011 Energy from Renewable Sources Act, the 2007 Renewable and Alternative Energy Sources and Biofuels Act was repealed.

Policy framework

Since 1 July 2007, the Bulgarian energy market has been fully liberalized, which means that each user has a legal right to choose a provider and free and fair access to the network for transmission of electricity to the place of consumption. A market-based model is implemented based on regulated third party access to the electricity transmission network, where transactions are concluded through direct bilateral contracts between producers or traders and consumers, and where insufficient quantities are purchased and the surplus under bilateral contracts is sold in the balancing market. During the transition period of gradual liberalization, in parallel with the free segment where prices are freely negotiated between the parties to the transactions that are subject to balancing, a segment subsists in which electricity transactions are concluded as per the EWRC-regulated prices.

National Renewable Energy Action Plan

The National Renewable Energy Action Plan has been drawn up in accordance with the template adopted by Commission Decision of 30 June 2009. The Plan is based on an integrated approach, taking into account the development of the various economic sectors and the protection of the environment and human life and health. It aims to ensure a smooth transition towards a low-carbon economy based on modern technologies and greater use of RES.

Based on the Act's provisions, and in order to achieve the mandatory national target of the Republic of Bulgaria for 16 per cent total share of energy from renewable sources in the gross ultimate energy consumption, including 10 per cent mandatory share of the energy from renewable sources in transport, the Ministry of Energy shall develop the National Renewable Energy Action Plan for the period 2010–2020. Such a Plan was developed in 2011.The Act also envisages biannual reporting on performance under the Plan by the Ministry of Energy to the European Commission, until 31 December 2021. Bulgaria submitted reports in 2011, 2013 and 2015.

Bulgaria's binding national target for the share of energy from renewable sources in the gross final consumption of energy in 2020 (in accordance with Directive 2009/28/EC) is 16 per cent. Expressed in terms of quantity of energy in the additional energy efficiency scenario, this target corresponds to 1,718 ktoe of energy from renewable sources. The Plan provides an overview of all existing policies and measures to promote the use of energy from renewable sources and to list new ones.

The new measures and the rationale behind them are broken down into eight categories, namely, institutional, electricity integration measures, financial, construction, soft, buildings, distributed energy generation and biofuels.

National Long-term Programme for the Promotion of the Use of Biomass 2008–2020

The National Long-term Programme for the Promotion of the Use of Biomass for the period 2008–2020 was adopted by Decision No. 388 of the Council of Ministers of 20 June 2008. The Programme analyses the biomass potential in the country according to the following categories: wood biomass, solid agricultural waste, livestock waste, solid household waste and landfill gas, gas from wastewater treatment plants and biofuels.

First National Energy Efficiency Action Plan 2008–2010

The First National Energy Efficiency Action Plan 2008–2010 (FNAPEE) was adopted by Decision of the Council of Ministers of 4 October 2007. The transitional objective, formulated in it, amounts to 209 ktoe saved energy by the end of 2010, representing one third of the general purpose. On 24 August 2011, the Council of Ministers adopted a summary report on its implementation. The report contains an analysis of energy efficiency in the period 2000–2009 and assessment of the results attained.

Table 10.11: Summarized indicators of the implementation of FNAPEE 2008-2010

Interim target of FNAPEE	GWh per year	2 430.0
	ktoe per year	209.0
Implementation of FNAPEE	GWh per year	3 549.0
	ktoe per year	311.5
Percentage of attainment of the interim target 2008–2010	%	146.0
Percentage of attainment of the final national target 2008–2016	%	48.7
Economic effect	€m. per year	284.3
Ecological effect	m. t CO_2 per year	2.0
Social effect	No. of new jobs	500.0

Source: Policies and measures of energy efficiency in Bulgaria, ODYSSEE-MURE 2010; Monitoring energy efficiency targets of the EU and Bulgaria, Sustainable Energy Development Agency, Sofia, September 2012.

Second National Energy Efficiency Action Plan 2011– 2013

The Second National Energy Efficiency Action Plan is for the period 2011–2013. The Plan determines an interim target for the period 2011–2013 equal to two thirds of the national target by 2016, i.e. 418 ktoe/year or 4,860 GWh. For this period, a total of 58 measures are planned to be implemented in all sectors – final energy consumers, as well as horizontal measures. The Plan contains an analysis of the public sector and the market for energy services and preparation of plans for buildings with near-zero-energy consumption.

National Energy Efficiency Action Plan 2014-2020

The National Energy Efficiency Action Plan (NEEAP) was developed in accordance with requirements of Energy Efficiency Directive 2012/27/EU and was submitted at the EC in 2014.

NEEAPs are developed according to a template adopted by the European Commission. NEEAPs contain energy efficiency improvement measures and the expected or obtained energy savings, including measures in energy transmission and distribution, as well as in final energy consumption, with a view to reaching the national energy efficiency target. Bulgaria sets the following indicative national energy-saving targets for the period to 2020:

- Energy savings at final energy consumption level: 716 ktoe/y;
- Energy savings at primary energy consumption level: 1 590 ktoe/y, including 169 ktoe/y in energy transformation, transmission and distribution processes.

Institutional framework

Ministry of Energy

The Ministry of Energy was created in 2014, with the division of the former Ministry of Economy, Energy and Tourism. The Ministry has neither an environment-related department nor an energy efficiency and RES department.

The environment-related goals of the Ministry include:

- Achievement of economically effective and secure delivery of electricity while meeting the requirements for environment protection;
- Effective management of mineral resources;
- Refinement of the energy infrastructure;
- Improvement of energy efficiency and reduction of GHG emissions in accordance with the priorities of the Europe 2020 strategy;
- Development of nuclear energy in accordance with contemporary requirements for reliability, safety and efficiency.

The Sustainable Energy Development Agency (SEDA) is a legal successor of the executive Energy Efficiency Agency (EEA). SEDA has the status of an executive agency within the Ministry of Energy. SEDA issues certificates of origin for energy produced by renewable sources.

Energy and Water Regulatory Commission

The State Energy Regulatory Commission was established by Decree No. 181 of the Council of Ministers of 10 September 1999 according to the Law on Energy and Energy Efficiency. In 2005, the

Commission was transformed into the State Energy and Water Regulatory Commission. In 2015 the Commission was transformed into the Energy and Water Regulatory Commission (EWRC).

The EWRC issues all licences in the energy sector and has control over all licensed activities. It also:

- Sets all regulated prices and fees (transmission, sales under regulated prices, distribution, etc.);
- Sets the feed-in tariff for all renewable energy production as well as consumer prices;
- Resolves disputes between licence holders as well as disputes between consumers and utility companies;
- Issues all regulations and rules setting the detailed legal framework for operation of the system.

Nuclear Regulatory Agency

The Nuclear Regulatory Agency (NRA) implements state regulation of the safe use of nuclear energy and ionizing radiation, the safety of radioactive waste management and the safety of spent fuel management. In accordance with the Safe Use of Nuclear Energy Act and Rules of Procedure of the Nuclear Regulatory Agency, the Agency interacts with the executive authorities granted regulatory and control functions in the use of nuclear energy and ionizing radiation and the safe management of radioactive waste and spent fuel within their respective jurisdictions, and makes proposals to the Council of Ministers for measures to coordinate these activities.

Other actors

The Bulgarian Energy Holding EAD

The Bulgarian Energy Holding EAD (BEH EAD) was established on 18 September 2008 by Decision of the Minister of Economy and Energy. The main subject of its activity is the acquisition, management, evaluation and sale of shares in companies carrying out business activities in the areas of production, extraction, transmission, transit, storage, management, distribution, sale and/or purchase of natural gas, coal, electricity, heat and other forms of energy and raw materials. BEH EAD is a shareholding company with 100 per cent state participation. BEH owns 100 per cent of the share capital of Maritsa Iztok Mines EAD, TPP Maritsa Iztok-2 EAD, NPP Kozloduy EAD, NEK EAD, ESO EAD, Independent Bulgarian Energy Exchange (IBEX) EAD, Bulgargaz EAD, Bulgartransgaz EAD and Bulgartel EAD.

Maritsa Iztok Mines EAD, a subsidiary of BEH EAD, is at the beginning of the technological process for electric power generation in TPPs in the Maritsa Iztok complex. The mines operate the largest lignite coal field in Bulgaria, which supplies coal to four TPPs for electricity generation and to a factory for the production of briquettes. The total coal output of the Maritsa Iztok Mines for 2014 was 27.6 million tons, which represents 88 per cent of the total output of coal used for the generation of electricity and heat in Bulgaria.

Natural gas

The companies engaged in domestic production of natural gas are Petroceltic (the former Melrose Resources Sarl) and "Oil and Gas Exploration and Production" Plc.
Bulgargaz EAD (the public provider of natural gas whose functions are related to the purchase and sale of natural gas) and Bulgartransgaz EAD (a combined operator whose functions are related to the transmission, transit and storage of natural gas; the company has submitted an application for certification as an independent transmission operator) have been established as a result of legal and organizational restructuring of the National Gas Company, and at present are subsidiaries of BEH EAD.

Gas distribution is organized by private regional and local companies.

National Electric Company EAD

The National Electric Company EAD (NEK EAD) is a subsidiary of BEH EAD, which carries out licensed activities in transmission, electricity generation from hydro and pumped-storage HPPs (2,631 MW) and supply of electric power to consumers connected to the transmission network and to end suppliers of electricity, and is a party to long-term bilateral power purchase agreements.

ESO EAD holds certification for transmission of electric power (Decision of State Energy and Water Regulatory Commission No. P-205, 18.12.2013). As of 4 February 2014, ESO EAD is the owner of the power transmission grid.The Independent Bulgarian Energy Exchange (IBEX) EAD holds a licence to operate the electricity exchange in Bulgaria for a period of 10 years. IBEX EAD was established in January 2014 as a fully owned subsidiary of BEH EAD. The distribution of electricity on the regulated market is performed by regional companies, which are operators of the electricity distribution network.

Heat energy

Licences for carrying out heat supply activities have been issued by EWRC to over 20 regional heat supply companies. Licences have also been granted to TPPs, which are part of the assets of chemical, metallurgical, food-processing, petrochemical and textile industrial enterprises. Most of these companies possess installations for co-generation of electricity and heat and respectively possess a licence for selling electricity obtained by co-generation applying the preferential prices approved by the EWRC.

All heat supplying companies, which carry out district heating in 12 big towns throughout the country, are privately owned, with one exception – Toplofikatsia Sofia AD, which services over 70 per cent of all consumers of heat in the country, is 100 per cent municipality owned.

Bulgarian Wind Energy Association

Founded in June 2010, and with more than 60 current members, the Association unites the majority of companies active in the Bulgarian wind energy sector, including manufacturers, developers, financial and technical consultants and law firms.

Bulgarian Photovoltaic Association

The Bulgarian Photovoltaic Association (BPVA) is a non-profit organization unifying more than 400 companies from the renewable energy sector in Bulgaria. BPVA's members are companies with different profiles – producers of solar panels, designers, installers, investors in the construction of photovoltaic power plants, project developers, financial institutions, investment companies and consultancies.

Bulgarian Biomass Association

The Bulgarian Biomass Association (BGBIOM) promotes RES – mainly biomass, plant residues and animal manure – as energy sources for sustainable society. The aim of BGBIOM is to promote the growth of different plants for non-food use. BGBIOM coordinates and facilitates the research and development works in the fields of biomass resources, biofuel production technologies, and the biofuel market in the transport, heat and energy sectors, as well as in the field of biomass non-energy products.

10.6 Regulatory and economic measures

In Bulgaria, the feed-in tariff was introduced in 2007. In 2011, the law regulating this scheme was amended and the producers received a chance to either use the feed-in tariff or trade their generated power on the free market. For the produced quantities, the EWRC issues certificates of origin and these certify the "green" value of the electricity, which the public provider and end suppliers are obliged to purchase.

The formula used to calculate the feed-in tariff is based on the average wholesale price for electricity from the previous year, calculated from a base component of 80 per cent. To that is added a bonus of 95 per cent of the price component utilized, which means that the overall price is subject to variation of only 5 per cent, giving investors certainty on which to base their intentions. The prices are updated once a year. However, in April 2012, the regulations changed, adjusting the base component (average wholesale price) down to 70 per cent and the making the bonus vulnerable to variations of any size. Furthermore, the duration of the power purchase agreements between the producers and the electricity distribution companies has been reduced from 15 to 12 years.

