ENVIRONMENTAL INDICATORS REPUBLIC OF MACEDONIA

2012

Republic of Macedonia
Ministry of Environment and Physical Planning
Macedonian Environmental Information Center

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The Ministry of Environment and Physical Planning as a body of the state administration responsible for the affairs of the environment, has proposed set of environmental indicators of the Republic of Macedonia on the basis of which the relevant report will be created as specified in:

- Article 45 paragraph 1 of the Law on Environment (Official Gazette of the Republic of Macedonia No. 53/05,81/05,24/07,159/08,83/09, 48/10 and 24/10),
- Articles 44 and 45 of the Rulebook on the form, content, objectives, methodology, data sources, and report review (Official Gazette of the Republic of Macedonia No. 81/10),
- conclusions of the Government of the Republic of Macedonia adopted at the Fifth Session held on 15 May 2007
- as well as in the requirements of the EU legislation and international organizations

FOREWORD

Dear readers, we present to you the second, updated and enhanced edition of the publication.

Environmental reporting via indicators is exactly such ambitious undertaking - to produce a report, a picture of the environment presented through as much as posiible quantitative data acquired through scientifically based measurements and analysis, indicating the sources, causes, consequences and trends of specific conditions. Development of indicators is fulfilling one of the obligations deriving from the Law on Environment, and will establish the basis necessary for appropriate decision making in the process of environmental management, and thus make the expected contribution to the sustainable development of our country.

By selecting indicators of individual areas, such as air, nature, climate change, soil, waste, water, agriculture, energy, fishery, transport, health and tourism, we have tried to present both to the expert and general public the state of the environment, the trends and the progress in individual areas by providing accurate and verified data.

Environmental information is always interesting and popular. It is the key of policy creation and important decisions making and every citizen of the Republic of Macedonia is entitled to know it in order to contribute to the process of the status improvement.

We hope that this publication will contribute to the better understanding of the state and changes in the environment and support the process of achieving the set goals of environmental protection.

Macedonian Environmental Information Centre

WHY ENVIRONMENTAL INDICATORS?

Monitoring and reporting of the state of the environment is an obligation specified in the national legislation. Led by the aspiration to get closer to the practices of the European Union in this area, the country has endeavoured to fulfill this obligation in a manner provided for in the European legislation, by delivering environmental data and information to the European Environmental Agency (EEA) and approximation of the reporting with the requirements of the relevant EU Directives and other regulations. The task to accomplish this obligation is performed by the Macedonian Environmental Information Centre within the Ministry of Environment and Physical Planning of the Republic of Macedonia.

Experiences gained through delivery of data to EEA have resulted in significantly augmented flow of environmental data, in terms of both quantity and quality, between the Republic of Macedonia and international institutions. These experiences have enabled comparisons of databases and, accordingly, their improvement by way of reorganization of the reporting processes on national level, enhanced exchange of information among experts, as well as improved public access to environmental data and information.

The establishment and development of environmental indicators was driven by the need to identify indicators of relevance for the environmental state monitoring and policy creation, in line with the EEA Core Set of Indicators (CSI). It was approved and adopted by all relevant bodies and the set reached 37 indicators in 2004. These indicators should respond to the key issues related to environmental policy development.

Reasonably selected indicators based on properly selected temporal series present the key trends and facilitate prompt and adequate action by all stakeholders involved in the process of environment protection. This is of particular importance in the context of environment protection policy creation.

In 2008, the Government of the Republic of Macedonia adopted Environmental Indicators of the Republic of Macedonia prepared by the Macedonian Environmental Information Centre. Thus, country specific indicators have been identified.

The number of adopted indicators is 40 in 12 chapters.

LIST OF INDICATORS

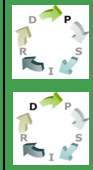
NO	Title of the indicator	Code	Compliance with other indicators			DPSIR		Trend
			EEA CSI	SDI	Thematics			
1 AIR POLLUTION AND OZONE DEPLETION								
1	EMISSIONS OF ACIDIFYING SUBSTANCES	MK NI 001	001	SDI	AP1	P		
2	EMISSIONS OF OZONE PRECURSORS	MK NI 002	002	SDI	AP19	P		
3	EXCEEDANCE OF AIR QUALITY LIMIT VALUES IN URBAN AREAS	MK NI 004	004		AP14	S		
4	CONSUMPTION OF OZONE DEPELTING SUBSTANCES	MK NI 006	006		OD3	P		
2 NATURE AND BIODIVERSITY								
5	THREATENED AND PROTECTED SPECIES	MK NI 007	007		BDIV20	S/I		
6	DESIGNATED AREAS	MK NI 008	008		SEBI 2010 - 7	P		
7	SPECIES DIVERSITY	MK NI 009	009		BDIV9	S		

NO	Title of the indicator	Code	Compliance with other indicators			DPSIR		Trend
			EEA CSI	SDI	Thematics			
3 CLIMATE CHANGE								
8	GREENHOUSE GAS EMISSIONS AND REMOVALS	MK NI 010	010	SDI	CC5	P		
9	PROJECTIONS OF GREENHOUSE GAS EMISSIONS AND REMOVALS	MK NI 011	011	SDI	CC14	P		
4 SOIL								
10	LAND TAKE	MK NI 014	014		TE090 TE091	P		
11	PROGRESS IN MANAGEMENT OF CONTAMINATED SITES	MK NI 015	015		TE117	P		
12	FOREST FIRES	MK NI 038			TE065	P		
5 WASTE								
13	MUNICIPAL WASTE GENERATION	MK NI 016	016	SDI	WMF8	P		

NO	Title of the indicator	Code	Compliance with other indicators			DPSIR		Trend
			EEA CSI	SDI	Thematics			
6 WATER								
14	USE OF FRESHWATER RESOURCES	MK NI 018	018	SDI	WQ3	P		
15	OXYGEN CONSUMING SUBSTANCES IN RIVERS	MK NI 019	019	SDI	WEU5	S		
16	NUTRIENTS IN FRESHWATER	MK NI 020	020		WEU2 WEU3	S		
17	BATHING WATER QUALITY	MK NI 022	022		WEU15	S		
18	DRINKING WATER QUALITY	MK NI 039			WEU13	S		
19	IRRIGATED LAND	MK NI 040		SDI	WQ4	D		

NO	Title of the indicator	Code	Compliance with other indicators			DPSIR		Trend
			EEA CSI	SDI	Thematics			
7 AGRICULTURE								
20	AREA UNDER ORGANIC FARMING	MK NI 026	026	SDI	IRENA 07 Agri22	P		
21	MINERAL FERTILISER CONSUMPTION	MK NI 08			IRENA 08	D		
22	CONSUMPTION OF PESTICIDES	MK NI 09			IRENA 09 Agri24	D		
		8 ENERGY						
23	FINAL ENERGY CONSUMPTION BY SECTOR	MK NI 027	027	SDI	EE18	D		
24	TOTAL ENERGY INTENSITY	MK NI 028	028	SDI	EE23	P		
25	TOTAL ENERGY CONSUMPTION BY FUEL	MK NI 029	029	SDI	EE24	D		
26	RENEWABLE ENERGY CONSUMPTION	MK NI 030	030	SDI	EE26	P		
27	RENEWABLE ELECTRICITY	MK NI 031	031	SDI	EE27	P		

NO	Title of the indicator	Code	Compliance with other indicators			DPSIR		Trend
			EEA CSI	SDI	Thematics			
9 FISHERY								
28	FISH STOCK CHARACTERISTICS	MK NI 041			FISH 3	S		
10 TRANSPORT								
29	PASSENGER TRANSPORT DEMAND	MK NI 035	035	SDI	TERM12	D		
30	FREIGHT TRANSPORT DEMAND	MK NI 036	036	SDI	TERM13	D		

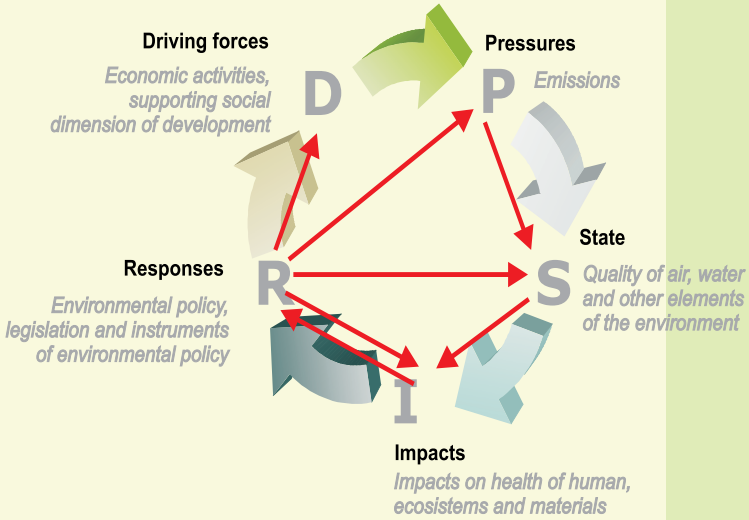
NO	Title of the indicator	Code	Compliance with other indicators			DPSIR		Trend
			EEA CSI	SDI	Thematics			
12 TOURISM								
31	TOURIST TRURB-OVER IN THE REPUBLIC OF MACEDONIA 1 International tourist visits 2 Foreign tourists stay 3 Domestic tourist visits	MK NI 047		SDI	TOUR12 TOUR 33	P D		
32	TOURISM SCALE AND FACILITIES INTENSITY	MK NI 048			TOUR 14	I		
33	ROLE OF TOURISM IN ECONOMY	MK NI 049		SDI	TOUR 35	D		

CLASSIFICATION OF ENVIRONMENTAL INDICATORS

All indicators in a set have been classified in accordance with the framework known by its abbreviation DPSIR, comprising the following concepts: Driving forces – Pressures - State – Impacts – Responses, where each phase transmits its own meaning (Figure 1). This framework is particularly important and clear with regard to environmental policy creation.

- Driving forces are a social and economic factors and activities that cause either the increase or mitigation of pressures on the environment. They may, for example, include the scope of economic, transport or tourist operations.
- Pressures are represented by direct anthropogenic pressures and impacts on the environment, such as pollutant emissions or the consumption of natural resources.
- State relates to the current state and trends of the environment that determine the level of air, water body and soil pollution, the biodiversity of species within individual geographical regions, the availability of natural resources, such as timber and fresh water.
- Impacts are the effects that the environmental changes have on human and non-human health status.
- Responses are society's reactions to environmental issues. They may include specific State measures, such as taxes on the consumption of natural resources. Decisions made by companies and individuals, such as corporate investments into pollution control or purchase of recycled goods by households are also important.

Figure 1



Indicators are also classified by their type into five categories, namely:

- A = descriptive indicator (answering the question What is happening to the environment and to humans?; in other words, it describes the current state)
- B = performance indicator (answering the question What is the distance between the current environmental situation and the desired situation (target)?, or it compares the current state of the environment with the specified environmental protection targets and they serve the monitoring of the progress towards such targets).
- C = efficiency indicator (answering the question Does the environment improve?, or it states if the socity has improved the quality of products and processes relative to resources, emissions and waste per unit waste)
- D = Policy-effectiveness indicator (answering the question How effectively has the official country's environmental policy been implemented? Or if and to what extent the official national policy has been implemented)
- E = Total Welfare indicators (answering the question Has the overall state improved?, or it describes if and to what extent has the country practiced sustainable development, i.e. economic development providing social welfare for the citizens and protection for the environment).

PRESENTATION OF ENVIRONMENTAL INDICATORS

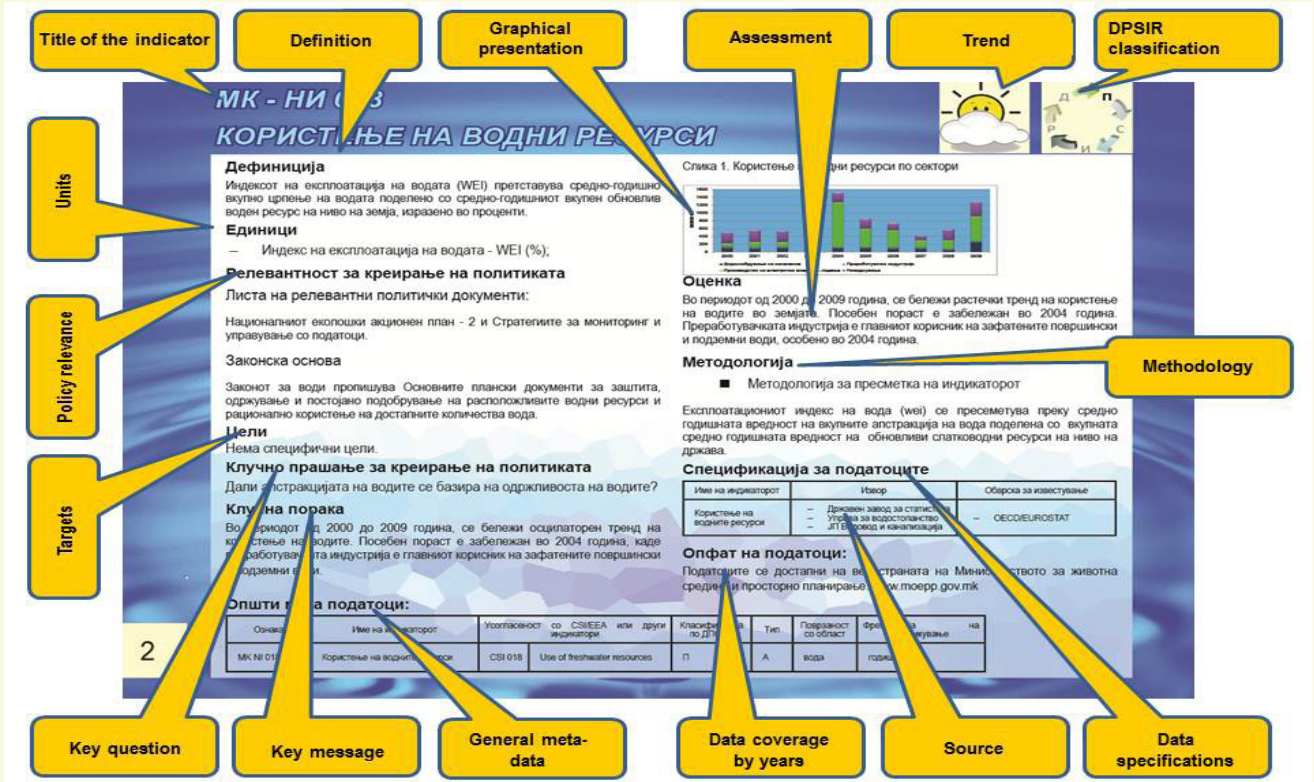
Quantitative values of a given indicator are expressed mostly as annual values for a given period, and presented by means of diagrams, tables and maps. They are then followed by explanations interpreting the trend and the possible causes, as well as the measures undertaken and planned to improve or preserve the current status of the environment. Each indicator is accompanied by a symbol making assessment of individual indicators and showing the trend of presented data and specified targets.

Symbols indicating trends assessment

	Positive development indicating the achievement of a qualitatively or quantitatively defined target
	Undefined course of development, insufficient for achieving qualitative or quantitative targets; it may also be a changeable trend within a given indicator
	Unfavourable course of development

In order to present indicators in a comprehensive manner, their information and data are presented by brief description

of the indicator, prepared in accordance with the template established by the European Environmental Agency in the following order:



AIR POLLUTION

Definition

The indicator tracks the trends in anthropogenic emissions of acidifying substances, i.e. acidifying processes in the air. These substances include nitrogen oxides, ammonia, and sulphur dioxide, and their acidifying power is weighted by their acidifying potential.

The indicator also provides information on emissions by sectors: energy generation and transformation, road and other transport, industry (processes and energy), fugitive emissions, waste, agriculture and other.

Units

- kt (acidifying equivalent)

Policy relevance of the indicator

List of relevant policy documents

Action Plan for European Partnership, National Plan for approximation of the national legislation with European regulations specifying bylaws that need to be prepared has been adopted.

The National Environmental Action Plan (NEAP II) has been adopted. It contains the measures that need to be taken to improve the overall status of air quality, including the reduction of emissions of acidifying substances. The National Plan for Ambient Air Protection for the period 2012 to 2017, the National Programme for gradual air emissions reduction by 2020 aimed at air quality improvement in certain local self-government units (LSGUs) with action plans (pilot: City of Skopje) have been developed and capacity has been built in technical vehicles control at registration, annual technical inspections and control on roads.

All 8 Protocols to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) have been ratified. With regard to the last three Protocols, on heavy metals, on POPs and Gothenburg Protocol, National Action Plan for Ratification and Implementation has been developed.

Inventory of Air Pollution by CORINAIR Methodology and reporting to UNECE and CLRTAP takes place on regular annual basis.

National Plan for POPs Emissions Abatement has been prepared.

Legal grounds

The Law on Ambient Air Quality establishes the legal grounds for adoption of a number of bylaws. Since its adoption in 2004, it has undergone several amendments. The following bylaws have been adopted so far: Decree on limit values of polluting substances in ambient air, Rulebook on criteria, methods and procedures for ambient air quality assessment, Rulebook on the methodology for inventory and determination of the levels of polluting substances emission in the atmosphere, Rulebook on the preparation of National Plan for Ambient Air Protection, Programme for Air Pollution Reduction and Quality Improvement and Action Plan for Air Protection, Rulebook on the quantities of pollutants emission ceilings, Rulebook on the limit values of permissible levels of emission and types of polluting substances, Rulebook on the methodology of ambient air quality monitoring, Rulebook on air quality information delivery, Rulebook on the manner, the form and the content of air cadastre management, Rulebook on the format and the content of forms for keeping the log of emission measurements, Decree determining the combustion plants required to undertake measures for ambient air protection against pollution.

Laws on ratification of the 8 Protocols to the Convention on Long-Range Transboundary Air Pollution have been adopted.

By means of endorsement method, 72 ISO and CEN standards in the area of air emissions and quality have been adopted.

Other legislation related to the regulation of air quality and air emissions includes the Law on Road Transport Safety, Law on Standardization, Rulebook on liquid fuels quality with national standards for liquid fuels quality, etc. The Law on Ambient Air Quality establishes the legal grounds for technical inspection at registration of non-road mobile sources of pollution to include compulsory regular control of the compliance with legal standards for emission level.

Key policy issue

What progress has been made in reducing acidifying substances emissions in the air?

Which different sectors and processes contribute to acidifying substances emissions?

Key message

In 2005, in the frames of the CORINAIR Programme, the Inventory of Air Emissions was established in the country, presenting emissions by individual sectors or activities, and in 2008 and 2010, respectively, updating was made for all SNAP sectors. Assessment was made for the period 2002 to 2010, which means that the trend presented has some uncertainty deriving from the use of emission factors contained in the Guidelines of the CORINAIR Methodology.

Sectors based on the CORINAIR Methodology and SNAP – selective nomenclature are given in the table below:

SNAP	
1	Combustion in energy and transformation industries (stationary sources)
2	Non-industrial combustion plants (stationary sources)
3	Combustion in manufacturing industry (stationary sources)
4	Production processes (stationary sources)
5	Extraction and distribution of fossil fuels and geothermal energy
6	Solvent and other product use
7	Road transport
8	Other mobile sources and machinery
9	Waste treatment and disposal
10	Agriculture
11	Nature

In the period 2002 to 2010, a varying trend in the emissions of certain acidifying substances was observed in the Republic of Macedonia, especially for SO2 (decrease by around 18%) by 2010. The varying trend in the amounts of emissions in the air during this period was due mainly to the decreased number or/and closed production processes in metallurgy which used to be sources of pollution, considering the fact that the country was undergoing a period of development. With regard to nitrogen oxide emissions, however, there was

almost no significant variations in the amounts and they remained at almost the same level between 2002 and 2010.

Electricity production remains the main source of pollution with SO2, mainly as a result of the poor quality (low calorific value) of fuels with high content of sulphur. These processes, together with the transport, are also the main sources of NOx emissions. Data on NH3 is rather limited and incomplete and thus it does not provide a clear picture of ammonia share and impact in the process of acidification.

So far, at country level, two key documents have been adopted, namely National Plan for Ambient Air Protection from 2012 to 2017 and National Programme for Emission Phasing-out by 2020. The implementation of these two documents should play significant role in the reduction of emissions of polluting substances with acidifying effect.

There are ongoing activities towards implementation of the system of integrated pollution prevention and control in accordance with the Law on Environment and Directive 2008/1/EC. Accordingly, the business facilities required to obtain A and B integrated permits, respectively, have been defined to specify the conditions for air pollution control and limit of their air emissions. So far, 28 A adjustment permits with adjustment plan have been issued. By introduction of this system, both emissions into and quality of the air are controlled, as is the possibility for reduction of acidifying substances emission into the air.

Figure 1. Total emission of acidifying substances

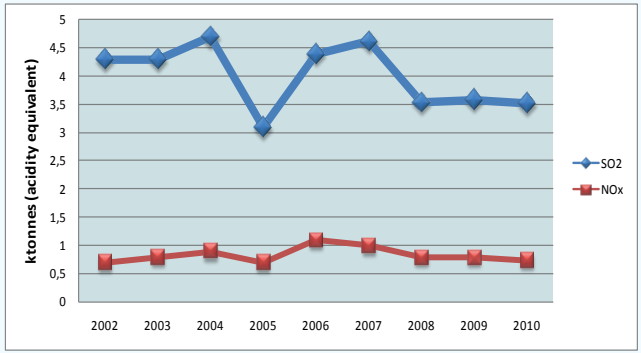


Figure 2. Total emission of SO_2 causing acidification by sector under SNAP – selective nomenclature

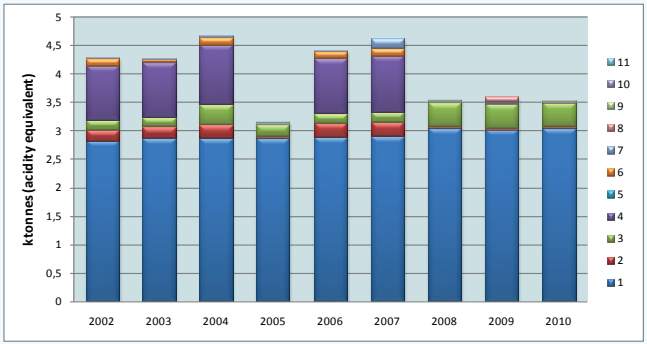
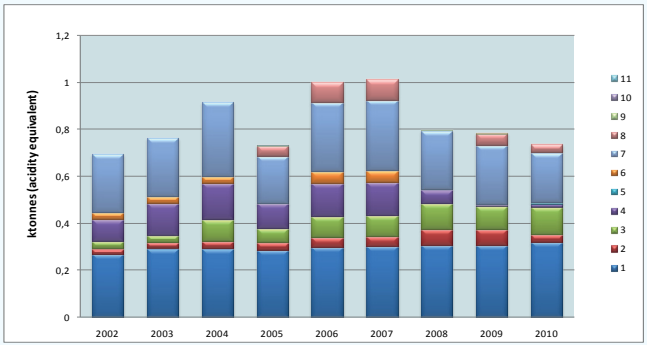


Figure 3. Total emission of NOx causing acidification by sector under SNAP – selective nomenclature



Assessment

In order to identify the amounts of air emissions of the main polluting substances, the Cadastre of Air Polluters and Pollutants in the Republic of Macedonia was developed and updated.

The Cadastre identified the polluting substances at the level of facility, however, in an observation of the requirements of the relevant international agreements, such as UNECE/CLRTAP. In order to obtain compatible and comparable data on the given polluting substances, regular inventory is carried out by application of the CORINAIR Methodology and SNAP nomenclature.

SO_2 emissions by sectors

By application of the CORINAIR methodology, inventory of SO_2 emissions was made for the period 2002 - 2010.

Variation in the trend of amounts of air pollutants in the air in this period may be attributed mainly to the decreased number and/or closed industrial processes in metallurgy, which used to be sources of pollution, given the fact that the country has been going through a period of development.

Namely, this shows that in absence of introduced specific measures and programmes for reduction of polluting substances, we cannot achieve continuous falling trend in the amounts of emission at annual level and for certain longer period.

Electricity production is the main source of this type of emissions. Namely, in 2010, around 86 % of sulphur dioxide emissions originated from electricity production and use of poor quality and low calorific value lignite.

Major proportion of these emissions is located in the southwestern part of the country, where the biggest thermal power plant for electricity production is located. The quality of both solid and liquid fuels is low (with high content of sulphur).

For the near future, activities and measures have been envisaged both on local and central levels, within the frames of the implementation of the National Plan for air quality protection

2012- 2017, and National Programme for emissions phasing-out by 2020

NOx emissions by sectors

Inventory of NOx emissions was made for the period 2002 - 2010.

This indicates that the main sources of NOx emission in the country include electricity production (41.8%), again owing to the poor quality of fuel, transport (32.6%) and other industrial production processes contributing more than 21.2% to the estimated emission.

Targets

Does any of the national documents set targets or targets set under international documents should be achieved?

National documents listed as references in the above text provide guidelines and specify actions that should be undertaken as a matter of priority. It is important to mention that the transposition of Directives 96/61/EC, 2000/81/EC, 2000/76/EC, 99/13/EC and 2001/81/EC into the national legislation, by way of development of laws and bylaws is in the final stage, while activities towards their implementation are in progress.

In accordance with the requirements of the UNECE Convention on Long-Range Transboundary Air Pollution, inventory based on the CORINAIR Programme has been introduced, setting the target of regular inventory of pollutants in tonnes per year.

Also, in accordance with Directive 2001/81/EC, as well as Gothenburg Protocol, the ceilings of the amounts of emissions have been set at the level of the Republic of Macedonia, that shall not be exceeded by 2020, while by 2020 the emissions should be reduced to 1990 level. At this moment, these have been delivered for verification to the Executive Body of the Convention on Long-Range Transboundary Air Pollution.

Inventory of pollutants by main sectors of relevance for effects caused by climate change is also performed in accordance with the United Nations Framework Convention on Climate Change (UNFCCC).

In order to achieve the targets for reduction of acidifying substances emission, causing also degradation of environment and materials, as well as negative effects on human health, it is necessary to adopt all documents planned under the National Programme for Approximation with the Acquis.

Methodology

- Methodological and data uncertainty

The methodology for this indicator calculation is based on aggregation and calculation of data on SO_2, NH_3 and NOx emissions at annual basis, on national level, as overall and distributed to sectors, i.e. activities. Calculations are in line with the Guidelines of UNECE/EMEP Convention on Long-Range Transboundary Air Pollution, and CORINAIR methodology for inventory and application of the SNAP – selective nomenclature of air pollution. With regard to this specific indicator, factors have been used in order to express the acidifying property potential. These factors are specific to each pollutant, namely NOx 0.02174, SO_2 0.03125 and NH_3 0.05882. The results are expressed in kilotonnes equivalent acidity

Uncertainty

- Methodological and data uncertainty

Use of factors of the acidifying property potential leads to some uncertainty. It has been assumed that the factors are representative for Europe as a whole; different factors may be estimated at local level. Comprehensive discussion on uncertainty of these factors can be found in de Leeuw (2002).

EEA uses data delivered officially by EU Member States

and other EEA member countries that follow common guidelines for data emission calculation and reporting (EMEP/EEA 2001) concerning the following air pollutants: NOx, SO_2 and NH_3.

- Reference of used methodology

EEA/ETC-ACC Technical Report outlining the methodologies for gap filling. EEA/ETC-ACC CLRTAP and information on GHG air emissions (CRF).

Data specification

Title of the indicator	Source	Reporting obligation
Emissions of acidifying substances	– State Statistical Office, Energy balance of the country – Report by the Government; – Cadastre of Air Polluters and Pollutants; – Data from measurements in companies – major polluters: – Database on motor vehicles of the Ministry of Interior; – Project: Introduction of CORINAIR Inventory Methodology of the Ministry of Environment and Physical Planning, – Spatial Plan of the Republic of Macedonia.	– Reporting obligations under multilateral agreements –UNECE/ CLRTAP and EEA – Annual report of processed data on air emissions

Data coverage:

Table 1: Total emission of acidifying substances

Substances (Kronnes)	2002	2003	2004	2005	2006	2007	2008	2009	2010
SO_2	4.3	4.3	4.7	3.1	4.4	4.62	3.54	3.59	3.53
NO_x	0.7	0.8	0.9	0.7	1.1	1	0.796	0.793	0.74

Table 2: Total emission of SO2 by sectors presented relative to acidification coefficients

SNAP		2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Combustion in energy and transformation industries (stationary sources)	2,8211	2,8714	2,8714	2,8707	2,8811	2,9	3,04	3,017	3,04
2	Non-industrial combustion plants (stationary sources)	0,1968	0,1968	0,232	0,0332	0,2588	0,25	0,034	0,034	0,034
3	Combustion in manufacturing industry (stationary sources)	0,1688	0,1688	0,3656	0,2016	0,1688	0,18	0,424	0,424	0,42
4	Production processes (stationary sources)	0,9581	0,965	1,0369	0,0111	0,9581	0,98	0,007	0,0006	0,007
5	Extraction and distribution of fossil fuels and geothermal energy									
6	Solvent and other product use	0,1244	0,0444	0,1383		0,1244	0,132			
7	Road transport	0,0161	0,0161	0,0308	0,0242	0,0161	0,18	0,032	0,0244	0,0244
8	Other mobile sources and machinery				0,0078				0,09	0,0065
9	Waste treatment and disposal				0,0001			0,00021		0,000125
10	Agriculture									
11	Nature				0,0012					
total		4,2852	4,3429	4,675	3,1499	4,4	4,622	3,54	3,59	3,53

Table 3: Total emission of NOx by sectors presented relative to acidification coefficients

SNAP		2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Combustion in energy and transformation industries (stationary sources)	0,2667	0,2923	0,2923	0,2848	0,2967	0,3	0,304	0,304	0,317
2	Non-industrial combustion plants (stationary sources)	0,0246	0,0246	0,0333	0,0326	0,0446	0,045	0,07	0,07	0,033
3	Combustion in manufacturing industry (stationary sources)	0,0328	0,0328	0,0885	0,0596	0,0885	0,09	0,11	0,098	0,12
4	Production processes (stationary sources)	0,0906	0,1352	0,1541	0,1072	0,1411	0,14	0,06	0,01	0,013
5	Extraction and distribution of fossil fuels and geothermal energy									0,0075
6	Solvent and other product use	0,0309	0,0309	0,0309		0,0512	0,05			
7	Road transport	0,2475	0,2467	0,3167	0,2	0,2914	0,3	0,25	0,25	0,211
8	Other mobile sources and machinery				0,045	0,0871	0,087		0,051	0,036
9	Waste treatment and disposal				0,0005			0,002	0,00065	
10	Agriculture									
11	Nature				0,0037					
total		0,6922	0,7619	0,9157	0,7334	1,0006	1,012	0,796	0,793	0,74

General metadata

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 001	Emissions of acidifying substances	CSI 001	Emissions of acidifying substances	P	B	- acidification - air	annually

MK - NI 002

EMISSIONS OF OZONE PRECURSORS

Definition

This indicator tracks trends in emissions of ozone precursors: nitrogen oxides, carbon monoxide, methane and non-methane volatile organic compounds, caused by anthropogenic activities, and each weighted by their tropospheric ozone-forming potential.

The indicator also provides information on emissions by sectors: energy industries; road and other transport; industry (processes and energy); other (energy); fugitive emissions; waste; agriculture and other (non energy.

Units

- kt (NMVOC - equivalent)

Policy relevance of the indicator

The European Partnership Action Plan has been adopted, the National plan for approximation of the national legislation with the European regulations stating the bylaws that need to be prepared.

NEAP II has been prepared, specifying the measures that need to be taken to improve the overall status of air and in that sense to reduce emissions leading to acidification. The National Ambient Air Protection Plan 2012-2017 has been adopted, the National program for gradual reduction of emissions until 2020 in order to improve the quality of certain LSG and action plans (pilot City of Skopje), Building capacities for technical control of vehicles, during registration, annual technical control and road checks.

All 8 protocols of the Convention for Long-range Trans boundary Air Pollution – CLRTAP have been adopted. A National Action Plan for Ratification and Implementation has been adopted for the last three Protocols for heavy metals, POPs and the Gutenberg Protocol.

Regularly prepares the annual inventory of the air pollution according to the CORINAIR methodology and the reports toward the UNECE and CLRTAP Convention.

The National plan for implementing reduction of POPs emissions has been prepared.

Legal grounds

The Law on Ambient Air Quality establishes the legal grounds for adoption of a number of bylaws. Since it was adopted in 2004 it has suffered many amendments

and changes. So far have been adopted: Decree on the limit values of levels of polluting substances in ambient air, Rulebook on criteria, methods and procedures for ambient air quality assessment, Rulebook on the methodology for inventory and determination of the levels of polluting substances in the atmosphere, the Rulebook for the preparation of the National Ambient Air Protection Plan, the Programme for pollution reduction and air quality improvement and the action plan for air protection, the Rulebook of the quantities and upper limits – ceilings of emissions of polluting substances, the Rulebook on limit values and permitted levels of emissions and types of polluting substances, the Rulebook on the methodology for ambient air quality monitoring, Rulebook on air quality information transfer, the Rulebook on the manner, the form and content for keeping the air cadaster, the Rulebook on the form and content of the forms for keeping the emission measurement diary, the Decree for determining the combustion capacities that need to undertake measures for ambient air pollution protection. By means of endorsement method, 72 ISO and CEN standards in the area of air emissions and quality have been adopted.

Other legislation related to the regulation of air quality and air emissions includes the Law on Road Transport Safety, Law on Standardization, Rulebook on liquid fuels quality with national standards for liquid fuels quality, etc. The Law on Ambient Air Quality establishes the legal grounds to include compulsory examination of the compliance with the legal standards for the level of emission during the technical examination in the process of registration of non-road mobile sources of pollution.

Key policy issue

What progress has been made in ozone precursors emissions reduction in Europe?

At present, activities are carried out in relation to the implementation of the system of Integrated Pollution Prevention and Control based on the Law on Environment and in accordance with Directive 96/61/EC. In this context, Decree and Rulebook for their implementation have been prepared. These acts define the business entities, i.e. production facilities obliged to acquire A and B integrated environmental permits, which specify the conditions for air pollution control and the limit values of emissions they will be allowed to release in the air. The introduction of this system will enable control of air emissions, thus providing possibility to reduce the emissions of pollutants identified as ozone

precursors. 22 IPPC and 23 B integrated permits have been issued by December 2012.

Specific policy issue

Which different sectors and processes contribute to ozone precursors emissions?

Key message

In 2005, in the frames of the CORINAIR Programme, the Inventory of Air Emissions was established in the country, presenting emissions by individual sectors, i.e. activities, and assessment was made for the period 2002-2005. Application of this manner of data processing, especially due to the lack of data in real time, the trend presented cannot be determined precisely.

Sectors based on the above stated Methodology and SNAP – selective nomenclature are given in the table below:

SNAP	
1	Combustion in energy and transformation industries (stationary sources)
2	Non-industrial combustion plants (stationary sources)
3	Combustion in manufacturing industry (stationary sources)
4	Production processes (stationary sources)
5	Extraction and distribution of fossil fuels and geothermal energy
6	Solvent and other product use
7	Road transport
8	Other mobile sources and machinery
9	Waste treatment and disposal
10	Agriculture
11	Nature

In the period 2002 – 2010, a rising trend has been tracked in the emissions of ozone precursors in the Republic of Macedonia until 2006, and a slight reduction in nitrogen oxides, while in CO-carbon monoxide the reduction is more drastic. The NMVOC

trend is constant in all three years with data (almost the same values of the NVOC equivalent). More significant NMVOC – equivalent expressed in kilotons has been marked in electricity production – sector 1, road traffic – sector 7, as well as sector 11 – nature, as main sources of emissions of ozone precursors.

At this moment, the only program for emission reduction is the National Program for Gradual Reduction of Emissions until 2020, where measures for gradual reduction of polluting substances in the atmosphere have been specified, at any level of the country.

The diagram below shows the annual trend in the emissions of CO (carbon monoxide) and nitrogen oxides presented as ozone precursors.

Figure 1. Trend of emissions of ozone precursors

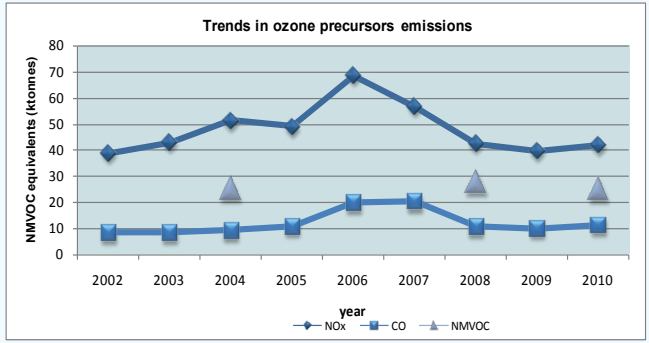


Figure 2. Total emissions of ozone precursors

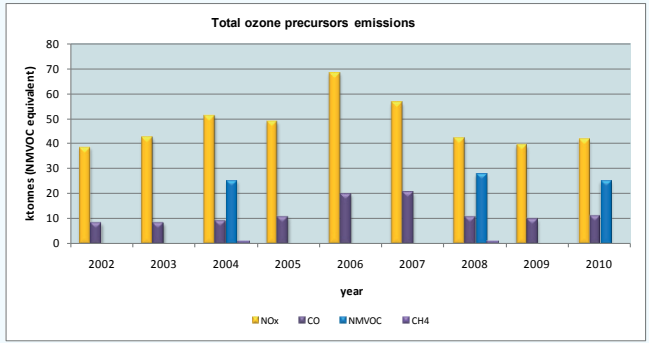


Figure 3. Total NOx emissions by sectors/year

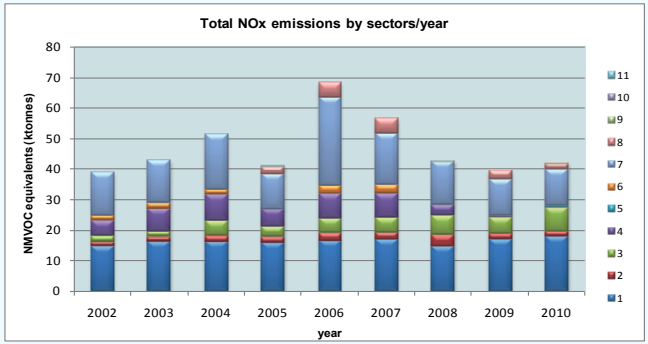


Figure 4. Total CO emissions by sectors/year

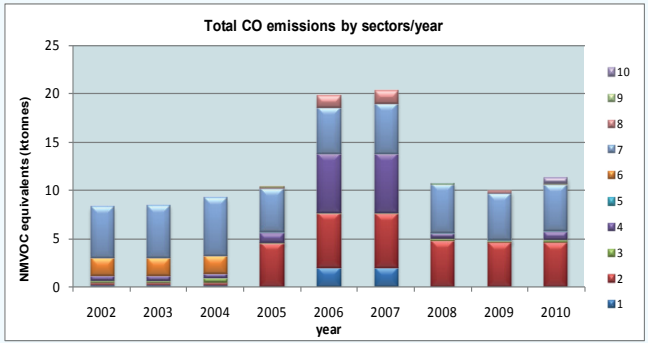


Figure 5. Total NMVC emissions by sectors/year

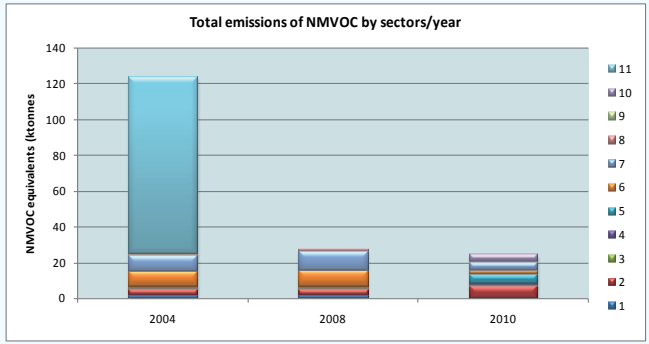
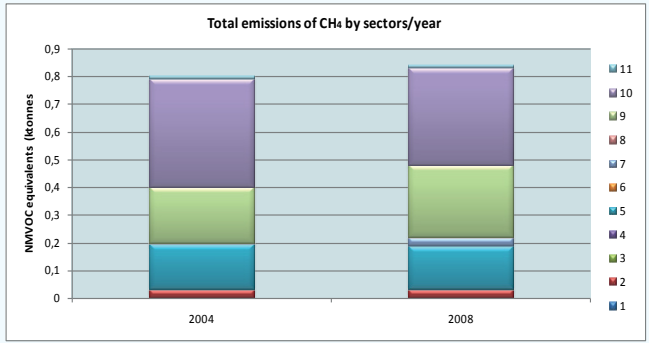


Figure 6. Total CH4 emissions by sectors/year



Assessment

For the purpose of identifying the amounts of air emissions of the main polluting substances, the Cadaster of Air Polluters and Pollutants in the Republic of Macedonia was developed in updated. The latest data update was performed in 2008-2009.

The cadaster identified the main polluting substances at the level of facilities, however in an observation of the requirements of the relevant international agreements, such as UNECE, and in order to obtain comparable and comparable data for the polluting substances, an inventory according to the CORINAIR and SNAP methodology was prepared from 2004 until 2010.

Total emission of ozone precursors

Series of emissions of ozone precursors were assessed for the period 2002 - 2010.

Extensive annual time series exist for the total emissions of ozone precursors on annual level. It can be concluded that, for the analyzed years from 2002 until 2012, NO_x and CO have rising trend until 2006 and declining from then until 2010. Quantities for NMVOC are presented for 2004, 2008 and 2010, and for CH_4 could be presented for 2004 and 2008 only. Namely, these two pollutants were covered in the inventory of the CORINAIR methodology. Most of the quantities of NMVOC and CH_4 emissions derive from the sectors: nature, road traffic and use of solvents and other product by SNAP.

Emissions of NOx as ozone precursor by sectors

Series of NOx emissions were assessed for the period 2002 - 2010.

Through application of the CORINAIR methodology in the inventory of nitrogen oxides emission, it was found out that the main sources of NOx in the country include electricity production, again due to the poor quality of fuel, transport and other industrial production processes.

Emissions of CO as ozone precursor by sectors

Series of CO emissions were assessed for the period 2002 - 2010.

Emissions of CO as ozone precursor show mild increase in the total quantity in the given years and in relation

SNAP sectors, the prevailing sectors are nonindustrial facilities and road transport

Emissions of NMVOC and CH4 as ozone precursor by sectors

Data for the emissions of NMVOC are provided for 2004, 2008 and 2010, whereas data for CH4 is provided for 2004 and 2008.

The application of the CORINAIR methodology in the inventory of NMVOC and CH4 emissions leads to the conclusion that the main sources of this emission in the country originate from the SNAP 11 sector.

Targets

Does any of the national documents set targets or targets set under international documents should be achieved?

National documents listed as references in the above text provide guidelines and specify actions that should be undertaken as a matter of priority. It is important to mention that the development of new regulations in the area of air emissions is in progress, and they will transpose the following Directives into the national legislation: 96/61/EC, 2000/81/EC, 2000/76/EC, 99/13/EC and 2001/81/EC.

In accordance with the requirements of the UNECE Convention on Long-Range Trans boundary Air Pollution, inventory based on the CORINAIR Programme has been introduced, setting the target of regular inventory of pollutants in tons per year.

Inventory of pollutants by main sectors of relevance for developments caused by climate change is also performed in accordance with the United Nations Framework Convention on Climate Change (UNFCCC).

The above documents provide basis for achievement of the targets for reduction of ozone precursors emission, causing degradation of environment and materials, as well as negative effects on human health.

Methodology

- Methodology for the indicator calculation

The methodology for this indicator calculation is based on aggregation and calculation of data on CO, NMVOC, CH_4 and NOx emissions at annual basis, on national level, as overall and distributed to sectors, i.e. activities.

Calculations are in line with the Guidelines of UNECE/EMEP Convention on Long-Range Transboundary Air Pollution, and CORINAIR methodology for inventory and application of the SNAP – selective nomenclature of air pollution.

With regard to this specific indicator, factors have been used in order to express the property of ozone pre-cursors. These factors are specific to each pollutant, namely for NOx it is 1.22, for NMVOC it is 1, for CO it is 0.11 and for CH_4 this value is 0.014. The results are expressed in kilotons NMVOC equivalent.

■ Reference of used methodology

Methodology applied in the calculation and presentation of this indicator has been taken from the Guidelines under CLRTAP and de Leeuw, F. (2002), Set of emission indicators of long-range transboundary air pollution, Environmental science and policy.

Data specification

Title of the indicator	Source	Reporting obligation
Emissions of ozone precursors	– State Statistical Office, Energy balance of the country-Report by the Government; – Cadaster of Air polluters and Pollutants; Data from measurements in companies – major polluters: – Database on motor vehicles of the Ministry of Interior; – Project: Introduction of CORINAIR Inventory Methodology of the Ministry of Environment and Physical Planning, – Spatial Plan of the Republic of Macedonia.	– Reporting obligations under multilateral agreements – UNECE transboundary air pollution transfer, as well as to EEA – Annual report of processed data on air emissions

Data coverage:

Table 1: Total emissions of ozone precursors

	2002	2003	2004	2005	2006	2007	2008	2009	2010
NOx	38,8	42,8	51,4	49,1	68,517	56,63	42,55	39,61	42,02
CO	8,4	8,4	9,2	10,9	19,768	20,28	10,72	9,921	11,25
NMVOC			25,22				27,822		25,07
CH_4			0,8				0,839		

Table 2: Total emission of NOx by sectors

SNAP		2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Combustion in energy and transformation industries (stationary sources)	14,965	16,405	16,405	15,981	16,65	16,850	14,910	17,02	17,78
2	Non-industrial combustion plants (stationary sources)	1,379	1,379	1,867	1,831	2,501	2,510	3,780	1,83	1,83
3	Combustion in manufacturing industry (stationary sources)	1,842	1,842	4,965	3,347	4,965	5,050	6,300	5,44	7,78
4	Production processes (stationary sources)	5,084	7,590	8,647	6,018	7,917	7,860	3,310	0,59	0,32
5	Extraction and distribution of fossil fuels and geothermal energy									0,422
6	Solvent and other product use	1,732	1,732	1,732		2,873	2,820			
7	Road transport	13,888	13,845	17,773	11,224	28,731	16,650	14,150	11,85	11,84
8	Other mobile sources and machinery				2,524	4,88	4,890		2,88	2,01
9	Waste treatment and disposal				0,025			0,100		0,037
10	Agriculture									
11	Nature				0,205					
Total		**38,847**	**42,756**	**51,387**	**41,158**	**68,52**	**56,630**	**42,550**	**39,61**	**42,019**

Table 3: Total annual CO emissions by sector

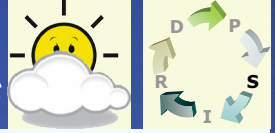
SNAP		2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Combustion in energy and transformation industries (stationary sources)	0,181	0,181	0,181	0,042	2,037	1,99	0,045	0,05	0,051
2	Non-industrial combustion plants (stationary sources)	0,203	0,203	0,241	4,559	5,621	5,62	4,701	4,56	4,6
3	Combustion in manufacturing industry (stationary sources)	0,214	0,214	0,428	0,061	0,054	0,05	0,265	0,21	0,233
4	Production processes (stationary sources)	0,520	0,579	0,601	0,990	6,062	6,06	0,591	0,021	0,86
5	Extraction and distribution of fossil fuels and geothermal energy				0,061			0,001	0,06	0,061
6	Solvent and other product use	1,825	1,825	1,825						
7	Road transport	5,424	5,424	5,963	4,502	4,759	5,23	5,110	4,77	4,78
8	Other mobile sources and machinery				0,223	1,235	1,33		0,25	0,064
9	Waste treatment and disposal				0,001			0,006		0,001
10	Agriculture									0,6
11	Nature				0,533					
Total		**8,366**	**8,426**	**9,238**	**10,971**	**19,768**	**20,28**	**10,718**	**9,921**	**11,25**

Table 4: Total annual NMVOC and CH4 emissions by sectors

		2004		2008		2010
SNAP		NMVOC	CH_4	NMVOC	CH_4	NMVOC
1	Combustion in energy and transformation industries (stationary sources)	1,6901	0,0007	1,762	0,00066	0,1
2	Non-industrial combustion plants (stationary sources)	3,5088	0,0306	3,506	0,0305	7,1
3	Combustion in manufacturing industry (stationary sources)	0,2105	0,002	0,27	0,00255	0,3
4	Production processes (stationary sources)	1,1078	0,0002	0,95	0,000014	1
5	Extraction and distribution of fossil fuels and geothermal energy	0,4249	0,1626	0,424	0,154	5,4
6	Solvent and other product use	8,4847		9,005		2,1
7	Road transport	8,8241	0,0026	10,828	0,031	4,6
8	Other mobile sources and machinery	0,9692	0,0002	1,077	0,00021	0,217
9	Waste treatment and disposal	0,001	0,2023		0,26	
10	Agriculture		0,3877		0,35	4,257
11	Nature		0,0119		0,0101	
total		**25,2211**	**0,8008**	**27,822**	**0,839034**	**25,074**

General meta-data

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 002	Емисии на озонски прекурсори	CSI 002	Emissions of ozone precursors	P	A	- air - air quality	annually



Definition

The indicator shows the portion of urban population potentially exposed at ambient air concentrations of pollutants in excess of the limit value set for human health protection.

Urban population taken into account is actually the total number of inhabitants living in cities with at least one monitoring station. These cities include the capital and other major cities of the Republic of Macedonia. The number of inhabitants is based on the last census carried out by the State Statistical Office in 2002.

Exceedance of air quality limit values occurs when the concentration of air pollutants exceeds the limit values for SO_2, PM10, NO_2 and the target values for O_3 as specified in the Decree on the limit values of levels and types of polluting substances in ambient air and on the alert thresholds, deadlines for the limit values achievement, margins of limit value tolerance, target values and long-term ozone targets (Official Gazette of the Republic of Macedonia No. 50/05, 4/2013), wherein the requirements of the Directive on Ambient Air Quality and Cleaner Air in Europe 2008/50 EC and Heavy Metals Directive 2004/107/EC have been transposed. Where there are multiple limit values (see section on Policy Targets), the indicator uses the most stringent case:

- Sulphur dioxide (SO_2): the daily limit value
- Nitrogen dioxide (NO_2): the annual limit value
- Particulate matter of a size up to 10 micrometer (PM10): the daily mean limit value
- Ozone (O_3): the short term objective

Units

The percentage of urban population potentially exposed at ambient air concentrations of sulphur dioxide (SO_2), particulate matter sized up to 10 micrometer (PM10), nitrogen dioxide (NO_2) and ozone (O_3) above limit values set for human health protection. Ambient air concentrations of sulphur dioxide (SO_2), particulate matter sized up to 10 micrometer (PM10), nitrogen dioxide (NO_2) and ozone (O_3) are expressed in microgram/m^3(µg/m^3).

Policy relevance of the indicator

List of relevant policy documents

The National Plan for Air Protection presents the state of air quality, defines the measures for ambient air

quality protection and improvement in the Republic of Macedonia and all relevant institutions responsible for their implementation within 5 year period, namely from 2013 50 2018.

Legal grounds

The Law on Ambient Air Quality was adopted in August 2004 and later amended on several occasions in line with the requirements of the relevant EU legislation (Official Gazette of the Republic of Macedonia Nos. 67/2004, 92/2007, 83/2009, 35/2010, 47/2011 and 59/2012) and it is framework law in the area of air. The main goals of this Law are: avoidance, prevention and reduction of harmful effects on human health and environment as a whole, prevention and reduction of pollution resulting in climate change, as well as provision of the relevant information on the quality of ambient air. This Law establishes the legal grounds for adoption of a number of bylaws in line with the requirements of the relevant AcquisCommunitaire.So far, 12 bylaws have been adopted. Calculations ofor this indicator are based on the provisions of the Decree on the limit values of levels and types of polluting substances in ambient air and on the alert thresholds, deadlines for the limit values achievement, margins of limit value tolerance, target values and long-term ozone targets (Official Gazette of the Republic of Macedonia No. 50/05, 4/2013).*

Targets

The Decree on the limit values of levels and types of polluting substances in ambient air and on the alert thresholds, deadlines for the limit values achievement, margins of limit value tolerance, target values and long-term targets, defines the limit values for SO_2, PM10, NO_2 and target values for O_3.

Limit values for concentrations of sulphur dioxide in ambient air

In accordance with the said Decree, two limit values are specified for sulphur dioxide for the purpose of human health protection.

- Mean daily limit value of 125 μg/m^3 which shall not be exceeded by more than three times during one calendar year
- Hourly limit value of 350 μg/m^3, which shall not be exceeded by more than 24 times during one calendar year.

Limit values for concentrations of nitrogen dioxide in ambient air

In accordance with the said Decree, two limit values are specified for nitrogen dioxide for the purpose of

human health protection.

- Hourly mean concentration of nitrogen dioxide shall not exceed the limit value of 200 μg/m^3 by more than 18 times during one calendar year.

- The mean annual concentration shall not exceed 40 μg/m^3.

Limit values for concentrations of suspended particulate matter of size up to 10 micrometers in the ambient air

The said Decree specifies two limit values for suspended particulate matter of size up to 10 micrometers, for the purpose of human health protection.

- 24-hourly limit value is 50 μg/m^3,and it shall not be exceeded by more than 35 times during one calendar year

- The mean annual concentration shall not exceed 40 μg/m^3.

Target values for ozone concentrations in ambient air

The said Decree, with regard to ozone, specifies target value for the purpose of human health protection and long-term target for the purpose of human health protection.

- The target value for ozone, for the purpose of human health protection, is specified so that 8-hourly mean value is calculated from the hourly concentrations in each day. The maximum daily 8-hourly mean value of ozone shall not exceed the value of 120 μg/m^3 in more than 25 days in the course of the year (calculated as an average value for three years). This target value should be achieved by 2010.

- The Decree also defines long-term target for the purpose of human health protection, set at 120 μg/m^3, as maximum daily 8-hourly mean value during a calendar year.

Key policy issue

What progress has been achieved in reducing the concentrations of pollutants in urban areas in order to achieve the limit values (for SO_2, PM10, NO_2) and target values (for O_3) set in the Decree?

Key message

Suspended particulate matter of size up to 10 micrometers(PM10)

In the period from 2004 to 2011, 100% of the population has been exposed at concentrations of suspended particulate matter in excess of the limit values specified in the Decree. Significantly higher concentrations are measured during winter period.

Nitrogen dioxide (NO_2)

In the period from 2004 to 2011, the portion of the population exposed at concentrations of nitrogen dioxide above the limit values set for human health protection ranged between 0 and 69%. The highest percentage of population exposure of 69% was recorded in 2011.

Ozone(O_3)

In the period from 2004 to 2011, the portion of the population exposed at concentrations of ozone higher than the target value set for human health protection ranged from 12 to 43%. The highest percentage of population exposure of 43% was recorded in 2007, followed by falling trend and the percentage of exposure was 12% in 2011.

Sulphur dioxide(SO_2)

No excess of mean daily concentrations of sulphur dioxide was recorded in the period from 2004 to 2011, i.e. the population was not exposed at sulphur dioxide concentrations above limit value, except in 2006 when out of the allowed 3 days, exceedance of the limit value was recorded in the course of 8 days in Skopje, which was not seen as significant problem.

Diagram 1: Percentage of urban population exposed at air pollution in areas where concentrations of pollutants are in excess of limit/target values

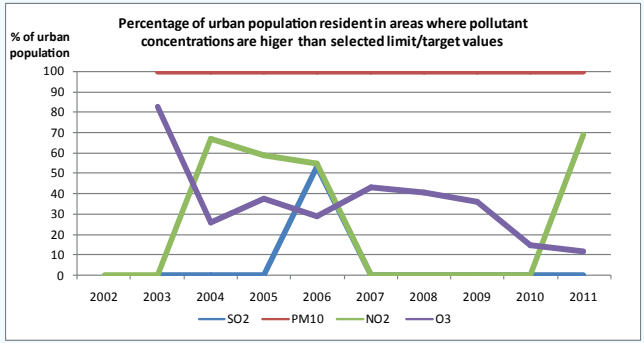


Diagram 2: Percentage of urban population exposed at concentrations of PM10above the daily mean limit value, expressed as number of days in the course of a calendar year

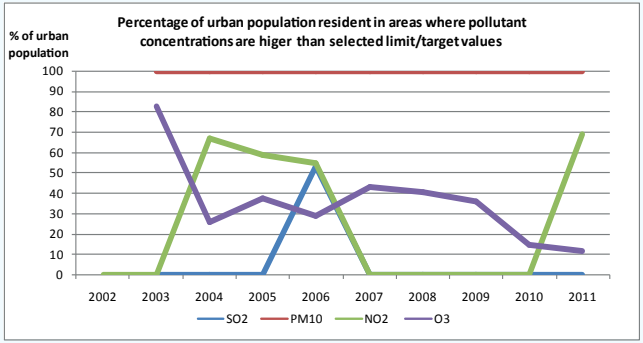


Diagram 3: 36th highest mean daily concentration of PM10

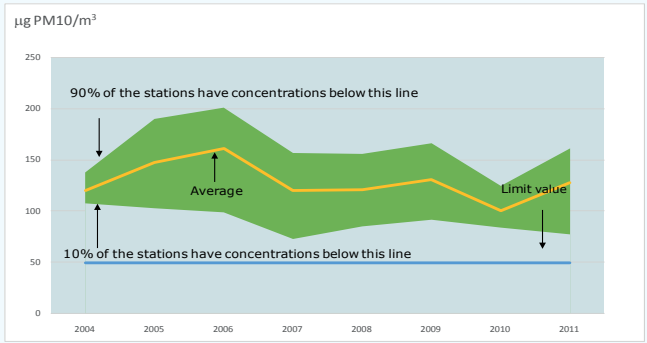


Diagram 4: Percentage of population exposed at NO_2 annual concentrations in urban areas

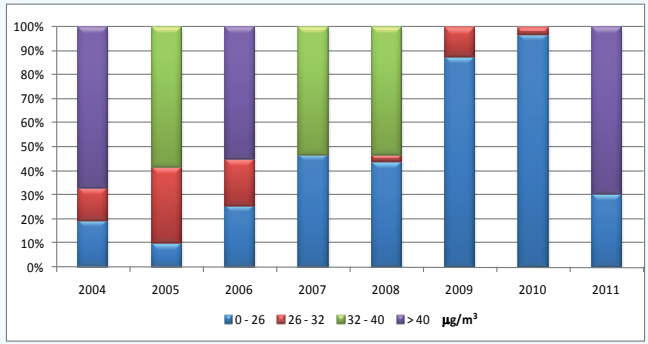


Diagram 5: Average annual concentration of NO_2

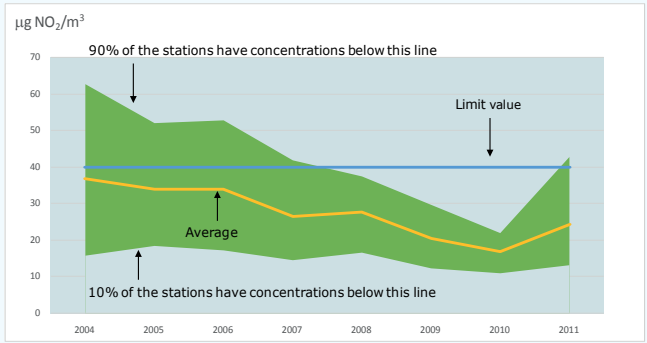


Diagram 6: Percentage of urban population exposed at concentrations of O_3 above the long-term target value for human health protection, expressed as number of days in the course of a calendar year

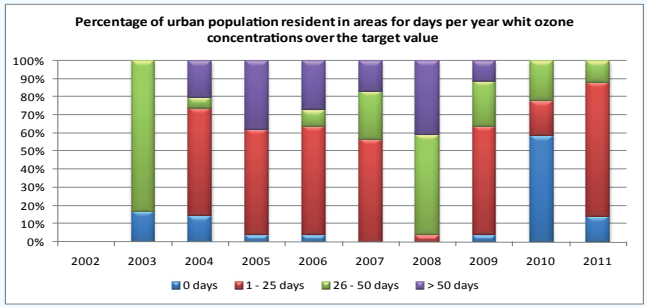


Diagram 7: 26th highest maximum 8-hourly mean concentration of O_3

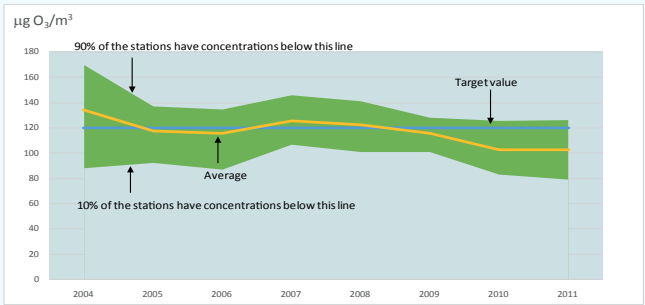


Diagram 8: Percentage of urban population exposed at concentrations of SO_2 above the daily mean limit value expressed as number of days in the course of a calendar year

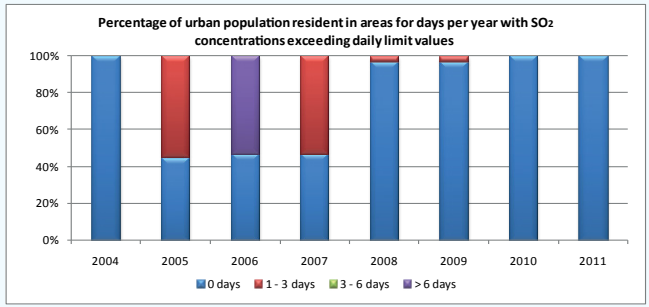
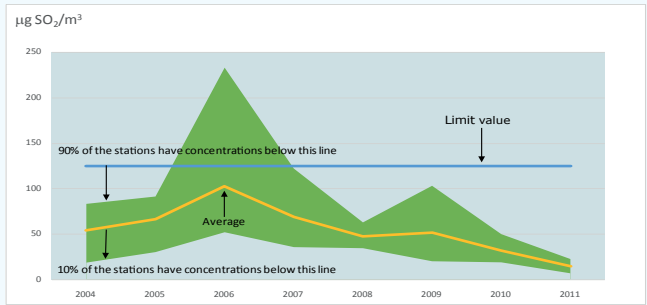


Diagram 9: 4th highest average mean daily concentration of SO_2



Assessment

Suspended particulate matters (PM10)

Suspended particulate matters of size up to 10 micrometers are particles able to pass through an opening conducting selection by size, with 50% loss in efficiency at aerodynamic diameter of size less than ten micrometers (10 μm). These particles of size not exceeding 10 micrometers are the so called fine particles or aerosols. Their retention time in the air is long and they originate from natural and anthropogenic sources. Among natural sources, the more prominent include yellow rains, present also with us, forest fires and chemical reactions going on in nature. Combustion of coal, wood and oil, industrial processes, transport and waste burning are the most significant anthropogenic sources.

Increased concentrations of suspended particulate matters can be recorded in urban areas, especially in autumn-winter seasons, which is most probably due to increased frequency in traffic, fossil fuels combustion and meteorological conditions.

The processed data for the period 2004 to 2011 show that during the entire period, 100% of the urban population was exposed at concentrations of suspended particulate matters are in excess of the limit value (mean daily limit value of 50 μg/m^{3}that shall not be exceeded in more than 35 days in the course of a calendar year). 100% of the urban population was exposed at concentrations above the limit value in more than 35 days in a calendar year.

Nitrogen dioxide(NO_2)

Investigations have testified the presence of several nitrogen oxides in the air, but the most significant among them are nitrogen dioxide and nitrogen monoxide. These pollutants most often originate from natural sources. However, in urban environments, the main source is the traffic, and industry is minor source. The most toxic of all nitrogen oxides is the nitrogen dioxide, the concentrations of which are dependent on season and meteorological conditions. Namely, concentration of NO is higher in morning hours when the traffic is more frequent, while the intensification of solar radiation during the day leads to transformation of NO into NO_2 resulting in increased concentration of NO_2. Nitrogen oxides influence the content of ozone and other photochemical oxidants in the air. During the spring-summer period, the concentration of NO_2 is higher, while in autumn-winter period, the concentration of NO is higher. The quantity of NOx

increases in winter period due to the higher frequency of traffic.

In the period 2004 to 2011, the portion of population exposed at nitrogen dioxide concentrations above the limit value for human health protection (40 μg/m^3 mean annual limit value) ranged from 0 to 69%. The highest percentage of 69% population exposure was recorded in 2011.

In 2004, 2006 and 2011, significant portion of the population (55-67%) of the population was exposed at concentrations above 40 μg/m^3.

Ozone (O_3)

Ozone layer is positioned at height of 10 km to 15 km from Earth and it plays the role of a filter for UV radiation and climate stabilizer.

Automatic monitoring stations measure the ground-level ozone formed as a result of photochemical reactions involving nitrogen oxides, volatile organic compounds (most frequently hydrocarbons), etc. However, its content is also dependent on solar radiation and annual seasons. Thus, higher ozone concentrations are observed in warmer days, especially during summer.

In In the period 2004 to 2011, the portion of population exposed at ozone concentrations above the target value for human health protection ranged from 12 to 43%. The highest percentage of 43% population exposure was recorded in 2007, followed by falling trend to reach 12% in 2011.

In the period 2004 to 2009, population was exposed at concentrations above the target value of 120 μg/m^3 in more than 25 to 50 days in a calendar year during the entire reporting period, except in 2005.

Sulphur dioxide (SO_2)

Sulphur dioxide in the air most frequently originates from major thermal power plants, as well as from small and medium size boilers for coal combustion in urban environments. The main anthropogenic sources include coal and oil combustion. This pollutant is also released in the air from industrial processes (production of cellulose and paper, sulphuric acid, lead and zinc ores smelting).

In the period 2004 to 2011, there have been no concentrations above the daily mean limit value for sulphur dioxide, i.e. population was not exposed at sulphur dioxide concentrations above the limit

value, except in 2006 when out of the allowed 3 days, exceedance of the limit value was recorded in the course of 8 days in Skopje, which was not seen as significant problem.

In 2006, 53% of the population was exposed at sulphur dioxide concentration above125 μg/m^3 for more than 6 days in the course of the year. In 2005 and 2007, there was higher percentage (around 50%) of the population exposed at sulphur dioxide concentration above 125 μg/m^3 for 1 to 3 days in the course of the year, while in 2008 and 2009, this percentage of population exposure was very low (3%).

Methodology

- Methodology for the indicator calculation

Sulphur dioxide - SO_2

For each measuring station located in urban environment, the number of days with mean daily concentration higher than the limit value (daily mean value of 125 μg/m^3) is calculated from the available hourly data. Selected urban stations include stations of the following types: stations measuring traffic pollution, stations measuring industrial pollution and so called urban background stations. The number of days with excess in a city is obtained by averaging the results of all stations located in that city.

Suspended particulate matter up to 10 micrometers – PM10

For each urban measuring station, the number of days with daily mean concentration above the limit value (daily mean limit value is 50 μg/m^3) is calculated from the available hourly data. Selected urban stations include stations of the following types: stations measuring traffic pollution, stations measuring industrial pollution and so called urban background stations. The number of days with exceedancein a city is obtained by averaging the mean values of the results from all stations located in that city.

Nitrogen dioxide - NO_2

The mean annual concentration in a city is calculatedas an average of the mean annual value measured in all monitoring stations located in urban areas. Selected urban stations include stations of the following types: stations measuring traffic pollution, stations measuring industrial pollution and so called urban background stations.

Ozone – O_3

For each measuring station located in urban environment, the number of days in which the maximum daily 8-hourly mean concentration of ozone is in excess of ozone target value for human health protection - 120 μg/m^3 is calculated. Selected urban stations include stations of the following types: stations measuring traffic pollution, stations measuring industrial pollution and so called urban background stations. The number of days with excess in a city is obtained by averaging the results of all stations located in that city.

Uncertainty

- Methodological uncertainty and data uncertainty

In general, data is not representative for all urban environments in the Republic of Macedonia. Compared to the methodology of the European Environmental Agency, where the calculation of the indicator is based only on data produced by the so called urban background stations, in our calculations we used data from all measuring stations located in urban environments. Also, due to the minimum number of monitoring stations, the calculation of the indicator also took into account the stations where data coverage is below 75% per calendar year. We can also point out as uncertainty in the indicator calculation the fact that the number of inhabitants in cities is based on the census of the population conducted by the State Statistical Office in 2002, instead of estimated number of population for each year.

Data specification

Title of the indicator	Source	Reporting obligation
Exceedance of air quality limit values in urban areas	MEPP	European Environmental Agency – Exchange of data on air quality, based on the Council Decision on the establishment of reciprocal exchange of information and data among all networks and individual ambient air quality measuring stations (97/101/EC). – Exceedance in ozone concentrations during April, May, June, July, August and September, under the requirements of Ozone Directive 2002/3/EC. – Exceedance in ozone concentrations during summer period, under Ozone Directive 2002/3/EC.

Data coverage: :

Table 1: Percentage of urban population exposed at air pollution in areas where concentrations of pollutants are in excess of limit/target values

	2004	2005	2006	2007	2008	2009	2010	2011
SO_2	0	0	53	0	0	0	0	0
PM10	100	100	100	100	100	100	100	100
NO_2	67	59	55	0	0	0	0	78
O_3	26	37	29	43	41	36	15	12

Table 2: Percentage of urban population exposed at concentrations of PM10above the daily mean limit value, expressed as number of days in the course of a calendar year

	2004	2005	2006	2007	2008	2009	2010	2011
0 days	0	0	0	0	0	0	0	0
0 - 7 days	0	0	0	0	0	0	0	0
7 - 35 days	0	0	0	0	0	0	0	0
> 35 days	100	100	100	100	100	100	100	100

Table 3: 36th highest mean daily concentration of PM10

City	Monitoring station	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Skopje	Lisiche	µg/m³				117	156	215	134	326
	Karposh	µg/m³	114	139	199	123	125			
	Centar	µg/m³		190		66	65			
	Gazi Baba	µg/m³						117	84	
	Rektorat	µg/m³		190	227	176	147	160	87	87
Veles	Veles 1	µg/m³	106	83	93	71		91	85	78
	Veles 2	µg/m³	112	138	154	117	106	115	97	115
Tetovo	Tetovo	µg/m³		224	201	150	170	167	104	
Kumanovo	Kumanovo	µg/m³	148	144	166	117	109	144	104	88
Kochani	Kochani	µg/m³		130	99	81	84	99	86	130
Kichevo	Kichevo	µg/m³		185	181	152	137	138	125	73

City	Monitoring station	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Bitola	Bitola 1	µg/m³		101	100	110	101	79	79	143
	Bitola 2	µg/m³		130	165	126	97	110	97	102
Kavadarci	Kavadarci	µg/m³		121	189	158	155	134	122	133
LV			**50**	50	50	50	50	50	50	50
Mean value			**120**	148	161	120	121	131	100	128
10 ‰			**108**	103	99	73	85	92	84	78
90 ‰			**138**	190	201	157	156	166	125	161

Table 4: Percentage of population exposed at NO2annual concentrations in urban areas

	2004	2005	2006	2007	2008	2009	2010	2011
0 - 26 µg/m³	20	10	26	47	44	88	97	31
26 - 32 µg/m³	14	31	20	0	3	12	3	0
32 - 40 µg/m³	0	59	0	53	53	0	0	0
> 40 µg/m³	67	0	55	0	0	0	0	69

Table 5: Average annual concentration of NO_2

City	Monitoring station	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Skopje	Lisiche	µg/m³	62.82	52.05	46.51	39.83	37.69	12.04	4	42
	Karposh	µg/m³	57.68	50.78	46.2	36.31	34.15			
	Centar	µg/m³	61.6	52.11	52.76	50.3	56.74			
	Gazi Baba	µg/m³	37.73		52.82	23.42	27.44	15.05	22	
	Rektorat	µg/m³			55.04	42.76	36.67	32.02	11	
Veles	Veles1	µg/m³	14.28	13.87	8.98	14.35		15.81	12	12
	Veles 2	µg/m³	25.82	28.83	25.55	19.65	16.59	18.52	22	21
Tetovo	Tetovo	µg/m³	28.04	27.71	29.42	24.67	21.03	26.53	21	17
Kumanovo	Kumanovo	µg/m³	74.48	28.93	23.01	25.5	22.42	17.95	13	
Kochani	Kochani	µg/m³	27.98	18.46	15.8	15.07	12.91	11.66	13	
kichevo	Kichevo	µg/m³	17.71	45.37		12.21	27.57	30.01	29	44
Bitola	Bitola 1	µg/m³	15.59	22.88	25.44	18.71	16.76	20.36	18	14
	Bitola 2	µg/m³	19.34	34.25	36.79	22.55	29.87	27.13	20	20
Kavadarci	Kavadarci	µg/m³			24.56	25.87	20.43	19.46		
LV			40	40	40	40	40	40	40	40
Mean value			37	34	34	27	28	21	17	24
10 ‰			16	18	17	15	17	12	11	13
90 ‰			63	52	53	42	37	30	22	43

Table 6: Percentage of urban population exposed at concentrations of O_3 above the long-term target value for human health protection, expressed as number of days in the course of a calendar year

	2004	2005	2006	2007	2008	2009	2010	2011
0 days	15	4	4	0	0	4	59	14
0 - 25 days	59	59	60	57	4	60	19	74
26 - 50 days	6	0	9	26	55	25	22	12
> 50 days	20	37	27	17	41	11	0	0

Table 7: 26th highest maximum 8-hourly mean concentration of O_3

City	Monitoring station	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Skopje	Lisiche	µg/m³	103	105	86	120	113	105	49	117
	Karposh	µg/m³	162	109	108	106	63			
	Centar	µg/m³								
	Gazi Baba	µg/m³								
	Rektorat	µg/m³		77	67	115	118	101	87	54
Veles	Veles 1	µg/m³	163	126	129	132		123	118	121
	Veles 2	µg/m³	139	137	130	147	136	121	99	102
Tetovo	Tetovo	µg/m³	169	134	127	131	139	125	119	98
Kumanovo	Kumanovo	µg/m³	81	136	143	155	149	142	125	126
Kochani	Kochani	µg/m³	97	91	97	106	101	94	90	94
Kichevo	Kichevo	µg/m³	89	109	114	127	130	119		

City	Monitoring station	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Bitola	Bitola 1	µg/m³	175	135	130	134	132	112	120	108
	Bitola 2	µg/m³	163	137	135	114	141	128	130	127
Kavadarci	Kavadarci	µg/m³		115	120	123	122	106	94	82
LV			120	120	120	120	120	120	120	120
Mean value			134	118	116	126	122	116	103	103
10 ‰			88	92	87	107	101	101	83	79
90 ‰			170	137	135	146	141	128	126	126

Table 8: Percentage of urban population exposed at concentrations of SO_2 above the daily mean limit value expressed as number of days in the course of a calendar year

	2004	2005	2006	2007	2008	2009	2010	2011
0 days	100	45	47	47	97	97	100	100
1 - 3 days	0	55	0	53	3	3	0	0
3 - 6 days	0	0	0	0	0	0	0	0
> 6 days	0	0	53	0	0	0	0	0

Table 9: 4th highest average mean daily concentration of SO_2

City	Monitoring station	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Skopje	Lisiche	µg/m³	53	64	130	91	34	32	29	15
	Karposh	µg/m³	95	92	233	123	66			
	Centar	µg/m³	66	118	234	133	44			
	Gazi Baba	µg/m³	17			52	47	103	19	7
	Rektorat	µg/m³								
Veles	Veles 1	µg/m³	63	84	72	34		54		
	Veles 2	µg/m³	85	68	71	46	41	39	65	16
Tetovo	Tetovo	µg/m³	49	56	92	60	38	37	26	14
Kumanovo	Kumanovo	µg/m³	49	70		54	60	61		
Kochani	Kochani	µg/m³	32	28	52	73	54	39	40	20
Kichevo	Kichevo	µg/m³	64	49	57	42	63	122	20	
Bitola	Bitola 1	µg/m³	64	68	61	42	55	41	46	28
	Bitola 2	µg/m³	14	23	30	30	21	20	23	6
Kavadarci	Kavadarci	µg/m³		79	97	118	42	14	18	9
LV			125	125	125	125	125	125	125	125
Mean value			54	67	103	69	47	51	32	14
10 ‰			19	30	52	36	34	20	19	7
90 ‰			83	91	233	122	63	103	50	22

General metadata

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 004	Exceedance of air quality limit values in urban areas	CSI 004	Exceedance of air quality limit values in urban areas	S	A	– air – Air quality	annual

Definition

Substances that deplete the ozone layer (ODSs) are the compounds which cause depletion of the ozone layer. This group includes CFCs, HCFCs, HBFCs CCl_4, halons, methyl chloroform, methyl bromide. In general, these compounds are very stable in troposphere and they decompose only under the influence of ultra-violet radiation emitted by the Sun. While decomposing, they release chlorine or bromine atoms which destroy the molecules of stratospheric ozone.