Because of the planned yearly adjustment of the feed-in tariffs, the amount to be set as the power purchase price for a certain wind farm is defined first when the turbines have been commissioned, rather than the time when they are fully permitted. Therefore, projects implemented in different stages, with turbines having varying commissioning dates, may receive different preferential prices, depending on whether they have been set up to produce before or after the yearly feed-in tariff regulations. This creates additional uncertainty in the actions of local developers as they cannot know the purchase price for the electricity for their investment.

Additionally to the above, the feed-in tariffs for wind power are dependent on how many full load hours per year the turbines have operated. If these are fewer than 2,250 hours per year, a higher price is to be paid for the electricity.

The changes of 2011

After the very rapid development and construction of 488 MW in the period 2007 through 2010, the technical constraints coming from limited grid capacity were becoming apparent and the Bulgarian authorities introduced the first proposals to limit and postpone the implementation of wind power during the early part of 2011.

The changes to the Bulgarian energy law that came into effect in May 2011 were categorized into two areas: changes to the feed-in tariff of projects that had not yet been connected to the grid (during

development), and changes affecting projects already in operation.

For projects under development, the legislative changes meant that the duration of the feed-in tariffs was reduced from 15 years to 12 years.

The limitation to the Bulgarian regulator's ability to adjust the premium component of the feed-in tariff (the 5 per cent limitation) was removed, and the base component would only constitute 70 per cent of the tariff. This meant that, in theory, the regulator could decrease the premium to 0. Moreover, as the changes also meant that the tariff for a given project would only be announced after its construction had been completed, developers, banks and investors would only know the project cash flow after all investments had been carried out, hence removing the all-important factor of predictability.

As a final important change, both annual caps on projects to be connected and grid reservation fees were introduced. The reservation fee meant that developers would have to deposit fees ranging between approximately €15,000 and €30,000 per MW intended in a project.

For those projects already operating, the changes made in 2011 implied key alterations, such as that the purchase price of electricity under the power purchase agreements (PPAs) concluded with the electric transmission companies were no longer subject to annual inflation adjustments. This placed a direct risk on the planned cash flows of the wind parks, creating uncertainty in the event that inflation would rise and thus causing higher operational costs for service, maintenance, spare parts, etc. to increase while income remained the same.

The changes of 2012

The 2012 regulatory changes meant that all preliminary agreements in place – no matter what the stage of development an individual project was at – would be ascertained by the local network operators, and they would be free to change terms with retroactive effect. Developers would only have one month to evaluate whether they would accept the changed terms – and in the case that it was not accepted, the preliminary agreements would be terminated. In addition to this amendment, the fixing of the feed-in tariff for a project was postponed even further. The changes of 2012 meant that the feed-in tariff would only be fixed after the full post-commissioning permitting process had been finalized and not after the practical construction of the project. In practice, this meant that investors would have to wait a further three to six months to know the exact feed-in tariff for the entire duration of the support period.

Last, but certainly not least, the state energy regulator utilized its new ability granted by the legislative changes of 2011 to adjust the feed-in tariff for all new projects. It decreased the feed-in tariff by 22.5 per cent.

Because of these changes, investors started abandoning the Bulgarian market.

The changes of 2013

In the middle of 2013, the national regulator adopted yet another decrease to the feed-in tariff, affecting all wind turbines with a capacity of 1 MW or more. The decrease was again significant – a further 18 per cent decrease on the already low tariff set in 2012.

In the period 2009–2013, the decrease amounted to 30 per cent for production below 2,250 full load hours per year and 35 per cent for production above 2,250 full load hours per year.

In late 2013, in connection with the annual parliamentary negotiations of the state budget, a significant change was introduced, entering into force on 1 January 2014. The change imposed what is essentially a production tax. Each producer, no matter when it was commissioned, will have to pay an annual tax, equal to 20 per cent of the annual turnover/production of the wind farm.

Seen in the light of Bulgaria's economic situation, the introduction of an industry-specific tax in a sector where – due to the immobile nature of installed wind power turbines – relocation is not possible, seems like selecting an easy target in terms of creating a new source of income for the state budget.

10.7 Conclusions and recommendations

Since 2007, Bulgaria substantially reduced the total amount of emissions of the main pollutants into atmospheric air from power stations, including sulphur oxides (a fivefold decrease) and nitrogen oxides (some 50 per cent decrease). Despite this remarkable achievement, the total emissions of some pollutants, especially sulphur oxides, are still not negligible, e.g. 139,860 tons in 2014.

Recommendation 10.1:
The Ministry of Energy should continue implementing measures to reduce emissions of the main pollutants into atmospheric air from thermal power stations.

In 2004, Bulgaria's share of renewables in gross final energy consumption amounted to 9.6 per cent. Since then, the country made remarkable progress and in 2012 the country's share of renewables in gross final energy consumption already stood at 16.3 per cent, against a target of 16 per cent for 2020. Thanks to the support mechanisms introduced in 2007, the Bulgarian wind energy market was able to triple its installed capacity during a single year (from 112.6 MW at the end of 2008 to 335 MW by the end of 2009).

After the very rapid development and construction of 488 MW in the period 2007 through 2010, the grid capacity faced its technical limits. The issue became so apparent that the Bulgarian authorities had to start imposing limits on wind power development.

Recommendation 10.2:
The Ministry of Energy should continue improve the electronic grid capacity to accommodate the increase of generation of wind energy.

ANNEXES

Annex I: Participation of Bulgaria in multilateral environmental agreements

Annex II: Key data and indicators available for the review

Annex III: Millennium Development Goals indicators, 2007–2015

Annex IV: List of major environment-related legislation

Annex I

PARTICIPATION OF BULGARIA IN MULTILATERAL ENVIRONMENTAL AGREEMENTS

Worldwide agreements		Bulgaria	
Year		**Year**	**Status**
1958	(GENEVA) Convention on the Continental Shelf	1962	Ac
1958	(GENEVA) Convention on Fishing and Conservation of the Living Resources of the High		
1958	(GENEVA) Convention on the Territorial Sea and the Contiguous Zone	1962	Ra
1958	(GENEVA) Convention on the High Seas	1962	Ra
1960	(GENEVA) Convention concerning the Protection of Workers against Ionising Radiations		
1961	(PARIS) International Convention for the Protection of New Varieties of Plants	1998	Ac
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	1994	Ac
	1997 (VIENNA) Protocol to Amend the 1963 Vienna Convention on Civil Liability for		
1968	(LONDON, MOSCOW, WASHINGTON) Treaty on the Non-Proliferation of Nuclear	1969	Ra
1969	(BRUSSELS) Convention relating to Intervention on the High Seas in Cases of Oil	1983	Ac
1971	(RAMSAR) Convention on Wetlands of International Importance Especially as Waterfowl	1975	Si
	1982 (PARIS) Amendment	1986	Si
	1987 (REGINA) Amendments	1990	At
1971	(GENEVA) Convention on Protection against Hazards from Benzene (ILO 136)		
1971	(LONDON, MOSCOW, WASHINGTON) Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil thereof	1971	Ra
1972	(PARIS) Convention concerning the Protection of the World Cultural and Natural Heritage	1974	At
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes	2006	Ac
	1996 (LONDON) Protocol	2006	Ac
1972	(LONDON, MOSCOW, WASHINGTON) Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin	1972	Ra
1972	(LONDON) International Convention on the International Regulations for Preventing	1975	Ra
1972	(GENEVA) International Convention for Safe Containers	1976	Ra
1973	(WASHINGTON) Convention on International Trade in Endangered Species of Wild	1991	Ac
	1979 (BONN) Amendment	1991	At
	1983 (GABORONE) Amendment	2010	At
1973	(LONDON) Convention for the Prevention of Pollution from Ships (MARPOL)		
	1978 (LONDON) Protocol relating to the International Convention for the Prevention of Pollution from Ships	1984 with the exception of annexes III, IV, V/1993 in respect of annexes III, IV,	Ac
	1997 (LONDON) Protocol to Amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto	2004	Ac
1974	(GENEVA) Convention concerning Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents (ILO 139)		
1977	(GENEVA) Convention on Protection of Workers against Occupational Hazards from Air Pollution, Noise and Vibration (ILO 148)		
1979	(BONN) Convention on the Conservation of Migratory Species of Wild Animals	1999	Ac
	1991 (LONDON) Agreement on the Conservation of Populations of European Bats	1999	Ac
	1995 (THE HAGUE) Agreement on the Conservation of African-Eurasian Migratory	1999	Ra
	1996 (MONACO) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)	1999	Ra

Ac = Accession; Ad = Adherence; Ap = Approval; At = Acceptance; De = Denounced; Si = Signature; Su = Succession; Ra = Ratification.

Worldwide agreements		Bulgaria	
Year		**Year**	**Status**
1980	(NEW YORK, VIENNA) Convention on the Physical Protection of Nuclear Material	1984	Ra
1981	(GENEVA) Convention Concerning Occupational Safety and Health and the Working Environment (ILO 155)		
1982	(MONTEGO BAY) Convention on the Law of the Sea	1996	Ra
	1994 (NEW YORK) Agreement related to the Implementation of Part XI of the Convention	1996	Ac
	1995 (NEW YORK) Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	2006	Ac
1985	(GENEVA) Convention Concerning Occupational Health Services (ILO 161)	2012	Ra
1985	(VIENNA) Convention for the Protection of the Ozone Layer	1990	Ac
	1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer	1990	Ac
	1990 (LONDON) Amendment to Protocol	1999	Ra
	1992 (COPENHAGEN) Amendment to Protocol	1999	Ra
	1997 (MONTREAL) Amendment to Protocol	1999	Ra
	1999 (BEIJING) Amendment to Protocol	2002	Ac
1986	(GENEVA) Convention Concerning Safety in the Use of Asbestos (ILO 162)		
1986	(VIENNA) Convention on Early Notification of a Nuclear Accident	1988	Ra
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	1988	Ra
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes	1996	Ac
	1995 Ban Amendment	2000	Ra
	1999 (BASEL) Protocol on Liability and Compensation		
1990	(GENEVA) Convention concerning Safety in the use of Chemicals at Work (ILO 170)		
1990	(LONDON) Convention on Oil Pollution Preparedness, Response and Cooperation	2001	Ac
1992	(RIO DE JANEIRO) Convention on Biological Diversity	1996	Ra
	2000 (MONTREAL) Cartagena Protocol on Biosafety	2000	Ra
	2010 (NAGOYA) Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization	2016	Ra
	2010 (NAGOYA - KUALA LUMPUR) Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety	2012	Ra
1992	(NEW YORK) United Nations Framework Convention on Climate Change	1995	Ra
	1997 (KYOTO) Protocol	2002	Ra
1993	(ROME) Agreement to Promote Compliance with International Conservation and Managament Measures by Fishing Vessels on the High Seas		
1993	(PARIS) Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction	1994	Ra
1994	(VIENNA) Convention on Nuclear Safety	1995	Ra
1994	(PARIS) United Nations Convention to Combat Desertification	2001	Ac
1997	(VIENNA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2000	Ra
1997	(NEW YORK) Convention on the Law of Non-navigational Uses of International Watercourses		
1997	(VIENNA) Convention on Supplementary Compensation for Nuclear Damage		
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	2000	Ac
2001	(STOCKHOLM) Convention on Persistent Organic Pollutants	2004	Ra
2001	(LONDON) Convention on Civil Liability for Bunker Oil Pollution Damage	2007	Ac
2003	(GENEVA) WHO Framework Convention on Tobacco Control	2005	Ra
2004	(LONDON) Convention for the Control and Management of Ships' Ballast Water and Sediments		
2013	(KUMAMOTO) Minamata Convention on Mercury	2013	Si
2015	(PARIS) Paris Agreement	2016	Ra

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Regional and subregional agreements		Bulgaria	
Year		**Year**	**Status**
1957	(GENEVA) European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)	1995	Ac
1958	(GENEVA) Agreement - Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts	1999	Ac
1968	(PARIS) European Convention - Protection of Animals during International Transport	2006	Ra
	1979 (STRASBOURG) Additional Protocol	2003	Si
1969	(LONDON) European Convention on the Protection of the Archaeological Heritage (revised in 1992)	1993	Ra
1976	(STRASBOURG) European Convention for the Protection of Animals Kept for Farming Purposes	2004	Ra
1979	(BERN) Convention on the Conservation of European Wildlife and Natural Habitats	1991	Ac
1979	(GENEVA) Convention on Long-range Trans-boundary Air Pollution	1981	Ra
	1984 (GENEVA) Protocol - Financing of Co-operative Programme (EMEP)	1986	Ap
	1985 (HELSINKI) Protocol - Reduction of Sulphur Emissions by 30%	1986	Ap
	1988 (SOFIA) Protocol - Control of Emissions of Nitrogen Oxides	1989	Ra
	1991 (GENEVA) Protocol - Volatile Organic Compounds	1998	Ra
	1994 (OSLO) Protocol - Further Reduction of Sulphur Emissions	2005	Ra
	1998 (AARHUS) Protocol on Heavy Metals	2003	Ra
	1998 (AARHUS) Protocol on Persistent Organic Pollutants	2001	Ra
	Ozone	2005	Ra
1991	(ESPOO) Convention on Environmental Impact Assessment in a Transboundary Context	1995	Ra
	2001 (SOFIA) First Amendment	2007	Ra
	2003 (KIEV) Protocol on Strategic Environmental Assessment	2007	Ra
	2004 (CAVTAT) Second Amendment	2007	Ra
1992	(HELSINKI) Convention on the Protection and Use of Transboundary Watercourses and International Lakes	2003	Ra
	1999 (LONDON) Protocol on Water and Health	1999	Si
	2003 (MADRID) Amendments to Articles 25 and 26	2012	At
1992	(HELSINKI) Convention on the Transboundary Effects of Industrial Accidents	1995	Ra
	2003 (KIEV) Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters	2003	Si
1992	(BUCHAREST) Convention on the Protection of the Black Sea Against Pollution	1993	Ra
	2002 (SOFIA) Black Sea Biodiversity and Landscape Conservation Protocol	2004	Ra
	2009 (SOFIA) Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities	2009	Si
1993	(OSLO and LUGANO) Convention - Civil Liability for Damage from Activities Dangerous for the Environment		
1994	(Sofia) Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention)	1999	Ra
1994	(LISBON) Energy Charter Treaty	1996	Ra
	1994 (LISBON) Protocol on Energy Efficiency and Related Environmental Aspects	1996	Ra
	1998 Amendment to the Trade-Related Provisions of the Energy Charter Treaty		
1998	(AARHUS) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	2003	Ra
	2003 (KIEV) Protocol on Pollutant Release and Transfer Register	2010	Ra
	2005 (ALMATY) Amendment on GMOs	2007	Ra
1998	(STRASBOURG) Convention on the Protection of Environment through Criminal Law		
2000	(FLORENCE) Convention on European Landscape	2004	Ra

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Annex II

KEY DATA AND INDICATORS AVAILABLE FOR THE REVIEW

Air pollution	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Emissions of SO_2									
- Total (1,000 t)	820.6	571.7	443.8	388.8	516.2	330.0	195.8	188.9	..
- by sector (1,000 t)									
Energy	799.2	546.8	419.1	363.8	487.7	304.8	162.4	158.3	..
Industry	20.0	21.9	19.9	22.7	26.7	23.6	31.4	28.7	..
Transport	1.4	3.0	4.7	2.2	1.8	1.6	2.1	1.9	..
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
- per capita (kg/capita)	107.4	75.2	58.7	51.8	70.4	45.3	27.0	26.2	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..
Emissions of NO_X (converted to NO_2)									
- Total (1,000 t)	165.6	166.4	150.7	140.5	156.8	142.1	127.3	133.3	..
- by sector (1,000 t)									
Energy	79.5	76.0	66.8	63.3	73.8	67.0	53.0	55.2	..
Industry	27.3	25.9	16.0	21.2	30.4	21.8	24.5	26.1	
Transport	55.0	61.0	64.0	52.0	49.3	49.9	46.0	48.2	..
Other	3.7	3.5	3.9	3.8	3.4	3.6	3.8	3.8	..
- per capita (kg/capita)	21.7	21.9	19.9	18.7	21.4	19.5	17.6	18.5	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..
Emissions of ammonia (NH_3)									
- Total (1,000 t)	52.5	51.1	42.1	41.7	40.1	38.1	30.8	31.1	..
- by sector (1,000 t)									
Energy	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	..
Industry	2.8	2.7	1.8	3.3	3.1	2.7	2.7	3.0	
Transport	0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.9	..
Other	48.8	47.6	39.4	37.4	36.2	34.6	27.1	27.2	..
- per capita (kg/capita)	6.9	6.7	5.6	5.6	5.5	5.2	4.2	4.3	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..
Emissions of total suspended particles (TSP)									
- Total (1,000 t)	144.2	126.5	97.2	99.3	112.5	98.4	93.5	96.0	..
- by sector (1,000 t)									
Energy	72.3	57.7	47.7	51.0	57.1	39.7	36.2	33.7	..
Industry	69.4	66.0	46.7	45.8	53.0	56.3	55.2	60.2	..
Transport	2.5	2.8	2.8	2.5	2.4	2.4	2.1	2.2	..
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
- per capita (kg/capita)	18.9	16.6	12.9	13.2	15.3	13.5	12.9	13.3	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..

Emissions of persistent organic pollutants (PCBs, dioxin/furan and PAH)	2007	2008	2009	2010	2011	2012	2013	2014	2015
- Total (1,000 t)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
- by sector (1,000 t)									
Energy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
Industry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
- per capita (kg/capita)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	..
- per unit of GDP (kg/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..
Emissions of heavy metals									
- Total lead (t)	118.1	187.4	84.3	69.6	75.4	74.8	76.3	197.7	..
- Total mercury (t)	1.6	1.4	1.0	0.9	1.0	0.8	0.8	0.8	..
- Total cadmium (t)	2.5	2.4	1.6	1.1	1.2	1.1	1.2	2.1	
Climate Change									
Greenhouse gas emissions (total of CO_2, CH_4, N_2O, CFC, etc.) expressed in CO_2 eq.	67 375.4	66 143.4	57 266.2	60 002.7	65 281.4	60 219.0	55 060.2	57 303.7	..
- Total aggregated emissions (1,000 t) without LULUCF	67 375.4	66 143.4	57 266.2	60 002.7	65 281.4	60 219.0	55 060.2	57 303.7	..
- Total aggregated emissions (1,000 t) with LULUCF	58 412.5	57 719.6	48 942.1	51 554.8	56 665.0	51 748.8	46 421.3	46 122.9	..
- per capita (t CO_2 eq/capita)	8.8	8.7	7.6	8.0	8.9	8.3	7.6	8.0	
- per unit of GDP (t CO_2 eq/1,000 US$ (2005) PPP)	..	..	..	..	..	..	..	..	..
- by sector (1,000 t)									
Energy	50 480.6	49 857.6	44 178.3	46 151.4	51 268.8	46 422.2	40 721.7	43 148.7	..
Energy industries	30 789.7	32 319.7	29 694.1	31 638.3	36 422.0	31 628.7	27 332.1	29 036.4	..
Manufacturing industries and construction	8 019.8	5 736.2	3 334.1	3 353.1	2 947.8	2 795.9	2 815.5	2 777.9	..
Transport	8 159.2	8 552.2	8 220.9	7 978.3	8 165.4	8 454.5	7 462.8	8 511.3	..
Other sectors	2 463.8	2 187.3	1 931.4	2 112.0	2 389.8	2 357.2	2 078.3	1 771.3	..
Other	NO	NO	NO	NO	NO	NO	NO	3.1	..
Fugitive emissions	1 048.0	1 062.2	997.8	1 069.6	1 343.7	1 185.9	1 033.0	1 048.7	..
Industry	6 825.8	5 867.6	2 968.5	3 310.5	3 805.8	3 495.5	3 408.2	3 619.0	..
Solvent and other product use	394.0	590.9	652.0	690.5	745.8	845.6	972.1	1 091.2	..
Agriculture	4 814.0	5 055.6	4 865.3	5 318.8	4 959.6	5 040.1	5 501.8	5 092.3	..
Land use, land use change and forestry (LULUCF)	- 8 962.9	- 8 423.7	- 8 324.0	- 8 447.9	- 8 616.3	- 8 470.2	- 8 638.9	- 11 180.8	..
Waste	4 861.0	4 771.7	4 602.1	4 531.4	4 501.5	4 415.4	4 456.3	4 352.5	..
Other	..	NO	NO	NO	NO	NO	NO	NO	..
- Total CO_2 emissions (without LULUCF) (1,000 t) of	67 375.4	66 143.4	57 266.2	60 002.7	65 281.4	60 219.0	55 060.2	57 303.7	..
Carbon dioxide (CO_2)	55 109.6	53 586.6	45 406.9	47 587.5	52 925.9	48 045.2	42 479.9	45 082.9	..
Nitrous Oxide (N_2O)	3 635.4	3 871.0	3 462.9	3 933.6	3 584.0	3 652.1	4 040.4	3 610.3	..
Methane (CH_4)	8 319.1	8 179.3	7 825.4	7 868.8	8 099.7	7 750.5	7 621.5	7 577.4	..
Perfluorocarbons (PFCs)	NO	NO	NO	NO	NO	NO	NO	NO	..
Hydrofluorocarbons (HFCs)	302.5	497.4	561.4	600.3	657.6	751.9	898.6	1 017.4	..
Sulfur hexafluoride (SF6)	8.8	9.2	9.5	12.5	14.2	19.3	19.7	15.6	..
- Total CO_2 emissions (with LULUCF) (1,000 t) of	58 412.5	57 719.6	48 942.1	51 554.8	56 665.0	51 748.8	46 421.3	46 122.9	..
Carbon dioxide (CO_2)	45 978.9	45 141.8	37 074.0	39 114.3	44 281.8	39 524.5	33 828.2	33 898.5	..
Nitrous Oxide (N_2O)	3 702.1	3 879.4	3 466.5	3 943.7	3 595.1	3 672.2	4 045.5	3 611.8	..

	2007	2008	2009	2010	2011	2012	2013	2014	2015
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Perfluorocarbons (PFCs)	NO	NO	NO	NO	NO	NO	NO	NO	..
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- Total CO_2 emissions (with LULUCF) (1,000 t) of	58 412.5	57 719.6	48 942.1	51 554.8	56 665.0	51 748.8	46 421.3	46 122.9	..
Carbon dioxide (CO_2)	45 978.9	45 141.8	37 074.0	39 114.3	44 281.8	39 524.5	33 828.2	33 898.5	..
Nitrous Oxide (N_2O)	3 702.1	3 879.4	3 466.5	3 943.7	3 595.1	3 672.2	4 045.5	3 611.8	..
Methane (CH_4)	8 420.1	8 191.9	7 830.7	7 884.0	8 116.3	7 780.8	7 629.2	7 579.6	..
Perfluorocarbons (PFCs)	NO	NO	NO	NO	NO	NO	NO	NO	..
Hydrofluorocarbons (HFCs)	302.5	497.4	561.4	600.3	657.6	751.9	898.6	1 017.4	..
Sulfur hexafluoride (SF6)	8.8	9.2	9.5	12.5	14.2	19.3	19.7	15.6	..
Ozone layer									
Consumption of ozone-depleting substances (ODS) (t of ODS)	5.7	3.7	..	..	..	..	..	..	..
Water									
Renewable freshwater resources (million m^3/year)	..	..	..	..	..	74 630.0	70 865.0	..	..
Gross freshwater abstracted (million m^3/year)	6 201.8	6 425.4	6 120.7	5 960.1	6 385.1	5 715.1	5 468.2		
- Share of water losses in total water abstraction (%)	..	..	..	..	..	..	..	..	..
Water exploitation index (water abstraction/renewable freshwater resources x 100)	5.8	6.0	5.7	5.6	6.0	5.4	5.1	..	..
Total water use by sectors (million m^3)	4 933.0	5 168.0	4 910.6	4 821.3	5 177.8	4 559.4	4 477.3	4 505.3	..
- Agriculture, forestry, fishing	258.0	291.0	326.3	308.9	348.4	295.8	296.2	289.3	..
- Households	..	..	..	..	..	..	..	..	..
- Services	..	..	..	..	..	..	..	..	..
- Industry	..	..	..	..	..	..	..	..	..
of which: Water used for cooling	..	..	..	..	..	..	..	..	..
- other	..	..	..	..	..	..	..	..	..
Household water use per capita (l/capita/day)	100.0	99.0	99.0	97.0	100.0	102.0	99.0	96.0	..
Ecosystems and biodiversity									
Protected areas	941.0	950.0	951.0	953.0	954.0	973.0	1 009.0	1 012.0	1 012.0
- Total area (ha)	566 701.2	581 736.0	582 076.3	582 458.1	582 122.2	583 876.3	584 587.1	584 498.5	584 530.0
- Total protected area (as percentage of total area)	5.1	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.3
Ia Strict Nature Reserve (as percentage of total protected area)	13.6	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Ib Wilderness Area (as percentage of total protected area)	..	..	..	..	..	..	..	..	..
II National Park (as percentage of total protected area)	26.5	25.8	25.8	25.8	25.8	25.8	25.7	25.7	25.7
III Natural Monument (as percentage of total protected area)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
IV Habitat / Species Management Area (as percentage of total protected area)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
V Protected Landscape / Seascape (as percentage of total protected area)	43.2	44.1	44.1	44.0	44.1	43.9	43.9	43.9	43.9
VI Managed Resource Protected Area (as percentage of total protected area)	13.0	13.2	13.2	13.3	13.2	13.5	13.6	13.6	13.6