This indicator quantifies the consumption of ozone-depleting substances (ODSs) in the Republic of Macedonia.

Units

- ODSs consumption is expressed in ODP tons which means quantity of each substance in metric tonnes (MT) multiplied by its Ozone Depletion Potential (ODP).

Policy relevance of the indicator

Upon the ratification of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer, series of policy measures aimed at steady reduction and elimination of ODSs consumption were undertaken in the Republic of Macedonia in the period between 1997 and 2011.

List of relevant policy documents

National Environmental Action Plan (NEAP II, 2006)

Country Programme for Phasing-out Substances that Deplete the Ozone Layer (1996) – strategic document establishing the main directions in the domain of management and elimination of ODSs in the Republic of Macedonia. It was adopted in 1996. Based on the recommendations of the Country Programme, ODSs elimination has been completed in industry (production of refrigerators, flexible and rigid foams), agriculture, private sector. By 2011, more than 99% of ODSs consumption defined in the National Programme was eliminated. Projects have been implemented by means of the financial support provided by the Multilateral Fund of the Montreal Protocol through the Ministry of Environment and Physical Planning/ Ozone Unit.

Legal grounds

- Law on the Ratification of the Vienna Convention for the

Protection of the Ozone Layer was adopted by the Republic of Macedonia by means of succession in 1994.

- Law on the Ratification of the Montreal Protocol on Substances that Deplete the Ozone Layer was adopted by the Republic of Macedonia by means of succession in 1994.

- Law on the Ratification of London Amendment to the Montreal Protocol.

- Law on the Ratification of Copenhagen Amendment to the Montreal Protocol.

- Law on the Ratification of Montreal Amendment to the Montreal Protocol.

- Law on the Ratification of Beijing Amendment to the Montreal Protocol.

- As of 1 March 1997, the import of ozone depleting substances is allowed only upon permit issued by the Ministry of Environment and Physical Planning.

- As of 12 June 1998, equipment containing ozone depleting substances (used refrigerators, freezers, cooling devices, heat pumps, etc.) may be imported only upon permit issued by the Ministry of Environment and Physical Planning.

- Law on Environment.

- Order banning the import of air-conditioning devices that contain HCFCs.

- Order restricting the import of ozone depleting substances.

- Order banning production of and trade in ozone depleting substances, as well as production of and trade in products containing ozone depleting substances.

- Order banning import and export of HCFC containing products.

Targets

By the act of ratification of the Montreal Protocol, the Republic of Macedonia has undertaken all obligations deriving from this document. According to the obligations specified in the Protocol, the schedule for the ODSs elimination is as follows:

Montreal Protocol		Controlled substances applied in the Republic of Macedonia	Obligations of the Republic of Macedonia (as Article 5 country under the Montreal Protocol)
Annex	Group		
A	I	CFC-11 CFC-12 CFC-115	Base level: Mean of the consumption in 1995-1997 Freeze : 1 July 1999 50% reduction : 1 January 2005 85% reduction : 1 January 2007 100% reduction : 1 January 2010
	II	Halon-1211 Halon-1301 Halon-2402	Base level: Mean of the consumption in 1995-1997 Freeze : 1 January 2002 50% reduction : 1 January 2005
C	I	HCFC-22 HCFC-141b	Base level: Consumption in 2009-2010 Freeze : 1 January 2013 10% reduction : 1 January 2015 35% reduction : 1 January 2020 67,5% reduction : 1 January 2025 97,5% reduction : 1 January 2030 100% reduction : 1 January 2040
E	I	Methyl bromide	Base level: Mean of the consumption in 1995-1998 Freeze : 1 January 2005 100% reduction : 1 January 2015

Key policy question

Does Macedonia fulfil the targets specified under the Montreal Protocol concerning ODSs reduction and elimination?

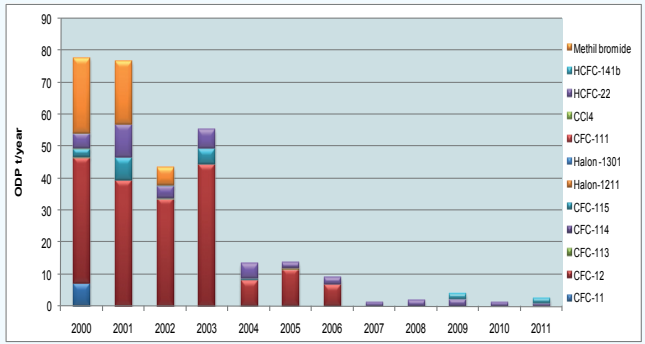
Key message

Considering the extent of ODSs elimination in the Republic of Macedonia, it may be concluded that the percentage of more than 99% of ODSs phased-out reflects the fact that our country has not only fulfilled its

obligations under the Montreal Protocol, but reached beyond the requirements specified in the Protocol.

The act of ratification of the Montreal Protocol (1994) and the establishment of the Ozone Unit under the Ministry of Environment and Physical Planning (1997) was immediately followed by national action to protect the ozone layer, through ODSs reduction and elimination. The main task of MEPP/Ozone Unit is to coordinate the activities related to ODSs phasing-out at national level. Thus, in the period between 1997 and 2011, under the coordination of this Unit, the implemented projects for ODSs phasing-out achieved removal of more than 99% of the total consumption of ODSs in the country. Apart from this, the MEPP/Ozone Unit conducts permanent monitoring of the import, export and consumption of the ODSs in the Republic of Macedonia, monitoring of collected and recycled amounts of ODSs [through the projects "Plan for Management and handling of Cooling Substances and Devices" (2000-2005) and "Final CFCs elimination" (2006-2010), the services for cooling devices were supplied with equipment for collection, treatment and recycling of ODSs and three ODSs recycling centres were established in the country], works on the awareness of directly affected stakeholders, as well as of the public in general. The ongoing activities concern implementation of the Plan for HCFC elimination in the Republic of Macedonia.

Figure 1: Consumption of Ozone Depleting Substances (ODP t/year)



Note: Given the fact that the Republic of Macedonia has never produced any ODS, the diagram includes data only on ODSs consumption in the period 2000-2011.

Assessment

With the establishment of the Ozone Unit under the Ministry of Environment and Physical Planning in 1997, the country has joined actively the global action for ODSs reduction and phasing-out. During the last

fifteen years (1997-2011), under the coordination of the Ozone Unit, application of ODSs has been phased-out in all industrial installations where such application has been identified in the Republic of Macedonia. All activities involving substitution of ODSs in industry, as well as in other economic sectors (agriculture, private sector) where ODSs found their application, have been implemented by means of financial support provided by the Multilateral Fund of the Montreal Protocol, amounting to US$ 5.894.000 US$.

According to data contained in the Country Programme for Phasing-out Substances that Deplete the Ozone Layer (1996), the average consumption of ODSs in the period 1995 - 1997 amounted 527 tons. According to the provisions of the Montreal Protocol, the said average has been taken as a base level in determining the extent of reduction to be achieved within the restrictions provided for by the Protocol. Table 1 shows the trend of decline in ODSs consumption, especially in the period of the last eleven years (2000 – 2011). Apart from ODSs elimination in industry (production of refrigerators and production of rigid and flexible foams), where technologies using ozone depleting substances before 1997 were replaced by non-ODSs solutions, interventions were also made in agriculture through substitution of methyl bromide with alternative solutions that did not involve application of ODSs, in cooling devices servicing and maintenance through establishment of the system for ODS collection and recycling. In the context of the latter, equipment for collection and recycling of cooling devices have been delivered to services and service technicians were trained in good cooling devices servicing practice. For the same purpose, training was organized for custom officers to control import-export of ozone depleting substances at border-crossings of the Republic of Macedonia.

The national action for ozone layer protection has resulted in elimination of more than 99% of the total consumption of ODSs in the Republic of Macedonia.

Methodology

- Methodology for the indicator calculation

The Indicator shows the quantity of consumed ODSs. The value presented has been obtained by multiplying the value of the consumed quantity expressed in metric tons by the Ozone Depletion Potential (ODP). The Table below presents the values of ODP for substances identified to be applied in the Republic of Macedonia

and the consumption of which is subject of reduction or control. The Ministry of Environment and Physical Planning/Ozone Unit has data on ODSs consumption in both metric and ODP tons.

ODSs	CFC-11	CFC-12	CFC-113	CFC-114	CFC-115	CFC-111	CCl4	Halon 1211	Halon 1301	HCFC-22	HCFC-141b	Methyl bromide
Value of ODP	1	1	0,8	1	0,6	1	1,1	3	10	0,055	0,11	0,7

Data specification

Title of indicator	Source	Reporting obligation
Consumption of ODSs	- MEPP/Ozone Unit	– UNIDO – UNEP- Secretariat for Ozone Layer Protection – Multilateral Fund of the Montreal Protocol

Data coverage:

Table 1: Consumption of ODSs

Substances	ODP t*/year											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
CFC-11	7,12											
CFC-12	39,6	39,58	34,07	44,53	8,27	11,83	6,99					
CFC-113	0,02											
CFC-114												
CFC-115	2,72	7,1	0,04	4,8	0,5							
Halon-1211												
Halon -1301												
CFC-111												
CCl4	0,04		0,1			0,012						
HCFC-22	4,93	10,36	3,81	5,96	4,76	1,86	2,36	1,25	2,03	2,29	1,32	0,9
HCFC-141b	0,05		0,11							1,73		1,61
Methyl bromide	23,37	19,92	5,32									
Total	**77,85**	**76,96**	**43,36**	**55,29**	**13,53**	**13,702**	**9,35**	**1,25**	**2,03**	**4,02**	**1,32**	**2,51**

* ODP (Ozone Depletion Potential): integrated change in the total amount of ozone per unit mass emission of specific compound relative to integrated change in the total amount of ozone per unit mass emission of CFC-11, Source: Environmental Assessment Report No. 2, EEA, 1999.

ODP tons: consumption in metric tons multiplied by the value of Ozone Depletion Potential

General metadata

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 006	Consumption of ozone depleting substances	CSI 006	Consumption of ozone depleting substances	P	B	- Climate change	annually

NATURE AND BIODIVERSITY

Definition

This indicator shows the number of species present in the Republic of Macedonia and assessed as globally threatened and/or protected by European instruments (such as EU Directives and the Bern Convention) protected at national level.

At present, the indicator shows the status of the number of endemic and threatened species at national level, identified in accordance with the relevant international documents and the national legislation:

- Number of endemic and threatened wild species of plants
- Number of endemic and threatened wild species of fungi
- Number of endemic and threatened wild species of animals

Units

- Number of species

Policy relevance of the indicator

List of relevant policy documents:

The Second National Environmeal Ation Plan, in its Chapter on Nature, emphasizes the goal of the establishment of integrated system for nature and biological diversity protection, in line with the EU standards and multilateral agreements, through the measure for application of mechanisms for further implementation of the National Strategy for Biological Diversity Protection with Action Plan and the National Capacity Self-Assessment (NCSA), the Law on Nature Protection and creation of appropriate conditions for Natura 2000 network establishment. It envisages action towards development of National Red Lists and Red Book of the Republic of Macedonia.

The National Strategy for Biological Diversity Protection with Action Plan defines integrated approach to the protection and sustainable use of components of biological diversity. The Action Plan outlines the specific actions to be taken to achieve the goals. One of the measures in this document is the Protection of Species, through several actions concerning elaboration of National Red Lists and Red Book of the Republic of Macedonia, vultures protection, and protection of endemic and relict species *Thymus oehmianus.*

Legal grounds

The Law on Nature Protection provides for elaboration of Red Lists and Red Book of the Republic of Macedonia,

as well as proclamation of strictly protected wild species and protected wild species, by which they shall acquire the status of natural heritage.

Targets

Identification of the extent of threat for certain species of plants, fungi and animals found in the Republic of Macedonia, which are of European or global significance and definition of measures for their protection and management.

Key policy issue

How many species of European/global significance are protected by national instruments?

Key message

Abundance and variety of species and ecosystems are the main features of biological diversity in the Republic of Macedonia. According to the available information, this wealth comprises the imposing number of around 17.604 species, out of which 976 species are endemic species.

Considering the fact that national Red Lists of animals, plants and fungi are under establishment, the analysis of threatened and protected wild species has been made in accordance with international criteria contained in a number of multilateral documents (conventions, agreements, Global Red List, European Red List, EU Directives).

Thus, the IUCN World Red List contains 72 taxa of higher plants from the Republic of Macedonia, 19 of which are local endemic taxa.

The Annexes of the Bern Convention include 12 species of higher plants.

The European List of vertebrate animals includes 113 species, of which: 30 fish species, 66 bird species16 mammals and 1 reptile species. Out of the total of 20 endemic fish species from the Republic of Macedonia, 17 have been enrolled in the category of globally threatened species. The total number of identified "Emerald" species (under Resolution No.6 to the Bern Convention) on the territory of the Republic of Macedonia is 165 species.

Figure 1. Number of endemic and threatened wild plant species

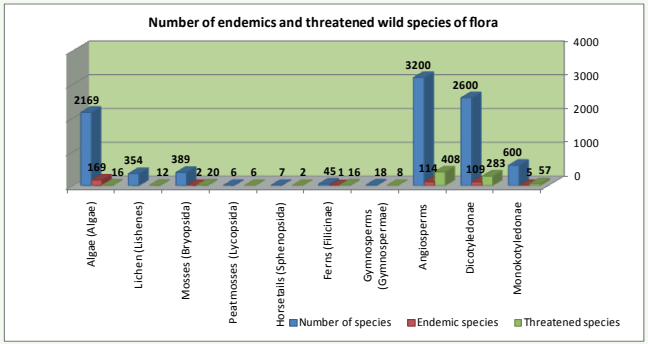


Figure 2. Number of threatened species of fungi

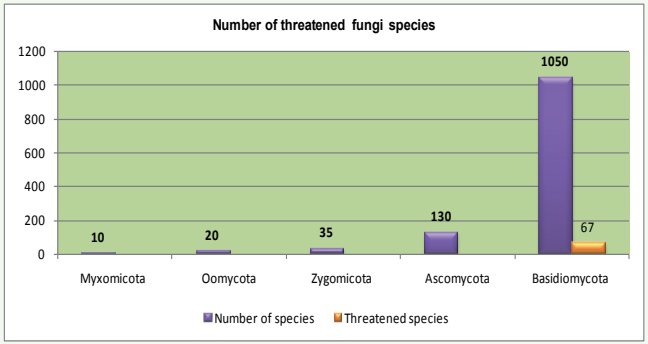


Figure 3. Number of endemic and threatened animal species

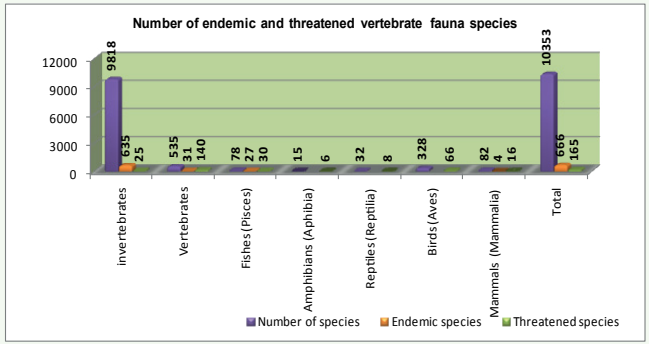
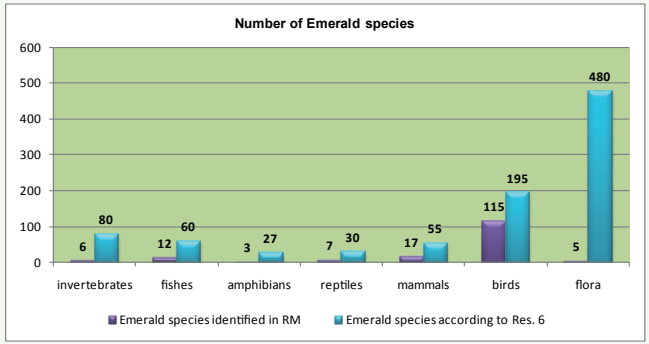


Figure 4. Number of Emerald species



Assessment

The flora of the Republic of Macedonia is very rich and diverse and represented by 4.028 species, of which 2.169 algae, 354 lichen species and 3.674 species of plants. Recent flora of higher plants is represented by a mosaic of various floral elements (Tertiary relicts, Mediterranean, Greek-Asia Minor, Illyric, Caucasian, Middle European, Skardo-Pindian, Eurasian, Arctic-Alpine, cosmopolitan), among which 228 species are endemic (Balkan, South Balkan, Macedonian, etc.). The highest number of endemic plant species (114) has been recorded with Angiosperms.

The National Red List of threatened wild plant species is under establishment. The number of threatened wild plant species is shown in Table 1. The assessment of threat of species by taxonomic groups has been carried out in accordance with international criteria contained in several international documents (conventions, agreements, Global Red List, European Red List, EU Directives).

The IUCN Global Red List contains 72 taxa from the Republic of Macedonia, 19 of which are local endemic species. The Annexes of the Bern Convention list 12 plant species having their area of spreading on the territory of the Republic of Macedonia.

Fungi compose exceptionally heterogeneous group of organisms; however, studies so far have focused on the types of Ascomycota and Basidiomycota, while others are poorly studies. The total number of studied and recorded growing wild fungi on the territory of the Republic of Macedonia is 1245 species. Most of those belong to the types Myxomicota (10), Oomycota (20), Zygomicota (35), Ascomycota (130) and Basidiomycota (1050).

The Preliminary National Red List of threatened fungi species includes 67 species belonging to the type of Basidiomycota.

The main feature of the fauna diversity is its high extent of taxonomic diversity, represented by as many as 10.354 species and 228 subspecies or 10.582 taxa in total.

The group of invertebrate animals is represented by 9.819 species, 635 of which are endemic. Nevertheless, detailed analyses of threat to species by taxonomic groups have not been completed yet, and therefore the number of preliminary listed species is only 25 invertebrate animal species.

The group of vertebrate wild animals is represented by 535 species, 31 of which are endemic species. The class of fish includes 78 species, 27 (34.5%) of which are endemic species. No endemic species have been recorded among the classes of amphibians, reptiles and birds, while four endemic species have been recorded with the class of mammals. With regard to the extent of threat to populations of vertebrate animals, the class of fish has 17 species included in the category of globally threatened species.

It is of particular importance to point out that the fauna of vertebrate animals includes 113 species that have been enrolled on the European Red List, namely: 30 species of fish, 66 birds, 16 mammals and 1 reptile species. The National Red List of threatened fauna species is under development.

Within the species diversity, particular significance is attributed to the identified "Emerald" species. Namely, total of 165 species have been identified, as follows: 6 species of invertebrate animals, 154 vertebrate animals (12 species of fish, 3 species of amphibians, 7 species of reptiles, 115 species of birds, 17 species of mammals and 5 species of plants).

Data specification

Title of the indicator	Source	Reporting obligation
Threatened and protected species	– Study on the Status of Biological Diversity in the Republic of Macedonia – Strategy and Action Plan for Bilogical Diversity Protection in the Republic of Macedonia – Analysis and valorization of species diversity in the Republic of Macedonia	– Secretariat of CBD – Secretariat of BC/CE

Data coverage:

Table 1: Number of endemic and threatened wild species of flora

	Number of species	Endemic species	Threatened species
Algae	2.169	169	16
Lichenes (Lichenes)	354	-	12
Mosses (Bryopsida)	389	2	20
Peat mosses (Lycopsida)	6	-	6
Horsetails (Sphenopsida)	7	-	2

Ferns (Filicinae)	45	1	16
Gymnosperms (Gymnospermae)	18	-	8
Total Angiosperms	3.200	114	408
Dicotyledonae	2.600	109	283
Monokotyledonae	600	5	57
Total.	4.028	286	468

Table 2: Number of threatened fungi species

Orders of Fungi	Total number of species	Threatened species
Myxomicota	10	
Oomycota	20	
Zygomicota	35	
Ascomycota	130	
Basidiomycota	1.050	67
Total	1.245	67

Table 3: Number of endemic and threatened vertebrate fauna species

	Number of populations	Endemic species	Threatened species
Invertebrate animals	9.818	635	25
Vertebrate animals	535	31	140
Fish (Pisces)	78	27	30
Amphibians (Amphibia)	15	-	6
Reptiles (Reptilia)	32	-	8
Birds (Aves)	328	-	66
Mammals (Mammalia)	82	4	16
Total	10.354	666	165

Table 4: Number of Emerald species identified in the Republic of Macedonia

	invertebrates	fish	amphibians	reptiles	mammals	birds	flora
Emerald species identified in the Republic of Macedonia	6	12	3	7	17	115	5
Emerald species according to Res. 6	80	60	27	30	55	195	480

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 007	Threatened and protected species	CSI 007	Threatened and protected species	S/I		Biological diversity	5 - annually

Definition

The indicator shows the proportion of a country designated total area that is protected under national instruments, or under the EU Birds and/or Habitats Directives (Natura 2000 sites), or under the Bern Convention (Emerald sites) and other multilateral agreements.

- Total (cumulative) designated area of sites protected under national instruments, or under the EU Birds and/or Habitats Directives and under multilateral agreements over the time.
- The indicator is also broken down to show the different trends of surface area in km2 designated under international conventions and initiatives, under EU Directives and under national legislation:
- Number of protected areas under the national categorization
- Percentile representation of individual national categories of protected areas out of the total protected area
- Changes over time in cumulative surface area of Emerald sites (designated under the Bern Convention).
- International instruments

Units

- Number of sites, ha, km^2 and %.

Policy relevance of the indicator

List of relevant policy documents

Spatial Plan of the Republic of Macedonia

The Second National Environmental Action Plan, in its Chapter on Nature, emphasizes the goal of the establishment of integrated system for nature and biological diversity protection, in line with the EU standards and multilateral agreements, through the measure for application of mechanisms for further implementation of the National Strategy for Biological Diversity Protection with Action Plan and the National Capacity Self-Assessment (NCSA), the Law on Nature Protection and creation of appropriate conditions for Natura 2000 network establishment.

The National Strategy for Biological Diversity Protection with Action Plan, adopted by the Government in 2004, defines integrated approach to the protection and sustainable use of components of biological diversity. One of the envisaged measures in the Second Action Plan is the expansion of the system of designated areas,

through several activities for nomination of different categories of new designated sites, as well as proposals for nomination of new areas for the Global Ramsar List and the List of the World Heritage under the UNESCO.

Legal grounds

The Law on Nature Protection (adopted in 2004) with the amendments in 2006, 2007, 2010, 2011, provides for introduction of a system of designated areas aimed at protecting biological diversity in natural environments, natural processes, as well as abiotic characteristics and biological diversity of the area. The Law adopts new categorization of the designated areas which is in accordance with the International Union for Conservation of Nature (IUCN) model, establishing 6 categories of protected natural heritage. The law stipulates a responsibility that, within 6 years, all designated areas (nominated before 2004) to be re-evaluated and designated according with the new categorization. These areas are foreseen with the Spatial Plan of the Republic of Macedonia for the period until 2020.

Targets

Expansion of the network of national designated areas up to around 12% in relation to the territory of the Republic of Macedonia is foreseen under the Spatial Plan of the Republic of Macedonia, the Spatial Plans of the Regions and the National Strategy for Biological Diversity Protection

The 35 areas identified by the National Emerald network will be used to form the Natura 2000 network; therefore it is necessary to strengthen the capacities at national and local level to start the process of identification of all areas in accordance with Natura 2000 and the EU Birds and Habitats Directive

Key policy issue

What is the progress in designation of areas (km2, %) under the national legislation, EU Directives and multilateral agreements?

Key message

As of 1948, when the First National Park "Pelister" was designated in the Republic of Macedonia, the number and the total surface area of different categories of protected areas have noted permanent growth on national level.

At this moment, due to the new categorization of

designated areas established under the new Law on Nature Protection, in accordance with the IUC categorization, the designated area system is in transition and includes designated areas under the old and under the new categorization. The analysis (in relation to the number and the area) includes all designated areas in the Republic of Macedonia designated under the old and also under the new categorization.

The National Emerald network of areas of special conservation interest, initiated in 2002, comprises 16 areas which cover a total area of 198.145 ha, or around 7.7% of the total national territory. Activities towards identification of new Emerald areas will continue until its full establishment. Emerald areas will be included in the Natura 2000 network when the Republic of Macedonia becomes an EU Member State.

In doing so, the areas designated in accordance with the old categorization have been processed according to the appropriate/corresponding IUCN category. The analysis of the area of the designated areas has been made by rendering the borders of the areas in GIS.

At the moment the network of designated areas comprises 81 areas which cover a total area of 231.385,6 ha, or around 9% of the total national territory. Most of it falls into the category national parks and natural monuments.

The National Emerald network of areas of special conservation interest in the Republic of Macedonia identifies 35 locations with an area of 752.223 ha or 29 % of its territory.

Figure 1. Number and area of designated areas in accordance with the national categorization

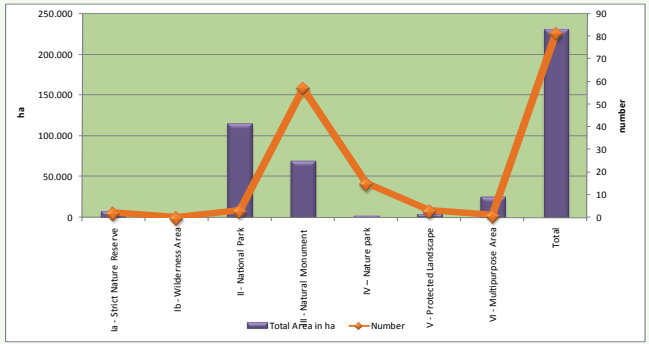


Figure 2. Share of individual national categories of designated areas on the overall territory of the Republic of Macedonia

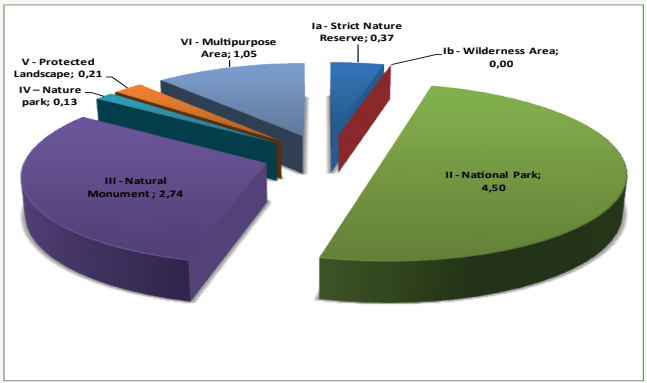
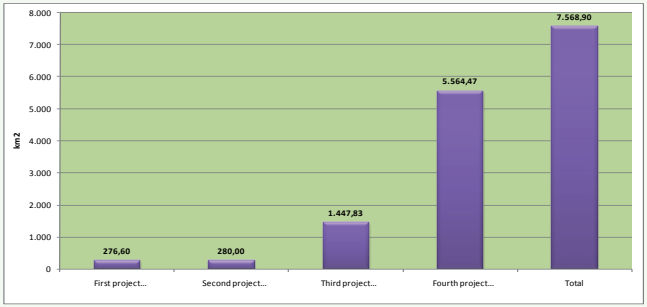


Figure 3. Area of identified Emerald areas



Assessment

1. Designated areas at national level

11 areas and objects, in the period 1948 to 1960, have been designated as natural rarities based on existing Law for protection of cultural monuments and natural rarities, with a total area of 131.599 ha (5,11 % of the territory of the country). With the Law for protection of natural rarities, adopted in 1960 and the amendments in 1965 and 1973, additional 58 items have been designated, therefore the total number of designated items is 69 taking area of around 7,16 % of the national territory.

Under the 2004 Law on Nature Protection, new categorization of designated area is introduced, aligned with the International Union for Conservation of Nature (IUCN), enabling inclusion of the national designated areas in the world network of designated areas. The law stipulates a responsibility that, within 6 years, all designated areas (nominated before 2004) to be re-evaluated and designated accordance with the new categorization. Because of the current transitional period, the network of designated areas (areas designated according to the new categorization

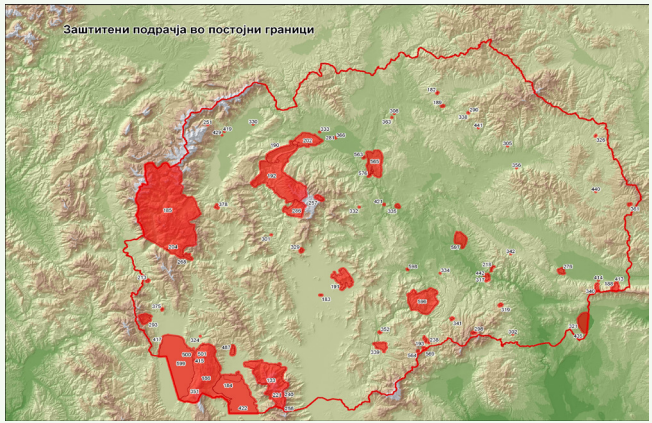
redesignated areas) the analysis (regarding the number and area they occupy) includes all designated areas in the Republic of Macedonia, designated under the old and also the new categorization. In doing so, the areas designated in accordance with the old categorization have been processed according to the appropriate/ corresponding IUCN category. The analysis of the area of the designated areas has been made by rendering the borders of the areas in GIS (according to the data from the acts of designation or redesignation of areas, the Spatial Plan of the Republic of Macedonia, and where precise data in the Spatial Plan were missing, the area of the designated areas was rendered in accordance with the experts opinion). [1]

Therefore, currently the designated area network comprises 81 areas, with total area of 231385.6 ha or around 9% of the territory of Macedonia.

Most of it falls into the category national parks with around 4,5 %, natural monuments with 2,74 % and the multipurpose area Jasen with 1,05 % of the national territory.

1 The analysis of the number and area of designated areas, i.e. the rendering of the borders in GIS has been done during 2010-2011, within the UNDP and GEF project „Strenghtening the environmental, institutional and financial sustainability of the system of designated areas in the Republic of Macedonia ".

Map 1. National designated areas



2. Designated areas with internationally recognized status

- Monument of Nature "Ohrid Lake" – World Natural Heritage (UNESCO);
- Monument of Nature "Prespa Lake" – Ramsar Site (1995);
- Monument of Nature "Dojran Lake" – Ramsar Site (2008);
- Monument of Nature "Markovi Kuli" (King Marko's

Towers) - World Natural Heritage (UNESCO's Tentative List); and

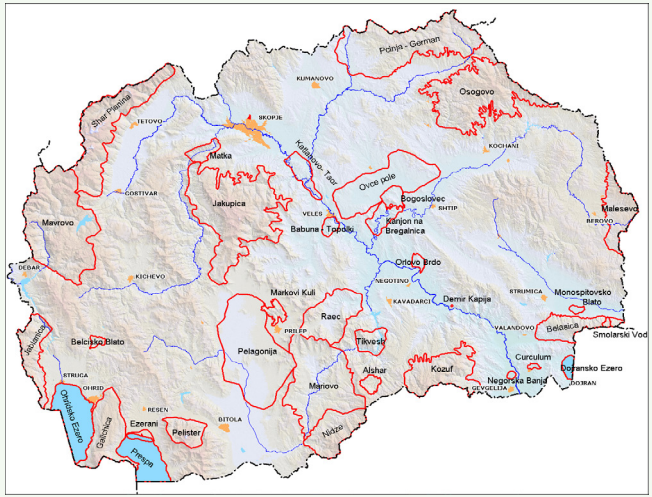
- Monument of Nature "Slatinski izvor" (The Springs of Slatino) - World Natural Heritage (UNESCO's Tentative List).

3. Emerald network

4 phase process was implemented in the Republic of Macedonia from 2002 to 2008 to identify the areas of special conservation interest (ASCI) and establish the Emerald Network. This network is established on the territory of the countries Parties to the Bern Convention and important part in the preparation of candidate countries for EU membership for the implementation of the EU Birds and/or Habitats Directives, or an additional tool in the process of establishing the coherent European Environmental Network Natura 2000.

35 locations have been identified in the National Emerald network. Under the first project, implemented in 2002-2003, 3 areas have been identified: SNR Ezerani, NP Galicica and SR Dojran Lake, with a total area of 27.660 ha (3,6%). In 2004 a second project was implemented, identifying another 3 areas: SNR Tikves, NP Pelister, SR Demir Kapija, with a total area of 28.000 ha (3,8%). Under the third project implemented in 2005-2006, ten areas with a total area of 144.783 ha (19,1%) were identified, while with the fourth project (implemented in 2008), another 19 areas were identified with a total area of 556.447 ha (73,5%). The National Emerald Network of the Republic of Macedonia identifies 35 areas covering and area of 752.223 ha or around 29 % of its territory.

Map 2. National Emerald network of the Republic of Macedonia



Methodology

- Methodology for the indicator calculation

The procedure for identification and designation of different categories of protected areas derives from the Law on Nature Protection, EU Directives and provisions of multilateral agreements.

Data specification

Title of the indicator	Source	Reporting obligation
Designated Areas	– CDDA – Emerald database	– Annually, to the European Environmental Agency – Annually, to the Secretariat of the Bern Convention with the Council of Europe

Data coverage:

Table 1: Number, area and representation of designated areas (according to national categorization)

Category	Number	Total Area in ha	% of territory of RM
Ia - Strict Nature Reserve	2	10,673.20	0,42
Ib - Wilderness Area	0	0	0
II - National Park	3	115.713,2	4,50
III - Natural Monument	57	70.424	2,74
IV - Nature park	15	3,375,53	0,13
V - Protected Landscape	3	5.387,12	0,21
VI - Multipurpose Area	1	26.923,03	1,05
Total	81	232,496.08	9,04

Table 2: Changes, over time, in the number and area of Emerald sites

	2002-2003	2004	2005-2006	2008	Total
Number	3	3	10	19	35
Area (km^2)	276,60	280	1 447,83	5 564,47	7 568,9
% of total area of Emerald sites	3,6	3,8	19,1	73,5	100

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 008	Designated areas	CSI 008	Designated areas	P	A	– Biological diversity – nature – policies	Annually

Definition

The indicator will show the trend in the number and distribution of selected species or species groups at national level, as relative assessment compared other baseline year of the monitoring commencement.

At the moment, species groups considered are the birds.

The indicator will show the trend of common birds species (developing) and the trend of certain selected species of birds of prey.

Units

- Number of species, estimated number of individuals for certain species.

Policy relevance of the indicator

List of relevant policy documents

The Second National Environmental Action Plan, in its Chapter on Nature, emphasizes the goal of the establishment of integrated system for nature and biological diversity protection, in line with the EU standards and multilateral agreements. One of the actions envisaged for the goal achievement is development of national monitoring programme for biological diversity components and elaboration of national biodiversity indicators.

The National Strategy for Biological Diversity Protection with Action Plan defines integrated approach to the protection and sustainable use of components of biological diversity. The Action Plan outlines the specific actions to be taken to achieve the goals. The strategic commitment "Research and monitoring" includes action for national biodiversity indicators development.(D.1.11).

Legal grounds

The Law on Nature Protection provides for organization of monitoring of nature state. The monitoring methodology needs to be specified in a regulation. The monitoring over the state of nature is carried out through: measurement, observation, assessment and control of the state of species, their habitats, habitat types, environmentally important areas, ecosystems, landscape types, monitoring and assessment of geological values and monitoring of the state of natural heritage.

Targets

Identification of the trend in populations for selected bird species and establishment of the reason sleading to reduction in their number and development and implementation of measures for the negative trend halting (contribution to the achievement of the Target 2020 for biodiversity loss prevention/reduction by 2020.

Key policy issue

What is the trend in the populations of selected bird species and what are the reasons leading to their number reduction?

Key message

According to available data, there is a trend of populations number reduction.

Figure1.Trend in the number of Griffon Vulture in Macedonia (by colonies)

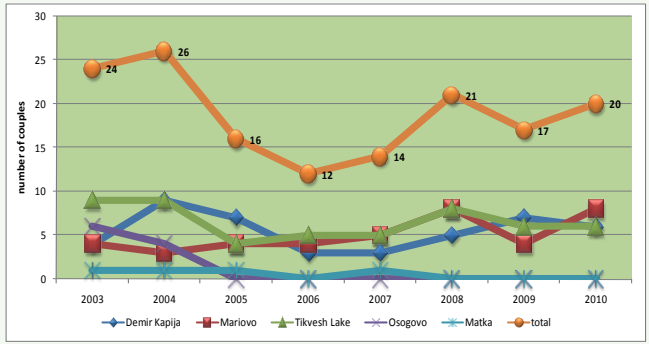
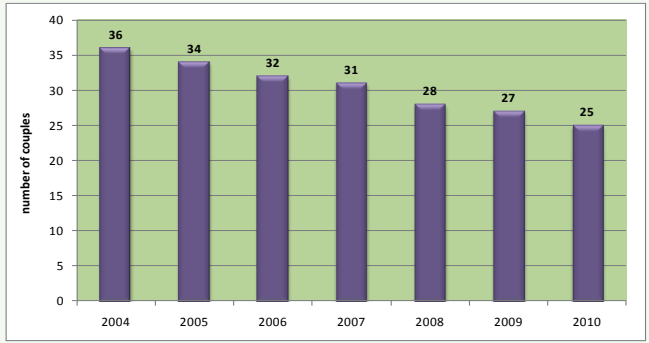


Figure2. Trend in the number of Griffon Vulture in Macedonia (by couples)



Assessment

Abundance and variety of species and ecosystems are the main features of biological diversity in the Republic of Macedonia. According to the available information, this wealth comprises the imposing number of 17.604 species, out of which 976are endemic species. According to the analysis of the richness of biodiversity in the countries of the European continent, theRepublicofMacedoniais positioned at the very top of the list of states known as "EuropeanHotspot».

Ornitofauna of the Republic of Macedonia is represented by 338 taxa (309 species and 19 subspecies) of birds.