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Forests and other wooded land	33.4	33.5	33.8	33.9	34.0	34.2	34.3	34.6	..
- Total forested area (% of total land area)	37 040.2	37 214.5	37 491.3	37 613.0	37 747.8	37 953.4	38 111.3	38 359.1	..
- Total forested and wooded area (km^2)	16 870.7	17 035.2	17 203.2	17 251.1	17 410.2	17 612.0	17 757.2	17 963.2	..
- Semi-natural (km^2)	8 357.2	8 129.3	8 240.0	8 169.9	8 344.1	8 260.0	8 239.5	8 086.6	..
- Plantation (km^2)	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	
- Undisturbed by humans (km^2)	930.8	789.0	739.6	707.6	683.1	680.6	691.2	665.3	..
- Area of regeneration (km^2)	..	..	..	..	..	..	..	..	..
Share of threateaned species (IUCN categories) in total number of species (animals):	..	..	..	..	..	..	..	..	..
- mammals (%)	..	..	..	..	..	..	..	..	..
- birds (%)	..	..	..	..	..	..	..	..	..
- fish (%)	..	..	..	..	..	..	..	..	..
- reptiles (%)	..	..	..	..	..	..	..	..	..
Share of threateaned species (IUCN categories) in total number of species (plants):	..	..	..	..	..	..	..	..	..
- vascular plants (%)	..	..	..	..	..	..	..	..	..
Land resources and soil									
Land area (km^2)	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	..
Built-up and other related area (% of total land area)	..	..	..	..	..	..	..	..	..
Soil erosion (ha) - Wind*	195 423.4	165 215.4	585 337.5	171 863.8	174 706.9	524 460.4	978 858.0	707 762.9	..
- % of total land area	17.7	14.9	5.3	15.5	15.8	4.7	8.8	6.4	..
- % of agricultural land	51.4	43.5	15.3	45.2	45.9	13.7	25.7	18.5	..
Soil erosion (ha) -Water*	3 114 262.9	2 964 398.0	2 963 960.0	2 712 870.1	3 139 895.6	3 112 813.6	3 059 997.8	3 141 640.0	..
- % of total land area	28.1	26.8	26.8	24.5	28.4	28.1	27.7	28.4	..
- % of agricultural land	58.5	57.6	55.7	50.9	59.0	58.5	57.5	59.1	..
Total consumption of mineral fertilizers per unit of agricultural land (kg/ha)	43.2	42.6	43.7	51.2	46.4	59.9	61.1	57.8	..
Total consumption of organic fertilizers per unit of agricultural land (kg/ha)	20.5	21.9	12.1	10.2	13.3	13.1	14.7	14.7	..
Total consumption of pesticides per unit of agricultural land (kg/ha):	..	..	..	..	..	..	..	..	..
- Insecticides (kg/ha)	..	..	..	..	..	..	..	..	..
- Fungicides (kg/ha)									
- Herbicide (kg/ha)	..	..	..	..	..	..	..	..	..
- Biological (kg/ha)	..	..	..	..	..	..	..	..	..
- Other (kg/ha)	..	..	..	..	..	..	..	..	..

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Forests and other wooded land	33.4	33.5	33.8	33.9	34.0	34.2	34.3	34.6	..
- Total forested area (% of total land area)	37 040.2	37 214.5	37 491.3	37 613.0	37 747.8	37 953.4	38 111.3	38 359.1	..
- Total forested and wooded area (km^2)	16 870.7	17 035.2	17 203.2	17 251.1	17 410.2	17 612.0	17 757.2	17 963.2	..
- Semi-natural (km^2)	8 357.2	8 129.3	8 240.0	8 169.9	8 344.1	8 260.0	8 239.5	8 086.6	..
- Plantation (km^2)	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	1 086.3	
- Undisturbed by humans (km^2)	930.8	789.0	739.6	707.6	683.1	680.6	691.2	665.3	..
- Area of regeneration (km^2)	..	..	..	..	..	..	..	..	..
Share of threateaned species (IUCN categories) in total number of species (animals):	..	..	..	..	..	..	..	..	..
- mammals (%)	..	..	..	..	..	..	..	..	..
- birds (%)	..	..	..	..	..	..	..	..	..
- fish (%)	..	..	..	..	..	..	..	..	..
- reptiles (%)	..	..	..	..	..	..	..	..	..
Share of threateaned species (IUCN categories) in total number of species (plants):	..	..	..	..	..	..	..	..	..
- vascular plants (%)	..	..	..	..	..	..	..	..	..
Land resources and soil									
Land area (km^2)	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	110 994.0	..
Built-up and other related area (% of total land area)	..	..	..	..	..	..	..	..	..
Soil erosion (ha) - Wind*	195 423.4	165 215.4	585 337.5	171 863.8	174 706.9	524 460.4	978 858.0	707 762.9	..
- % of total land area	17.7	14.9	5.3	15.5	15.8	4.7	8.8	6.4	..
- % of agricultural land	51.4	43.5	15.3	45.2	45.9	13.7	25.7	18.5	..
Soil erosion (ha) -Water*	3 114 262.9	2 964 398.0	2 963 960.0	2 712 870.1	3 139 895.6	3 112 813.6	3 059 997.8	3 141 640.0	..
- % of total land area	28.1	26.8	26.8	24.5	28.4	28.1	27.7	28.4	..
- % of agricultural land	58.5	57.6	55.7	50.9	59.0	58.5	57.5	59.1	..
Total consumption of mineral fertilizers per unit of agricultural land (kg/ha)	43.2	42.6	43.7	51.2	46.4	59.9	61.1	57.8	..
Total consumption of organic fertilizers per unit of agricultural land (kg/ha)	20.5	21.9	12.1	10.2	13.3	13.1	14.7	14.7	..
Total consumption of pesticides per unit of agricultural land (kg/ha):	..	..	..	..	..	..	..	..	..
- Insecticides (kg/ha)	..	..	..	..	..	..	..	..	..
- Fungicides (kg/ha)									
- Herbicide (kg/ha)	..	..	..	..	..	..	..	..	..
- Biological (kg/ha)	..	..	..	..	..	..	..	..	..
- Other (kg/ha)	..	..	..	..	..	..	..	..	..

Demography and Health	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Total population (million inhabitants)	7.6	7.6	7.5	7.5	7.3	7.3	7.3	7.2	7.2
Birth rate (per 1,000)	9.8	10.2	10.7	10.0	9.6	9.5	9.2	9.4	9.2
Total fertility rate	1.4	1.5	1.6	1.5	1.5	1.5	1.5	1.5	1.5
Mortality rate (per 1,000)	14.8	14.5	14.2	14.6	14.7	15.0	14.4	15.1	15.3
Infant mortality rate (deaths/1,000 live births)	9.2	8.6	9.0	9.4	8.5	7.8	7.3	7.6	6.6
Life expectancy at birth (years)	73.0	73.3	73.4	73.6	73.8	74.0	74.5	74.7	74.5
Female life expectancy at birth (years)	76.3	76.6	771.1	77.2	77.4	77.6	78.0	78.3	78.5
Male life expectancy at birth (years)	69.2	69.5	70.0	70.0	70.4	70.6	71.0	71.2	71.1
Population aged 0-14 years (% of total)	13.4	13.4	13.6	13.8	13.4	13.6	13.7	13.9	14.0
Population ages 15-64 (% of total)	69.3	69.2	68.9	68.5	67.8	67.3	66.7	66.1	65.6
Population ages 65 and above (% of total)	17.3	17.4	17.5	17.7	18.8	19.1	19.6	20.0	20.4
Use of improved drinking water source									
- Total population (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	99.0
- Urban (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
- Rural (%)	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
Access to improved sanitation									
- Total population (%)	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0
- Urban (%)	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0
- Rural (%)	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0	84.0
Macroeconomic context									
GDP									
- in current prices (million NCU)	63 970.0	73 095.0	72 844.0	73 780.0	80 100.0	81 544.0	81 971.0	83 612.0	86 373.0
- in current prices (million US$)	44 825.2	54 966.9	51 949.8	50 010.2	57 010.7	53 566.3	55 664.1	56 793.9	48 997.6
- in prices and PPPs of 2005 (million US$)	90 071.0	95 157.0	91 142.0	91 192.0	92 636.0	92 856.0	94 046.0	95 503.0	98 338.0
- change over previous year (%)	7.7	5.6	- 4.2	0.1	1.6	0.2	1.3	1.5	3.0
- change (2005=100)	114.9	121.4	116.3	116.4	118.2	118.5	120.0	121.9	125.5
- per capita in current prices and PPPs (US$)	13 321.0	14 935.0	14 876.0	15 074.0	15 603.0	15 965.0	16 063.0	16 617.0	..
- per capita in prices and PPPs of 2005 (US$)	11 937.0	12 700.0	12 243.0	12 331.0	12 606.0	12 710.0	12 945.0	13 220.0	13 663.0
Consumer price index (CPI) (% change over the preceding year, annual average)	8.4	12.4	2.8	2.4	4.2	3.0	0.9	- 1.4	- 0.1
Producer price index (PPI) (% change over the preceding year, annual average)	8.0	13.2	- 4.3	7.2	8.6	5.3	- 1.3	- 0.9	- 1.7
Registered unemployment (% of labour force, end of period)	6.9	5.6	6.8	10.3	11.3	12.3	13.0	11.4	9.4
Labour force participation rate (% of 15-64 year-old)	66.7	68.4	67.7	66.8	66.2	67.2	67.7	68.1	..
Current account balance									
- Total (million US$)	- 11 437.0	- 11 875.3	- 4 256.3	504.4	606.4	- 210.1	983.5	692.9	..
- (as % of GDP)	- 25.5	- 21.7	- 8.2	1.0	1.1	- 0.4	1.8	1.2	..
Exports of goods and sevices (million US$)	26 298.0	30 446.2	23 264.9	33 564.8	35 606.4	33 976.0	37 255.9	36 842.2	..
Imports of goods and services (million US$)	35 243.2	41 066.4	27 187.7	33 295.0	35 182.4	35 623.2	37 477.3	37 106.7	..
Balance of trade in goods and services (million US$)	- 8 363.4	- 10 751.0	- 4 294.5	- 1 359.7	544.3	- 1 498.0	- 315.9	- 494.3	..
Net foreign direct investment (FDI) (million US$)	- 12 903.1	- 9 179.2	- 3 535.4	- 418.0	- 1 606.6	- 1 378.0	- 1 637.5	- 1 091.3	..
Net foreign direct investment (FDI) (as % of GDP)	31.0	18.8	7.5	2.5	3.7	3.3	3.6	3.5	..
Cumulative FDI (million US$)	..	..	..	..	..	..	..	..	..

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Foreign exchange reserves									
- Total reserves including gold (million US$)	17 544.6	17 930.4	18 522.1	17 223.2	17 215.7	20 507.1	19 883.4	20 129.7	20 783.3
- Total reserves as months of imports	5.3	4.8	7.4	5.7	5.4	6.5	5.9	6.1	..
Net external debt (million US$)	43 822.5	53 065.1	55 670.3	50 634.7	47 642.1	50 702.8	519 780.5	48 742.4	..
Ratio of net debt to exports of goods, services and primary income (%)	159.4	166.4	228.3	181.2	130.1	145.0	135.7	124.2	..
Ratio of net debt to GDP (%)	..	..	13.0	14.3	14.5	17.2	..	..	..
Exchange rate, annual averages (National currency unit/US$)	1.4	1.3	1.4	1.5	1.4	1.5	1.5	1.5	1.8
Income distribution and poverty									
GDP per capita in prices and PPPs of 2005 (US$/capita)	11 937.0	12 700.0	12 243.0	12 331.0	12 606.0	12 710.0	12 945.0	13 220.0	13 663.0
Population below national poverty line									
- Total (%)	22.0	21.4	21.8	20.7	22.2	21.2	21.0	21.8	22.0
- Urban (%)	..	..	..	..	..	..	..	..	..
- Rural (%)	..	..	..	..	..	..	..	..	..
Telecommunications									
Fixed telephone lines per 100 inhabitants	30.4	29.2	29.6	29.3	31.0	29.3	26.9	25.4	..
Cellular subscribers per 100 population	130.9	139.0	140.4	138.0	142.9	148.1	145.2	137.7	..
Personal computer in use per 100 population	..	..	..	..	..	..	..	..	..
Internet users per 100 population	33.6	39.7	45.0	46.2	48.0	51.9	53.1	55.5	..
Education									
Literacy rate (%)	..	..	..	..	..	..	..	..	..
Literacy rates of 15-24 years old, both sexes, percentage	..	..	..	..	..	..	..	..	..
Gender Inequality									
Share of women employment in the non-agricultural sector (%)	..	..	..	..	..	..	..	..	..
Gender Parity Index in									
- Primary education enrolment (ratio)	0.99	1.00	1.00	1.00	1.00	0.99	0.99	..	..
- Secondary education enrolment (ratio)	0.96	0.97	0.96	0.96	0.95	0.96	0.95	..	..
- Tertiary education enrolment (ratio)	1.24	1.32	1.33	1.32	1.30	1.27	1.27	..	..

Sources: Bulgarian National Statistical Institute, UN Millenium Development Goal Databank, World Bank Databank, ECE Statistical Division, 2016.

Annex III

MILLENNIUM DEVELOPMENT GOALS INDICATORS, 2007–2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
1.1 Proportion of population below $1.25 (PPP) per day									
Population below $1.25 (PPP) per day, percentage	0.30	0.70		1.60	1.90				
Population below national poverty line, total, percentage	21.40	21.80	20.70	22.20	21.20	21.00	21.00		
Population below national poverty line, urban, percentage									
Population below national poverty line, rural, percentage									
Purchasing power parities (PPP) conversion factor, local currency unit to international dollar	0.77	0.80	0.80	0.79	0.77	0.77			
1.2 Poverty gap ratio									
Poverty gap ratio at $1.25 a day (PPP), percentage	0.10	0.30		0.60	0.80				
1.3 Share of poorest quintile in national consumption									
Poorest quintile's share in national income or consumption, percentage	8.50	6.90		6.20	6.40				
1.4 Growth rate of GDP per person employed									
Growth rate of GDP per person employed, percentage	2.22	2.35	-1.89	7.28	4.99	1.56	1.03		
1.5 Employment-to-population ratio									
Employment-to-population ratio, both sexes, percentage	49.00	50.80	49.40	46.70	46.60	46.60	46.90		
Employment-to-population ratio, men, percentage	54.40	56.50	54.90	51.30	51.10	50.80	51.40		
Employment-to-population ratio, women, percentage	44.00	45.50	44.40	42.40	42.40	42.60	42.80		
1.6 Proportion of employed people living below $1.25 (PPP) per day									
Proportion of employed people living below $1 (PPP) per day, percentage									
1.7 Proportion of own-account and contributing family workers in total employment									
Proportion of own-account and contributing family workers in total employment, both sexes, percentage	8.40	8.70	9.00	9.00	8.50	8.00	8.20		
Proportion of own-account and contributing family workers in total employment, women, percentage	7.10	7.50	7.70	8.00	7.10	6.60	6.80		
Proportion of own-account and contributing family workers in total employment, men, percentage	9.50	9.80	10.10	9.90	9.70	9.30	9.50		
1.8 Prevalence of underweight children under-five years of age									
Children under 5 moderately or severely underweight, percentage									
Children under 5 severely underweight, percentage									

[non-MDG] Unemployment rate of young people aged 15-24 years, each sex and total	2007	2008	2009	2010	2011	2012	2013	2014	2015
Youth unemployment rate, aged 15-24, both sexes	15.10	12.70	16.20	23.20	25.00	28.10	28.40		
Youth unemployment rate, aged 15-24, women	15.90	11.40	13.80	21.70	23.60	26.00	25.70		
Youth unemployment rate, aged 15-24, men	14.50	13.70	17.80	24.10	26.00	29.50	30.20		
Ratio of youth unemployment rate to adult unemployment rate, both sexes	2.50	2.50	2.70	2.50	2.50	2.60	2.40		
Ratio of youth unemployment rate to adult unemployment rate, women	2.40	2.20	2.30	2.50	2.60	2.70	2.30		
Ratio of youth unemployment rate to adult unemployment rate, men	2.50	2.90	3.00	2.50	2.40	2.40	2.40		
Share of youth unemployed to total unemployed, both sexes	18.50	19.20	19.40	18.00	16.90	17.00	14.90		
Share of youth unemployed to total unemployed, women	17.30	15.00	15.00	15.80	15.60	15.40	12.80		
Share of youth unemployed to total unemployed, men	19.70	23.00	23.10	19.70	17.80	18.00	16.50		
Share of youth unemployed to youth population, both sexes	4.40	3.80	4.80	6.70	7.40	8.60	8.40		
Share of youth unemployed to youth population, women	4.10	3.00	3.40	5.30	5.90	6.60	6.30		
Share of youth unemployed to youth population, men	4.60	4.70	6.00	8.10	8.80	10.40	10.40		
1.9 Proportion of population below minimum level of dietary energy consumption									
Population undernourished, percentage	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Population undernourished, millions									
2.1 Net enrolment ratio in primary education									
Total net enrolment ratio in primary education, both sexes	95.70	97.60	99.10	99.40	98.00	96.40	96.50		
Total net enrolment ratio in primary education, boys	95.60	97.30	98.50	99.10	97.80	96.30	96.50		
Total net enrolment ratio in primary education, girls	95.70	98.00	99.70	99.70	98.30	96.50	96.50		
2.2 Proportion of pupils starting grade 1 who reach last grade of primary									
Percentage of pupils starting grade 1 who reach last grade of primary, both sexes	93.70	93.80	97.40	96.60	96.90	96.00			
Percentage of pupils starting grade 1 who reach last grade of primary, boys	93.30	94.00	97.60	96.80	97.50	96.20			
Percentage of pupils starting grade 1 who reach last grade of primary, girls	94.10	93.50	97.10	96.50	96.40	95.80			
Primary completion rate, both sexes	97.50	89.70	94.20	105.10	104.40	98.20	96.90		
Primary completion rate, boys	97.90	90.50	93.80	104.60	104.60	98.70	97.60		
Primary completion rate, girls	97.20	88.90	94.60	105.60	104.30	97.70	96.20		
2.3 Literacy rate of 15-24 year-olds, women and men									
Literacy rates of 15-24 years old, both sexes, percentage					97.90				
Literacy rates of 15-24 years old, men, percentage					98.10				
Literacy rates of 15-24 years old, women, percentage					97.70				
Women to men parity index, as ratio of literacy rates, 15-24 years old					1.00				
3.1 Ratio of girls to boys in primary, secondary and tertiary education									
Gender Parity Index in primary level enrolment	0.99	1.00	1.00	1.00	1.00	0.99	0.99		
Gender Parity Index in secondary level enrolment	0.96	0.97	0.96	0.96	0.95	0.96	0.95		
Gender Parity Index in tertiary level enrolment	1.24	1.32	1.33	1.32	1.30	1.27	1.27		
3.2 Share of women in wage employment in the non-agricultural sector									
Share of women in wage employment in the non-agricultural sector	49.10	48.70	48.80	49.20	49.30	49.60	49.80		

3.3 Proportion of seats held by women in national parliament	2007	2008	2009	2010	2011	2012	2013	2014	2015
Seats held by women in national parliament, percentage	22.10	21.70	21.70	20.80	20.80	20.80	22.90	24.60	20.40
Total number of seats in national parliament	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00
Seats held by men in national parliament	187.00	188.00	188.00	190.00	190.00	190.00	185.00	181.00	191.00
Seats held by women in national parliament	53.00	52.00	52.00	50.00	50.00	50.00	55.00	59.00	49.00
4.1 Under-five mortality rate									
Children under five mortality rate per 1,000 live births	14.30	13.70	13.30	13.00	12.60	12.10	11.60		
4.2 Infant mortality rate									
Infant mortality rate (0-1 year) per 1,000 live births	12.30	11.80	11.50	11.30	10.90	10.50	10.10		
4.3 Proportion of 1 year-old children immunized against measles									
Children 1 year old immunized against measles, percentage	96.00	96.00	96.00	97.00	95.00	94.00	94.00		
5.1 Maternal mortality ratio									
Maternal mortality ratio per 100,000 live births	13.00	12.00	11.00	11.00	11.00	10.00	11.00	11.00	11.00
Maternal mortality ratio per 100,000 live births (Lower bound)	10.00	9.00	9.00	9.00	9.00	8.00	8.00	8.00	8.00
Maternal mortality ratio per 100,000 live births (Upper bound)	15.00	14.00	13.00	14.00	14.00	13.00	14.00	14.00	14.00
5.2 Proportion of births attended by skilled health personnel									
Births attended by skilled health personnel, percentage	99.60	99.60		99.50			99.70		
5.3 Contraceptive prevalence rate									
Current contraceptive use among married women 15-49 years old, any method, percentage	69.20								
Current contraceptive use among married women 15-49 years old, modern methods, percentage	40.10								
Current contraceptive use among married women 15-49 years old, condom, percentage	22.30								
5.4 Adolescent birth rate									
Adolescent birth rate, per 1,000 women	43.00	45.60	49.10	42.90	42.00	42.50			
6.2 Condom use at the last high-risk sex									
Condom use at last high-risk sex, 15-24 years old, women, percentage									
Condom use at last high-risk sex, 15-24 years old, men, percentage									
Condom use to overall contraceptive use among currently married women 15-49 years old, percentage	32.30								
6.5 Proportion of population with advanced HIV infection with access to antiretroviral drugs									
Antiretroviral therapy coverage among people with advanced HIV infection, percentage (lower bound)			20.40	18.50	19.90				
Antiretroviral therapy coverage among people with advanced HIV infection, percentage			25.90	23.50	25.40				
Antiretroviral therapy coverage among people with advanced HIV infection, percentage (upper bound)			33.30	30.20	32.70				
Percentage of HIV-infected pregnant women who received antiretroviral drugs to reduce the risk for mother-to-child transmission (lower bound)				12.30	11.70				
Percentage of HIV-infected pregnant women who received antiretroviral drugs to reduce the risk for mother-to-child transmission (Mid point)									
Percentage of HIV-infected pregnant women who received antiretroviral drugs to reduce the risk for mother-to-child transmission (upper bound)				34.60	34.60				

6.9 Incidence, prevalence and death rates associated with tuberculosis	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tuberculosis prevalence rate per 100,000 population (mid-point)	67.00	60.00	54.00	47.00	42.00	39.00	37.00		
Tuberculosis prevalence rate per 100,000 population (lower bound)	31.00	27.00	23.00	19.00	17.00	15.00	15.00		
Tuberculosis prevalence rate per 100,000 population (upper bound)	116.00	106.00	97.00	88.00	80.00	74.00	69.00		
Tuberculosis death rate per year per 100,000 population (mid-point)	3.60	3.10	2.60	2.80	2.40	2.30	2.10		
Tuberculosis death rate per year per 100,000 population (lower bound)	3.60	3.10	2.60	2.70	2.30	2.30	2.00		
Tuberculosis death rate per year per 100,000 population (upper bound)	3.70	3.20	2.70	2.80	2.40	2.40	2.10		
Tuberculosis incidence rate per year per 100,000 population (mid-point)	48.00	45.00	41.00	38.00	34.00	32.00	29.00		
Tuberculosis incidence rate per year per 100,000 population (lower bound)	46.00	43.00	39.00	36.00	33.00	30.00	27.00		
Tuberculosis incidence rate per year per 100,000 population (upper bound)	50.00	47.00	43.00	40.00	37.00	35.00	33.00		
Tuberculosis detection rate under DOTS, percentage (lower bound)	75.00	84.00	82.00	81.00	80.00	83.00	81.00		
Tuberculosis detection rate under DOTS, percentage (upper bound)	83.00	92.00	91.00	92.00	91.00	96.00	98.00		
6.10 Proportion of tuberculosis cases detected and cured under directly observed treatment short course									
Tuberculosis detection rate under DOTS, percentage (mid-point)	78.00	88.00	87.00	87.00	86.00	90.00	91.00		
Tuberculosis treatment success rate under DOTS, percentage	82.00	85.00	87.00	87.00	86.00	87.00			
7.1 Proportion of land area covered by forest									
Proportion of land area covered by forest, percentage				36.10					
7.2 Carbon dioxide emissions, total, per capita and per $1 GDP (PPP)									
Carbon dioxide emissions (CO2), thousand metric tons of CO2 (CDIAC)	52,188.70	50,791.60	42,654.50	44,128.70	49,339.50				
Carbon dioxide emissions (CO2), thousand metric tons of CO2 (UNFCCC)	55,465.80	53,707.80	45,416.80	47,721.40	53,197.40	48,363.90			
Carbon dioxide emissions (CO2), metric tons of CO2 per capita (CDIAC)	6.90	6.77	5.73	5.97	6.73				
Carbon dioxide emissions (CO2), metric tons of CO2 per capita (UNFCCC)	7.30	7.20	6.10	6.50	7.30	6.60			
Carbon dioxide emissions (CO2), kg CO2 per $1 GDP (PPP) (CDIAC)	0.48	0.44	0.39	0.40	0.44				
Carbon dioxide emissions (CO2), kg CO2 per $1 GDP (PPP) (UNFCCC)	0.51	0.47	0.42	0.43	0.47	0.43			
Energy use (kg oil equivalent) per $1,000 GDP (Constant 2005 PPP $)	185.00	172.00	160.00	163.00	171.00				
7.5 Proportion of total water resources used									
Proportion of total water resources used, percentage				28.70					
7.6 Proportion of terrestrial and marine areas protected									
Terrestrial and marine areas protected to total territorial area, percentage								31.46	
Terrestrial and marine areas protected, sq. km.								45,929.00	
Terrestrial areas protected to total surface area, percentage								40.52	
Terrestrial areas protected, sq. km.								44,920.00	
Marine areas protected to territorial waters, percentage								15.30	
Marine areas protected, sq. km.								1,009.00	
Marine areas protected to sea areas under national jurisdiction (0-200 nautical miles)								2.90	
7.7 Proportion of species threatened with extinction									
Proportion of species threatened with extinction									