66 bird species found in the Republic of Macedonia have been included in the European Red List. From among "Emerald" species identified in the RepublicofMacedonia (under the Resolution No. 6 of the Bern Convention), 115 species are birds.

IntheperiodfromJanuary 2003 until October 2010, within the Project for vultures conservation, monitoring of the populations of two species of birds of prey, namely Griffon Vulture and Egyptian Vulture has been carried out, accompanied also by monitoring of the Imperial Eagle (there is also older data on the said species, as well as on the Golden Eagle, Mediterranean Falcon andlong-legged buzzard;however, this data should be updated and analyzed again).

Theimplementation of the Projectforcommonbirdspeci esmonitoringwasinitiatedin 2007 and data on the trend in certain indicative bird species has been obtained in the course of the past four years.

Methodology

- Methodology for indicator calculation

Sampling quadrants (10 – 15) with an area of 1 km2are taken by random and common bird species were counted there by the method of linear transect. Counting took place in the period of nesting (from 15 April to 15 June) with the intensity of two searches per year. Data was statistically processed resulting in the established trend in the populations of species at national level.

With reference to birds of prey, full census of couples in nest and determination of their success in nest have been envisaged.

- Source of used methodology

We applied methodology used by the organization British Trust for Ornithology in carrying out the census of birds in nests on the territory of the United Kingdom.

Indicator: Number of vulture couples

The indicator shows the estimate of the size of populations (in couples) of Griffon Vulture and Egyptian Vulture in Macedonia, based on detailed monitoring of nesting sites of the two species on the whole territory of Macedonia.

Data specification

Title of the indicator	Source	Reporting obligation
Species diversity	– Grubac, B. & VELEVSKI, M. (2004-2010): Survey and monitoring of the status, breeding success and threats to the Egyptian Vulture in Macedonia- Report to BVCF/FZS. – Grubac B., Velevski M., Lisicanec T., Lisicanec E., Rolevski, D.&Andevski, J. (2007): Decrease of population size of the Griffon vulture Gypsfulvus in Macedonia and assessment of conservation measures. III Congress of Ecologists of Republic of Macedonia, 06-09.10.2007, Struga. Abstract Book, 101-102. Macedonian Ecological Society. – Macedonian Ecological Society and Wild Flora and Fauna Fund.	

Data coverage:

Table1.Trend in the number of Griffon Vulture in Macedonia (by colonies)

Griffon Vulture - couples						
	Demir Kapija	Mariovo	Tikvesh Lake	Osogovo	Matka	total
2003	4	4	9	6	1	24
2004	9	3	9	4	1	26
2005	7	4	4	0	1	16
2006	3	4	5	0	0	12
2007	3	5	5	0	1	14
2008	5	8	8	0	0	21
2009	7	4	6	0	0	17
2010	6	8	6	0	0	20

Table 2.Trend in the number of Egyptian Vulture in Macedonia (in couples)

Egyptian Vulture	
year	couples
2004	36
2005	34
2006	32
2007	31
2008	28
2009	27
2010	25

General metadata

Code	Title of the indicator	CompliancewithCSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 009	Species diversity	CSI 009	Species diversity	C		Biological diversity	

CLIMATE CHANGE

GREENHOUSE GAS EMISSIONS AND REMOVALS

Definition

The indicator shows the quantities of greenhouse gas emissions into atmosphere on national level. The emissions are presented by greenhouse gas type. The indicator provides information on emissions in the following sectors: energy, industrial processes, agriculture, forestryand land use change (LUCF) and and waste.

Units

- Kilotons CO2-equivalent

Policy relevance

The Grenhouse Gases Inventory establishes the basis for the analysis of the GHG reduction.

Legal grounds

Republic of Macedonia is a Party to the United Nations Framework Convention on Climate Change and to the Kyoto Protocol. Climate change issues have been incorporated in the Law on Environment, including the requirements for preparation of GHG emission inventories and GHG removal via sinks, as well as development of action plan with measures and activities aimed at GHG emissions abatement and climate change impacts mitigation. In addition to this, by means of amendment of the Law on Environment, provision has been made for Designated National Authority to approve the projects under the Kyoto Protocol Clean Development Mechanism.

Key message

Total GHG emissions in 2009 dropped by 12.2% compared to emissions in 2008, and by 28.4% compared to baseline 2000, due to global economic crisis, low industrial production and demand for energy and change in agricultural practices.

In 2000, total GHG emission was the highest and amounted 14.310,05 kilotons CO2-equivalent.

At sectoral level, there was reduction of emission in 2009 compared to 2008 and baseline 2000 in the sectors of energy, industry and agriculture. There was minor emission increase in waste sector.

In LUCF sector, emissions of CO2-eq. are expressed as (-), because they are actually removals or sinks of the carbon through the process of carbon binding into carbon dioxide, which contributes to the reduction of CO2-eq. emissions.

As far as direct GHG emissions is concerned, at an average around 76% of emissions are due to CO2 emission (mostly from fuels combustion in energy sector), 13.2% are emissions of CH4 (mostly from agriculture and waste), 8.3% are N2O emissions (from fuels combustion and emission from soils) and 0.6% are HFCs emissions from industrial sector.

Figure 1. Total GHG emission in kilotons CO2-equivalent (baseline 2000)

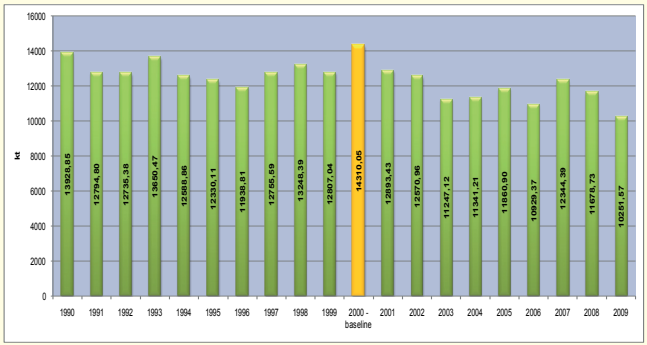
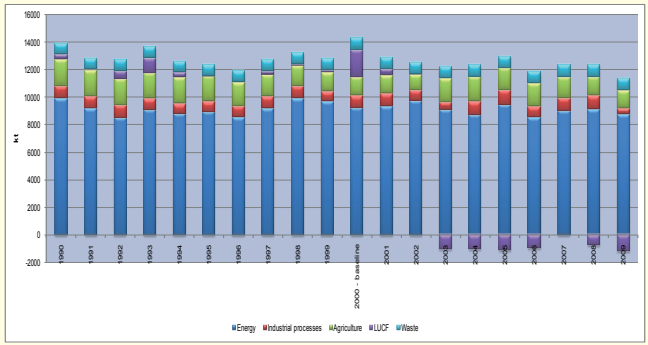


Figure 2. Share by sector of GHG emissions in kilotons per year



Assessment

Total GHG emissions in the period from 1990 to 2009 are shown on Figure 1, where it is notable that the highest GHG emission was recorded in 2000, selected as baseline year (a year which is constant point for emissions comparison over time).

In 2009, the total emission of GHG, if we exempt emissions and removals from LUCF sector, amounted 11.397,83 kt CO2-eq. The greatest share in GHG emission belonged to energy sector with 8761,31 kt CO2-eq, followed by agriculture with 1321,19 kt CO2-eq, waste with 880,88 kt CO2-eq and the lowest share

Figure 3. Share by sector of GHG emissions in % per year

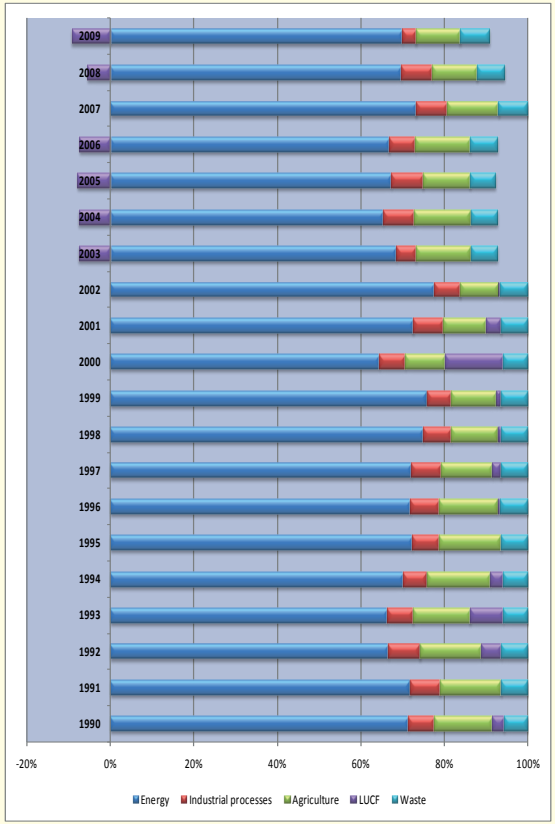
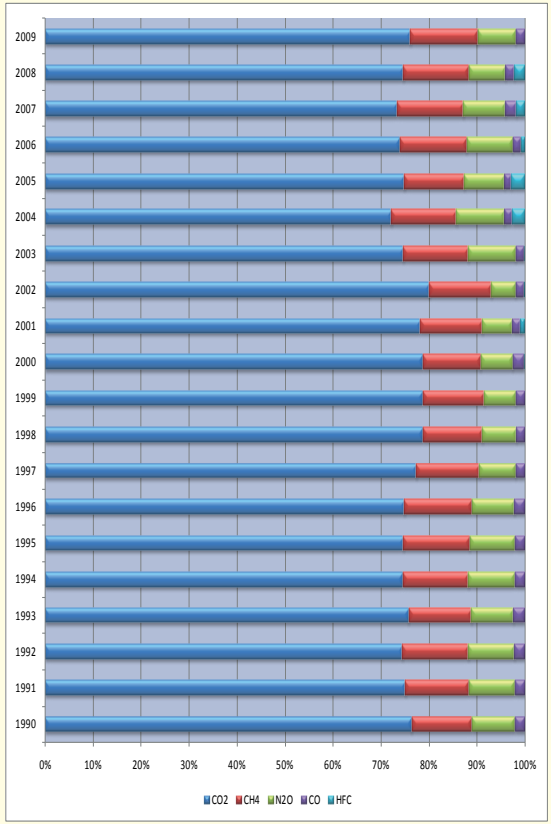


Figure 4. Share of individual pollutants in the total GHG emissions in % per year



belonged to industrial sector with 434,44 kt CO2-eq.

Compared to 2008, provided that emissions and removals from LUCF sector are exempted, we may note drop in GHG emissions by around 8%. At sectoral level, emission reduction is notable in 2009 compared to 2008 in the sectors energy (4.2%), industry (55.4%) and agriculture (5.8%). There has been a minor increase of emissions in waste sector (1%). This was due to global economic crisis, low industrial production and demand for energy and change in agricultural practices.

Compared to baseline year of 2000, provided that emissions and removals from LUCF sector are exempted, we may note drop in GHG emissions by around 7.6%. At sectoral level, emission reduction is notable in 2009 compared to 2000 in the sectors energy (5%), industry (50.9%) and agriculture (4.2%). There has been a minor increase of emissions in waste sector (4.34%). This was due to global economic crisis, low industrial production and demand for energy and change in agricultural practices.

As far as direct GHG emissions is concerned, at an average around 76% of emissions are due to CO2 emission (mostly from fuels combustion in energy sector), 13.2% are emissions of CH4 (mostly from agriculture and waste), 8.3% are N2O emissions (from fuels combustion and emission from soils) and 0.6% are HFCs emissions from industrial sector

In 2009 compared to 2008, there was reduction in all and each of the GHGs, as follows: CO2 by 6.7%, CH4 by 4%, N2O by 6.6%, CO by 3.5% and HFCs by 100%.

Also, compared to baseline year of 2000 , there was reduction in all and each of the GHGs, as follows: CO2 by 21.6%, CH4 by 5.3%, N2O by 5.5%, CO by 32.2% and HFCs by 100%.

Methodology

- Methodology for the indicator calculation

To calculate GHG emissions as well as GHG inventories, the methodology provided by UNFCC/IPCC- Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories 1996, revised version, is used. The Report on Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, does not substitute the IPCC Guidelines, but it provides a reference compliant with the Guidelines. This has been made because IPPC Guidelines apply in reporting by non-Annex I Parties

to the United Nations Framework Convention on Climate Change (UNFCCC).

Methodology is based on the calculation of GHGs as a product from the rate of activity for individual sectors and emission factors.

In the frames of the Third Communication on Climate Change, GHGs inventory has been prepared. Identification of the key categories of sources relied on methods Tier 1 and Tier 2. Tier 1 method is used to identify categorization of key sector and establishment of the trend in emissions from the national emission inventories. Given the fact that the inventory has data for several years, estimates of shares of each category in emission level and trends were made.

Tier 2 level is also applied for certain categories of sources, by using analysis of uncertainty. Application of Tier 2 method is useful, as it enables additional identification of the reasons for which certain categories of emission are key and enables prioritization of activities in order to improve the quality of inventory and reduce overall uncertainty.

Data specification

Title of the indicator	Source	Reporting obligation
Greenhouse gases emissions and removals	– Greenhouse Gas Emissions Inventory in: the First National Communication of Macedonia under the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environment and Physical Planning, p. 29-46, 2003 – Second National Communication of Macedonia under the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environment and Physical Planning; www.unfccc.org.mk – Third National Communication of Macedonia under the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environment and Physical Planning; www.unfccc.org.mk	– UNFCCC

Опфат на податоци:

Table 1: GHG Inventory from the Third National Communication

CO_2-eq emissions by sector

CO_2-eq. [kt]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Energy	9939,83	9190,47	8484,18	9068,37	8839,56	8925,02	8578,29	9198,29	9939,13	9716,39
Industrial processes	889,29	908,89	957,78	831,36	716,56	793,28	819,71	910,30	891,78	742,43
Agriculture	1908,27	1866,08	1881,62	1858,08	1888,54	1825,04	1682,11	1571,02	1462,96	1377,56
LUCF	405,17	34,39	605,72	1084,29	390,53	8,11	73,57	253,76	127,40	142,28
Waste	786,29	794,97	806,08	808,37	753,66	778,67	785,13	822,21	827,12	828,38
Total	13928,85	12794,80	12735,38	13650,47	12588,86	12330,11	11938,81	12755,59	13248,39	12807,04
CO_2-eq. [%]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Energy	71,36	71,83	66,62	66,43	70,22	72,38	71,85	72,11	75,02	75,87
Industrial processes	6,38	7,10	7,52	6,09	5,69	6,43	6,87	7,14	6,73	5,80
Agriculture	13,70	14,58	14,77	13,61	15,00	14,80	14,09	12,32	11,04	10,76
LUCF	2,91	0,27	4,76	7,94	3,10	0,07	0,62	1,99	0,96	1,11
Waste	5,65	6,21	6,33	5,92	5,99	6,32	6,58	6,45	6,24	6,47
Total	100	100	100	100	100	100	100	100	100	100

CO_2-eq. [kt]	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Energy	9226,90	9355,70	9755,52	9059,45	8732,00	9456,41	8543,18	9034,99	9146,05	8761,32
Industrial processes	885,70	929,02	784,05	598,35	971,43	1075,64	784,48	943,50	974,83	434,44
Agriculture	1379,52	1313,29	1141,02	1733,51	1787,86	1581,20	1677,13	1495,89	1403,47	1321,19
LUCF	1973,70	459,03	49,78	-976,71	-988,89	-1092,57	-927,27	7,76	-717,83	-1146,25
Waste	844,23	836,38	840,59	832,52	838,79	840,21	851,84	862,25	872,22	880,88
Total	14310,05	12893,43	12570,96	11247,12	11341,21	11860,90	10929,37	12344,39	11678,73	10251,57
CO_2-eq. [%]	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Energy	64,48	72,56	77,60	80,55	76,99	79,73	78,17	73,19	78,31	85,46
Industrial processes	6,19	7,21	6,24	5,32	8,57	9,07	7,18	7,64	8,35	4,24
Agriculture	9,64	10,19	9,08	15,41	15,76	13,33	15,35	12,12	12,02	12,89
LUCF	13,79	3,56	0,40	-8,68	-8,72	-9,21	-8,48	0,06	-6,15	-11,18
Waste	5,90	6,49	6,69	7,40	7,40	7,08	7,79	6,98	7,47	8,59
Total	100	100	100	100	100	100	100	100	100	100

Contribution of CO_2, CH_4, N_2O and HFC in the total CO_2-eq emissions from all sectors

CO_2-eq. [kt]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CO_2	10655,73	9607,46	9486,27	10344,28	9396,73	9215,29	8948,47	9862,97	10443,72	10093,89
CH_4	1739,10	1703,96	1756,75	1791,97	1703,31	1696,09	1667,35	1679,37	1632,69	1630,58
N_2O	1253,86	1218,69	1222,36	1200,82	1225,42	1173,39	1057,39	971,34	936,99	845,58
CO	280,15	264,68	269,99	313,40	263,39	245,33	265,60	241,91	234,98	237,00
HFC	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total	13928,85	12794,80	12735,38	13650,47	12588,86	12330,11	11938,81	12755,59	13248,39	12807,04
CO_2-eq. [%]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CO_2	76,50	75,09	74,49	75,78	74,64	74,74	74,95	77,32	78,83	78,82
CH_4	12,49	13,32	13,79	13,13	13,53	13,76	13,97	13,17	12,32	12,73
N_2O	9,00	9,52	9,60	8,80	9,73	9,52	8,86	7,61	7,07	6,60
CO	2,01	2,07	2,12	2,30	2,09	1,99	2,22	1,90	1,77	1,85
HFC	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total	100	100	100	100	100	100	100	100	100	100

CO_2-eq. [kt]	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CO_2	11283,60	10084,59	10072,66	9302,42	9049,24	9851,94	8911,58	9445,80	9493,09	8850,65
CH_4	1741,23	1663,84	1622,01	1681,32	1692,03	1647,75	1688,35	1764,01	1718,96	1649,39
N_2O	959,99	799,39	636,46	1222,70	1262,61	1088,57	1162,45	1134,89	971,11	906,90
CO	327,56	225,14	209,13	219,59	201,89	188,69	192,05	297,49	230,27	222,16
HFC	25,20	120,47	30,71	22,49	330,53	372,19	101,09	226,85	274,30	0,00
Total	14337,58	12893,43	12570,96	12448,52	12536,31	13149,14	12055,52	12869,04	12687,73	11629,10
CO_2-eq. [%]	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CO_2	78,70	78,21	80,13	74,73	72,18	74,92	73,92	73,40	74,82	76,11
CH_4	12,14	12,90	12,90	13,51	13,50	12,53	14,00	13,71	13,55	14,18
N_2O	6,70	6,20	5,06	9,82	10,07	8,28	9,64	8,82	7,65	7,80
CO	2,28	1,75	1,66	1,76	1,61	1,43	1,59	2,31	1,81	1,91
HFC	0,18	0,93	0,24	0,18	2,64	2,83	0,84	1,76	2,16	0,00
Total	100	100	100	100	100	100	100	100	100	100

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 010	Greenhouse gases emissions and removals	CSI 010	Greenhouse gases emissions and removals	P	B	– air – air quality – climate change	Annually

MK - NI 011 PROJECTIONS OF GREENHOUSE GAS EMISSIONS AND REMOVALS

Definition

The indicator illustrates projected trends in anthropogenic greenhouse gas (GHG) emissions by means of application of the existing policies and measures and/or additional policies and measures. Projected trends are presented by sector types: energy, industrial processes, agriculture, land use change and forestry and waste

Units

- Tons CO_2-equivalent.

Policy relevance

This indicator is of vital importance for the national climate change mitigation policy. It is also related to future implementation of projects based on the Clean Development Mechanism (CDM) of the Kyoto Protocol.

Legal grounds

Republic of Macedonia is a Party to the United Nations Framework Convention on Climate Change and to the Kyoto Protocol. Climate change issues have been incorporated in the Law on Environment, including the requirements for preparation of GHG emission inventories and GHG removal via sinks, as well as development of action plan with measures and activities aimed at GHG emissions abatement and climate change impacts mitigation. In addition to this, by means of amendment of the Law on Environment, provision has been made for Designated National Authority (DNA) to approve the projects under the Clean Development Mechanism (CDM) of the Kyoto Protocol.

Key message

According to specific emissions (κt CO2-eq per capita), Macedonia remains among countries with relatively high emissions per capita, mainly due to the use of fossil fuels in electricity production. Compared to the baseline scenario, this parameter notes gradual decline along with the introduction of gas in mitigation scenarios. Considering the close interaction between GHG emissions and the manner of energy production and consumption, the national policy for energy efficiency (EE) and renewable energy sources (RES) will by itself contribute to the climate change mitigation, as achievement of the objectives set in these policies will at the same time reduce the GHG emissions.

Figure 1: Projections of total GHG emissions [kt CO_2-eq] - Baseline scenario

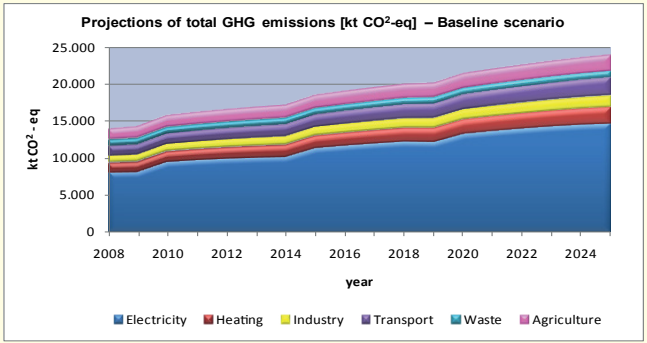


Figure 2: Projections of total GHG emissions [kt CO_2-eq] - First mitigation scenario

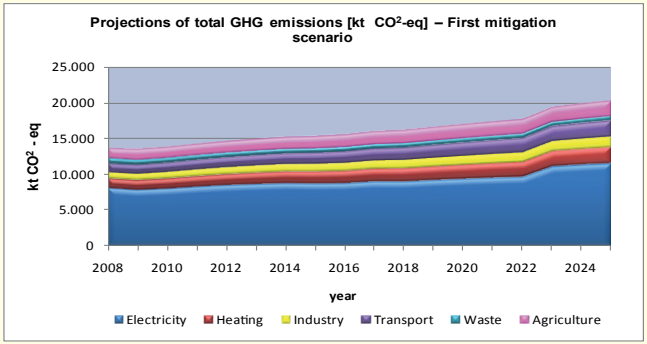


Figure 3: Projections of total GHG emissions [kt CO_2-eq] - Second mitigation scenario

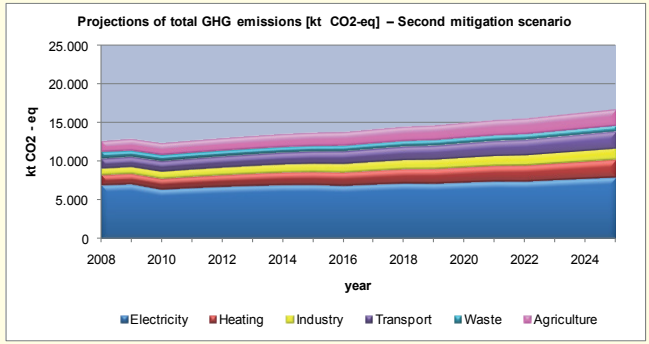


Figure 4: Effectiveness of the three scenarios expressed as absolute emissions growth in 2025 relative to emissions in 2008

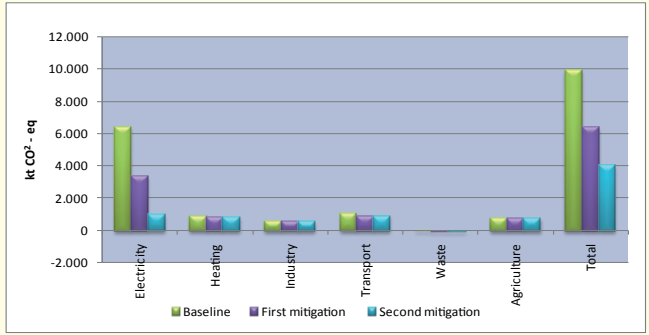


Figure 5: Effectiveness of the three scenarios expressed as absolute emissions growth in 2025 relative to emissions in 2008

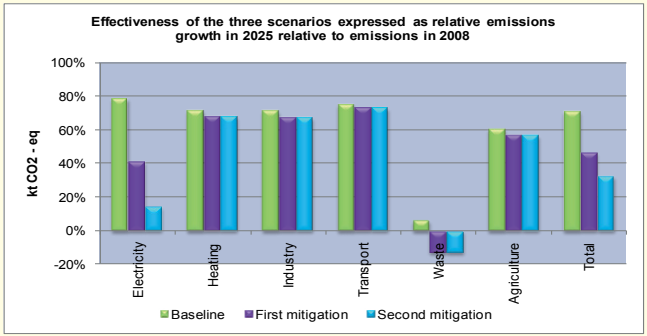
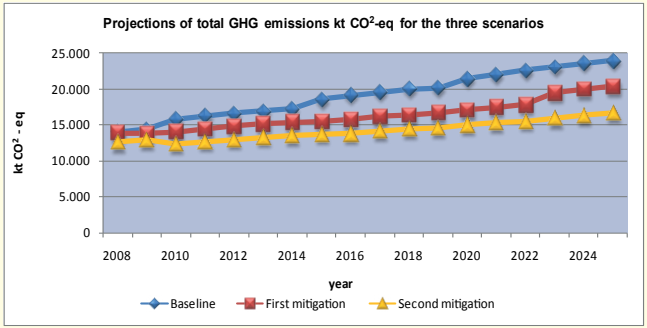


Figure 6: Projections of total GHG emissions kt CO_2-eq for the three scenarios



Assessment

This Chapter integrates sectoral emissions in order to project total GHG emissions for the period 2008 - 2025 based on adopted scenarios: baseline, first and second mitigation scenarios. It should be noted that the first and the second mitigations scenarios differ only in electric power sector, where the second mitigation scenario includes additional measures for emission abatement, which will, as shown below, contribute significantly to the overall emission abatement. Total emissions at the beginning and at the end of the period by all scenarios are summarized on Table 1. Further on, Table 2 (and Figure 1), Table 3 (and Figure 2) and Table 4 (and Figure 3) present sectoral and total GHG emissions by years, for each scenario, respectively Analysis of the baseline scenario: According to projections presented in Table 2 and on Figure 1, there will be significant increase of GHG emissions by 2025 compared to values estimated for 2008 (around 9.900 kt CO2-eq in absolute value, or around 71% in relative terms), provided that business-as-usual is preserved (Figure 4 and Figure 5, the last group of columns). This increase is mainly connected to the growth in electric power sector (absolute difference of 6.400 kt CO2-eq and 78% relative growth of the value in 2008), which

reflects the so called dark scenario, i.e. development scenario of the national energy sector based on lignite (Figure 4 and Figure 5, first group of columns). Other sectors also show significant growth in GHG emissions, so that values in 2025 compared to values in 2008 are higher by 75% - transport, 71% - heating and industry, 60% - agriculture and 6% - waste (Figure 4 and Figure 5).

Analysis of scenarios of emission abatement: The state could improve if development paths include activities/ measures leading to GHG emissions reduction. As a result, the first mitigation scenario (as defined in the analysis by sectors) will lead to increase in total emissions of 46% of the values in 2025 compared to the value in 2008 or absolute difference of around 6.400 kt CO2-eq. (Table 3 and Figure 2; also Figure 4 and Figure 5, last group of columns). This increase in total emissions decreases further by 32% (absolute difference of around 4.000 kt CO2-eq) if development paths observe the second mitigation scenario (Table 4 and Figure 3; also Figure 4 and Figure 5, last group of columns).

With regard to emission projections by sectors for the three scenarios, comparison of emissions in 2025 with those in 2008 shows highest rise of emissions in electric energy sector. Namely, the relative increase of 78% in the baseline scenario falls at 41% in the first mitigation scenario due to the introduction of two plants on natural gas for combined electricity and heat production (the first one in 2009 and the second in 2015). The relative increase drops at 14% under the second mitigation scenario, as a result of reduced consumption by major consumers, introduction of renewable energy sources and termination of the thermal power plant (TPP) in Negotino upon the establishment of the new gas power plant (Figure 4 and Figure 5, last group of columns). As far as the sectors are concerned, there is a notable result in the waste sector, where the relative increase of 6% in the baseline scenario reaches negative relative increase (-13%) under both mitigation scenarios. This means that, under the mitigation scenario, the values of emissions in 2025 will be by 13 % lower compared to their values in 2008 (Figure 4 and Figure 5, fifth group of columns), owing to the introduction of technology for landfill gas combustion at several landfills in the country. Other sectors note minor contribution to the reduction of overall emissions, considering the fact that the relative difference between baseline and mitigation scenarios ranges within 2 - 4%. (Figure 5).

Summary of the projections of total GHG emissions by years, in line with the adopted scenarios, is presented in Table 5 and on Figure 6.

According to its country specific emissions (kt CO2-eq/capita), Macedonia remains among countries with relatively high emissions per capita, owing mainly to the use of fossil fuels in electricity production. Compared to the baseline scenario, this parameter notes gradual decrease with the introduction of gas under mitigation scenarios. The calculated specific emissions for the three scenarios are presented in Table 6.

Methotodolgy

- Methodology for the indicator calculation

The electric energy production sector (which contributes more than 50% to the total GHG emissions) has been modeled by application of the WASP software (a tool used in the energy sector development planning), while emissions estimates for other sectors have been made by using the software tool GACMO and expert judgments. Projections of GHG emissions have been made by downscaling analysis made under the national reports.

Data specification

Title of the indicator	Source	Reporting obligation
Projections of GHG emissions and removals	Analysis for GHG emissions reduction in: the First National Communication on Climate Change to UNFCCC, MEPP, UNDP, p. 47-84, 2003 Second National Communication on Climate Change to UNFCCC, MEPP, www.unfccc.org.mk	UNFCCC

Data coverage:

Table 1 Determining values for the three scenarios

	Total GHG emissions in 2008 [kt CO2-eq]	Total GHG emissions in 2025 [kt CO2-eq]
Baseline scenario	14.040	23.947
First mitigation scenario	13.904	20.348
Second mitigation scenario	12.645	16.713

Table 2 Projections of total GHG emissions [κt CO2-eq]- Baseline scenario

Year	Electricity	Heating	Industry	Transport	Waste	Agriculture	Total
2008	8.196	1.328	906	1.390	844	1.376	14.040
2009	8.268	1.375	937	1.432	847	1.517	14.376
2010	9.584	1.423	970	1.475	850	1.553	15.855
2011	9.836	1.472	1.004	1.520	853	1.595	16.280
2012	10.025	1.524	1.039	1.566	856	1.637	16.647
2013	10.154	1.577	1.076	1.614	859	1.679	16.959
2014	10.246	1.632	1.113	1.664	862	1.722	17.239
2015	11.388	1.690	1.152	1.715	865	1.764	18.574
2016	11.719	1.740	1.187	1.775	868	1.807	19.096
2017	12.006	1.792	1.222	1.838	871	1.851	19.580
2018	12.261	1.846	1.259	1.902	875	1.894	20.037
2019	12.199	1.902	1.297	1.970	878	1.937	20.183
2020	13.260	1.959	1.336	2.039	881	1.981	21.456
2021	13.628	2.017	1.376	2.112	884	2.025	22.042
2022	13.954	2.078	1.417	2.186	887	2.070	22.592
2023	14.241	2.140	1.459	2.264	891	2.114	23.109
2024	14.463	2.205	1.503	2.344	894	2.159	23.568
2025	14.600	2.271	1.548	2.427	897	2.204	23.947

Table 3 Projections of total GHG emissions [κt CO2-eq]- First mitigation scenario

Year	Electricity	Heating	Industry	Transport	Waste	Agriculture	Total
2008	8.196	1.328	902	1.258	844	1.376	13.904
2009	7.922	1.353	931	1.296	769	1.517	13.788
2010	8.093	1.401	961	1.335	757	1.512	14.059
2011	8.354	1.451	993	1.375	741	1.546	14.460
2012	8.575	1.502	1.025	1.416	729	1.588	14.835
2013	8.719	1.556	1.059	1.458	720	1.630	15.142
2014	8.831	1.611	1.094	1.502	700	1.673	15.411
2015	8.784	1.647	1.130	1.547	703	1.715	15.526
2016	8.827	1.697	1.163	1.601	706	1.757	15.751
2017	9.071	1.749	1.196	1.656	709	1.800	16.181
2018	9.055	1.803	1.231	1.714	712	1.844	16.359
2019	9.262	1.859	1.267	1.773	715	1.887	16.763
2020	9.428	1.916	1.304	1.834	718	1.930	17.130
2021	9.580	1.975	1.342	1.897	722	1.974	17.490
2022	9.700	2.035	1.381	1.963	725	2.018	17.822
2023	11.131	2.097	1.422	2.031	728	2.063	19.472
2024	11.367	2.162	1.463	2.101	731	2.107	19.931
2025	11.553	2.228	1.506	2.174	735	2.152	20.348

Table 4 Projections of total GHG emissions [κt CO2-eq]- Second mitigation scenario

Year	Electricity	Heating	Industry	Transport	Waste	Agriculture.	Total
2008	6.937	1.328	902	1.258	844	1.376	12.645
2009	7.082	1.353	931	1.296	769	1.517	12.948
2010	6.430	1.401	961	1.335	757	1.512	12.396
2011	6.613	1.451	993	1.375	741	1.546	12.719
2012	6.765	1.502	1.025	1.416	729	1.588	13.025
2013	6.881	1.556	1.059	1.458	720	1.630	13.304
2014	6.973	1.611	1.094	1.502	700	1.673	13.553
2015	6.990	1.647	1.130	1.547	703	1.715	13.732
2016	6.878	1.697	1.163	1.601	706	1.757	13.802
2017	7.042	1.749	1.196	1.656	709	1.800	14.152
2018	7.180	1.803	1.231	1.714	712	1.844	14.484
2019	7.143	1.859	1.267	1.773	715	1.887	14.644
2020	7.290	1.916	1.304	1.834	718	1.930	14.992
2021	7.415	1.975	1.342	1.897	722	1.974	15.325
2022	7.398	2.035	1.381	1.963	725	2.018	15.520
2023	7.586	2.097	1.422	2.031	728	2.063	15.927
2024	7.756	2.162	1.463	2.101	731	2.107	16.320
2025	7.918	2.228	1.506	2.174	735	2.152	16.713

Table 5 Projections of total GHG emissions for the three scenarios [κt CO2-eq]

Year	Baseline scenario	First mitigation scenario	Second mitigation scenario
2008	14.040	13.904	12.645
2009	14.376	13.788	12.948
2010	15.855	14.059	12.396
2011	16.280	14.460	12.719
2012	16.647	14.835	13.025
2013	16.959	15.142	13.304
2014	17.239	15.411	13.553
2015	18.574	15.526	13.732
2016	19.096	15.751	13.802
2017	19.580	16.181	14.152
2018	20.037	16.359	14.484
2019	20.183	16.763	14.644
2020	21.456	17.130	14.992
2021	22.042	17.490	15.325
2022	22.592	17.822	15.520
2023	23.109	19.472	15.927
2024	23.568	19.931	16.320
2025	23.947	20.348	16.713

Table 6 Country Specific GHG emissions in Macedonia kt CO2-eq/capita

Year	Population projections (1000 inhabitants)	Baseline scenario	First mitigation scenario	Second mitigation scenario
2008	2.055	6,83	6,76	6,15
2009	2.062	6,97	6,69	6,28
2010	2.068	7,67	6,80	5,99
2011	2.074	7,85	6,97	6,13
2012	2.080	8,00	7,13	6,26
2013	2.086	8,13	7,26	6,38
2014	2.093	8,24	7,36	6,48
2015	2.099	8,85	7,40	6,54
2016	2.105	9,07	7,48	6,56
2017	2.112	9,27	7,66	6,70
2018	2.118	9,46	7,72	6,84
2019	2.124	9,50	7,89	6,89
2020	2.131	10,07	8,04	7,04
2021	2.137	10,31	8,18	7,17
2022	2.143	10,54	8,31	7,24
2023	2.150	10,75	9,06	7,41
2024	2.156	10,93	9,24	7,57
2025	2.163	11,07	9,41	7,73

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 011	Projections of GHG emissions and removals	CSI 011	Projections of GHG emissions and removals	P	A	- air - air quality - climate change	Annually

SOIL

Definition

Changes in and current status of agriculture, forest and other semi-natural land taken by urban and other artificial land development. It includes areas sealed by construction and urban infrastructure as well as urban green areas and sport and leisure facilities. The main drivers of land take are grouped in processes resulting in the extension of:

- housing, services and recreation,,
- industrial and commercial sites,
- transport networks & infrastructures,
- mines,quarries and waste dumpsites.

Units

Units of measurement for changes and current status recording and mapping are hectares. For data presentation, the unit in km^2 can be used as well.

Results are presented as:

- current status of land cover based on the nomenclature adopted at European level, at five-year intervals;
- changes in land cover, at five-year intervals, presented in % of the total area of the country and % of the various land cover types..

Note: Particular attention is paid to areas changing as a result of urban systems extension leading to negative impact on the environment.

Policy relevance of the indicator

Legal grounds

Under the Law on Environment, every citizen is entitled to have an access to environmental state information. This indicator provides not only data on the state of the environment (land cover), but it also facilitates uniform access there to, both at national and European levels.

Based on the Law on Land Survey and Registration, by means of regular land survey information is provided on the types of land cover. Although these parameters do not correspond with the CORINE land cover nomenclature, there is a possibility for unique integration of land cover elements.

Law on Urban and Spatial Planning.

Targets

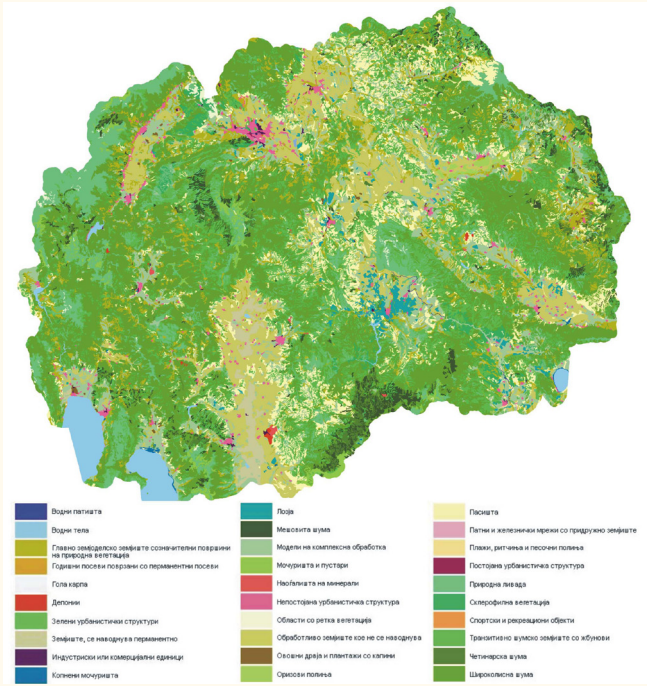
Tracking the changes in land cover and mapping

of current status. Changes are monitored over five-year intervals. Methodology and nomenclature have been additionally harmonized at European level, thus enabling integrated monitoring of changes at regional and European levels.

Key message

Based on the CORINELandCOVERmethodology, the largest portion of the land in the Republic of Macedonia is under forest and semi-natural areas, covering 1.548.855 ha or 59,8% of the total area. The category of agricultural land area covers 939.013 ha or 36.9% of the total area, the category of water bodies covers 56.444 ha or 2.2% of the total area, the category of artificial areas covers 41.480ha or 1.6% of the total area, and the smallest area of 2.000 ha or 0.1% of the total area is wetlands.

Map 1. CORINE Land COVER 2000 (data of 1996)



Map 2.CORINE Land Cover over all changes 2000-2006

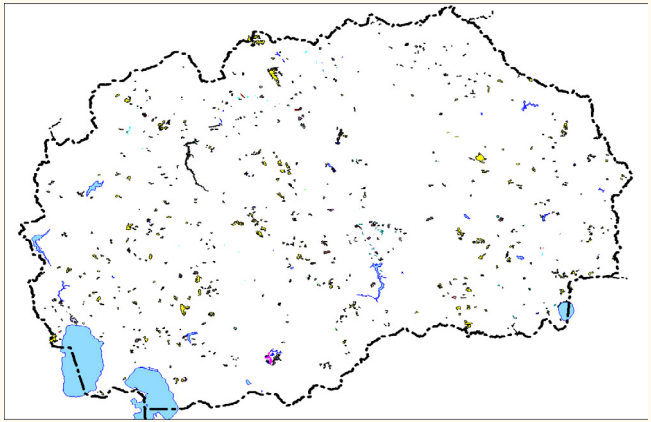
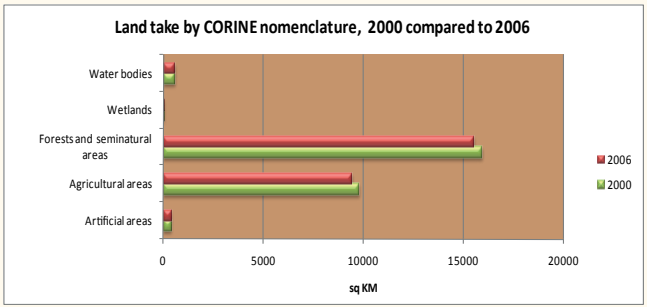


Figure 1.Changes in areas according to CORINE Land Cover nomenclature, 2000 relative to 2006



Assessment

Owing to characteristics of land cover of the territory of the Republic of Macedonia, out of 44 possible classifications under the CORINE Land Cover Nomenclature, 31 classifications have been identified up to the third level of the Nomenclature.

CORINE Land COVER changes between 2000 and 2006 cover territory of around 35.565 ha which is around 1.4% of the total territory of the country.

Concerns rising fact is that the biggest change occurs in area of class 311 (broad-leaved forest) into class 324 (transitional woodland with shrubs) covering total area of 18.171 ha, or 44.57% of the total changes. This change is most probably due to wood cut and forest fires.

Opposite process of changes from class 324 (transitional woodland with shrubs) into class 311 (broad-leaved forest) concerns total area of 4.275 ha, or 14.13% of the total changes is due to new forest growth.

Methodology

- Methodology for the indicator calculation

The assessment of CORINE Land Cover in 2000 and 2006 was based on data from satellite images.

Owing to characteristics of the land cover of the Republic of Macedonia, out of the possible 44 classifications, 31 were identified. In addition to this and for the same reason, the minimum spatial unit treated within the project was reduced at 20 hectares instead of 25 hectares.

The substance of the process is photo-interpretation of satellite images consisting of:

- Delineation of boundaries of areas representing unique land area units at images with «false» colours;
- Application of interpretation keys, supporting documentation and satellite/aeroplane images for marking with identification number - class in nomenclature;
- Extrapolationofthismarking and identification of all segments of the image exhibiting similar characteristics: colour, structure and composition.

Technical Guideline for CORINE Land Cover development was prepared by the European Environmental Agency.

Data specification

Title of the indicator	Source	Reporting obligation
Land take	– CORINE Land Cover	– EEA

Data coverage:

Table 1:Percentage of individual areas by CORINE Nomenclature

	Area in km²		% of total area	
	2000	2006	2000	2006
Artificial areas	389	414	1,51	1,61
Agricultural areas	9.739	9.390	37,88	36,52
Forests and semi-natural areas	15.879	15.488	61,75	60,23
Wetlands	20	20	0,08	0,08
Water bodies	591	564	2,30	2,19

Table 2. CORINE level 1 overall changes 2000 – 2006 (in hectares)

class	reduction	increase	overall changes
Artificial areas	385	2.624	2.239
Agricultural areas	7.423	4.516	-2.907
Forests and semi-natural areas	27.564	26.720	-844
Wetlands	60	84	24
Water bodies	81	1.569	1.488

General metadata

Code	Title of the indicator	Compliancewith CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 014	Land take	CSI 014	Land take	P	A	– management – nature – other – population – soil – tourism – transport – urbanization	10 - annually

Definition

The term ‹contaminated site› refers to a well-delimited area where the presence of soil contamination has been confirmed and the severity of possible impacts to ecosystems and human health are such that remediation is needed, specifically in relation to the current or planned use of the site. The remediation or clean-up of contaminated sites can result in a full elimination or in a reduction of these impacts.

The term ‹potentially contaminated site› includes any site where soil contamination is suspected but not verified and further investigations need to be carried out.

The progress in the management of contaminated sites has been designed to show reduction and elimination of negative effects to ecosystems and human health where environment degradation has been confirmed.

The management of contaminated sites starts with investigation that can further lead to rehabilitation or treatment of contaminated site, measures for its conservation and maintenance and revitalization of contaminated sites:

The indicator shows progress in five main steps:

1) site identification/ preliminary study;

2) preliminary investigation;

3) main site investigation;

4) implementation of remediation measures;

5) measure completed.

Units

- Number of sites managed up to a certain step out of the five main steps of the indicator.
- Share of economic activities in soil contamination as percentage of sites where the activity is present compared to the total number of sites

Policy relevance of the indicator

List of relevant policy documents

The Second National Environmental Action Plan of the Republic of Macedonia.

Legal grounds

Our country lacks legally prescribed limit values for concentrations of certain contaminating substances in soil and standards for their detection in soil. Generally, the existing legislation is intended to prevent new contaminations.

Soil protection is regulated by several laws, including those concerning environment, nature protection, agricultural land, etc., but there is no soil specific law, with clearly defined institutional responsibilities.

Targets

Remediation of tailings, stabilization and re-cultivation of industrial landfills.

Key policy issue

What progress has been made in contaminated sites management and what is the share of economic activities contributing to soil contamination?

Key message

The management of contaminated sites in the period from 2005 to 2011 showed progress with regard to the main site investigation, as well as implementation of remediation measures. With regard to completion of remediation measures, no progress has been recorded, i.e. completion of remediation measures has not been recorded in none of the identified hot-spots.

With regard to economic activities contributing to soil contamination expressed in percentage, the highest share belongs to mining and metallurgy with 31.25%, and oil refining and leather manufacturing industry with 6.25%.

Figure 1. Progress in contaminated sites management

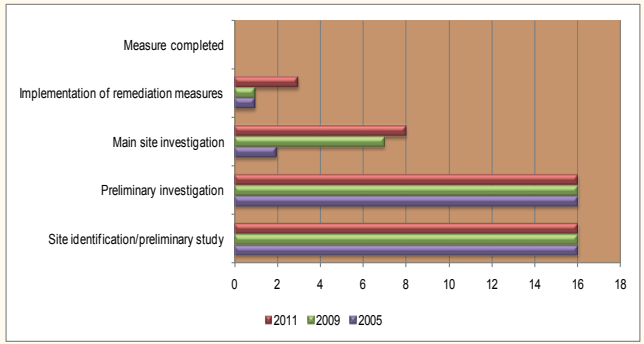
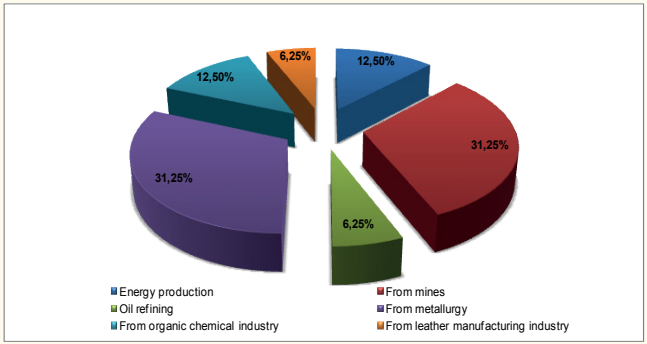


Figure 2. Share of economic activities in soil contamination



Assessment

In the Republic of Macedonia, identification and preliminary investigations have been carried out with 16 sites, where soil contamination has been detected and those sites have been marked as hot-spots. Main investigations have been carried out with eight sites. Remediation measures have been implemented with three sites, while completion of measures has not been recorded with none of the sites.

With regard to economic activities contributing to soil contamination expressed in percentage, the highest share belongs to mining and metallurgy with 31.25%, followed by organic chemical industry with 12.5% and oil refining and leather manufacturing industry with 6.25%.

Data specification

Title of the indicator	Source	Reporting obligation
Progress in the management of contaminated sites	Ministry of Environment and Physical Planning	Soil contamination (TE-2)

Data coverage:

Table 1: Progress in contaminated sites management

Five main steps in the progress in contaminated sites management	2005	2009	2011
Site identification/preliminary study	16	16	16
Preliminary investigation	16	16	16
Main site investigation	2	7	8
Implementation of remediation measures	1	1	3
Measure completed	0	0	0

Table 2: Estimated share of economic activities in soil contamination

Economic activity	Number of sites	Share
Energy production	2	12,5
From mines	5	31,3%
Oil refining	1	6,3%
From metallurgy	5	31,3%
From organic chemical industry	2	12,5%
From leather manufacturing industry	1	6,3%
Total	16	100%

Methodology

- Methodology for the indicator calculation

Data for the indicator calculation was taken from the National Waste Management Plan of the Republic of Macedonia or Special Study E, and from CARDS 2006 Project concerning development of remediation plans with financial requirements for elimination of industrial hot-spots, as well as Feasibility assessment and development of main technical design for water protection measures in the mine Buchim – UNDP Macedonia.

The estimated shares of economic activities contributing to soil contamination are calculated as e.g. [number of mines contributing to soil contamination]/[total number of sites or sites where soil contamination has been confirmed] x 100.

- Source of applied methodology

According to European Environmental Agency.

Uncertainty

- Methodological uncertainty

Although there is a definition of contaminated site, because of the lack of limit values for the concentration of certain toxic chemicals in the soil, it is difficult to determine the exact number of sites where soil contamination has been confirmed.

The assessment of contaminated site depends to a great extent on the individual expert assessment.

- Uncertainty of data set

All sites where certain industrial/economic activity is performed have not been accounted as sites with determined contamination, although such activities

generate chemical substances.

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
МК НИ 015	Progress in the management of contaminated sites	CSI 015	Progress in management of contaminated sites	R	A	- chemicals - industry - management - nature - почва - soil - transport - urbanization - waste - water	annually

Definition

The indicator provides information on the number of forest fires on the territory of the Republic of Macedonia. It also provides information on the magnitude of forest fires presenting the area subjected to fire and the type of wood mass seized by fire, as well as the total damage caused by fire.

Units

The area seized by fire is expressed in ha (hectares), while wood mass seized by fire is expressed in m^3. The total damage from forest fires is expressed in denars, as well as number of forest fires.

Policy relevance of the indicator

List of relevant policy documents:

The Second National Environmental Action Plan (NEAP 2) defines measures for improved protection against forest fires, instructions on the need for capacity strengthening for sustainable forest management, as well as development of strategy for forest protection against fires.

Strategy for Sustainable Development of Forestry in the Republic of Macedonia.

Legal grounds

- Law on Forests, which regulates forests and forest resources management and protection. Protection of forests is integrated and indivisible part of the overall forest management. In the context of forests protection against fires and regulation of measures in this area, we should also mention the 2001 Rulebook on specific measures for forest protection against fires.
- Law on Natural Rarities Protection
- Law on National Parks Protection
- Law on Fire Prevention

Targets

Compliance with the legislation concerning forests and forest resources protection. Reduction of forest fires number, reduction of wood mass and forest area affected by forest fires. Reduction of costs and damages resulting from forest fires. Increase of the public awareness in relation to fire prevention and undertaking all possible measures to reduce human

factor as forest fires cause.

Key policy issue

What is the status of forest fires in the Republic of Macedonia? What is the number of forest fires, what is the area and wood mass affected by fire?

Key message

In the Republic of Macedonia, in the period between 2002 and 2011, rapid increase in the number of fires, area and mass affected by fire was tracked in 2007, reaching the maximum of 652 fires. Then, there was a trend of gradual fall by 2009, and then started to rise in 2010 and 2011 again.

The number of fires in 2011 compared to the number of fires in 2009 noted rise by 395%. In other years, the number of fires was between 182 and 61 fires per year.

Figure 1. Number of forest fires

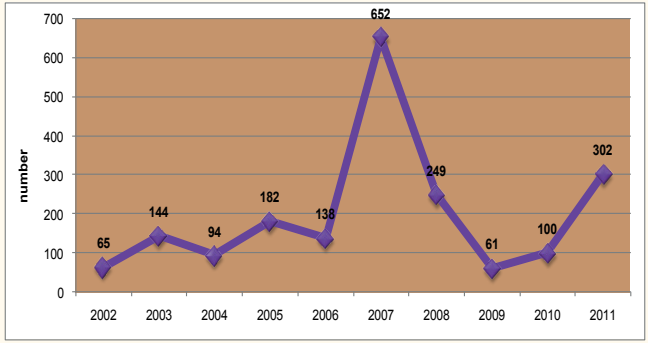


Figure 2. Area under fire

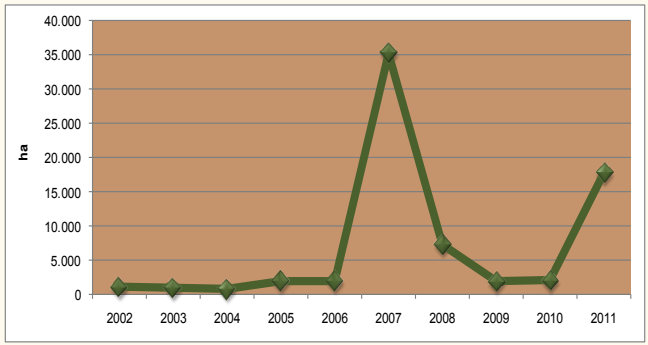


Figure 3. Wood mass subjected to fire

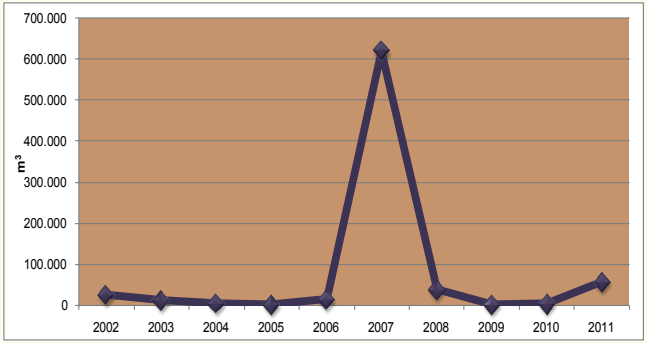
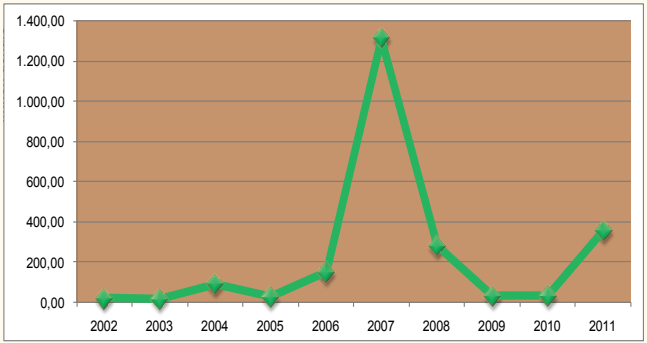


Figure 4. Total damage from fires expressed in denars



Assessment

Forest fires are among the most severe problems in forestry, as well as environment as a whole in the Republic of Macedonia. Great quantity of wood mass is destroyed by forest fires and this is an economic problem. Forest fires cause pollution of air, soil and water. Burnt woods are source of pathogens and pests. There is also increase in erosive processes in burnt areas, disturbed balance of water regime, loss of vegetation and desertification. Almost 95% of forest fires are caused by man. At an average, forest fires destroy around 7.192 ha forest per year. In the period from 2002 to 2011, the average number of forests per year was 199, In 2007, due to extreme draughts and human factor, the number of forest fires reached 652 fires at an area of around 35.000 ha.

In proportion with the parameters discussed above, the overall damage from fires by year expressed in denars was highest in 2007 reaching the value of 1.311.167.721,95 denars and in 2011 with a value of 355.053.833,58 denars. The total average damage from fires in the period from 2002 to 2011 amounted 230.626.886,65 denars per year.

Data specification

Title of the indicator	Source	Reporting obligation
Forest fires	– Public Enterprise for Forests Management - "Macedonian Forests"	

Data coverage:

Table 1: Number of fires, area affected by fires in ha, wood mass affected by fires in m^3

Year	Number of fires	Area affected by fire in ha	Wood mass affected by fire in m^3
2002	65	1.186,30	24.661,28
2003	144	1.068,88	10.987,00
2004	94	892.05	4.322,30
2005	182	2.084,10	1.063,00
2006	138	2.085,95	12.978,00
2007	652	35.248,06	617.678,67
2008	249	7.411,70	37.362,50
2009	61	1.990,60	1.551,00
2010	100	2.143,35	3.443,00
2011	302	17.812,84	5.5743,30

Table 2: Total damage resulting from forest fires by year presented in denars

Year	Total damage from fires in denars
2002	18.531.939,00
2003	15.594.691,00
2004	91.083.591,00
2005	25.287.638,00
2006	148.712.782,00
2007	1.311.167.721,95
2008	280.083.235,00
2009	29.746.034,00
2010	31.007.401,00
2011	355.053.833,58

Methodology

- Methodology for the indicator calculation

Data and the indicator calculation were made by the Public Enterprise for Forests Management of the Republic of Macedonia - «Macedonian Forests».

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 038	Forest fires			P		- Soil - Forestry - Agriculture - Nature - Urbanization	annually

WASTE

MK - NI 016

MUNICIPAL WASTE GENERATION

Definition

The indicator presents municipal waste generation, expressed in kg per person. Municipal waste is non-hazardous waste generated by natural persons in households and commercial waste, collected by municipalities or on their behalf.

Units

- kilogramme per person per year, percentage.

Policy relevance of the indicator

List of relevant policy documents:

Second National Environmental Action Plan of the Republic of Macedonia (2006)

Strategy for Waste Management in the Republic of Macedonia (2008-2020)

National Waste Management Plan (2009-2015) of the Republic of Macedonia

Legal grounds

Law on Waste Management (2004)

Key question

Is the amount of generated municipal waste decreasing?

Key message

Important message contained in the relevant policy documents in the area of waste is to decouple waste generation from economic growth in the Republic of Macedonia. Estimates and data indicate that around 3% of the overall waste generated in the Republic of Macedonia is municipal waste. The observation of the period from 2003 to 2008 showed that the GDP real growth rate noted slight growth of 2.8% to 5%, to fall in 2009 by -0.9%. Then, in 2010 and 2011 there was growth by 2.9 and 2,8, respectively. In the same period, municipal waste recorded increase by more than 3% at annual level. In the period between 2008 and 2011, generated municipal waste first noted increase by 1.4%, then decrease by 0.85% and again slight increase by 1.7%. This leads to the conclusion that generation of municipal waste goes hand in hand with the economic growth, noting slight increase during the last year along with the economic growth, from which it has not decoupled yet.

The amount of generated municipal waste expressed in persons was 348 kg/person/year or 0.9 kg/person/day for 2008, for 2009 it was 354 kg/person/year, while for 2010 and 2011 it was 351 kg/ person/year and 357 kg/ person/year, respectively. These figures also indicate lower generation of municipal waste per person on annual level in the Republic of Macedonia compared to European Union Member States.

Figure 1. Generation of municipal waste in tones per year

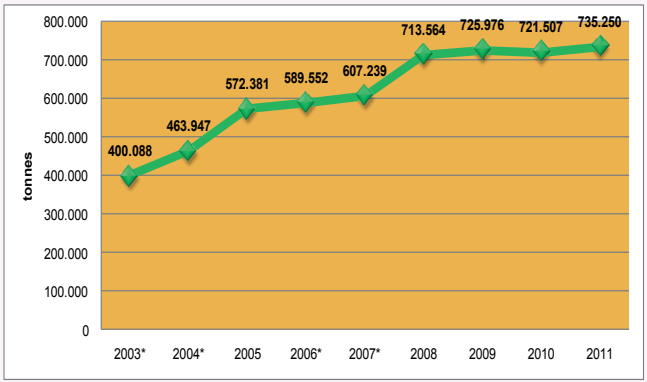
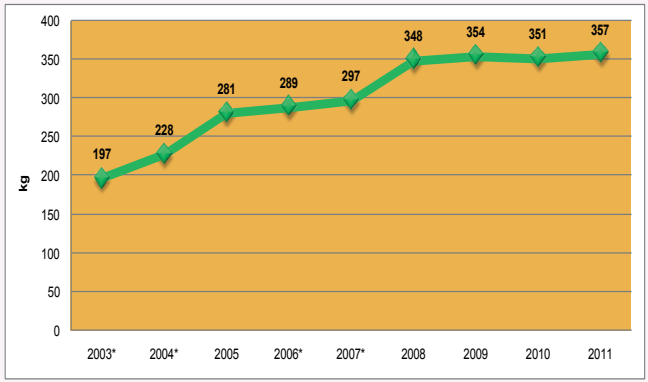


Figure 2. Generation of municipal waste in kg per person per year



Assessment

The amount of generated municipal waste as indicator can show the direction towards which the use and consumption of products and goods moves, and it indirectly reflects the environmental burden if municipal waste fails to be recognized as potential resource. Increased generation of municipal waste indicates increased use and consumption of products and goods. Taking into account that 100% of collected municipal waste is disposed of at landfills, increased generation of municipal waste will potentially increase

the negative impact on the environment.

Methodology

- Methodology for the indicator calculation

Estimates, Reports of the State Statistical Office (2009, 2010, 2011, 2012), and annual reports by municipalities.

Data specification

Title of the indicator	Source	Reporting obligation
Municipal waste generation	– Reports of the State Statistical Office (2009, 2010, 2011, 2012) in the area of environment – Strategy for Waste Management in the Republic of Macedonia (2008-2020), MEPP – National Waste Management Plan (2009-2015) of the Republic of Macedonia, MEPP	EUROSTAT

Data coverage:

Table 1: Generation of municipal waste in tones and kg per person per year

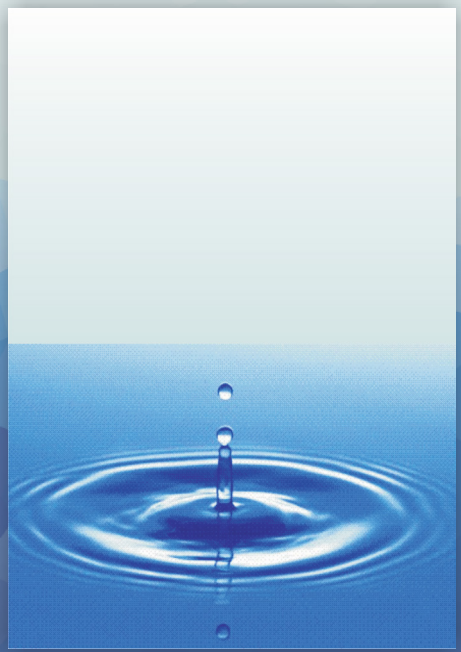
	Ammount (tonnes/year)	kg per person per year
2003*	400.088	197
2004*	463.947	228
2005	572.381	281
2006*	589.552	289
2007*	607.239	297
2008	713.564	348
2009	725.976	354
2010	721.507	351
2011	735.250	357

*Estimated values

General metadata:

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 016	Municipal waste generation	CSI 016	Municipal waste generation	P	A	- Households - economy - population - urbanization - waste	yearly

WATER



Definition

The water exploitation index (WEI) is the mean annual total abstraction of freshwater divided by the mean annual total renewable freshwater resource at the country level, expressed in percentage terms.

Units

- Water exploitation index - WEI (%); water abstraction for irrigation, public water supply, manufacturing industry and energy cooling (mio. m^3 per year).

Policy relevance of the indicator

List of relevant policy documents:

The National Environmental Action Plan - 2 and Environmental Monitoring Strategy and Data Management Strategy.

The policy for sustainable use of water resources based on the Sixth Environmental Action Programme and Framework Water Directive requirements.

National strategy on waters.

Legal grounds

The Law on Waters prescribes the basic planning documents for protection, maintenance and constant improvement of the disposable water resources and rational use of the available water quantities.

Basic planning and water management development documents in the Republic of Macedonia are:

- The National water strategy
- Water Master Plan of the Republic of Macedonia and
- River Basin Management Plans.

The Law specifies that the maintenance and improvement of water regime is carried out on the basis of River Basins Management Plans. Such Plans contain the environmental protection goals, good status of surface water bodies (good quantitative status and chemical status, including good environmental potential) and of the groundwater resources (quantitative status and chemical status).

Use of water for different purposes is specified under the Decree on Water Classification, according to which

water is divided into five different classes based on the level of pollution, while water characteristics are determined on the basis of classes and purposes for which water can be used.

Targets

No specific targets.

Key policy issue

Is water resources approximation based on water resources sustainability?

Key message

In the period 2002 – 2011, oscillatory trend was tracked in freshwater resources use. Particular rise was recorded in 2004 where the processing industry is the main user of the affected surface and ground water. Variability of data could be conditioned by discontinuity of industrial processes.

Figure 1. Water exploitation index

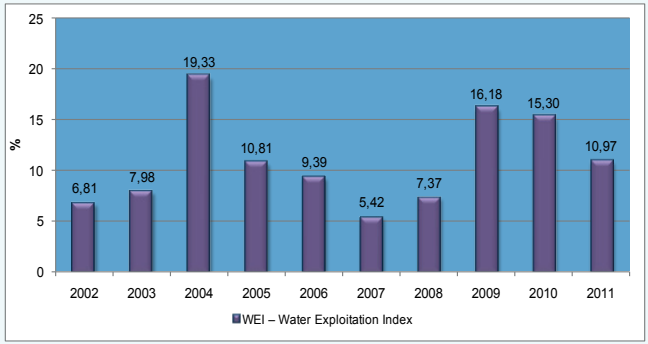
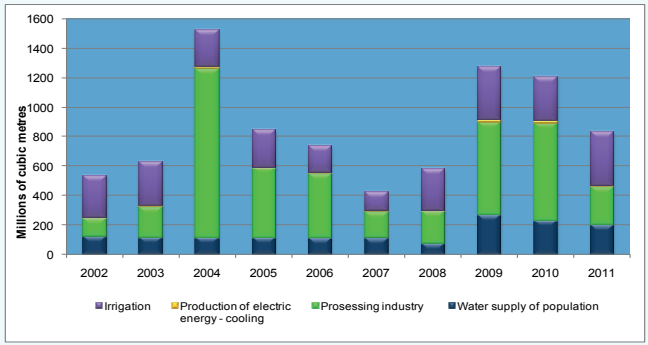


Figure 2. Freshwater resources use by sectors



Assessment

In the period 2002 – 2011, rising trend was tracked in freshwater resources use in the country. Particular rise was recorded in 2004. Processing industry is the main user of abstracted fresh surface and ground waters, especially in 2004. There has been discontinuity of industrial processes, reflected in water abstraction.

Methodology

- Methodology for the indicator calculation

Data is collected and processed by sectors and types of industry.

Water Exploitation Index (wei) is calculated by the mean annual total abstraction of freshwater divided by the mean annual total renewable freshwater resource at the country level.

Where: totABS = mean annual value of total water abstraction for all purposes; LTAA = long term annual mean value of freshwater resources, where data is expressed in average for a period of at least 20 consecutive years. Unit =%

Data specification

Title of the indicator	Source	Reporting obligation
Use of freshwater resources	– State Statistical Office – Water Management Administration – Public Water Supply and Sewerage Enterprise	– OECD/EUROSTAT

Data coverage:

Table 1: Water exploitation index

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
WEI – Water Exploitation Index	6,81	7,98	19,33	10,81	9,39	5,42	7,37	16,18	15,30	10,97

Table 2: Use of freshwater resources by sectors

Millions of cubic metres/year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	LTAA
Water supply of population	126	122	119	118	116	115	79	273,8	235	205	
Prosessing industry	122	203	1146	478	436	175	215	622	659	254	
Production of electric energy - cooling	7	10	12	1	6	12	8	18,1	18	15	
Irrigation	281	293	245	255	182	126	278	360	293	360	
Total use of freshwater resources	536	628	1522	851	740	427	580	1274	1205	864	7874,2

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 018	Use of freshwater resources	CSI 018	Use of freshwater resources	P	A	- water	annual

Definition

The key indicator for the oxygenation status of water bodies is the biochemical oxygen demand (BOD) which is the demand for oxygen resulting from organisms in water that consume oxidisable organic matter.The indicator illustrates the current situation and trends regarding BOD and concentrations of ammonium (NH_4) in rivers.

Units

- Annual average BOD after 5 or 7 days incubation (BOD_5/BOD_7) is expressed in mg O_2/l and annual average total ammonium concentrations in micrograms N/l.

Policy relevance of the indicator

List of relevant policy documents:

The National Environmental Action Plan - 2,

The Environmental Monitoring Strategy and Environmental Data Management Strategy,

Strategy for Waters has been developed in order to establish long-term policy that will secure sustainable development of waters by meeting the demands of all water users, protecting waters against pollution and pollution control.

The Law on Waters transposing the following EU Directives into the national legislation:

- Framework Water Directive (FWD) 2000/60/EEC, according to which, by the year of 2015, rivers in EU should achieve good ecological status or good ecological potential.

- Directive on nitrates (91/676/EEC), the goal of which is to reduce nitrates and pollution by organic matter originating from agricultural lands.

- Directive on urban wastewater treatment (91/271/EEC) aimed at reducing the pollution from sewerage and industrial wastewater treatment plants.

The Law on Environment has transposed the Directive on Industrial Pollution Prevention and Control (IPPC) 96/61/EEC is aimed at control and prevention of water resources pollution by industry.

Legal grounds

The Law on Waters prescribes the main planning documents for water protection, maintenance and permanent improvement of available water resources and sustainable use of available water quantities.

The main planning documents for water management planning and development include:

- The National Strategy for Waters
- Water Management Master Plan of the Republic of Macedonia, and
- River basin management plans.

For the purpose of maintenance and improvement of the quality of water and establishment of the adequacy of water for use for different purposes, the Law on Waters specifies classification of waters and categorization of water bodies, as well as specification of deadline for achievement of the water quality goals for each water category and specification of the minimum standards for water quality and environmental protection goals for all water bodies. According to the Law, management plan will be adopted for each river basin, in order to achieve the environmental protection objectives.

The Decree on categorization of water courses, lakes, accumulations and water resources (1999) specifies the quality of water by specific classes of water in water bodies, lakes, accumulations and groundwater resources. This Decree also establishes five categories of water courses.

Targets

Reduction and prevention of water pollution and thus achievement of good ecological status or potential of waters. RequirementsoftherelevantEUDirectiv es, namelyFWD, on urban wastewater treatment, on nitrates, on hazardous substances, as well as Directives on drinking and bathing waters, have been transposed in the Law on Waters).

Key policy issue

Has pollution of rivers by biochemical oxygen demand (BOD_5) and ammonium not noted increase?

Key message

During the assessed period from 2002 to 2011, significant reductionin BOD_5 and concentrations of ammonium in rivers was tracked in the Republic of Macedonia in 2003, 2009 and 2010, and slight in crease in BOD_5 concentration and ammonium concentration was tracked in 2022. The rest of the period is characterized with stable trend in BOD_5 concentrations. As far as ammonium concentrations are concerned, there are significant variations in the rivers every year. At some monitoring stations, located on the rivers Crna Reka and Vardar, eutrophic water status with high BOD value was recorded. These results could reflect the status of inefficient treatment of urban and industrial wastewaters in the country, as well as the inadequate protection of river basins.

Adequate protection of rivers, and especially the introduction of regular wastewater treatment in the country, is the top priority of the policy at both national and local levels.

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Figure 1. Biochemical oxygen demand (BOD_5) in rivers

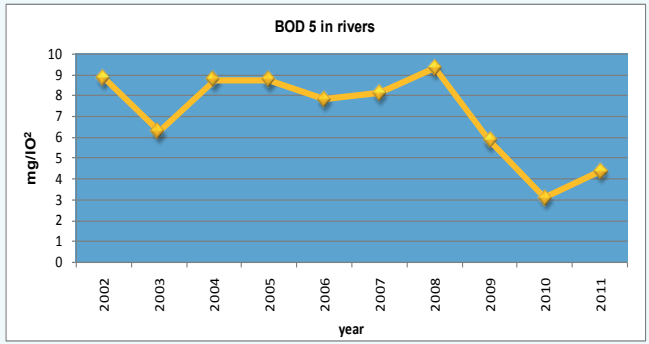


Figure2. Biochemical oxygen demand (BOD_5) in rivers by river

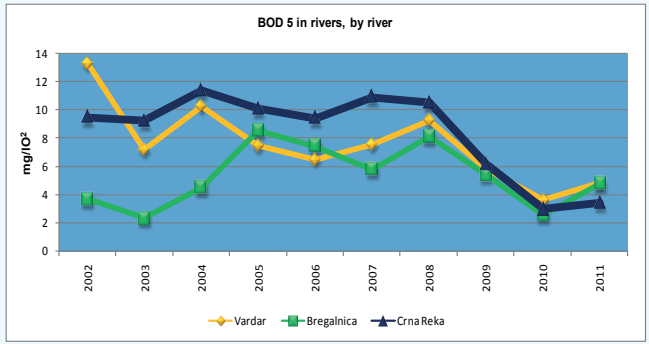


Figure3. Total ammonium in rivers

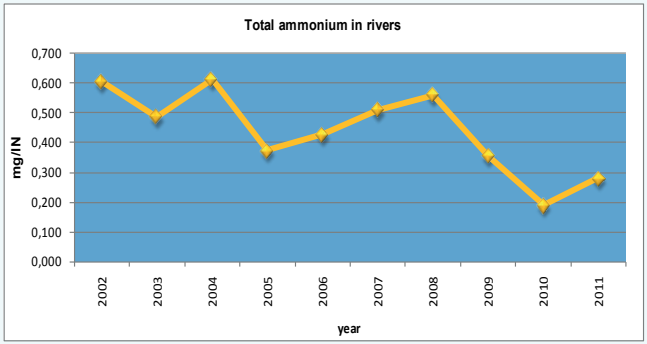
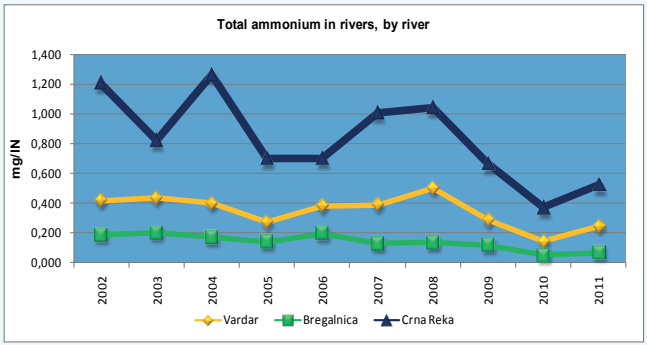


Figure4. Total ammonium in rivers by river



Assessment

After end of oscillating BOD_5 and ammonium concentrations was tracked int he rivers in the Republic of Macedonia at certain measuring points in the period 2002-2011. Drop in BOD 5 and ammonium concentrations was tracked in 2009 and 2010. Eutrophic status with high BOD was particularly recorded in two rivers: Crna Reka and Vardar. These results could reflect the status of inefficient treatment of urban and industrial wastewaters in the country, as well as the inadequate protection of river basins.

Methodology

- Methodology for the indicator calculation

Indicators calculation is based on the methodology established by Eurowaternet, determined by the European Topic Centre for water under the European Environmental Agency.

This process defines the manner of selection of the monitoring stations, the types of parameters to be monitored, as well as thefrequency of their collection

Data specification

Title of the indicator	Source	Reporting obligation
Oxygen consuming substances in rivers	– MEPP – HMA – HBI	– EEA

Data coverage:

Table 1: BOD_5 in the rivers

Year	2002	2003	2004	2005	2006	2007	2008	2009	2008	2009	2010	2011
BOD_5 (mg/lO_2)	8,81	6,25	8,72	8,7	7,79	8,08	9,29	5,82	9,29	5,82	3,09	4,36

Table 2: BOD_5 in the rivers, by individual river (mg/lO_2)

River/Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vardar	13,28	7,18	10,27	7,46	6,52	7,55	9,27	5,88	3,67	4,86
Bregalnica	3,68	2,36	4,50	8,55	7,44	5,79	8,09	5,41	2,60	4,79
Crna Reka	9,47	9,22	11,38	10,08	9,41	10,91	10,51	6,16	3,00	3,44

Table 3: Total ammonium in the rivers

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total ammonium(mg/lN)	0,60	0,49	0,61	0,37	0,43	0,51	0,56	0,36	0,19	0,28

Table 4: Total ammonium in the rivers, by river (mg/lN)

River/Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vardar	0,42	0,43	0,40	0,27	0,38	0,39	0,50	0,29	0,15	0,25
Bregalnica	0,19	0,20	0,17	0,14	0,20	0,13	0,14	0,12	0,05	0,07
Crna Reka	1,20	0,82	1,27	0,70	0,70	1,01	1,04	0,67	0,37	0,53

General metadata

Code	Title of the indicator	Compliance with CSI EEAor other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 019	Oxygen consuming substances in rivers	CSI 019	Oxygen consuming substances in rivers	S	A	- water	annual

Definition

Concentrations of orthophosphate and nitrate in rivers, total phosphorus and nitrate in groundwater bodies. The indicator can be used to illustrate geographical variations in current nutrient concentrations and temporal trends.