7.8 Proportion of population using an improved drinking water source	2007	2008	2009	2010	2011	2012	2013	2014	2015
Proportion of the population using improved drinking water sources, total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.00	99.00
Proportion of the population using improved drinking water sources, urban	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Proportion of the population using improved drinking water sources, rural	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
7.9 Proportion of population using an improved sanitation facility									
Proportion of the population using improved sanitation facilities, total	86.00	86.00	86.00	86.00	86.00	86.00	86.00	86.00	86.00
Proportion of the population using improved sanitation facilities, urban	87.00	87.00	87.00	87.00	87.00	87.00	87.00	87.00	87.00
Proportion of the population using improved sanitation facilities, rural	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00
8.12 Debt service as a percentage of exports of goods and services									
Debt service as percentage of exports of goods and services and net income	4.00	3.20	2.50	1.60	1.20	1.20	2.00		
8.13 Proportion of population with access to affordable essential drugs on a sustainable basis									
Population with access to essential drugs, percentage									
8.14 Fixed-telephone subscriptions per 100 inhabitants									
Fixed-telephone subscriptions per 100 inhabitants	30.42	29.18	29.62	29.29	30.99	29.31	26.89	25.35	
Fixed-telephone subscriptions	2,300,355	2,189,773	2,205,394	2,164,258	2,272,834	2,132,905	1,942,424	1,816,952	
8.15 Mobile-cellular subscriptions per 100 inhabitants									
Mobile-cellular subscriptions per 100 inhabitants	130.86	138.98	140.40	138.04	142.85	148.13	145.19	137.71	
Mobile-cellular subscriptions	9,897,477	10,429,012	10,454,822	10,199,942	10,475,083	10,780,732	10,486,824	9,870,806	
8.16 Internet users per 100 inhabitants									
Internet users per 100 inhabitants	33.64	39.67	45.00	46.23	47.98	51.90	53.06	55.49	
Internet users									
Personal computers per 100 inhabitants									
Personal computers									

Source: UNSTAT website at http://mdgs.un.org/unsd/mdg/Data.aspx accessed on 27.9.2016.

Annex IV

LIST OF MAJOR ENVIRONMENT-RELATED LEGISLATION

Access to Public Information Act, Promulgated, State Gazette (SG) No. 55/7.07.2000
Agricultural Land Conservation Act, Promulgated, SG No. 35/24.04.1996
Biological Diversity Act, Promulgated, SG No. 77/9.08.2002
Clean Ambient Air Act, Promulgated, SG No. 45/28.05.1996
Climate Change Mitigation Act, Promulgated, SG No. 22/11.03.2014
Customs Act, Promulgated, SG No. 15/6.02.1998
Energy Act, Promulgated, SG No. 107/9.12.2003
Energy Efficiency Act, Promulgated, SG No. 35/15.05.2015, effective 15.05.2015
Energy from Renewable Sources Act, Promulgated, SG No. 35/3.05.2011
Environmental Protection Act, Promulgated, SG No. 91/25.09.2002
Fisheries and Aquaculture Act, Promulgated, SG No. 41/24.04.2001
Forestry Act, Promulgated, SG No. 19/8.03.2011
Genetically Modified Organisms Act, Promulgated, SG No. 27/29.03.2005
Hunting and Game Protection Act, Promulgated, SG No. 78/26.09.2000
Liability for Prevention and Remedying of Environmental Damage Act, Promulgated, SG No. 43/29.04.2008
Local Taxes and Fees Act, Promulgated, SG No. 117/10.12.1997
Medicinal Plants Act, Promulgated, SG No. 29/7.04.2000
Plant Protection Act, Promulgated, SG No. 61/25.07.2014
Protected Areas Act, Promulgated, SG No. 133/11.11.1998
Protection Against the Harmful Impact of Chemical Substances and Mixtures Act (Title amended, SG No. 114/2003, SG No. 63/2010, effective 13.08.2010), Promulgated, SG No. 10/4.02.2000
Protection from Environmental Noise Act, Promulgated, SG No. 74/13.09.2005
Regional Development Act, Promulgated, SG No. 50/30.05.2008
Soils Act, Promulgated, SG No. 89/6.11.2007
Waste Management Act, Promulgated, SG No. 53/13.07.2012
Water Act, Promulgated, SG No. 67/27.07.1999
Water Supply and Sewerage Services Regulation Act, Promulgated, SG No. 18/25.02.2005

Sources

Selected authors:

Belev, T. and Antonov, P. (2016). Participation for nature: Representation of environmental organisations in councils and other bodies of central and local authorities. *Analytical Report.* BlueLink Foundation, Sofia, 2016.

Bourgoudjiev, T. (2012). Packaging waste recycling in Bulgaria. 1st International EIMPack Congress: Recycling of Packaging Waste: Considering all the Costs and all the Benefits. 29-30 November 2012. Available from: http://eimpack.ist.utl.pt/docs/1.3%20Todor%20Bourgoudjiev.pdf

Cheresheva, M. (2016). Bulgaria Bails Out its Indebted Municipalities. *Balkan Insight*, 28 May 2016. Available from: http://www.balkaninsight.com/en/article/bulgarian-state-to-fund-indebted-municipalities-05-25-2016

Chinowsky, P., Price, J.C. and Neumann, J. (2011). Assessment of Climate Change Adaptation Costs for the U.S. Road Network. *Global Environmental Change*. Volume 23, Issue 4, August 2013, Pages 764–773.

Evstatieva, L. et. al. (2007). Medicinal plants in Bulgaria: diversity, legislation, conservation and trade. *Phytologia balcanica* 13(3): 415–427, Sofia, 2007.

Hawkesworth, I.et. al. (2009). Budgeting in Bulgaria. *OECD Journal on Budgeting*. Vol. 2009/3.

Hristova, E. (2013 no 2). Elemental composition of air particulate (PM10) in Sofia by EDXRF techniques. National Institute of Meteorology and Hydrology - BAS 2013. Available from: http://dl.uctm.edu/journal/node/j2014-2/8.per cent20E.per cent20Hristova_163-169.pdf

Hristova, E. (2013 no1). Seasonal variation of PM10 elemental composition in urban environment, National Institute of Meteorology and Hydrology- BAS 2013. Available from: http://www.scientific-publications.net/get/1000001/1401630983662664.pdf Source: Seasonal variation of PM10 elemental composition in urban environment,

Johannesson Linden, A. et. al. (2014). Electricity tariff deficit: Temporary or permanent problem in the EU? *European Economy. Economic Papers 534*. European Commission. October 2014.

Kisyov, P. (2015). Report on national situation in the field of fuel poverty – Bulgaria. Available from: www.reach-energy.eu

Milova, E. P. (2014). Bulgaria - Strengthening the National Trust Eco-Fund's Financing and Implementation Capacity: P118427 - Implementation Status Results Report: Sequence 03. Washington, D.C. World Bank Group. Available from: http://documents.worldbank.org/curated/en/2014/02/18896705/bulgaria-strengthening-national-trust-eco-funds-financing-implementation-capacity-p118427-implementation-status-results-report-sequence-03

Peev, D. and Delcheva, M. (2007). Florogeographical Elements and Evolutionary Trends in the Bulgarian Flora. *Biogeography and ecology of Bulgaria*. Fet, V. and Popov, A. (eds). Dordrecht, 2007.

Peev, P. (2011). Local environmental governance and rules on the ground in Bulgarian municipalities. PhD Thesis. Central European University, June 2011.

Petrova, A. and Vladimirov, V. (eds.) (2009). "Red List of Bulgarian vascular plants." *Phytologia Balcanica* 15 (1): 63 – 94. Sofia, 2009.

Stoyan, C. et. al. (2014). Challenges for Habitat and Species Conservation in the Natura 2000 Network, Bulgaria: an Overview from Two Special Protection Areas. *Acta Zoologica Bulgarica.* Suppl. 5, 2014: 3-8.

Veselinova Plachkova, D. (2014). Factors Limiting the Development and Implementation of Wind Power Parks on Emerging European Markets. Aarhus University, School of Business and Social Sciences. May 2014.

Yordanova, I.I. et.al. (2015). Natural radioactivity in virgin soils and soils from some areas with closed uranium mining facilities in Bulgaria. *Open Chemistry*, 2015;13: 600–605.

Material from Bulgaria

AEWA (2012). Bulgaria's report on the implementation of AEWA for the period 2009-2011.

AEWA (2015). Bulgaria's report on the implementation of AEWA for the period 2012-2014.

AEWA (2015). Implementation Review Process - Report to MOP6. Available from: http://www.unep-aewa.org/en/document/implementation-review-process-report-mop6

Bulgarian Biodiversity Foundation (2013). National Action Plan for Conservation of Wetlands of High Significance in Bulgaria 2013-2022.

Bulgarian Biodiversity Foundation (2016). Анализ на Черния ПР срещу Коалиция "За да остане природа в България" и природозащитните НПО, които членуват в нея.

Bulgarian News Agency (2015). FLAG Fund provides Lev 1,000 Million for 824 EU-Funds-Supported Municipal Projects. 4 June 2015. Available from: http://www.bta.bg/en/c/DF/id/1093610

CEELM (2015). New Decisions of the Bulgarian Energy Regulator – Higher Electricity Prices for the Business and Lower Revenues for the Renewables. 4 August 2015. Available from:

http://www.ceelegalmatters.com/index.php/legal-analysis-energy/162-energy/2915-new-decisions-of-the-bulgarian-energy-regulator-higher-electricity-prices-for-the-business-and-lower-revenues-for-the-renewables

Center for Study of Democracy (2009). CSD Brief No 19: Energy Strategy of Bulgaria 2020: A Better Governance Perspective. November 2009. Available from: http://www.csd.bg/artShow.php?id=9949

Center for the Study of Democracy (2015). Financing of organised crimes.

Convention on Biological Diversity (2015). Bulgaria's Third National Report on the implementation of the Cartagena Protocol on Biosafety.

Council of Ministers (2001). National Strategy for the Environment and Action Plan 2000-2006. Sofia, 2001.

Energy Management Institute (2015). Main changes in energy legislation in 2015. Available from:

http://www.emi-bg.com/en/index.php?id=868

Enterprise for the Management of Environmental Protection Activities, Report on the activities of the Enterprise for the Management of Environmental Protection Activities in 2015. Available from:

http://pudoos.bg/

Enterprise for the Management of Environmental Protection Activities, Report on the activities of the Enterprise for the Management of Environmental Protection Activities in 2014. Available from:

http://pudoos.bg/

Enterprise for the Management of Environmental Protection Activities, Report on the activities of the Enterprise for the Management of Environmental Protection Activities in 2013. Available from:

http://pudoos.bg/

Environment Agency Executive (2014). Report on Executive Environment Agency pursuant to section 29 of the Ordinance on disused motor vehicles. 2014.