Units

- Concentration of nitrate is expressed as mg nitrate (NO_3)/l, and orthophosphate and total phosphorus as mgP/l.

Policy relevance of the indicator

List of relevant policy documents:

The National Environmental Action Plan - 2 and the Environmental Monitoring Strategy and Environmental Data Management Strategy.

Strategy for Waters has been developed in order to establish long-term policy that will secure sustainable development of waters by meeting the demands of all water users, protecting waters against pollution and providing pollution control.

The Law on Waters transposing the following EU Directives into the national legislation:

- Framework Water Directive (FWD) 2000/60/EEC, according to which, by the year of 2015, rivers in EU should achieve good ecological status or good ecological potential.

- Directive on nitrates (91/676/EEC), the goal of which is to reduce nitrates and pollution by organic matter originating from agricultural lands.

- Directive on urban wastewater treatment (91/271/EEC) aimed at reducing the pollution from sewerage and industrial wastewater treatment plants.

The Law on Environment has transposed the Directive on Industrial Pollution Prevention and Control (IPPC) 96/61/EEC is aimed at control and prevention of water resources pollution by industry.

Legal grounds

The Law on Waters prescribes the main planning documents for water protection, maintenance and permanent improvement of available water resources and sustainable use of available water quantities.

The main planning documents for water management planning and development include:

- The National Strategy for Waters
- Water Management Master Plan of the Republic of Macedonia, and
- River basin management plans.

For the purpose of maintenance and improvement of the quality of water and establishment of the adequacy of water for use for different purposes, the Law on Waters specifies classification of waters and categorization of water bodies, as well as specification of deadline for achievement of the water quality goals for each water category and specification of the minimum standards for water quality and environmental protection goals for all water bodies. Such plans contain environmental protection objectives in order to achieve good status of surface water bodies (good quantitative and chemical status, including also good ecological potential) and ground water resources (good quantitative status and chemical status).

The Decree on categorization of water courses, lakes, accumulations and water resources (1999) specifies the quality of water by specific classes of water in water bodies, lakes, accumulations and groundwater resources. This Decree also establishes five categories of water courses

Under the Law on Waters, authorities responsible for health protection are obliged to carry out monitoring of waters intended for human consumption and bathing waters, and for undertaking measures for active protection of the population against communicable diseases of high social and health relevance. The competent institutes perform microbiological parasitological, hygienic, toxicological and biochemical analyses within the scope of their activity.

Programme for preventive health protection performs monitoring over the quality of surface waters at all points of health interest, in order to enable timely undertaking of measures for population protection. Waters used as drinking water sources, sports and recreation and primary agricultural production are of highest interest.

Targets

The indicator is not related directly to the requirements of a single Directive. Ecological quality of surface water requiring reduction of eutrophication and nutrient

concentrations is a target specified in several Directives, namely:

- Directive on drinking water (98/83/EC) – maximum permissible concentration of nitrates is 50 mg/l;
- Directive on abstraction of surface water intended for drinking (75/440/EEC) requires nitrates concentration of 25 mg/l.
- Directive on nitrates (91/676/EEC) requires identification of groundwater bodies where the annual concentration exceeds or may exceed 50 mg/lnitrates.
- Directive on urban wastewater treatment (91/71/EEC) specifies reduction of the pollution caused by organic matter as its objective.

Key policy issue

Has the nutrients concentration in water courses shown rising trend?

Despite of the absence of continuous monitoring of the status of groundwaters quality in the Republic of Macedoniaduring the last years, it can be stated that the concentration of nitrates in drinking water has been in a stable environmental health status.

With regard to rivers, increased annual mean value of nitrates was recorded in 2003 in the river of Bregalnica, while the highest annual mean value of orthophosphates was recorded in 2004 in the River of Vardar. The remained period up to 2011 is characterized by fall in the annual mean value of orthophosphates in rivers.

Throughout the investigation period, the Lake of Ohrid has sustained its oligotrophic nature as shown on the Table on the concentrations of phosphorus and nitrates. Significantly higher concentration was found in the waters of the Lake of Prespa, thus increasing the risk of Lake's water eutrophication.

Figure 1. Nitrates and orthophosphatesin rivers

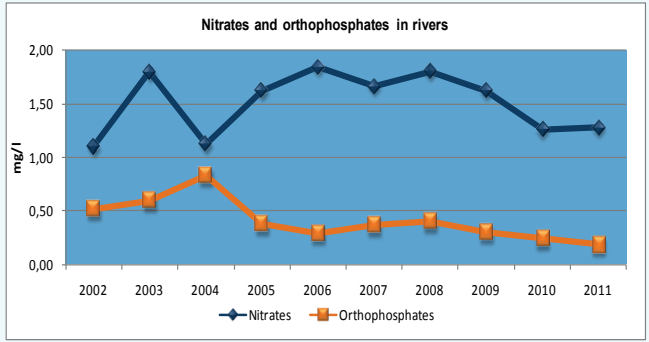


Figure2. Nitratesin rivers by river

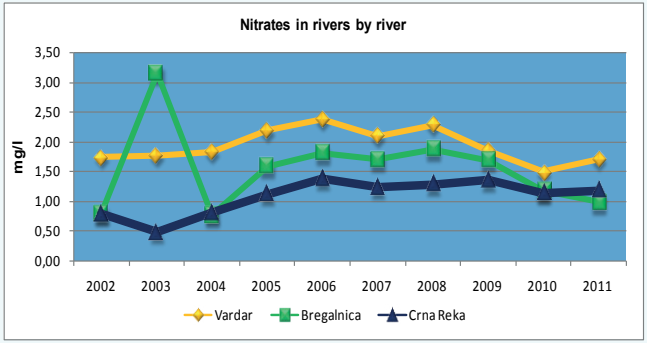


Figure3. Orthophosphatesin riversby river

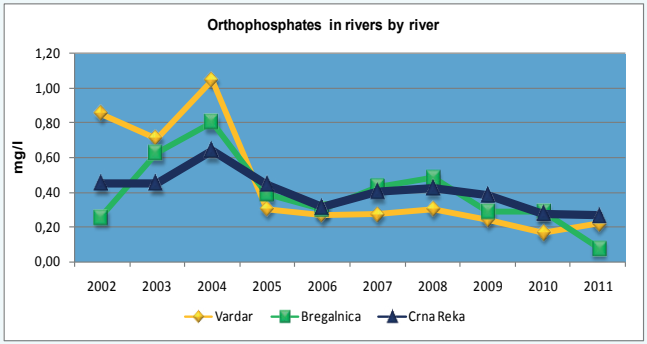


Figure 4. Total phosphorous in lakes

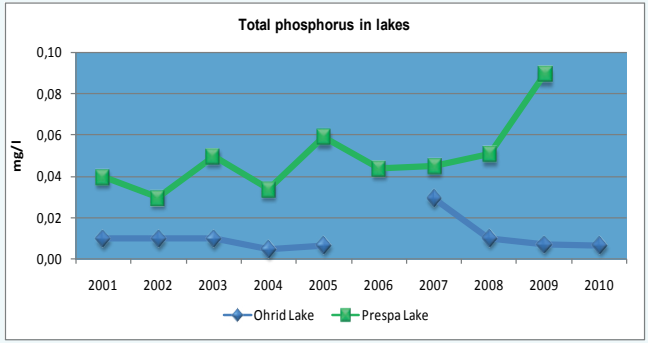
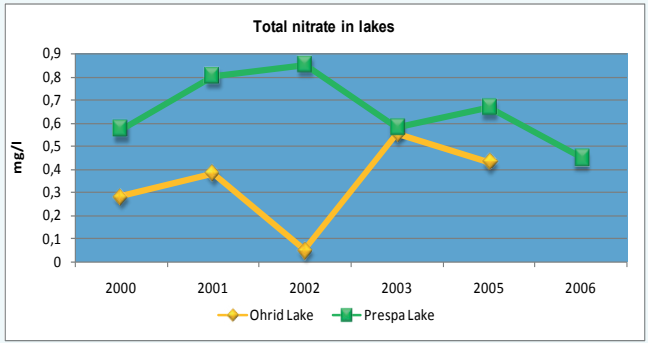


Figure 5. Total nitrate in lakes



Assessment

Annual mean concentrations of nitrates and orthophosphates have remained relatively stable since the beginning of 1990's. It has been found out that the concentration of these parameters is higher at certain measuring points of Vardar River.

Analysis of the results from the measurements in the plagial parts of OhridLake throughout the period has confirmed the oligotrophic nature with relatively stable concentrations of phosphorus (below 0.015 mg./l), with higher concentrations of phosphorous (0.030 mg/l)recorded in 2007 in Ohrid Lake and nitrates concentrations within permissible limits (mean annual concentrations below 0.55 mg/l). Concentrations are significantly higher in Prespa Lake, where organic compounds are found at high levels, thus increasing the risk of Lake's water eutrophication.

Methodology

- Methodology for the indicator calculation

The calculation of the indicator is based on the methodology established underEurowaternet, established by the European Topic Centre for waters of the European Environmental Agency.

Under this process, the manner of selection of monitoring stations is defined and the type of monitoring parameters and the frequency of their collection are specified.

Data specification

Title of the indicator	Source	Reporting obligation
Nutrients in freshwater	– MEPP – HMA – HBI	– EEA

Data coverage:

Table 1: Nitrates and orthophosphate in rivers

Nutrients/year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Nitrate(mg/lN)	1,11	1,80	1,13	1,62	1,85	1,67	1,81	1,63	1,26	1,28
Orthophosphate(mg/lP)	0,52	0,60	0,83	0,38	0,30	0,37	0,40	0,31	0,25	0,19

Table 2: Nitrate (mg/lN)in rivers by river

River/year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vardar	1,73	1,76	1,82	2,17	2,37	2,08	2,27	1,85	1,49	1,70
Bregalnica	0,80	3,14	0,76	1,58	1,80	1,69	1,87	1,69	1,17	0,98
Crna Reka	0,78	0,49	0,81	1,12	1,37	1,23	1,28	1,35	1,13	1,17

Table 3: Orthophosphates (mg/lP)in rivers by river

River/year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Vardar	0,85	0,71	1,05	0,31	0,27	0,27	0,30	0,24	0,17	0,22
Bregalnica	0,26	0,62	0,80	0,39	0,30	0,43	0,48	0,29	0,29	0,08
Crna Reka	0,45	0,45	0,64	0,44	0,32	0,40	0,43	0,38	0,28	0,27

Table 4: Total phosphorus in lakes

Lake/year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Ohrid Lake	0,01	0,01	0,01	0,01	0,01		0,03	0,01	0,01	0,01
Prespa Lake	0,04	0,03	0,05	0,03	0,06	0,04	0,05	0,05	0,09	

Table 5: Total nitrate in lakes

Lake/year	2000	2001	2002	2003	2005	2006
Ohrid Lake	0,28	0,38	0,05	0,55	0,43	
Prespa Lake	0,57	0,8	0,85	0,58	0,67	0,45

General metadata

Code	Title of the indicator	Compliance with CSI/ EEAor other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 020	Nutrients in freshwaters	CSI 020	Nutrients in freshwater	S	A	– Water	Annually

Definition

The indicator describes the changes over time in the quality of designated bathing waters in terms of compliance with standards for microbiological parameters (total coliforms and faecal coliforms) and physicochemical parameters (mineral oils, surface-active substances and phenols) introduced by the EU Bathing Water Directive (76/160/EEC).

Units

- The data is expressed in a form of percentage of inland bathing waters with mandatory standards and levels specified in guidelines for microbiological and physicochemical parameters..

Policy relevance of the indicator

List of relevant policy documents

The National Environmental Action Plan - 2 and the Environmental Monitoring Strategy and Environmental Data Management Strategy.

Bathing Water Directive (76/160/EEC) requires the countries to designate water bodies intended for bathing and carry out monitoring of their quality during the bathing period. Water bodies designated for bathing are those water bodies designated by the competent authorities and those where bathing has been practiced traditionally by high number of swimmers. The bathing period is determined in accordance with the period during which the highest number of swimmers is present. Qualitative monitoring takes place on daily basis during the bathing season, as well as two weeks before the commencement of the bathing season. 95% of the samples have to comply with mandatory standards.

Legal grounds

Law on Waters, Decree on categorization of water courses, lakes, accumulations and water resources.

Targets

It is necessary that all water bodies designated for bathing comply with mandatory values of water quality specified in Bathing Water Directive and the provisions of the Law on Waters..

Key policy issue

Has the quality of bathing water improved?

Key message

The quality of lake water is at mainly satisfactory level. However, there are rivers which with their entry into the lakes contribute to deterioration of the quality of lake water. The percentage of samples with non-compliant quality is still very high (especially for physical and chemical parameters) Settlements around the three natural lakes are among the rare ones with wastewater treatment plants available in the country.

Approximation of the national legislation and standards in this area with the EU Bathing Water Directive should continue.

Figure 1.Quality of bathing freshwater - lakes

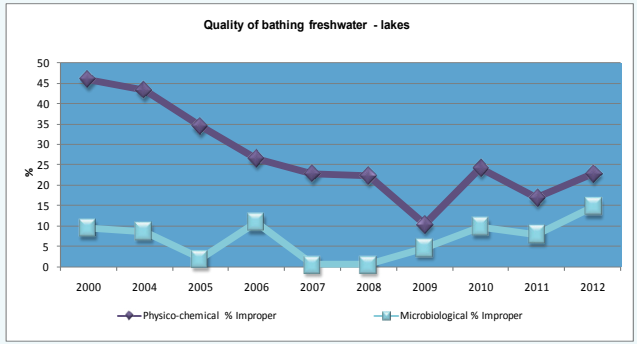
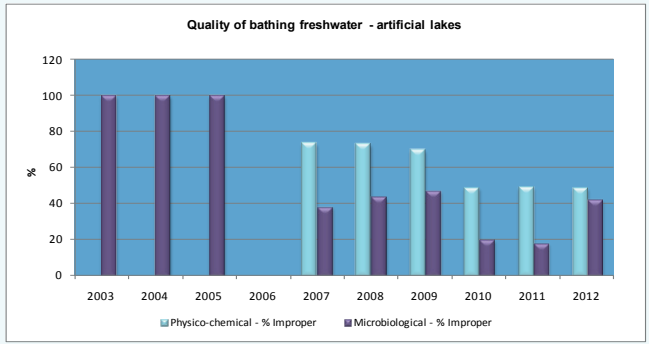


Figure2.Quality of bathing freshwater – artificial lakes



Assessment

The greatest proportion of water areas in the country belongs to natural lakes, the shores of which are used for recreation purposes. Thequalityofwater in these lakes is threatened by discharges of wastewater, uncontrolled use of lake waters for agricultural and tourismpurposes, as well as by weather conditions. Apart from natural lakes, there are artificial lakes - water accumulations in the Republic of Macedonia, used for both recreation and economic purposes.

The problems of bathing water quality protection in the lakes are closely related to the implementation of one of the highest priorities in the country›s environment protection - construction of adequate wastewater treatment facilities.

As international waters, the waters of the biggest natural lakes, i.e. Ohrid and Prespa, are also subject of bilateral and trilateral agreements between the Republic of Macedonia, Republic of Albania and Republic of Greece, respectively.

Methodology

- Methodology for the indicator calculation

Standard methodology for sampling - annual data.

Data specification

Title of the indicator	Source	Reporting obligation
Bathing water quality	– Public Health Institute of the Republic of Macedonia	– WHO

Data coverage:

Table 1: Bathing water quality – lakes

Parameter	Physico-chemical	Microbiological
Year/ % Improper	% Improper	% Improper
2000	45,80	9,47
2004	43,13	8,63
2005	34,37	1,93
2006	26,54	10,81
2007	22,83	0,63
2008	22,29	0,63
2009	10,42	4,69
2010	24,22	9,75
2011	16,95	7,9
2012	22,76	14,63

Table 2: Bathing water quality – artificial lakes

Year	Number of samples	Physico-chemical % Improper	Microbiological % Improper
2003	18	0	100
2004	20	0	100
2005	16	0	100
2006			
2007	83	73,49	38,55
2008	63 ph.c.; 57 mic.	73,01	43,86
2009	63 ph.c.; 57 mic.	69,8	47,3
2010	98 ph.c.; 98 mic.	48.97	20.4
2011	87 ph.c.; 87 mic.	49.42	18.4
2012	82 ph.c.; 82 mic.	48.78	42.68

General metadata

Code	Title of the indicator	Compliance with CSI/ EEAor other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 022	Bathing water quality	CSI 022	Bathing water quality	S	B	– shore – water	annually

Definition

This indicator shows the exceedance of limit values set in Drinking Water Directive (80/778/EEC) and its amendment (98/83/EC which entered into force in 2003) and in the Rulebook on drinking water safety (Official Gazette of the Republic of Macedonia No.57/04), as well as the guideline values set for the quality of drinking water by the World Health Organization (WHO, 2004 and 2006).

Exceedance of drinking water quality limit values occurs when the concentration/dose of the pollutant exceeds the limit values specified in the above listed regulations.

Where more than one limit values exist (see the section on Policy goals), the indicator shall adopt the most strict case.

Units

- Numberofaerobicmesophilicbacteriain 1 ml,
- Number of coliform bacteria in 100 ml,
- Number of thermo-tolerant coliform bacteria in 100 ml,
- Concentration of physico-chemical pollutants in mg/l,
- Parameters for radiological safety of drinking water in bekerels/l and total indicative dose in mSV/l.

Policy relevance of the indicator

List of relevant policy documents:

The National Environmental Action Plan - 2 (2006) sets the improvement of the quality of drinking water through reduction of emissions of the main pollutants into surface and groundwaters as its main objective. The same document specifies the primary measure to be applied: to strengthen the processes of drinking water quality monitoring and assessment.

The 1999 National Environmental Health Action Plan (NEHAP) sets two main objectives:

- Reduction and minimization of health risks for the population through provision of drinking water for every citizen, which is safe from health point of view, sufficient in quantity, with guaranteed microbiological, organoleptical and physico-chemical composition, compliant with national standards and WHO Guidelines, as well as waters intended for sports and recreation and healthy food production;

- Reduction of exposure to toxic chemicals through water originating from agriculture and industry.

The NEHAP also sets the following priorities:

- approximation of the legislation on the quality of

ambient and drinking waters with the recommendations of the EU (approximation completed in 2004) and with the WHO Guidelines;

- introduction of disincentive prices for non-earmarked consumption of drinking water by commercial and non-commercial users and restrictive prices for the population in circumstances of draught for the purpose of consumption streamlining (implemented under the Law on Drinking Water Supply and Urban Wastewater Collection);

- establishment of sanitary protection zones around water supply sources in order to prevent contamination of anthropogenic origin (permanent process performed and most of the public utilities have established zones in line with the Elaborates for sanitary protection zones developed by the Public Health Institution RIHP and other authorised vocational institutions);

- completion of the process of construction of municipal and industrial wastewater treatment systems;

- monitoring of the quality of surface and groundwaters, especially at drinking water abstraction, places intended for sports and recreation and points for abstraction of water for irrigation, monitoring of discharged untreated and treated municipal and industrial wastewaters in accordance with EU and WHO Guidelines (monitoring is performed regularly and continuously by the Public Health Institute - Skopje and the 10 Regional public health centers with their local units);

- although the pilot project for fluoridation of milk consumed by pre-school children has been initiated, introduction of drinking water fluoridation as the most efficient, the least costly and socially and medically most fair means for massive caries prophylaxis has remained as public health option.

Legal grounds

Law on Health Protection, Law on Waters, Programme for preventive health protection in the Republic of Macedonia for 2011, Law on Drinking Water Supply and Urban Wastewater Collection, Decree on Water Classification, which in its Article 2, specifies five classes of surface watercourses, lakes and accumulations and ground water resources.

The Law on Food and Food stuffs and Materials in Contact with Food, in its Article 4 includes drinking water as food.

Rule book on drinking water safety (sets frequency of drinking water safety control).

In the Law on Nature Protection, one of the main goals defined in Article 4, item 6 of the Law is the securing of the right of citizens to a healthy environment.

The following EU Directives have been transposed in the new legal acts:

Drinking Water Directive (80/778/EEC) and its amendment (98/83/EC which entered into force in 2003).

Targets

The Rulebook on drinking water safetyspecifies the limit values for the parameters monitored in drinking water in terms of human health protection.

Limit values of concentrations of certain parameters in drinking water:

- According to the said Rulebook, limit values have been specified for the purpose of human health protection, harmonized with the EU Directive and WHO Guidelines on the quality of drinking water (2004).

Key policy issue

What progress has been made in reducing the concentrations of pollutants in urban and rural environments in order to reach drinking water limit values specified in the Rulebook?

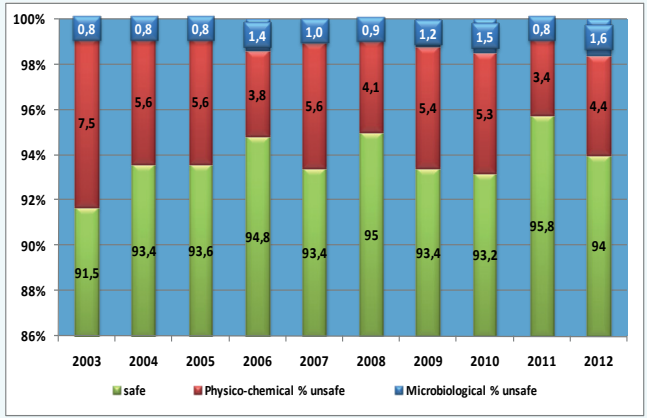
Key message

Bacteriological contamination of drinking water in rural environments, where no regular disinfection of drinking water is carried out in local water supply systems.

Drinking water quality

Access to safe drinking water in the Republic of Macedonia amounts 93% (period from 2003 to 2006) with a note that population in urban areas has 99% access to safe drinking water and 78% of rural population has access to health safe drinking water, while the rest is exposed at occasional risk of bacteriological pollution of drinking water.

Figure 1.Drinking water quality in percentage



Assessment

Quality of drinking water

Sanitary and hygienic condition of facilities and health safety of analyzed water samples are, generally, satisfactory, i.e. within the expected limits compared to previous years. In the period 2003-2012, the percentage of unsafe samples based on physical and chemical analysis ranged between 3.4 and 7.5 %, while the percentage of unsafe samples based on microbiological analysis ranged between 0.8 and 1.6%. The most frequent causes of unsafe findings in the physical and chemical include absence of residual chlorine or increased content of iron in raw water and in very few samples it is due to increased content of nitrites from dag or drilled wells of individual users.

With bacteriologically positive findings, the cause is mostly increased number of aerobic mesophile bacteria. Toxic parameters are within the prescribed legal norms.

In the segment of health safe drinking water supply in rural populated places, the deficiencies in terms of undefined sanitary protection zones around drinking water sources, lack of adequate equipment for drinking water filtering and disinfection and inappropriate technical maintenance, have been constantly present. Therefore, there is high percentage of bacteriologically unsafe (9-25%).

Methodology

- Methodology for the indicator calculation

Drinking water quality

Data is, generally, representative for the whole urban area in the Republic of Macedonia. The indicator is subject to modifications from year to year, depending on the introduction of new wastewater treatment plants and in line with the enhanced trend of rural population coverage with safe drinking water supply.

- Data uncertainty

Data is, generally, representative for the whole urban area in the Republic of Macedonia. Representativeness of monitoring selection is in accordance with the requirements of Directive 98/83/EC.

Data specification

Title of the indicator	Source	Reporting obligation
Drinking water quality	– PHC – 10 Regional – Public Health Institute of the Republic of Macedonia	– European Environmental Agency – Exchange of data on drinking water quality, based on the Council decision on the establishment of reciprocal exchange of information and data on drinking water quality (98/83/EC). – World Health Organization - ENHIS – Drinking water quality, in line with the WHO Guidelines on drinking water quality of 1987 and 2004, respectively.

Data coverage:

Table 1: Drinking water quality in percentage

Year	safe	Physico-chemical	Microbiological
		% unsafe	% unsafe
2003	91,5	7,5	0,8
2004	93,4	5,6	0,8
2005	93,6	5,6	0,8
2006	94,8	3,8	1,4
2007	93,4	5,6	1,0
2008	95	4,1	0,9
2009	93,4	5,4	1,2
2010	93,2	5,3	1,5
2011	95,8	3,4	0,8
2012	94	4,4	1,6

General metadata

Code	Title of the indicator	Compliance with CSI/ EEAor other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 039	Drinking water quality	WEU13	Drinking water quality	S	A	– Water quality	Annually

Definition

The indicator tracks the trend in irrigated areas in a given time interval on the whole territory of the Republic of Macedonia, as well as total quantities of consumed water on the entire territory and proportion of irrigated land compared to the total cultivable land area.

Units

- Area of irrigated land (expressed in hectares), quantity of water used for irrigation expressed in cubic meters consumed at annual level, % of irrigated land in the total cultivable land area.

Policy relevance of the indicator

List of relevant policy documents:

The National Environmental Action Plan - 2 and Environmental Monitoring Strategy and Data Management Strategy.

The policy for sustainable use of water resources based on the Sixth Environmental Action Programme and Framework Water Directive requirements as transposed in the national Law on Waters.

Legal grounds

The Law on Waters provides for integrated approach, specifying the conditions and the manner of waters use and allocation, protection against harmful impacts of water, as well as standards and values for water quality and control of pollution, while taking into account integration of measures and activities for water protection in all development, strategic, planning and programme documents.

The main planning documents for water management planning and development include:

- The National Strategy for Waters
- Water Management Master Plan of the Republic of Macedonia, and
- River basin management plans.

The National Strategy for Waters is aimed at establishing long-term policy to ensure sustainable use of water by meeting the demands of all users with adequate quality water in sufficient quantities, rational and cost-effective consumption of waters, water protection against contamination and contamination control.

The Water Master Plan of the Republic of Macedonia

provides for integrated planning and implementation of programmes and measures, technical and economic solutions for rational water use, protection of waters against contamination and protection against harmful impacts of water, based on the principles of sustainable development and the timeframe for their implementation.

The River Basins Management Plans enable maintenance and improvement of water regime. Such Planscontainthe environmental protection goals, good status of surface water bodies (good quantitative status and chemical status, including good ecological potential) and ground water resources (good quantitative status and chemical status).

Use of water for different purposes is specified under the Decree on Water Classification, according to which water is divided into five different classes based on the level of pollution, while water characteristics are determined on the basis of classes and purposes for which water can be used.

Targets

No specific targets.

Key policy issue

Is the water abstraction based on water-sustainability?

Key message

An uneven trend in water use for land irrigation was observed in the period between 2002 and 2011, due to weather conditions in the given year, as well as to organization all restructuring of the sector. Particular fall in water use for land irrigation was recorded in 2006 and 2007.

Data is not part of the official statistics published in the country.

Figure 1.Use of water resources

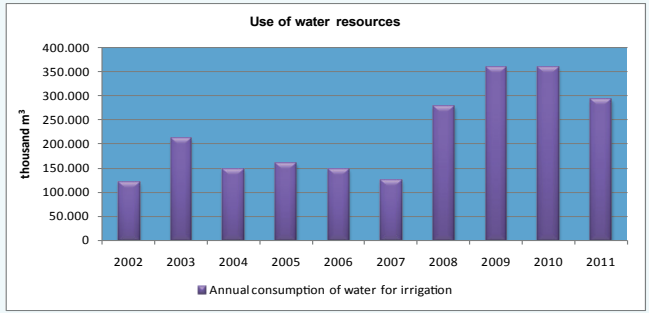


Figure 2.Total area irrigated

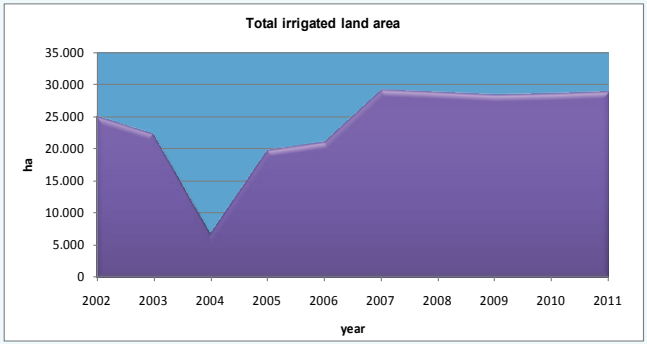
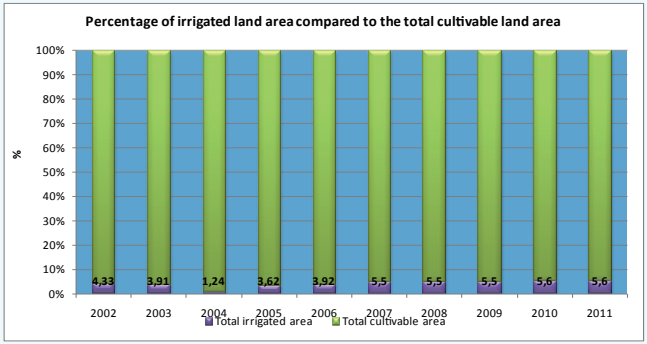


Figure3.Percentage of irrigated area relative to total cultivated land area



Assessment

Figure 2 shows the whole irrigated land area for the period 2002-2011, reflecting anuneventrendinwater useforlandirrigation. Thereisanevident data that the quantity of water consumed by this sector in 2004 was significantly lower compared to the entire successive interval. This is due to the favorable weather conditions in 2004, when increased number of precipitation and increased water masses were noted. Figure 3presents the percentage of irrigated land area compared to the entire cultivable land area in the Republic of Macedonia, showing that the percentage is really low with the average being below 5% for the entire time interval, except from 2007 to 2011 when higher percentage was recorded, reaching 5.6%.

Methodology

- Methodology for the indicator calculation

Data is collected and processed by years.

Data specification

Title of the indicator	Source	Reporting obligation
Irrigated land	– State Statistical Office	– OECD/EUROSTAT

Data coverage:

Table 1: Use of water resources

(thousand m^3)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Annual consumption of water for irrigation	281.400	293.300	244.800	255.100	182.000	125.500	278.000	360.000	360.000	293.000

Table 2: Area of irrigated land*

h/y	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total irrigated land area	22.267	6.967	19.787	21.038	29.059	28.690	28.281	28.476	28.791

*Data covers only land area irrigated in agricultural cooperatives and agricultural companies

Table 3: Total cultivable land

h/y	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total cultivable land area	569.000	560.000	546.000	537.000	526.000	521.000	513.000	508.967	511.316
Total irrigated land area	22.267	6.967	19.787	21.038	29.059	28.690	28.281	28.476	28.791

Table 4: Percentage of irrigated area compared to total cultivable area

%	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total cultivable land area	100	100	100	100	100	100	100	100	100
Total irrigated land area	3,9	1,2	3,6	3,9	5,5	5,5	5,5	5,6	5,6

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 040	Irrigated land	WQ4	Irrigated land	D	A	– Water	Annually

AGRICULTURE

AREAS UNDER ORGANIC FARMING

Definition

The indicator is calculated as share (percentage) of area under organic farming (sum of existing areas under organic farming and areas in a process of conversion for organic farming) in the total area or total cultivable land area.

Units

The indicator is presented as sum of area under organic farming and area being converted for organic farming, measured in ha. Share of organic farming is given as a percentage of total utilized agricultural area.

Policy relevance of the indicator

List of relevant political documents

- National strategy with action plan for development of organic farming in the Republic of Macedonia 2008-2011
- Strategy for agriculture and rural development – condition and need to establish agro-environmental policy.
- The Strategy for compliance of the Macedonian agricultural and food sector with the EU Common agricultural policy – indicates the need to identify the regions suitable for organic farming and to comply with the European regulations.
- The Treaty with the World Trade Organization – improvement of the international food safety standards
- The Second National Environmental Action Plan – strives to include environmental issues directly in the agricultural development policy and to maintain the natural resources needed for sustainable development on high level. In accordance with this, a control and certification body for organic agricultural production, recognized by the EU has been defined and established.
- National strategy for biodiversity with Action Plan
- National strategy for sustainable development

Legal grounds

The framework for the organic farming is established by the Law on Organic Farming and regulations which are in a process of adoption; the Law on Stimulating Agriculture Development, Law on Environment and Law on Nature Protection.

The provisions of this Law have been harmonized with international and European ones, especially with EU Regulation No.2092/91, which is of particular importance in the context of future development of trade exchange in organic products with European countries.

Targets

In 2011, the organic cultivable land has a 2% share in the total cultivable land in Macedonia.

In 2011, while the wild collection area has a share of 5% in the total cultivable area in Macedonia.[1]

Клучно прашање за креирање на политиката

Дали уделот на органското обработливо земјиште во однос на вкупното обработливо земјиште е во пораст?

Клучна порака

Во периодот од 2005 до 2011 година површините со органско земјоделско производство и бројот на органски оператори е во постојан пораст, со што трендот на органско производство е во постојан пораст во Република Македонија.

Во 2011 година површините со органско земјоделско производство пораснале на 6.580,92 хектари и во однос на вкупната обработлива површина органското производство учествува со 1,288%, што значи дека сеуште не е постигната целта од 2%, во однос на вкупната земјоделска површина изнесува 0,588%. Бројот на сертифицирани органски оператори пораснал од 50 во 2005 на 780 во 2011 година.

1 National Strategy and Action Plan for organic agriculture in the Republic of Macedonia 2008-2011 http://www.mzsv.gov.mk/files/NSAP%20Mkd.pdf

Figure 1. Area with organic agricultural production

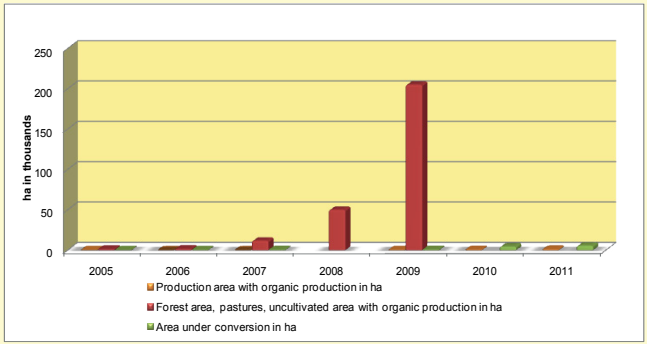


Figure 2. Share of area with organic agricultural production in cultivable and total agricultural area.

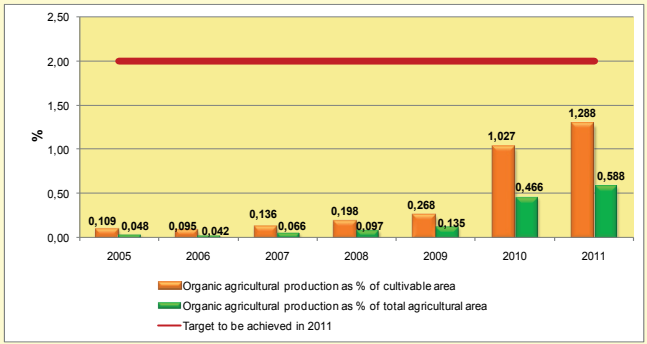


Figure 3.Vegetable organic production in 2011 in ha

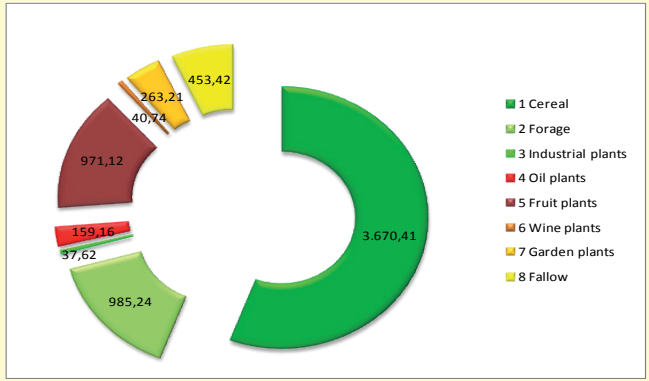
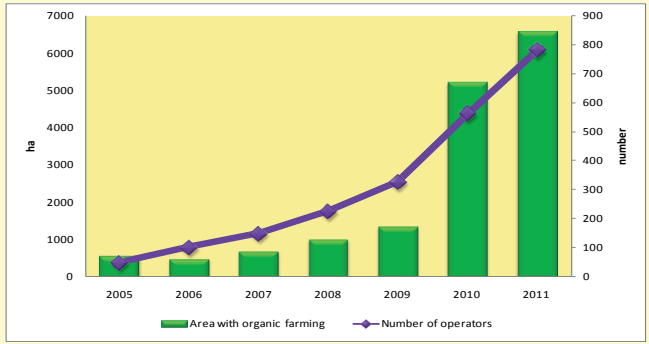


Figure 4. Ratio between the number of operators and the area under organic agricultural production



Assessment

In the period 2005-2011, the production areas with organic farming have increased from 266 ha to 1007,26 ha subsequently. There is also an increase in areas under conversion from 327 to 5573,66 ha.

The share of organic farming areas in the total cultivable area has grown from 0,109% in 2005 to 1,288% in 2011. This growth is insignificant given that, according to the National strategy for organic production, the target for 2 % share of organic cultivable area should be achieved in Macedonia.

It can be noted from Figure 3 that cereals are the main organic culture in Macedonia in 2011, with share of 55,77%, followed by forage with 14,97 % share, while the industrial cultures have the smallest share with 0,57 % of the overall certified areas.

The number of certified organic operators in the period 2005-2011 has grown proportionally with the growth of the area under organic agricultural farming (figure 4).

Methodology

The method of the European Environmental Agency.

The indicator is presented as sum of area under organic farming and area being converted for organic farming, divided by the total cultivable land area or total agricultural area. This value is multiplied by 100 in order to present the value in percentage.