Environment Agency Executive website. Areas for assessment and management of air quality, according to Ordinance № 7 of 1999. Available from: https://translate.googleusercontent.com/translate_c?depth=1&hl=nl&ie=UTF8&prev=_t&rurl=translate.google.nl&sl=bg&tl=en&u=http://eea.government.bg/bg/prev_nsmos/air/roukav/index.html&usg=ALkJrhhe9zzZseuD6b0mJ5u2YlVcxZbUwQ

Jaspers (2013). Practical Guidance on the SEA and EIA Directives Training – Key Elements.

Ministry of Economy and Energy (2014). National Energy Efficiency Action Plan. 2014-2020. Sofia, July 2014.

Ministry of Economy, Energy and Tourism (2011). Energy Strategy of the Republic of Bulgaria till 2020. June 2011.

Ministry of Economy, Energy and Tourism (2011). National Renewable Energy Action Plan drawn up in accordance with the template for national renewable energy action plans as set out in Directive 2009/28/EC of the European Parliament and of the Council. 20 April 2011.

Ministry of Energy (2015). Bulletin on the State and Development of the Energy Sector in the Republic of Bulgaria. 2015.

Ministry of Energy (2015). Third National Report of Bulgaria's Progress in the Promotion and use of Energy from Renewable Sources. December 2015.

Ministry of Environment and Water (2007). Operational Programme "Environment 2007-2013". Sofia, 2007.

Ministry of Environment and Water (2012).Third National Action Plan on Climate Change for the Period 2013-2020. Sofia, 2012.

Ministry of Environment and Water (2013). Bulgaria's CITES Biennial Report 2011-2012.

Ministry of Environment and Water (2014). National climate change risk and vulnerability assessment for the sectors of the Bulgarian economy - June 2014 Framework document.

Ministry of Environment and Water (2014). National Waste Management Plan 2014-2020. Sofia, September 2014.

Ministry of Environment and Water (2014). OPE 2014-2020 Ex-ante evaluation report. November 2014. Available from: http://ope.moew.government.bg/files/useruploads/files/documentation/nov_ex-ante_evaluation_report_en.pdf

Ministry of Environment and Water (2014). Operational Programme Environment 2014-2020. Available from:

http://ope.moew.government.bg/files/useruploads/files/ope_2014_-_2020_eng_15_june.pdf

Ministry of Environment and Water (2015). 25 years Ministry of Environment and Water. 2015.

Ministry of Environment and Water (2015). Black Sea River Basin Management Plan 2016-2021.

Ministry of Environment and Water (2015). Bulgaria's CITES Biennial Report 2013-2014.

Ministry of Environment and Water (2015). Bulgaria's Second Biennial Report in Compliance with the Obligations under the United Nations Framework Convention on Climate Change According to Decisions 2/CP.17 and 19/CP.18 of the Conference of the Parties. 29.12.2015.

Ministry of Environment and Water (2015). Danube River Basin Management Plan 2016 -2021.

Ministry of Environment and Water (2015). East Aegen River Basin Management Plan 2016-2021.

Ministry of Environment and Water. Convention on Biological Diversity. Fifth National Report 2009 – 2013.

Ministry of Environment and Water. Municipal Solid Waste Update 2014 - Bulgaria. GMI MSW Subcommittee meeting. Brazil, 2014,

Ministry of Finance (2009). Tax Expenditure Report 2007-2009.

Ministry of Finance (2011). Tax Expenditure Report 2010-2011,

Ministry of Finance (2012). Tax Expenditure Report 2012.

Ministry of Finance (2012). Tax incentives and preferential tax regimes in Bulgaria – Overview. 2012.

Ministry of Finance (2013). Tax Expenditure Report 2013.

Ministry of Finance (2014). Tax Expenditure Report 2014.

Ministry of Finance (2015). Europe 2020: National Reform Programme, 2015 Update. Sofia, April 2015.

Ministry of Health (2014). Bulgarian national report under the WHO Framework Convention on Tobacco Control for 2011-2013. Available from:

http://apps.who.int/fctc/implementation/database/sites/implementation/files/documents/reports/bulgaria_%202014_report_final.pdf

Ministry of Regional Development (2014). Strategy for development and management of the water supply and sanitation sector in the Republic of Bulgaria 2014-2023. Volume I: Main text. April 2014.

Ministry of Regional Development (2014). Strategy for Development and Management of the Water Supply and Sanitation Sector in the Republic of Bulgaria 2014 – 2023. April 2014. Available from: http://www.mrrb.government.bg/docs/24e7666f6785ee40bfb094bec3ad5f45.pdf

National Centre for Regional Development (2012). National Concept for Spatial Development for the period 2013-2025 The national space – our common heritage for the future. Sofia, 2012.

National Statistical Institute (2011). 2011 Population Census. As of 1 February 2011.

National Statistical Institute (2015). Environmental Statistics – Annual Data for 2014.

National Statistical Institute. Emissions of pollutants in the air from industrial, combustible and production processes. Available from: http://www.nsi.bg/en/content/5084/emissions-pollutants-air-industrial-combustible-and-production-processes.

National Statistical Institute. Environment 2010.

National Statistical Institute. Environment 2013.

National Statistical Institute. Environment 2014. Available from: http://www.nsi.bg/en/content/14189/%D0%BF%D1%83%D0%B1%D0%BB%D0%B8%D0%BA%D0%B0%D1%86%D0%B8%D1%8F/environment-2014

National Trust Eco Fund (2010). Bulgarian National TrustEcoFund 15 Years – Successful Completion of the Debt for Environment Swap Agreement between Bulgaria and Switzerland.

National Trust Eco Fund (2014). Annual Activity Report – Independent Auditor's Report – Financial Statements. 31 December 2014.

National Trust Eco Fund (2015). Independent Auditor's Report – Financial statements. 31 December 2015.

Novite.com Sofia News Agency (2015). Bulgaria to Amend Garbage Fee Calculation Formula as of 2015. Available from: http://www.novinite.com/articles/158578/Bulgaria+to+Amend+Garbage+Fee+Calculation+Formula+as+of+2015#sthash.alc4oHAr.dpuf

Ramsar Convention (2014). Bulgaria's national report on the implementation.

Republic of Bulgaria (2012). National Development Program: Bulgaria 2020.

Republic of Bulgaria (2013). Sixth National Communication on Climate Change United Nations Framework Convention on Climate Change.

Republic of Bulgaria (2014). Annual Report on the Implementation of Operational Programme Regional Development 2007-2013 in 2014.

Republic of Bulgaria and National Audit Office (2004). Management of the Protected Areas in the Republic of Bulgaria National and Nature Parks. Performance Audit.

Sofia Municipal Council (2006). Ordinance for the definition and administration of local taxes and fees for services provided by the municipality. Decision No. 894 Minutes No. 93 of 23.11.2006, effective 1.01.2007; amended and supplemented Decision No. 250, Minutes No.11 of 03.31. 2016.

Sofia Municipal Council (2014). Acceptance and approval for 2015: Cost estimate for the collection, transportation, disposal at landfills or other facilities of municipal waste and maintenance of cleanliness of public areas. Amount of waste tax for residential and non-residential property of citizens and businesses. Decision No. 867 on 29.12. 2014.

Sustainable Energy Development Agency (2012). Policies and measures of energy efficiency in Bulgaria. ODYSSEE- MURE 2010. Monitoring energy efficiency targets of the EU and Bulgaria. Sofia, September 2012.

Regional and international institutions:

Bio by Deloitte (2014). Construction and Demolition Waste Management in Bulgaria. Resource Efficiency of mixed wastes.

CEZ (2015). CEZ Group (České Energetické Závody): The leader in power markets of central and southeastern Europe. April 2016.

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions: Roadmap to a Resource Efficient Europe. {COM(2011) 571 final},{SEC(2011) 1068 final}. Available from: http://ec.europa.eu/environment/resource_efficiency/pdf/working_paper_part2.pdf

Council of Europe (2007). Convention on the Conservation of European Wildlife and Natural Habitats. Standing Committee. Recommendation No. 130 (2007). Available from:

https://wcd.coe.int/ViewDoc.jsp?p=&id=1485557&Site=&direct=true

Council of Europe (2015). Convention on the Conservation of European Wildlife and Natural Habitats. Standing Committee, 35th meeting. Report. Strasbourg, 1-4 December 2015.

Council of European Union (2003). Restructuring the Community framework for the taxation of energy products and electricity. Council Directive 2003/96/EC of 27 October 2003.

Deloitte. Tax Legislation Changes for 2016. *Newsletter 2016.* Deloitte Bulgaria. Available from: https://www2.deloitte.com/content/dam/Deloitte/bg/Documents/tax/Tax%20Newsletters/tax_newsletter_2016_en.pdf

EBRD (2010). Energy sector assessment. Country report 2010. Available from: http://www.ebrd.com/legal-reform/where-we-work/bulgaria.html%20

EBRD (2015). Commercial laws of Bulgaria - An assessment by the EBRD. September 2015. Available from:

www.ebrd.com/documents/legal.../bulgaria-country-law-assessment.pdf

EBRD (2015). Strategy for Bulgaria. As approved by the Board of Directors at its meeting on 8 July 2015. Available from:

www.ebrd.com/documents/strategy-and-policy.../strategy-for-bulgaria.pdf

ECE (2000). EPR Bulgaria. Second review. Geneva, 2000.

ECE (2014). Towards an Accountability Framework for the Post-2015 Development Agenda: Perspectives from the UNECE region. Questionnaire completed by Bulgaria.

ECE (2014). Aarhus Convention National Implementation Report of Bulgaria 2013.

ECE (2014). Meeting of Parties to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. Fifth session. Excerpt from the addendum to the report of the fifth session of the Meeting of the Parties (ECE/MP.PP/2014/2/Add.1). Decision V/9d on compliance by Bulgaria. Maastricht, the Netherlands, 30 June and 1 July 2014.

ECE (2014). PRTR Protocol Implementation Report of Bulgaria, 2013.

ECE (2015). Meeting of Parties to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. Compliance Committee, Finding and recommendations with regard to communication ACCC/C/2012/76 concerning compliance by Bulgaria, 9 October 2015.

ECE (2015). Meeting of Parties to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. First Progress Review of the Implementation of Decision V/9d on Compliance by Bulgaria with its obligations under the Convention.

ECE (2016). Questionnaire completed by Bulgaria on the implementation of the Protocol on Strategic Environmental Assessment in the period 2013–2015.

ECE (2016). Questionnaire completed by Bulgaria on the implementation of the Convention on Environmental Impact Assessment in a Transboundary Context in the period 2013–2015.

ECE TEIA database. Reports by Bulgaria on the implementation of the Convention on the Transboundary Effects of Industrial Accidents, various years.

Environment Agency of Austria (2015). Technical assessment of the implementation of Council Directive concerning Urban Waste Water Treatment (91/271/EEC). Available from:

http://ec.europa.eu/environment/water/water-urbanwaste/implementation/implem_report_2016/8th%20Technical%20assessment%20of%20information%20on%20the%20implementation%20of%20Council%20Directive%2091-271-EEC.pdf

EUROBATS (2009). Report on the Implementation of the Agreement in Bulgaria. September 2003 - December 2009.

European Commission – DG Environment (2014). Development of Guidance on Extended Producer Responsibility (EPR). Final Report. Available from:

http://ec.europa.eu/environment/waste/pdf/target_review/Guidance%20on%20EPR%20-%20Final%20Report.pdf

European Commission – Press release (2015). Commission refers BELGIUM and BULGARIA to Court and gives Sweden a final warning over poor air quality. Brussels, 18 June 2015. Available from: http://europa.eu/rapid/press-release_IP-15-5197_en.htm

European Commission (2000). Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC).

European Commission (2007). Directorate-General Taxation and Customs Union. Excise duty tables, Part II – Energy products and Electricity. Available from: http://ec.europa.eu/taxation_customs/index_en.htm#

European Commission (2010). 2009 Environment Policy Review. Staff Working Paper. SEC(2010) 975 final.

European Commission (2010). Directorate-General Taxation and Customs Union. Excise duty tables, Part II – Energy products and Electricity. (Situation as at 1 January 2010) REF1030 January 2010. Available from: http://ec.europa.eu/taxation_customs/index_en.htm#

European Commission (2011). Commission Staff Working Paper. Analysis associated with the Roadmap to a Resource Efficient Europe. Part II. Accompanying the document.

European Commission (2014). JRC Technical Reports. A comparative analysis of the causes of air pollution in three cities of the Danube region: implications for the implementation of the air quality directives. EUR 27712 EN. doi:10.2788/73231. Available from:

http://publications.jrc.ec.europa.eu/repository/handle/JRC100075

European Commission (2014). JRC Technical Reports. Managing Nitrogen and Phosphorus Loads to Water Bodies: Characterization and Solutions, 2014.