Data specification

Title of the indicator	Data Source	Reporting responsibilities
Areas under organic farming	– Statistical Yearbook, State Statistical Office – Ministry of Agriculture, Forestry and Water Economy, Division of Organic farming.	– Annual report for quality of the environment in the Republic of Macedonia – Environmental statistics – European Environment Agency

Data coverage:

Table 1: Total cultivable area and total agricultural area

	2005	2006	2007	2008	2009	2010	2011
Cultivable area in ha	546.000	537.000	526.000	521.000	513.000	509.000	511.000
Total agriculture area in ha	1.229.000	1.225.000	1.077.000	1.064.000	1.014.000	1.121.000	1.120.000

Table 2: Areas under organic agricultural production

	2005	2006	2007	2008	2009	2010	2011
Production area with organic production in ha	266	7	37		426	719,5	1007,26
Forest area, pastures, uncultivated area with organic production in ha	1.300	1.592	11.775	50.000	204.956		
Area under conversion in ha	327	503	677		947	4505,5	5573,66
As % of the cultivable area	0,109	0,095	0,136	0,198	0,268	1,027	1,288
As % of the total agricultural area	0,048	0,042	0,066	0,097	0,135	0,466	0,588

Table 3: Organic vegetable production in ha

	type/culture	2009	2010	2011
1	Cereal	667,87	2.999,8	3.670,41
2	Forage	183,09	994,6	985,24
3	Industrial plants	43,63	32,1	37,62
4	Oil plants	63,78	47,4	159,16
5	Fruit plants	211,03	334,2	971,12
6	Wine plants	60,17	244,3	40,74
7	Garden plants	142,86	199,9	263,21
8	Fallow		372,7	453,42

Table 4: Number of operators and area under organic farming in ha

	Number of operators	Area with organic farming
2005	50	592,54
2006	102	509,42
2007	150	714,47
2008	226	1029
2009	327	1.372,43
2010	562	5225
2011	780	6.580,92

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
МК НИ 026	Area under organic farming	CSI 026	Area under organic farming	R	A	– agriculture – biological diversity	Annually

MK - NI 08

MINERAL FERTILIZER CONSUMPTION

Definition

Mineral fertilizers are substances containing chemical elements required for plants growth, especially nitrogen, phosphorus and potassium.

This indicator shows the consumption of mineral fertilizers in the Republic of Macedonia, by presenting total amounts in tonnes consumed substances, and their application per hectare cultivated land area.

Units

- Total amounts in tonnes consumed mineral fertilizers, and their application per hectare cultivated land area(kg/ha).

Policy relevance of the indicator

List of relevant policy documents:

The Second National Environmental Action Plan (NEAP 2) specifies the measure for rationale use of natural resources, as well as controlled use of mineral fertilizers. The same document also specifies the measure for establishment of monitoring and information system for soil, to monitor the mineral fertilizers consumption.

Legal grounds

The Law on Agricultural Landspecifies the measures for improved agricultural land fertility through undertaking of agrotechnical measures, one of them being fertilizers application, i.e. use of mineral fertilizers. It is specified that agriculturallandprotection against pollution and contamination is performed by prohibition, restriction and prevention of direct input of harmful matters in soil, input of harmful matters through water and air and undertaking of other measures for its productivity maintenance and improvement. It is also specified that, for the purpose of agricultural land protection against pollution and contamination, the provisions contained in the regulations on environment and nature protection and improvement shall apply accordingly.

The Law on Fertilizers Use regulates the manner of fertilizers use.

The Law on Nature Protection, in its Article 4, specifies the goals of protection, including preservation and recovery of existing biological and landscape diversity in a state of natural balance and prevention of harmful activities and nature disruption.

Targets

No specific targets.

Key policy issue

What is the trend in the amount of used mineral fertilizers in agriculture?

Key message

Mineral fertilizer consumption in agriculture noted a falling trend in the period from 2002to 2011. Consumption of nitrogen mineral fertilizers dropped by 57.79%.Consumption of phosphorous fertilizers dropped by 100%.Consumption of combined mineral fertilizers dropped by 80.32% between 2002 and 2009, while the total consumption of mineral fertilizers dropped by 53.19%. Consumption of potassium fertilizers dropped by 98.11% by 2005, followed by increase again in the period from 2005 and 2009 and then drop again by 2011.

Figure 1.Consumption of mineral fertilizers

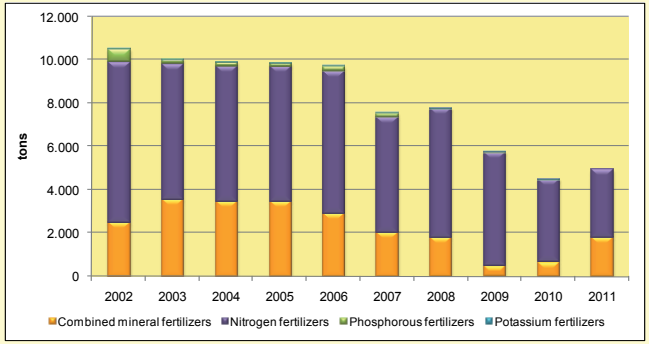
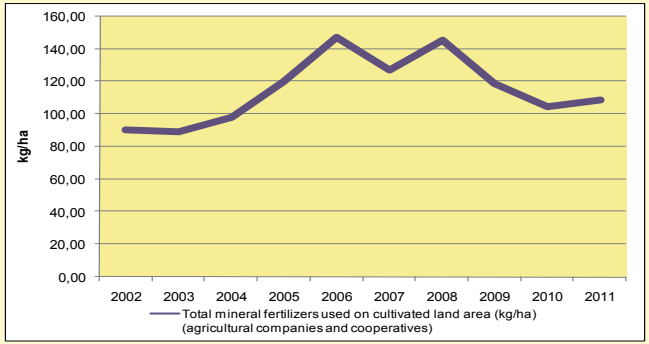


Figure 2. Use of mineral fertilizers on cultivated land area (kg/ha)by agricultural cooperatives and agricultural companies))



Assessment

In the period 2002 to 2011, consumption of mineral fertilizers in agriculture dropped from 10.593tons to 4.958tons of fertilizers; the quantity of mineral resources used on cultivated land area (of agricultural companies and cooperatives) expressed in kilograms per hectare increased between 2002 and 2009, from 90.34 kg/hato 118.76 kg/ha, which is a rise by 31.45 %, and in the period from 2009 to 2011 it dropped by 8.21%.

It is difficult to connect the trend in reduction in mineral fertilizers consumption directly with the impact on the quality of the environment. The ultimate effect on the quality of environment depends to a great extent on other factors, such as use of organic fertilizer, yield from crops, soil types, management of agricultural farms, etc.

Methodology

- Methodology for the indicator calculation

Consumption of individual groups of mineral fertilizers as combined mineral fertilizers, nitrogen fertilizers, phosphorous fertilizers, potassium fertilizers, as well as total mineral fertilizers per hectare utilized agricultural area is obtained by dividing the total quantity of consumed group of mineral fertilizers in kg by the total utilized agricultural area presented in ha..

Data specification

Title of the indicator	Source	Reporting obligation
Mineral fertilizer consumption	– Statistical Yearbooks, State Statistical Office	

Data coverage:

Table 1: Mineral fertilizers consumption* (in tons)

	Combined mineral fertilizers	Nitrogen fertilizers	Phosphorous fertilizers	Potassium fertilizers	Total mineral fertilizers
2002					
2003	3.588	6.250	234	2	10.074
2004	3.498	6.217	213	3	9.931
2005	3.488	6.200	211	1	9.900
2006	2.935	6.537	230	44	9.746
2007	2.077	5.293	189	10	7.569
2008	1.820	5.957	1	12	7.790
2009	499	5.242	1	40	5.782
2010	681	3.819	7	3	4.510
2011	1.841	3.117	0	0	4.958

*Data on mineral fertilizers consumption concerns quantity of fertilizers used in agricultural companies and cooperatives

Table 2: Total utilized agricultural area in thousand hectares (ha)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total cultivated agricultural area in thousand ha(agricultural companies and cooperatives)	117	113	101	83	66	60	54	49	43	45

Table 3: Mineral fertilizers consumed per cultivated land area (kg/ha)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
'Total mineral fertilizers used on cultivated land area*	90,34	89,17	98,32	119,99	147,24	127,17	145,24	118,76	104,74	109,00

*Data on mineral fertilizers consumption concerns quantity of fertilizers used in agricultural companies and cooperatives

General metadata

Code	Title of the indicator	Compliancewith CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 08	Mineral fertilizer consumption	IRENA 08	Mineral fertiliser consumption	D		– Agriculture	Annually

MK - NI 09
CONSUMPTION OF PESTICIDES

Definition

Plants protection products or pesticides are chemical substances which restrain diseases and pests in plants. Thisindicatorshows the quantities of pesticides used for plants protection, such as fungicides, herbicides, insecticides and category of total including, apart from the mentioned ones, other plant protection products.

Units

- Total quantities of used substances in tones, share of different groups of pesticides, as well as their application per hectare utilized agricultural area (kg/ha).

Policy relevance of the indicator

List of relevant policy documents:

The Second National Environmental Action Plan (NEAP 2) specifies the measure for rationale use of natural resources, as well as controlled use of pesticides, i.e. plant protection products. The same document also specifies the measure for establishment of monitoring and information system for soil, to monitor the pesticides consumption.

Legal grounds

The Law on Agricultural Land specifies the measures for improved agricultural land fertility through undertaking of agro-technical measures, hydro-amelioration, agramelioration and anti-errosion measures.

The Law on Nature Protection specifies the goals of protection, including preservation and recovery of existing biological and landscape diversity in a state of natural balance and prevention of harmful activities and nature disruption.

TheLawonPlantsProtectionregulates the protection of plants against diseases, pests and weeds, as well as use of plant protection products.

The Law on Plant Protection Products regulates approval, placement on the market, use and control of active substances that are products; maximum level of residues, equipment for products application; exchange of information related to products, products production, records keeping of legal and natural persons involved in production and placement of products on the market, conditions for authorization by authorities responsible for implementation, monitoring and control of this law.

The Law on Plant Health regulates the health of plants, measures and obligations concerning occurrence of harmful organisms in plants, plant products and other articles and objects, prevention of their inlet and spread, measures for control, biological measures for plant protection, access to and exchange of information and information system, costs and compensations, responsibilities of competent authorities, authorized services, authorities and bodies in the area of plants health and it also regulates other issues in the area of plants health.

Targets

No specific targets.

Key policy issue

Has the use of pesticides in agriculture increased in quantity?

Key message

Application of pesticides in agriculture, including all-plant protection products, like fungicides, herbicides, insecticides and total quantity shows at rend of reduction in quantity consumed in the period between 2002 and 2008, and then increase again from 2008 to 2011.

The application of fungicides reduced by 2008 by 39.82%, and from 2008 to 2011 it increased by 16.17%. Application of herbicides reduced by 87.67%, application of insecticides reduced by 57.40%, while the total use of pesticides by 2008 in agriculture reduced by 63.67%, and from 2008 to 2011 the total use of pesticides noted gradual increase by 25.84%.

Figure 1.Use of plant protection products

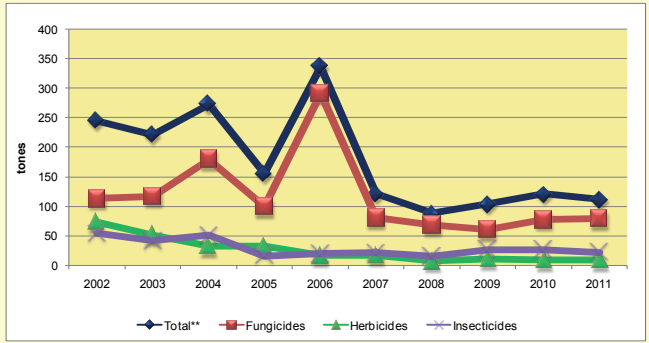


Figure 2.Share of plant protection products in percentage

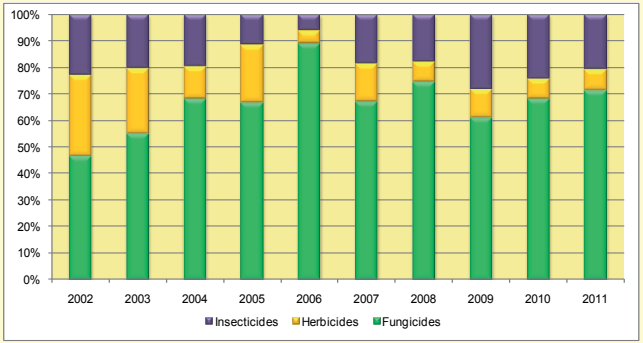
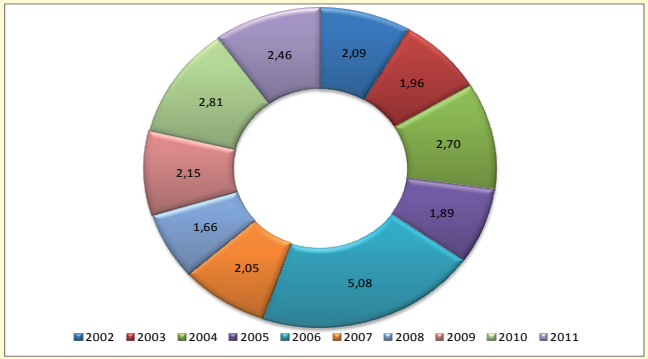


Figure 3.Total plant protection products used on the total cultivable land (kg/ha) (from agricultural companies and agricultural cooperatives)



Assessment

In the period 2002 to 2008, use of pesticides in agriculture dropped from 245 to 89 tons, and then increased again by 2011. With regard to the share of plant protection products, in the period 2002to 2011, fungicides noted highest share. In 2011, fungicides were the most used with 70.53%, then insecticides with 20.53% and herbicides with 8%.

The total amount of plant protection products used on the total cultivable land in agricultural companies and agricultural cooperatives expressed in kg/ha, increased from 2.09 to 2.46 kg/ha, which is an increase by17.70 %.

Methodology

- Methodology for the indicator calculation

The share of different pesticide groups as fungicides, herbicides and insecticides is obtained when the quantity of each group is divided by the total quantity of consumed pesticides, and then the value obtained is multiplied by 100. Theapplicationofindividualgroupperhectareutilized agricultural area isobtained when the total quantity of consumed pesticides expressed in kgis divided by the total utilized agricultural area (agricultural companies and agricultural cooperatives) in

the Republic of Macedonia expressed in ha.

Data specification

Title of the indicator	Source	Reporting obligation
Consumption of pesticides	– Statistical Yearbooks, State Statistical Office	

Data coverage:

Table 1: Total utilized agricultural area in thousand hectares (ha)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total utilized agricultural area in thousand ha (agricultural companies and agricultural cooperatives)	117	113	101	83	66	60	54	49	43	45

Table 2: Consumedplant protection products *

Total**	Fungicides	Herbicides	Insecticides	Инсектициди
2002	245	113	73	54
2003	222	116	52	42
2004	273	179	32	51
2005	156	99	33	17
2006	336	291	16	20
2007	122	80	17	22
2008	89	68	7	16
2009	104	60	11	27
2010	121	77	9	27
2011	112	79	9	23

*Data on consumed plant protection products refer to quantities consumed by agricultural companies and agricultural cooperatives

**The category total, apart from mentioned fungicides, herbicides and insecticides includes other plant protection products as well.

Table 3: Total pesticides consumed per total utilized agricultural area (kg/ha)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total pesticides consumed per total utilized agricultural area (kg/ha)(agricultural companies and agricultural cooperatives)	2,09	1,96	2,70	1,89	5,08	2,05	1,66	2,15	2,81	2,46

General metadata

Code	Title of the indicator	Compliancewith CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 09	Consumption of pesticides	IRENA 09	Consumption of pesticides	D		– Agriculture	Annually

ENERGY

MK - NI 027

FINAL ENERGY CONSUMPTION BY SECTOR

Definition

Final energy consumption is energy supplied to meet the demand of the final consumers and is calculated as the sum of final energy consumption from all sectors, namely industry, transport, agriculture, households, and other sectors.

The indicator «Final energy consumption by sector» is expressed in thousand tonnes of oil equivalent (ktoe) and in percentage as a ratio between final energy consumption by each sector and final energy consumption by all sectors.

Units

- thousand tonnes of oil equivalent (ktoe)
- percentage (%)

Policy relevance of the indicator

- Strategy for Energy Efficiency Promotion in the Republic of Macedonia by 2020 [1]
- Strategy for Energy Development in the Republic of Maceodnia by 2030. [2]

[1] http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf
[2] http://www.economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply.

Key question

Is final energy consumption increasing and in which sector it is the highest?

Key message

Policies in energy sector should favour measures aimed at rational and efficient energy consumption, especially by households and industry.

Between 2002 and 2011, final energy consumption in the Republic of Macedonia increased by 7,3%, with an annual average rate of 0,7%. Industry is the sector with the most rapid growth in energy consumption noting an increase by 47%. During the same period, final energy consumption in transport increased by around 27%, while final energy consumption in households increased by 20%. Significant fall in final energy consumption was recorded in the sector agriculture (-18,7%) and other sectors (-55,6%).

The highest share in the total final energy consumption was recorded in the sectors industry and households.

Figure 1. Final energy consumption by sector

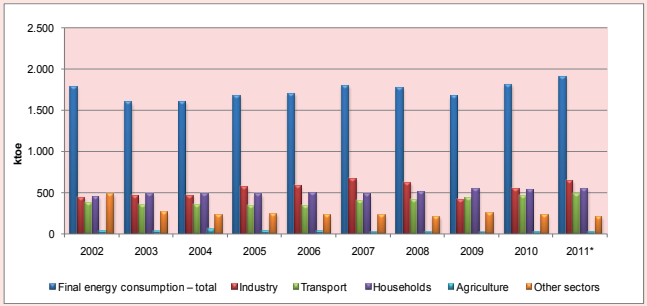
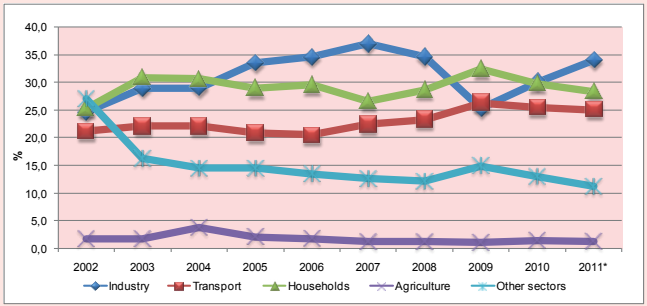


Figure 2. Share of individual sectors in final energy consumption



Assessment

Depending on the characteristics of economies and the extent of efficiency in energy consumption, diverse structure of energy consumption can be found in individual sectors.

Final energy consumption in the Republic of Macedonia correlates closely with the dynamics of industrial production, due to the high share of industry in the total energy consumption.

Between 2002 and 2011, final energy consumption in the Republic of Macedonia increased by 7,3%, with an annual average rate of 0,7%. Industry is the sector with the most rapid growth in energy consumption noting an increase by 47%. Upon the analysis of data on final energy consumption in 2009 we may note fall in industry resulting from economic crisis, while the highest increase in final energy consumption in industry wqas recorded in 2007. During the same period, final energy consumption in transport increased constantly by around 27%. Final energy consumption in households increased by 20% in the period from 2002 to 2011, with a notable growth in the period from 2008 to 2011. Significant fall in final energy consumption was recorded in the sector agriculture (-18,7%) and other

sectors (-55,6%).

The highest share in the total final energy consumption in agricultural sector was recorded in 2004, followed by continuous fall in consumption in the period from 2005 to 2011.

The highest share in the total final energy consumption was recorded in the sectors industry and households.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008).
- „Energy Statistics Methodology Eurostat F4, 1998"
- National classification of activities, Rev.2 (Official Gazette of the Republic of Macedonia no. 147/2008)

Data specification

Title of the indicator	Source	Reporting obligation
Final energy consumption by sector	– State Statistical Office	– Eurostat, – ECE/UN – IEA/OECD.

Data coverage:

Table 1: Final energy consumption by sector

ktoe	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Final energy consumption	1.780	1.593	1.600	1.678	1.702	1.793	1.771	1.671	1.802	1.910
Industry	438	460	462	562	589	664	613	422	543	648
Transport	376	353	353	350	349	401	413	440	460	479
Households	452	493	490	486	503	478	508	542	537	542
Agriculture	32	29	63	36	31	23	23	19	27	26
Other sectors	482	260	232	244	230	227	215	249	235	214

* Previous data

Table 2: Final energy consumption by sector (%)

(%)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Final energy consumption	100	100	100	100	100	100	100	100	100	100
Industry	24,6	28,9	28,9	33,5	34,6	37,0	34,6	25.5	30,1	34,0
Transport	21,1	22,1	22,1	20,9	20,5	22,4	23,3	26,3	25,5	25,1
Households	25,4	30,9	30,6	29,0	29,6	26,7	28,7	32,4	29,8	28,4
Agriculture	1,8	1,8	3,9	2,2	1,8	1,3	1,3	1,1	1,5	1,3
Other sectors	27,1	16,3	14,5	14,5	13,5	12,7	12,1	14,9	13,0	11,2

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 027	Final energy consumption by sector	CSI 027 EE 18	Final energy consumption by sector	D	A	Energy	annualy

MK - NI 028

TOTAL ENERGY INTENSITY

Definition

Total energy intensity is the ratio between the total energy demand (or total energy consumption) and the Gross Domestic Product.

The total energy consumption is calculated as the sum of the total energy demand from solid fuels, oil, natural gas and renewable sources.

The Gross Domestic Product (GDP) is converted by the Price Adjusted Rate of Exchange (PARE) method, applying the OUN Methodology (2000 database).

The total energy demanded (or total energy consumption) is expressed in thousand tonnes oil equivalent, and Gross Domestic Product in million EUR.

The indicator «Total energy intensity» is expressed in kilograms oil equivalent per 1000 EUR (kgoe/1000 EUR).

The indicator is also calculated in indexes with 2000 as base year (2000=100).

Units

- million EUR
- thousand tonnes oil equivalent (ktoe)
- kilograms oil equivalent (kgoe)
- indexes (2000=100)

Policy relevance of the indicator

List of relevant policy documents:

- Strategy for Energy Efficiency of the Republic of Macedonia [3]
- Strategy for Energy Efficiency Promotion in the Republic of Macedonia by 2020 [4]
- Strategic Plan for Work of the Ministry of Economy for the period 2010 – 2012 [5]
- Strategy for Energy Development in the Republic of Maceodnia by 2030[6]

[3] http://www.economy.gov.mk/WBStorage/Files/Strategija%20za%20energetska%20efikasnost%20na%20Republika%20Makedonija.pdf

[4] Taken over fro the Ministry of Economy http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf

[5] http://www.economy.gov.mk/WBStorage/Files/STRATESKI_PLAN_NA_ME_2010_2012.pdf

[6] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Targets

Target to be achieved in EU is spending tonnes oil equivalent per 1.000 US$ GDP, while the target in the Republic of Macedonia is 0,75 tonnes oil equivalent. The implementation of measures under the Strategy for Energy Efficiency Promotion, this should drop down to 0,45 to 0,49 into 2020.

Key question

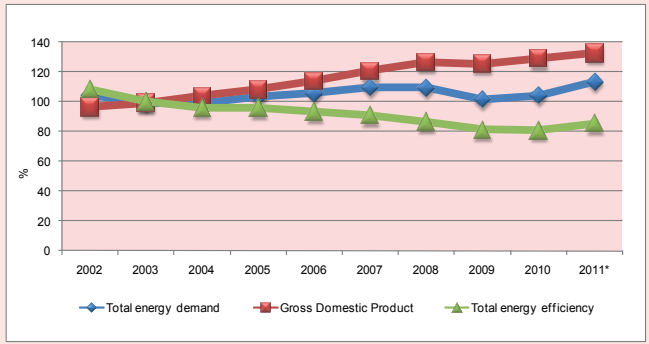
What will be the dynamics of strategic targets implementation and achievement?

Key message

The trend in Energy intensity in the Republic of Macedonia recorded decline by 21,3% in the period from 2002 to 2011, mainly due to the trend of growth in GDP for the same past period.

At this moment, the ratio of energy intensity is by four times higher compared to the European one, i.e. energy efficiency measured by GDP is by four times lower than the energy efficiency in the European Union.

Figure 1. Total energy intensity



Assessment

Constant change in the trend of total energy intensity was notable in the period from 2002 to 2011. The trend of decline by 21,3% of total energy intensity was specific for the same period.

Comparative analysis of energy consumption relative to GDP, so called indicator of energy intensity, has shown that the Republic of Macedonia belongs to

the group of countries with relatively high energy consumption levels, due to the high energy intensity of the facilities that lead the economic growth. Also, due to the long-lasting treatment of the electricity price as a social category, the residential sector uses significant quantities of electricity for heating.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008),,
- „Energy Statistics Methodology Eurostat F4, 1998"
- National classification of activities NCA Rev.2 (Official Gazette of the Republic of Macedonia no. 147/2008)..

Data specification

Title of the indicator	Source	Reporting obligation
Total energy intensity	– State Statistical Office	– Eurostat – ECE/UN – IEA/OECD

Data coverage:

Table 1: Total energy intensity

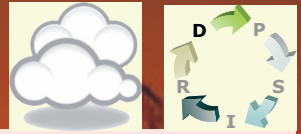
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Total energy demand (ktoe)	2892	2740	2749	2863	2925	3033	3023	2810	2879	3133
Total energy intensity (kgoe/'000 EUR)	771,4	710,9	681,6	680,3	661,9	646,5	613,9	575,7	573,3	607,1
	Index 2000=100									
Total energy demand	104,6	99,1	99,4	103,5	105,8	109,7	109,3	101,6	104,1	113,3
Gross Domestic Product	96,3	99,0	103,6	108,1	113,5	120,5	126,5	125,4	129,0	132,6
Total energy intensity	108,6	100,1	96,0	95,8	93,2	91,0	86,4	81,1	80,7	85,5

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 028	Total energy intensity	CSI 028 EE 23	Total energy intensity	R	B	energy	annualy

MK - NI 029 TOTAL ENERGY CONSUMPTION BY FUEL (GROSS INLAND CONSUMPTION)



Definition

Total energy consumption or gross inland consumption represents the total quantity of energy necessary to satisfy the total national needs for energy for energy transformations, all types of consumption by energy sector and final energy and non-energy consumption.

The total energy consumption is calculated as sum of the total energy consumption originating from solid fuels, oil, natural gas and renewable sources.

The indicator «Total energy consumption by fuel» is expressed in thousand tonnes of oil equivalent (ktoe) and in percentage as ratio between the total energy consumption per fuel and the total energy consumption of all fuels.

Units

- thousand tonnes of oil equivalent (ktoe)
- percentage (%)

Policy relevance of the indicator

- National Strategy for Sustainable Development in the Republic of Macedonia 2009 – 2030[7]
- Strategy for Energy Efficiency in the Republic of Macedonia by 2020[8]
- Strategy for Energy Development in the Republic of Maceodnia by 2030[9]

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Targets

Reduction in the dependence on imported fuels and reduction in inefficient energy consumption;

Modernization of energy infrastructure and diversification of energy supply (extension of the network for natural gas is an important essential element for the implementation of all measures envisaged towards energy efficiency);

Participation in of regional cooperation and compliance with the legislation of the Energy Community;

[7] http://www.moepp.gov.mk/WBStorage/Files/Nacionalna%20Strategija%20za%20Odrzliv%20Razvoj%20vo%20RM-NSSD%20Del%201.pdf

[8] http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf

[9] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

Key question

What are the trends conserning the share of fuels in the total energy consumption?

Key message

In the period between 2002 and 2011, the total energy consumption by fuel increased by 8.3%. The highest share in the total energy consumption belongs to solid fuels ranging from 45% to 51.6%. For the period 2002 to 2011, there was significant increase in the amounts of natural gas used as one of the fuels with cleaner ecological footprint, noting increase by 48.64%. Use of oil shows obviously constant values, except in 2002 (1173 ktoe) and 2007 (1173 ktoe), when increase in the use of oil was recorded.

Significant change in the trend of solid fuels use and gradual structural saubstitution with cleaner or renewable energy sources is necessary.

Figure 1. Total energy consumption by fuel

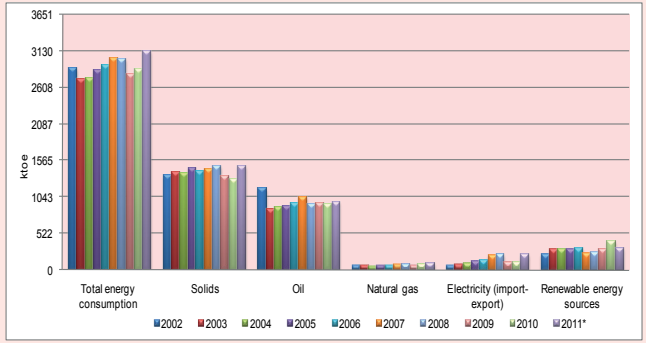
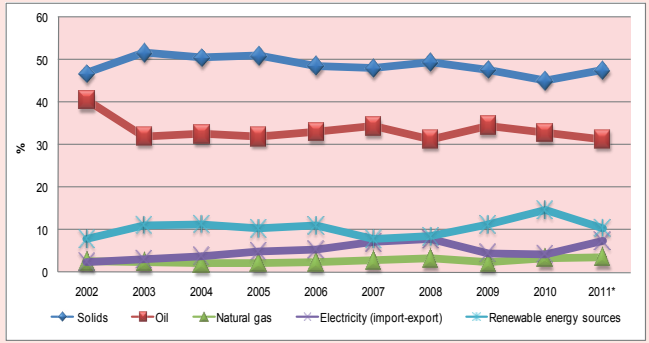


Figure 2. Share by fuel in the total energy consumption



Assessment

In tha past period, dominant energy sources in the Republic of Macedonia have been coal, oil and oil derivatives. The share of solid fuels in the total energy consumption for the period between 2002 and 2011 was significantly higher compared to other energy sources. Reduction of ecological footprint of electricity production in thermal power plants fueld by low calorific coal – lignite is among the greatest challenges in the attempt to reduce the effects of gas emissions in the production process. Renewable energy sources have negligible share, except for wood which is mostly used in individual households without adequate filters for combustion gas emissions.

Increase in the share of renewable energy sources in total energy consumption would be at the same time a possibility for economy restructuring in several sectors, energy efficiency in households and industry, as well as jobs creation.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008),
- „Energy Statistics Methodology Eurostat F4, 1998»

Data specification

Title of the indicator	Source	Reporting obligation
Total energy consumption by fuel	– State Statistical Office	– Eurostat – ECE/UN – IEA/OECD

Data coverage:

Table 1: Total energy consumption by fuel

	2002	2003	2004	2005	2006	2007	2008	2009 *	2010	2011 *
Gross inland consumption (ktoe)	2892	2740	2749	2863	2925	3033	3023	2810	2879	3133
- Solids	1352	1415	1385	1459	1419	1455	1492	1338	1296	1488
- Oil	1173	876	895	912	968	1042	945	970	946	980
- Natural gas	74	65	57	62	66	85	96	64	95	110
- Electricity (import-export)	68	82	101	137	154	214	235	124	122	230
- Renewable energy sources	225	302	310	293	318	237	254	314	420	325

*Previous data

Table 2: Percentage of the total energy consumption by fuel

	2002	2003	2004	2005	2006	2007	2008	2009 *	2010	2011 *
Gross inland consumption (%)	100	100	100	100	100	100	100	100	100	100
- Solids	46,8	51,6	50,4	51,0	48,5	48,0	49,4	47,6	45,0	47,5
- Oil	40,6	32,0	32,6	31,8	33,1	34,4	31,3	34,5	32,8	31,3
- Natural gas	2,6	2,4	2,1	2,2	2,3	2,8	3,2	2,3	3,3	3,5
- Electricity (import-export)	2,4	3,0	3,7	4,8	5,3	7,1	7,8	4,4	4,2	7,3
- Renewable energy sources	7,8	11,0	11,3	10,2	10,9	7,8	8,4	11,2	14,6	10,4

*Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 029	Total energy consumption by fuel	CSI 029 EE 24	Total energy consumption by fuel	D	A	energy	annualy

MK - NI 030

RENEWABLE ENERGY CONSUMPTION

Definition

Renewable energy sources are defined as renewable non-fossil energy sources: hydropower, geothermal, solar and wind power; solid biomass; biogas, liquid biofuels, etc.

The indicator «Renewable energy consumption» is expressed as ratio of total renewable energy consumption and the total energy consumption originating from all fuels (in percentage).

Units

- thousand tonnes of oil equivalent (ktoe)
- percentage (%)

Policy relevance of the indicator

- Strategy for Energy Efficiency in the Republic of Macedonia by 2020[10]
- Strategic Plan for Work of the Ministry of Economy for the period 2010 – 2012
- Strategy for Energy Development in the Republic of Macedonia by 2030[11]
- Strategy for Utilization of Renewable Energy Sources (RES) in the Republic of Macedonia by 2020[12]

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Key question

How fast is the share of renewable energy in the total energy consumption?

Key message

Policies in energy sector should favour measures for greater use of renewable energy sources.

Relatively low share of renewable energy in the total energy consumption (10,35% at an average) indicates dominant use of fossile fuels which is unfavourable in terms of both depletion of energy resources and environmental pollution.

[10] Taken over from the Ministry of Economy http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf

[11] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

[12] http://www.economy.gov.mk/WBStorage/Files/Strategija_za_OIE_28_juni_2010.pdf

Biomass has the highest share of renewable energy in the total energy consumption and ranges from 4,63% to 6,90%, while the lowest share belongs to solar electric energy with 0,003%. Hydro electricity has a share in the range between 2,3 and 7,3%.

Targets

Reduction in the dependence on imported fuels and reduction in inefficient energy consumption;

Modernization of energy infrastructure and diversification of energy supply;

Participation in of regional cooperation and compliance with the legislation of the Energy Community.

Figure 1. Share of renewable energy in the total energy consumption by energy source (%)

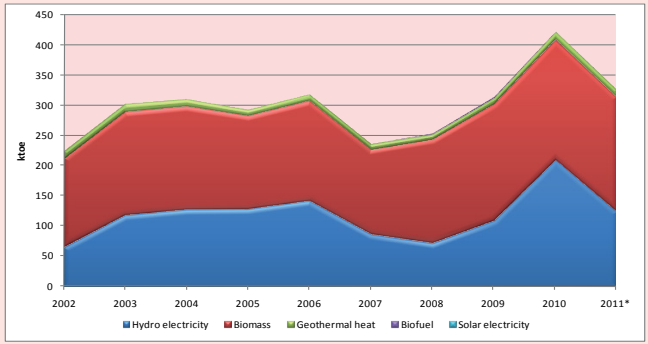


Figure 2. Total share of renewable energy in the total energy consumption (%)

Assessment

Relatively low share of renewable energy in the total energy consumption (10,35% at an average) indicates the dominant use of fossile fuels which is unfavorable in terms of both energy resources depletion and environment pollution.

In the period from 2002 to 2006, there was growth by 41,3 % in the share of renewable energy in the total energy consumption, followed by decline in 2007 by 25,4%, and then growth again in the period from 2008 to 2010 of 77,13%, and significant decline in 2011 amounting 77,13%.

Biomass has the highest share of renewable energy in the total energy consumption and ranges from 4,63% to 6,90%, while the lowest share belongs to solar electric energy with 0,003%. Hydro electricity has a share in the range between 2,3 and 7,3%.

The minimal share of renewable energy sources in the share of the total energy production and consumption in the Republic of Macedonia indicates that the available resources (e.g.geothermal, hydro, solar power) are insufficiently utilized, but also the aspects of energy security, in terms of all steps that need to be undertaken by the state to prevent threats in relation to planned demands for energy by the national economy. Energy security or threat to economy and social welfare the factors of which are minimized with reduction of dependence on energy and energy resources import, indicate the importance of social resources streamlining towards maximum utilization of natural renewable sources.

Methodology

- Methodology for the indicator calculation

Statistical methodology for calculation:

- Regulation on Energy Statistics of the European Parliament and of the Council (Regulation no.1099/2008),
- „Energy Statistics Methodology Eurostat F4, 1998»

Data specification

Title of the indicator	Source	Reporting obligation
Renewable energy consumption	▪ State Statistical Office	▪ Eurostat ▪ ECE/UN ▪ IEA/OECD

Data coverage:

Table 1: Share of renewable energy in the total energy consumption by energy resources type

	Total energy consumption	Hydro electricity		Biomass		Geothermal heat		Biofuel		Solar electricity		Total share
year	ktoe	ktoe	%	ktoe	%	ktoe	%	ktoe	%	ktoe	%	%
2002	2.892	65	2,3	147	5,08	13	0,45					7,78
2003	2.740	118	4,3	171	6,24	13	0,48					11,03
2004	2.749	127	4,6	171	6,22	12	0,43					11,28
2005	2.863	128	4,5	154	5,39	10	0,35					10,22
2006	2.925	142	4,8	166	5,66	10	0,35					10,86
2007	3.033	87	2,9	140	4,63	10	0,32					7,82
2008	3.023	72	2,4	172	5,68	9	0,30	1	0,04			8,41
2009	2.810	109	3,9	193	6,86	10	0,35	2	0,07			11,16
2010	2.879	209	7,3	199	6,90	12	0,41	0	0,02	0,00	0,000	14,59
2011*	3.133	123	3,9	189	6,04	12	0,40	0	0,01	0,10	0,003	10,38

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 030	Renewable energy consumption	CSI 030 EE 26	Renewable energy consumption	R	B	energy	annualy

MK - NI 031

RENEWABLE ELECTRICITY

Definition

Renewable electricity sources are defined as renewable non-fossil sources of energy, such as: hydropower, geothermal, solar and wind power; solid biomass; biogas, liquid biofuels, etc.

The indicator «Renewable electricity» measures the share of electricity produced from renewable sources in gross national electricity production (in percentage).

The gross national electricity consumption is a sum of the total gross production and import of electricity minus electricity exported.

Units

- GWh
- percentage

Policy relevance of the indicator

- National Strategy for Sustainable Development in the Republic of Macedonia 2009 – 2030[13]
- Strategy for Energy Efficiency Promotion in the Republic of Macedonia by 2020 [14]
- Strategy for Energy Development in the Republic of Maceodnia by 2030[15]

Legal grounds

Law on Energy; Energy Balance of the Republic of Macedonia - annual planning document defining the demands for energy and the possibility for their supply (Article 16 of the Law on Energy).