European Commission (2014). Tax expenditures in direct taxation in EU Member States. European Economy - Occasional Papers 207. December 2014.

European Commission (2015). Directorate-General Taxation and Customs Union, Excise duty tables, Part II – Energy products and Electricity. (Situation as at 1 July 2015) REF1044 July 2015. Available from: http://ec.europa.eu/taxation_customs/index_en.htm#

European Commission (2016). Directorate-General Taxation and Customs Union, Excise duty tables, Part II – Energy products and Electricity. (Shows the situation as at 1 January 2016.) REF 124 rev.1045 rev1, January 2016.) Available from:

http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

European Compost Network (2014). Country report of Bulgaria, 5/2014.

European Court of Justice. 14 January 2016, European Commission v Republic of Bulgaria, Case C-141/14, Judgment ECLI:EU:C:2016:8.

European Environment Agency EEA (2012). Protected areas in Europe — an overview. Copenhagen, 2012.

European Environment Agency EEA (2013). Municipal Waste Management in Bulgaria. February 2013.

European Environment Agency EEA (2013). Waste Management in Bulgaria.

European Environment Agency EEA (2014). Waste prevention in Europe — the status in 2014.

European Environment Agency EEA (2015). Air quality in Europe – 2015 report.

European Environment Agency EEA (2015). State of Environment Report – Countries and regions – Bulgaria.

European Union, European Regional Development Fund, and Cohesion Fund. Annual Report on Operational Programme Environment 2007-2013.

Eurosai (2012). Coordinated audit on the enforcement of the European Waste Shipment Regulation. Available from: http://www.eca.europa.eu/sites/cc/Lists/CCDocuments/other%20publications/Coordinated_audit_on_the_enforcement_of_the_European_Waste_Shipment_Regulation.pdf

Eurosai (2014). National Parks – A cooperative audit. Available from: http://www.eurosaiwgea.org/audits/Audit%20documents/National%20Parks%20-%20a%20Cooperative%20Audit.pdf

Eurostat (2015). Environmental taxes in the EU. News release 205/2015 – 25 November 2015.

GIZ (2013). Economic Instruments in Solid Waste Management. Case Study Bulgaria. Available from:

https://www.giz.de/en/downloads/giz2013-en-economic-instruments-bulgaria.pdf

Global Water Partnership (no date). The post-2015 development agenda - Bulgaria stakeholder perspectives on a water goal and its implementation. Stockholm.

Global Water Partnership (no date). The post-2015 Development Agenda. Bulgaria stakeholder perspectives on a water goal and its implementation.

Grant Thornton (2014). Energy Efficiency and Renewable Sources Fund. Annual Activity Report; Independent Auditor's Report; Financial Statements. 31 December 2014. Available from: http://www.bgeef.com/_private/Annual%20Activity%20Report_2014_EN.pdf

Grant Thornton (2015). Energy Efficiency and Renewable Sources Fund. Annual Activity Report; Independent Auditor's Report; Financial Statements. 31 December 2015. Available from: http://www.bgeef.com/_private/BEEF%20FS%202015_EN.pdf

IEEP (2009). A Report on the Implementation of Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE). April 2009. Available from: http://ec.europa.eu/environment/archives/waste/reporting/pdf/WEEE_Directive.pdf

IMF (2015). Bulgaria - Staff Report for the 2015 Article IV Consultation. April 16, 2015. Available from: http://www.imf.org/external/pubs/ft/scr/2015/cr15119.pdf

Insight-E (2015). Energy poverty and vulnerable consumers in the energy sector across the EU: analysis of policies and measures. Policy Report 2, May 2015. Available from: www.insightenergy.org

Journal of International Scientific Publications: Ecology and Safety Volume 8, ISSN 1314-7234 (Online). Available from: http://www.scientific-publications.net

KPMG (2015). Amendments to the Excise Duty and Tax Warehouses Act. *Tax News*. Issue 11, December 2015. Available from: http://www.kpmg.com/BG/en/IssuesAndInsights/ArticlesPublications/Tax-News/Documents/2015-11-Tax-News-en.htm#bookmark6

KPMG (2015). New definition of "energy product used for heating purposes". *Tax News*. Issue 10, December 2015. Available from: http://www.kpmg.com/BG/en/IssuesAndInsights/ArticlesPublications/Tax-News/Documents/2015-10-Tax-News-en.htm

PWC (2014). 2014 Automotive Global Tax Guide. June 2014. Available from: www.pwc.se/sv/fordon/assets/2014-global-automotive-tax-guide.pdf

Regional Environmental Center (2011). Regional Report on the Implementation of SEA and EIA Laws in Bulgaria, Romania and Turkey.

Umweltbundesamt (2013). National Sludge Management Plan for Bulgaria 2013-2020.

UNDP (2008). Millennium Development Goals – 2008. Sofia, 2008.

UNDP (2010). National Survey and Development of a National Strategy Outline of HCFC Phase-Out for Consumption Sectors in Republic of Bulgaria. Sofia, April 2010.

UNDP (2014). Renewable Energy Snapshot: Bulgaria. 24 July 2014.

UNEP (2014). National report of Bulgaria on the Implementation of the Convention on the Conservation of Migratory Species of Wild Animals. UNEP/CMS/COP11/Inf.20.3.BG.

UNESCO World Heritage Centre – IUCN (2011). Mission Report. Reactive Monitoring Mission to Pirin National Park, Bulgaria. November 2011.

UNFCCC (2015). Bulgaria's National Inventory Report 2015. Available from: http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/bgr-2015-nir-6nov15.zip

V Analysis of the legislation. Programming Documents in Policies in the Waste Management Sector, prepared for OP 2014-2020.

World Bank (2011). Country Partnership Strategy for Bulgaria for the period 2011-2013. April 20, 2011. Report No. 60604-BG.

World Bank (2012). Bulgaria - Public expenditures for growth and competitiveness. Public expenditure review (PER). Washington, DC: World Bank. Available from: http://documents.worldbank.org/curated/en/2012/03/16270635/bulgaria-public-expenditures-growth-competitiveness

World Bank (2013). Republic of Bulgaria Power Sector Rapid Assessment. May 2013. Available from:

http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/05/30/000356161_20130530122419/Rendered/PDF/781130WP0Box370essment00May270final.pdf

World Bank (2015).Water and Wastewater Services in the Danube Region: Bulgaria Country Note. Washington, DC. © World Bank. Available from: https://openknowledge.worldbank.org/handle/10986/22134 License: CC BY 3.0 IGO.

Websites:

Air Index (in Bulgarian) http://eea.government.bg/bg/dokladi/threemonth/threemonth_04/air/index

Air Quality Daily Bulletin
http://eea.government.bg/airq/bulletin-en.jsp

Air Quality Index City of Sofia
http://aqicn.org/city/sofia/

Ares (2016)32682 - 05/01/2016
https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports

Biodiversity Information System for Europe (BISE). Sebi indicators http://biodiversity.europa.eu/topics/sebi-indicators

EEA. Air pollution fact sheet Bulgaria 2013

http://www.eea.europa.eu/themes/air/air-pollution-country-fact-sheets/bulgaria-air-pollutant-emissions-country-factsheet/view

EMEP DAB: EMEP DAB reports till 2013
http://webdab.umweltbundesamt.at/official_country_year.html?cgiproxy_skip=1

Emission inventory Environment Agency Executive. National report on the status and protection of the environment in Bulgaria, 2013
http://translate.google.com/translate?u=httpper cent3Aper cent2Fper cent2Feea.government.bgper cent2Fbgper cent2Fsoerper cent2F2013&langpair=autoper cent7Cen&hl=en

Environmental Protection Act (SG No. 42/3.06.2011)
http://www3.moew.government.bg/files/file/PNOOP/Acts_in_English/Environmental_Protection_Act.pdf)

European Commission – Press Release Database

http://europa.eu/rapid/search.htm

European Commission at Work

http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/?lang_code=en

European Commission. Radioactivity Environmental Monitoring https://rem.jrc.ec.europa.eu/RemWeb/

European Commission Directorate-General for Economic and Financial Affairs
http://ec.europa.eu/dgs/economy_finance/index_en.htm

European Nature Park Declaration
http://www.europarc.org/wp-content/uploads/2015/04/2014-European-Nature-Parks-Declaration-Europe-needs-nature-parks.pdf

Eurosai. Adaptation to climate change – are governments prepared?
http://www.google.at/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjRv8z6o5nQAhUfM8AKHeevB0MQFggeMAA&url=http%3A%2F%2Fwww.klimatilpasning.dk%2Fmedia%2F598596%2Fadaptation_to_climate_change_final_version.pdf&usg=AFQjCNGNSZLOZ4zGBBOI50NLoyzHLe4f-g&bvm=bv.137904068,bs.1,d.bGg

Eurostat Statistics Explained: Environmental tax statistics http://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_tax_statistics

Eurostat. Waste Tables

http://ec.europe.eu/eurostat/web/waste/data/main-tables

Executive Environment Agency Bulgaria

https://eea.government.bg/en

FAO Global Forest Resource Assessment 2014 Bulgaria
http://www.fao.org/3/a-az175e.pdf

Fund for Local Authorities and Governments in Bulgaria – FLAG JSC (2015), Annual activity report; auditor's report and annual financial statement.
www.flag-bg.com/docs/

GMO-free Europe

http://www.gmo-free-regions.org/gmo-free-regions/bulgaria.html

Government of Bulgaria. Ordinance of road testing
http://www.rta.government.bg/images/Image/n_uredba/nH32.pdf

ICP Forests Manual
http://icp-forests.net/page/icp-forests-manual

ICPDR – International Commission for the Protection of the Danube River Bulgaria
https://www.icpdr.org/main/danube-basin/bulgaria

ISO certified companies
http://www.club9000.org/bg/ISO14001-Certified-Firms.php

Ministry of Environment and Water http://www5.moew.government.bg/?page_id=46117

Ministry of Food and Agriculture. Annual
reportshttp://www.mzh.government.bg/mzh/Documents/reports.aspx)

Ministry of Environment and Water. Programs of measures and action plans related to water

http://www.moew.government.bg/?show=top&cid=48&lang=en

National Agency for Vocational Education and Training http://www.navet.government.bg/en/

National Association of Municipalities in the Republic of Bulgaria

http://projects-namrb.org/index.php/en/

National report on the status and protection of the environment in Bulgaria
http://eea.government.bg/bg/soer/2014

National State of the Environment Report http://eea.government.bg/en/output/soe-report/index.html

National Statistical Institute http://www.nsi.bg/en

National Statistical Institute. GDP Annual data http://www.nsi.bg/en/content/12584/annual-data.

National Statistical Institute. Production and deliveries of oil and petroleum products

http://www.nsi.bg/en/content/5021/production-and-deliveries-oil-and-petroleum-products.

National Statistical Institute. Urban Audit City of Plovdiv http://www.nsi.bg/en/node/646.

National Statistical Institute. Urban Audit City of Sofia http://www.nsi.bg/en/node/647.

National System for Environmental Monitoring http://eea.government.bg/en/nsmos/index.html

National system of environmental monitoring. Water http://eea.government.bg/bg/nsmos/water.

NGOs in Bulgaria

http://www.ngobg.info/en/organizations/environment-2-13.html

OpenData government http://opendata.government.bg/

Bulgaria
Environmental Performance Reviews
Third Review

The United Nations Economic Commission for Europe (ECE) Environmental Performance Review Programme assesses progress made by individual countries in reconciling their economic and social development with environmental protection, as well as in meeting international commitments on environment and sustainable development.

The Environmental Performance Review Programme assists countries to improve their environmental policies by making concrete recommendations for better policy design and implementation. Environmental Performance Reviews help to integrate environmental policies into sector-specific policies such as those in agriculture, energy, transport and health. Through the peer review process, the reviews promote dialogue among Governments about the effectiveness of environmental policies as well as the exchange of practical experience in implementing sustainable development and green economy initiatives. They also promote greater Government accountability to the public.

The present publication contains the third Environmental Performance Review of Bulgaria. It takes stock of progress made by the country in the management of its environment since 2007. The publication also covers issues of specific importance to the country related to legal and policy frameworks, the financing of environmental policies, greening the economy, and integrating environmental concerns into selected sectors, in particular air protection, water management, waste management, biodiversity, national ecological network, climate change and energy. Suggestions for strengthening efforts towards a comprehensive and systemic response to sustainable development challenges and implementation of the 2030 Agenda for Sustainable Development are also provided.

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