Targets

To achieve the required increase in order to reach the EU indicative target of 21% share by 2020.

Key question

What is the share of electrcity originating from renewable sources in the gross electricity consumption in the Republic of Macedonia?

Key message

In the context of the indicative goal of 21% of gross consumption of electricity originating from renewable energy sources in EU-25, as specified by the EU in

[13] http://www.moepp.gov.mk/WBStorage/Files/Nacionalna%20Strategija%20za%20Odrzliv%20Razvoj%20vo%20RM-NSSD%20Del%201.pdf
[14] http://www.economy.gov.mk/Uploads/files/EE.pdf.pdf
[15] http://economy.gov.mk/WBStorage/Files/precisten_tekst_Strategija_za_energetika_na_RM.pdf

its Directive No. 2001/77/EC, the need for greater utilization of renewable energy sources in the Republic of Macedonia is in line with the practices in developed countries and their efforts to reduce pollutants emission and support the sustainable development. Republic of Macedonia needs to set the national target for renewable energy share in line with the potential of the available renewable energy sources.

The share of electrcity originating from renewable sources in the gross electricity consumption in the Republic of Macedonia is rather low. It makes relatively high annual fluctuation depending on hydrological conditions.

In 2010, resulting from favourable hydrological conditions, the share of renewable electricity in the total gross electricity consumption was 28%, while in 2011 it noted a fall to 15%.

Figure 1. Trend in gross electricity and renewable electricity consumption

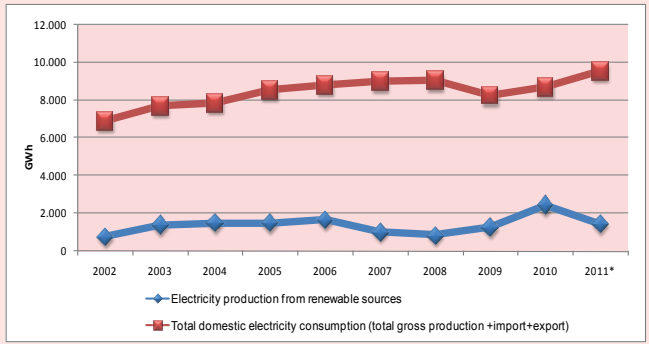
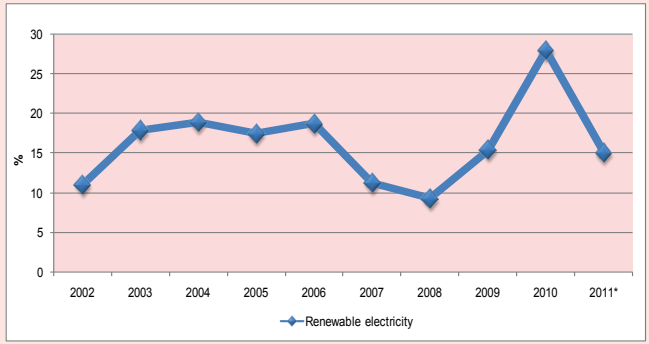


Figure 2. Electricity production from renewable sources (%)



Assessment

The production of electricity from renewable sources in the Republic of Macedonia is based on the hydropower, while minor contribution has been noted by solar electricity for the last couple of years. Production in large hydropower plants is predominant.

At present, the share of renewable electricity in the overall electricity consumption is very important and depends on hydrological conditions during the year. Variable hydrological conditions result in variations in the production of hydro energy due to lower quantities of precipitation. This indicates the fact that there is a need for investments in installations to enable utilization of other renewable energy sources as well, such as geothermal, solar and wind power and increase in the share of the total electricity production.

During the observed period 2002 - 2011, and according to available data, the trend was even. The highest share of renewable electricity was recorded in 2010, amounting 28 %.

Methodology

■ Methodology for the indicator calculation

Statistical methodology for calculation:

- Common surveys for coal, oil, natural gas, electricity and heat, renewable energy for 2005 by Eurostat, ECE/UN and IEA/OECD
- „Energy Statistics Methodology Eurostat F4, 1998»

Data specification

Title of the indicator	Source	Reporting obligation
Renewable electricity	– State Statistical Office	– Eurostat – ECE/UN – IEA/OECD

Data coverage:

Table 1: Trend in gross electricity consumption and renewable electricity consumption

GWh	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Electricity produced from renewable energy sources	1.170	626	757	1.374	1.482	1.492	1.650	1.010	840	1.270
Gross national electricity consumption (Total gross production+Import-Export)	6.923	6.792	6.881	7.690	7.841	8.541	8.801	8.990	9.044	8.266

* Previous data

Table 2: Renewable electricity production in %

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 *
Electricity produced from renewable sources	16,9	9,2	11,0	17,9	18,9	17,5	18,7	11,2	9,3	15,4

* Previous data

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 031	Renewable electricity	CSI 031 EE 27	Renewable electricity	R	B	energy	annualy

FISHERY

MK - NI 041

FISH STOCKS CHARACTERISTICS

Definition

The indicator shows the number of freshwater species living in rivers and lakes in the Republic of Macedonia and the fish species represented in fishponds that are subject to aquicultural production.

At present, the indicator shows the status of:

- catch of two economically significant fish species in fishing waters;
- total catch of other fish species in fishing waters;
- otal aquicultural fish production in fishponds.

Units

Number of fish species, kilograms (tones) fish catch.

Policy relevance of the indicator

List of relevant policy documents

The Study on the State of Biological Diversity in the Republic of Macedonia and the National Strategy for Biological Diversity Protection with Action Plan establish integrated approach to the protection and sustainable use of biological diversity components including fishery.

Spatial Plan of the Republic of Macedonia.

Legal grounds

The Law on Fishery and Aquiculture regulates the management, planning, commercial management and aquicultureof fish in fishing waters, fish ponds, semi fish ponds, cages and other fish breeding resources..

Targets

The overall fish production in the Republic of Macedonia has been envisaged to grow by 2.300 tons by 2020. The main mass in this grow will consist of trout fish (1.435 tons or 62%of the total catch) mostly from fishponds.[1]

Key policy issue

How sustainable is the fish catch in the Republic of Macedonia?

Key message

Fish in gand fish stock exploitation in fishponds and artificial water accumulations in the Republic of

[1] Spatial Pln of the Republic of Macedonia

Macedonia is under permanent supervision, with constant care for the fish stocks and regular stocking with economically important fish species. In this way, sustainable development and exploitation of fish as an important economic resource is provided, as well as for sports fishing. Exploitation of fish stocks from natural lakes has been coping with permanent problems for a longer period, including over-fishing and uncontrolled fish catch in those aquatic ecosystems. These activities affect particularly the endemic fish species, such as Ohrid trout (SalmoletnicaKar.), as well as other endemic species represented by small populations in certain aquatic ecosystems. Scientific institutions in the Republic of Macedonia, in the frames of their annual programmes and their primary activity of freshwater ecosystems monitoring and protection, carry out regular monitoring of the fish stock status, within the limits of their possibilities.

Figure 1. Total fish catch

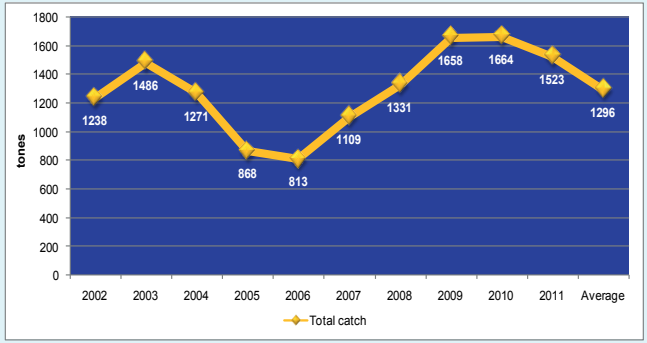


Figure2. Total catch of the main fish species

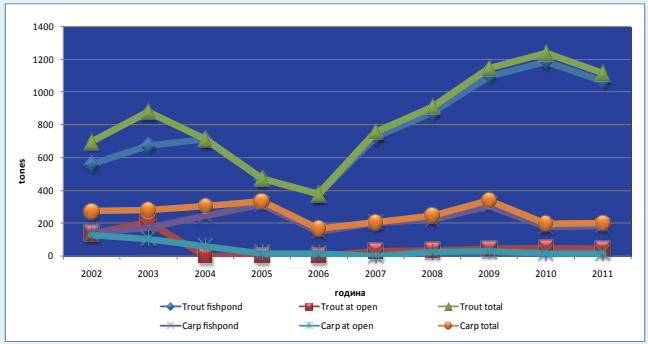
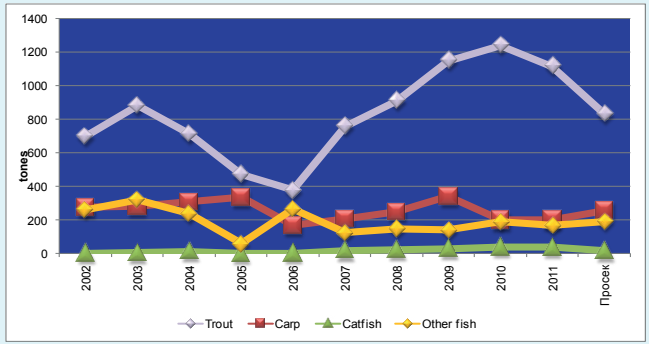


Figure 3. Total fish catch by fish species



Assessment

Table 1, with regard to total catch (production of commercial fish and fishing by sports fishermen), shows that the average fish catch in the Republic of Macedonia is 1 296 tonnes of different fish species. In the period 2003 to 2006, the yield has decreased because some fishing companies, business entities and concessionaireshave lost their licences for fishing activities in certain water basins, and significant number of sports fishing clubs have been terminated.

Increase by 104.6% in the total fish catch was noted in the period 2006 to 2010.Figure 3 showsthatthecarpis predominantfishspeciesinravine waters with raising trend from 2006 to 2011 (167 tonnes to 202 tonnes), whiletrout is leading in high land waters with rising trend from 2006 to 2011 (378 tonnes to 1.114 tonnes).

Methodology

Methodology for the indicator calculation

- Source of data and methodology for the indicator calculation

The source of data on the characteristics of fish stocks in the Rerpublic of Macedonia is the State Statistical Office and their methods are used for data processing.

- Uncertainty

Uncertainty derives from the assumed incomplete data on fish catch in rivers and lakes. The uncertainty increases further because of the limitted number of literature data on genetic structure of fish populations in natural aquatic ecosystems.

Data specification

Title of the indicator	Source	Reporting obligation
Fish stocks characteristics	– State Statistical Office	– FAO – Fisheries and Aquaculture Department

Datacoverage:

Table 1: Total fish catch in the Republic of Macedonia in tones

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Просек
Total catch	1.238	1.486	1.271	868	813	1.109	1.331	1.658	1.664	1.523	1.296

Table 2: Total fish catch and fish production in the Republic of Macedonia in tones

Catch and production of consumable fish								
	Trout			Carp			Catfish	Other fish
	fishpond	at open	total	fishpond	at open	total	total	total
2002	560	138	698	145	130	275	4	261
2003	672	208	880	174	106	280	5	321
2004	711	1	712	248	59	307	15	237
2005	471	1	472	316	19	335	2	59
2006	377	1	378	150	17	167	4	264
2007	728	30	758	204	2	206	21	124
2008	874	36	910	222	25	247	25	149
2009	1.101	46	1.147	307	33	340	31	140
2010	1.188	50	1.238	178	19	197	41	188
2011	1.069	45	1.114	183	19	202	40	167

General metadata

Code	Title of the indicator	ComplianceswithCSI/EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MKNI 041	Fish stock characteristics	FISH 3	Fish stock characteristics	S		– Water – Biodiversity – Tourism	annual

TRANSPORT

Definition

The indicator «passenger transport demand» will be presented in two different ways:

1) To measure decoupling of passenger transport demand from economic growth, the volume of passenger transport relative to GDP will be used. The decoupling indicator is defined as the ratio between passenger-km (inland modes) and GDP (Gross Domestic Product in constant 2000 EUR). In the presentation of this indicator in the Republic of Macedonia, the index 2001=100 is taken as baseline year for comparison.

2) Modal split share of passenger transport: This indicator is defined as the percentage share of transport by passenger car in total inland transport. The unit used is the passenger-kilometre (pkm), which represents one passenger traveling a distance of one kilometre. It is based on transport by passenger cars, buses and coaches and trains.

All data should be based on movements on national territory, regardless of the nationality of the vehicle. However, data collection methodology should be harmonised at the EU level.

Units

The unit used is the passenger-kilometre (pkm), which represents one passenger travelling a distance of one kilometre. It is based on transport by passenger cars, buses and coaches, and trains.

Passenger transport demand and GDP are shown as an index 2000=100.

Policy relevance of the indicator

List of relevant policy documents

The National Strategy for Transport prepared and adopted by the Government of the Republic of Macedonia determines the main directions of the transport policy development in the Republic of Macedonia through identification of goals and development strategy for road, rail and air transport sectors.

Legal grounds

The road transport is regulated by the Law on Road

Transport. It regulates the conditions and the manner of performing transport of passengers and goods in internal and international road transport.

Transportation of dangerous goods is regulated by the Law on Dangerous Goods Transportation in Road and Railroad Transport, regulating the conditions under which transport of dangerous goods shall be performed (preparation of matter, loading, transport, on road procedures, unloading, safety in transportation, vehicles equipment and staff training).

Railroad transportation is regulated by the Law on Railroads, Law on Agreements on Transportation in Railroad Traffic, Law on Agency Regulating Railroad Transport Services Market and Law on Railroad Transport Safety.

Targets

The indicator is targeted at presenting information to be used in the preparation of documents and actions aimed at reducing the negative effects on the environment and people.

One of the actions is to substitute the road by railroad, waterway and public passenger transport, to reach share of road transport in 2010 not to be higher than the one in 1998.

Key policy question

Is the passenger transport in road transport reduced compared to other transport modes?

Is the passenger transport demand decoupled from economic growth?

Key message

The share of passenger kilometers in the total passenger transport for road transport was 98,1% in 2011, reflecting an increase by 0,4 % compared to 2010, for railroad transport it was 1,9% in 2011 or decline by 0,4 % relative to 2010.

The share of the passenger cars in the total passenger transport is the highest. The share in 2011 was 98,1 %, while this share was the lowest in 2003 amounting 98,7%. Data on the share of passenger cars has been estimated.

Figure 1 Passenger kilometers of individual types of passenger transport in the total passenger transport in million kolimeters.

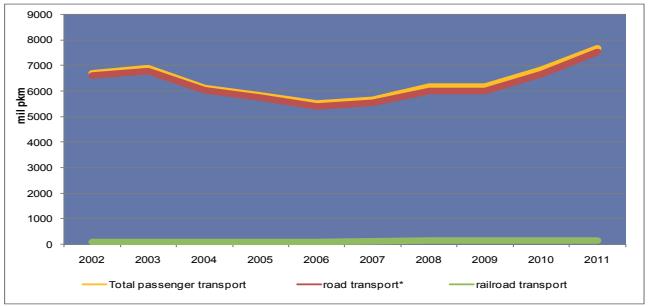


Figure 2 Share in percentage of passenger kilometers of individual types of passenger transport in the total passenger transport

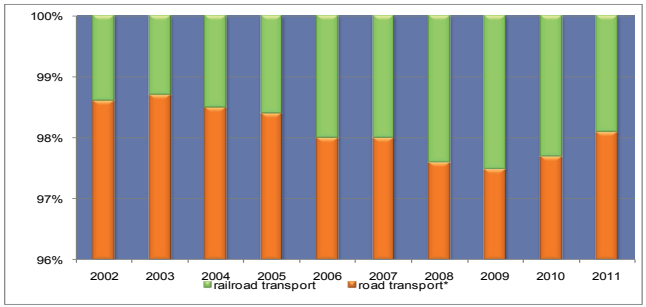


Figure 3: Share in percentage of passenger kilometers by passenger cars in road transport

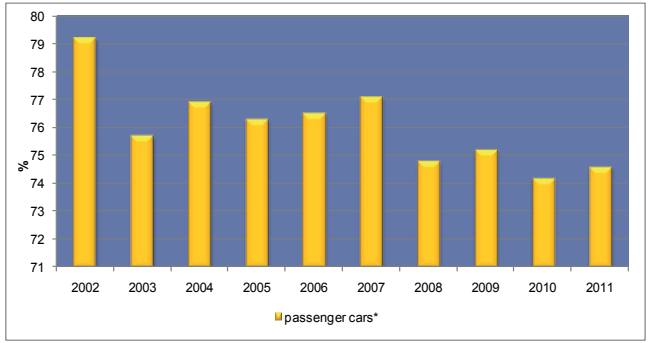
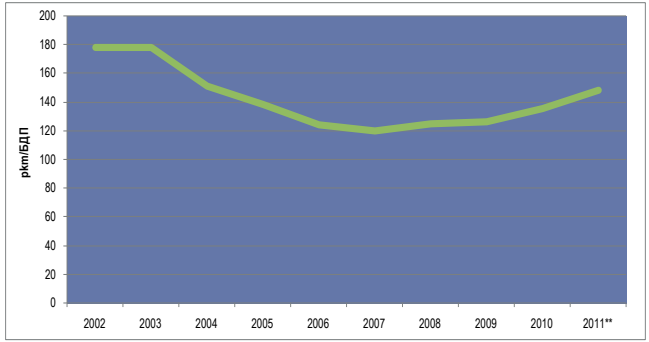


Figure 4: Overview of passenger kilometers/GDP ratio



Assessment

The trend in the course of 2006 to 2009, in comparative terms, in road and air passenger transport has noted slight increase. The increase in the index of passenger per kilometer in 2010 and 2011 was higher relative to previous years.

Figure 2 indicates that in the period 2002 to 2011, the road transport encompassed the highest percentage in the total passenger transport and ranged between 97,5% and 98,7%, while the share of railroad transport was from 1,3% to 2,5%. This indicates that the reduction of environmental pollution requires reduction in the share of road transport in the share of passenger transport in favour of other transport modes. This would also result in avoided costs for the expensive liquid fuel which while combusting pollutes the environment.

Figure 4 shows decline in the trend of the passenger kilometer/GDP ratio from 2003 to 2007, while from 2008 to 2011 there was increase in the same trend. This ratio is indexed for the year 2000=100 in order to monitor the changes in the intensity of passenger transport demand relative to economic growth presented through GDP.

Methodology

- Methodology for the indicator calculation

In order to measure the decoupling of passenger transport demand from economic growth, the volume (i.e. intensity) of passenger transport relative to GDP is calculated. Relative decoupling occurs when the passenger transport demand rises at rate lower than the one of the GDP. Absolute decoupling occurs when the passenger transport demand falls while GDP rises or remains constant.

The unit used is the passenger-kilometre (pkm), which represents one passenger traveling a distance of one kilometre.

With regard to EU Member States, according to Regulation on road transport and Regulation (EC) No 91/2003 on railroad transport statistics, data is based on all movements of passenger transport on the national territory.

- Source of used methodology

Structural indicators of Eurostat on transport State Statistical Office

■ Methodological uncertainty and data uncertainty

All data is based on the movements on the national territory, regardless of the nationality of the vehicle. The methodology of data collection has been harmonised at EU level, but estimated data has been used for the purposes of data calculation on the transport by passenger car. Sources include EUROSTAT, National statistical offices, ECMT, UNECE, UIC, DG TREN.

In order to answer the question whether the passenger transport demand is decoupling from economic growth, the intensity of passenger transport relative to changes in real GDP is considered.

■ Uncertainty of data sets

In order to obtain full picture of passenger transport demand and corresponding problems in the environment, it would be very useful to supplement data with data on the number of passenger-kilometers by vehicle-kilometers.

Data specification

Title of the indicator	Source	Reporting obligation
Passenger transport demand	– State Statistical Office	– EUROSTAT

Data coverage:

Table 1. Passenger kilometers by individual passenger transport modes in the total passenger transport in million kilometers

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Passenger transport total	6.689	6.876	6.116	5.816	5.492	5.627	6.148	6.163	6.822	7.675
road transport*	6.591	6.784	6.022	5.722	5.387	5.518	6.000	6.009	6.667	7.530
railroad transport	98	92	94	94	105	109	148	154	155	145

* estimated data

Table 2: Share in percentage of passenger kilometers by individual passenger transport modes in the total passenger transport

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
road transport*	98,6	98,7	98,5	98,4	98,0	98,0	97,6	97,5	97,7	98,1
railroad transport	1,4	1,3	1,5	1,6	2,0	2,0	2,4	2,5	2,3	1,9

* estimated data

Table 3: Share in percentage of passenger kilometers by passenger cars in road transport

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
passenger cars*	79,2	75,7	76,9	76,3	76,5	77,1	74,8	75,2	74,2	74,6

* estimated data

Table 4: Overview of passenger kilometers /GDP ratio

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011**
pkm/GDP	178,4	178,4	151,6	138,2	124,3	119,9	124,9	126,3	135,9	148,7

** Previous data on GDP
2000=100

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 035	Passenger transport demand	CSI 035	Passenger transport demand	P	B	– Passenger transport per kilometer – GDP	annualy

FREIGHT TRANSPORT DEMAND

Definition

The indicator «freight transport demand» will be presented in two different ways:

1) To measure decoupling of freight transport demand from economic growth, the volume of freight transport relative to GDP will be used. The decoupling indicator is defined as the ratio between tonne-km (inland transport) and GDP (Gross Domestic Product in constant 2000 EUR). Presentation of this indicator in the Republic of Macedonia will be based the baseline year 2000=100.

2) Modal split share of freight transport: This indicator is defined as the percentage share of freight transport in total inland transport. The unit used is tonne-kilometre (tkm), which represents movement of one tonne over a distance of one kilometre. It includes road and railroad inland transport. Railroad transport is based on movements on national territory, regardless of the nationality of the vehicle. Road freight transport is based on all movements of vehicles registered in the reporting country.

Units

The unit used is the tonne-kilometre (tkm), which represents the movement of one tonne over a distance of one kilometre. It includes transport by road and rail.

Freight transport demand and GDP are shown as an index (2000=100).

Policy relevance of the indicator

List of relevant policy documents

The National Strategy for Transport prepared and adopted by the Government of the Republic of Macedonia determines the main directions of the transport policy development in the Republic of Macedonia through identification of goals and development strategy for road, rail and air transport sectors.

Legal grounds

The road transport is regulated by the Law on Road Transport. It regulates the conditions and the manner of performing transport of passengers and goods in internal and international road transport.

Transportation of dangerous goods is regulated by the Law on Dangerous Goods Transportation in Road and Railroad Transport, regulating the conditions under which transport of dangerous goods shall be performed (preparation of matter, loading, transport, on road procedures, unloading, safety in transportation, vehicles equipment and staff training).

Railroad transportation is regulated by the Law on Railroads, Law on Agreements on Transportation in Railroad Traffic, Law on Agency Regulating Railroad Transport Services Market and Law on Railroad Transport Safety.

Targets

The fourth goal of the National Strategy for Transport is securing sustainable protection of the environment.

Key policy question

Is the freight transport in road transport reduced compared to other transport modes and is the freight transport demand decoupled from economic growth?

Key message

The freight transport demand in tone kilometers for road transport noted continuous increase almost identical at annual level by 2005, and then from 2005 to 2006 there was a rapid increase. In the period from 2006 to 2009, there was a significant trend of decline, followed by increase again in 2010 and 2011. With regard to railroad freight transport, there has been almost no change in data on annual level and the trend has been constant with no major or notable variations..

Figure 1: Freight transport by modes in tone kilometers (in million km)

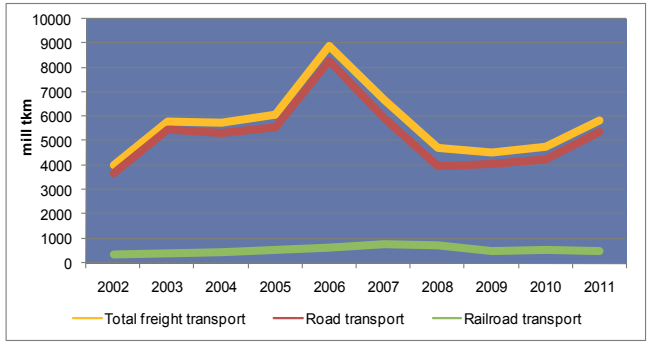


Figure 2: Share in percentages of tone kilometers of individual freight transport modes in the total freight transport

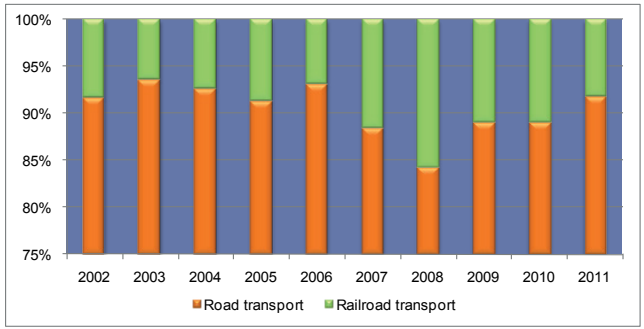
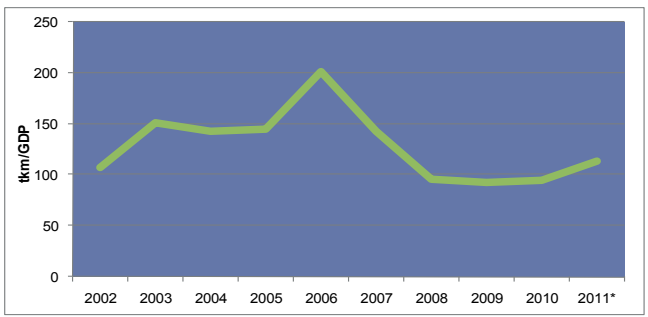


Figure 3: Overview of tonne kilometers / GDP ratio



Assessment

Figure 2 shows that in the period 2001 to 2011, the highest share in freight transport belongs to freight transport belongs to road transport ranging between 84,3% and 93,6 %, while road freight transport has a share of 6,4 to 15,7 % in the total freight transport.

The above is sufficient indication that the indicator should endeavour towards reduction of road transport in favour of other freight transport modes. The reason for this is that the road freight transport uses costly liquid fuels which during combustion on roads cause significant pollution of the environment, air, soil, biodiversity, etc.

Figure 3 shows that the trend of the index of tone kilometers relative to GDP from 2002 to 2003 was growing and then falling up to 2005, after which from 2005 to 2006 there was rapid growth followed again by rapid decline in the period between 2006 and 2009, and then again a trend of increase in 2010 and 2011. It is indexed on baseline year 2000=100 in order to monitor the changes in the intensity of freight transport demand relative to economic growth expressed through GDP.

Methodology

- Methodology for the indicator calculation

In order to measure the decoupling of freight transport demand from economic growth, the volume (i.e. intensity) of freight transport relative to GDP is calculated. Relative decoupling occurs when the freight transport demand rises at rate lower than the one of the GDP. Absolute decoupling occurs when the freight transport demand falls while GDP rises or remains constant.

The unit used is the tonne-kilometre (tkm), which represents movement of one tonne over a distance of one kilometre.

With regard to EU Member States, according to Regulation on road transport and Regulation (EC) No 91/2003 on railroad transport statistics, data is based on all movements of passenger transport on the national territory.

According to Regulation (EC) No 1172/98, data on freight road transport is based on all movements of vehicles registered in the reporting country. All other data on transport refer mainly to movements on national territory, regardless of the nationality of the vehicle.

- Sources of used methodology

Structural indicators of EUROSTAT on transport

State Statistical Office.

- Methodological uncertainty and data uncertainty

All data is based on movements on national territory, regardless of the nationality of the vehicle. Methodology of data collection has been harmonized at EU level. Sources include EUROSTAT, National statistical offices, ECMT, UNECE, UIC, DG TREN.

In order to answer the question whether the freight transport demand is decoupling from economic growth, the intensity of freight transport relative to changes in real GDP is considered.

- Uncertainty of data sets

In order to obtain full picture of transport demand and corresponding problems in the environment, it would be very useful to supplement data with data on the number of vehicle-kilometers.

Data specification

Title of the indicator	Source	Reporting obligation
Freight transport demand	State Statistical Office	

Data coverage:

Table 1: Freight transport by modes in tonne-kilometers (in million km)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total freight transport	4013	5823	5767	6106	8913	6717	4721	4532	4760	5860
road transport	3679	5450	5341	5576	8299	5938	3978	4035	4235	5381
railroad transport	334	373	426	530	614	779	743	497	525	479

Table 2: Share in percentages of tone kilometers of individual freight transport modes in the total freight transport

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
road transport	91,7	93,6	92,6	91,3	93,1	88,4	84,3	89,0	89,0	91,8
railroad transport	8,3	6,4	7,4	8,7	6,9	11,6	15,7	11,0	11,0	8,2

Table 3: Overview of tonne kilometers / GDP ratio

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*
tkm/GDP	107,1	151,1	143	145,1	201,7	143,2	95,9	92,9	94,8	113,5

* Previous data on GDP
2000=100

General metadata

Code	Title of the indicator	Compliance with CSI/ EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 036	Freight transport demand	CSI 036	Freight transport demand	P	B	– Freight transport per kilometre – GDP	annualy

TOURISM

Definition

The indicator shows:

1.1 International tourist intensity

The indicator shows the total number of foreign tourists by years at country level and by statistical regions and structure of visitors by country of origin.

1.2 Overnights of foreign tourists

The indicator shows the total number of overnights of foreign tourists by years at country level and by statistical regions. Also, it shows the structure of overnights and average stay of tourists by country of origin.

1.3 National tourists intensity

The indicator shows the total number of overnights of national tourists by years at country level and by statistical regions and average stay of tourists.

Units

- Number, intensity and structure.

Policy relevance

List of relevant policy documents

National Strategy for Tourism Development 2009 - 2013

- National Environmental Action Plan - 2 - in Section 4.2.6. Tourism, describes the main challenge for sustainable tourism development, implementation of economic potential with minimum possible impact on the environment.

- Spatial Plan of the Republic of Macedonia – in its Chapter 5.4. «Tourism development and organization of tourist areas», defines the status, objectives and planning determinations for tourism development.

- National Strategy for Sustainable Development of the Republic of Macedonia – in the section on tourism, presents the directions for sustainable development of tourism, within short, medium, and long-term frames, up to 2030.

- Strategy for Biological Diversity Protection in the Republic of Macedonia with Action Plan – under measure C.5 «Stimulation of traditional use of biological diversity and eco-tourism», defines the action for identification of sites suitable for eco-tourism.

Legal grounds

The Law on Tourist Activity specifies the conditions and the manner of performing tourist activity (Chapter 15 Services in rural, ethno and eco-tourism), Law on

Catering Activity.

The Law on Environment, the Law on Nature Protection, the Law on Waste Management, the Law on Ambient Air Quality and the Law on Waters regulate partially the requirements for environmental protection in tourist activity.

Targets

- Integration of the principles of sustainable development and environmental considerations in tourist sector
- Identification of areas of priority importance for tourism development
- Encouragement of exchange of best practices between public and private tourist interests
- Protection of natural heritage and biological diversity in tourist destinations
- Adoption and implementation of legislation in the area of tourism to regulate the protection of the environmnet
- Promotion of organic farming, healthy food production and especially traditional production of certain products (e.g. cheese, wine), production of honey, herbs growing, etc.
- Promotion of certain types of tourism such as wine tourism, hunting tourism, birds observation tourism, etc.

Key policy issue

1. What is the impact of tourism on the environment?

Tourism is a development factor with regard to phenomena and interactions in the environment, both in economic and non-economic activities. Tourism is not a product of natural and anthropogenic impact of environmental elements, but it is a significant transformer of the environment. The impacts of tourism on the environment may be systematized in all domains of tourist industry. In the domain of emitting environment, tourism appears as environment transformer in a form of numerous billboards, illuminated advertisements, and shop windows. In the communication domain, transportation means for tourist purposes are employed, such as railways, cable railways, abandoned trains and cars, even trunks, advertisements on by-road billboards and transportation means. New properties are introduced in the attractive-reception environment. Mountains obtain skiing terrains and view platforms, hunting is related to drinking and feeding places and observatories, shores contain wellarranged beaches, parter and horticultural substances, interior and

exterior developments are present, rural areas are adapted to receive tourists, the space is planned for infrastructure and communal services, and commercial network undergoes evolution and turns into tourist merchandise profile through sales of souvenirs and articles for tourist activities.

2. Does the increased number of tourists make enhanced pressure on the environment?

Increased number of tourists should not by itself imply enhanced pressure on the environment. Such pressure occurs in conditions of weak organization. In such conditions, the increased number of tourists may cause confrontations and misunderstandings among stakeholders involved in tourist industry, insufficient observation of traffic regulations, lack of care for public hygiene, non-observation of the code of conduct in tourist resort, robberies and destruction of nature and artifacts and sociofacts, criminogene conduct in terms of dealings with drugs, alcohol, prostitution, violations and other types of crime.

Development of tourism and increased number of tourists are accompanied by building activities that are not in accordance with the regulations and in harmony with authentic features of natural values.

Key message

With regard to international tourist intensity, total number of foreign tourists has had a trend of increase from 2002 to 2011 by 162%, and Greece with 311.759 tourists has had significant share in the number of foreign tourists. In terms of statistical regions, the highest number of tourists visited Skopje and Southwestern regions.

The total number of overnights by foreign tourists from 2002 to 2011 has had a rising trend by 175%. The highest average number of overnights was realized by tourists from Luxemburg with 3.89 days of average stay. In terms of statistical regions, the highest number of overnights were accomplished in Skopje and Southwestern regions.

With regard to national tourist intensity, it can be noted that the number of tourists from 2002 to 2011 has noted insignificant trend of increase. The number of overnights has been varying from year to year, though with falling trend. The average stay of national tourists for the same period has noted falling trend from 5 to

around 4 days of average stay.

Considering the fact that tourism is organized activity, monitoring of these indicators is necessary and so are the actions of all stakeholders for the purpose of environment protection and improvement through timely interventions and planned activities.

1.1 International tourist intensity

Figure 1. Total number of foreign tourists

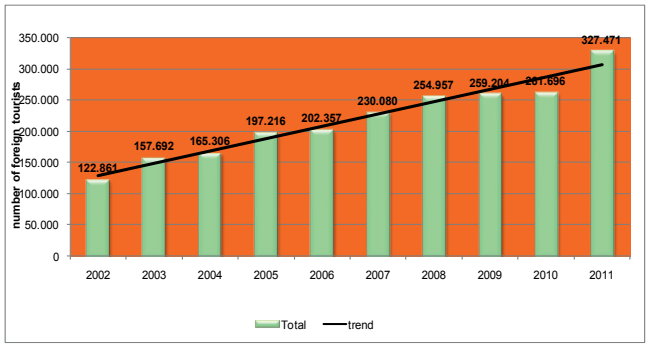


Figure 2. Total number of foreign tourists by country of origin in the reporting period

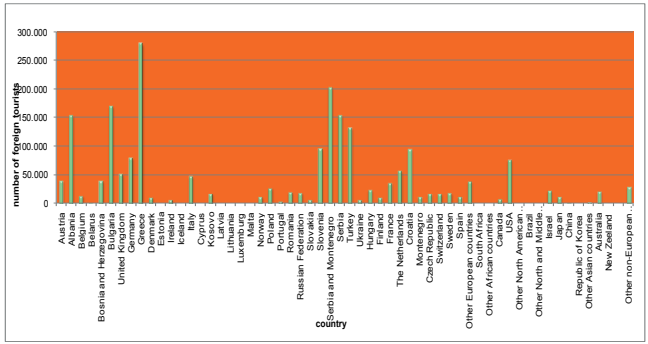


Figure 3. Countries with significant share in the number of foreign tourists

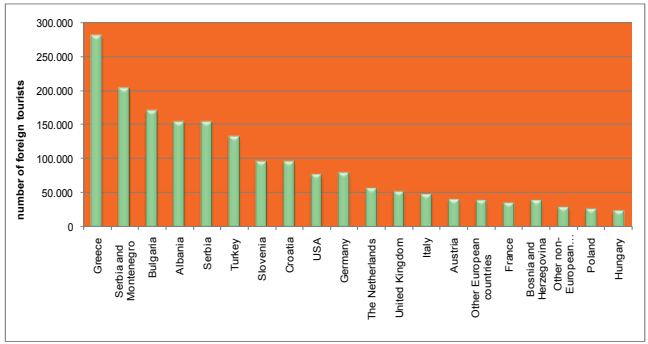
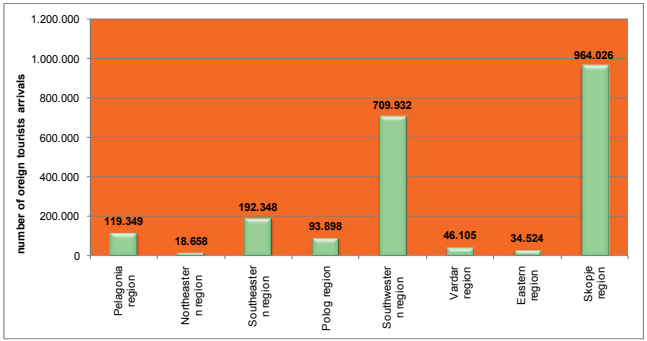


Figure 4. Foreign tourists arrivals by statistical regions



1.2 Overnights of foreign tourists

Figure 5. Total number of overnights by foreign tourists

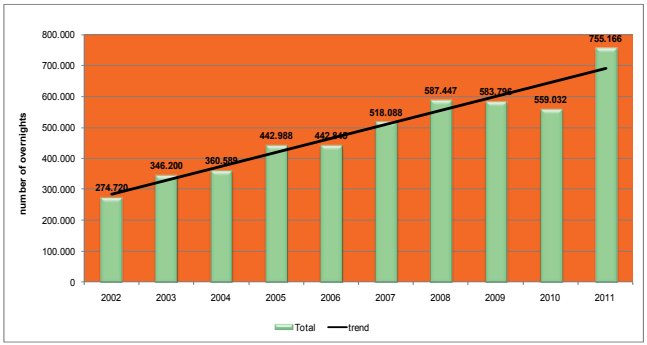


Figure 6. Total number of overnights and average stay by foreign tourists by country of origin

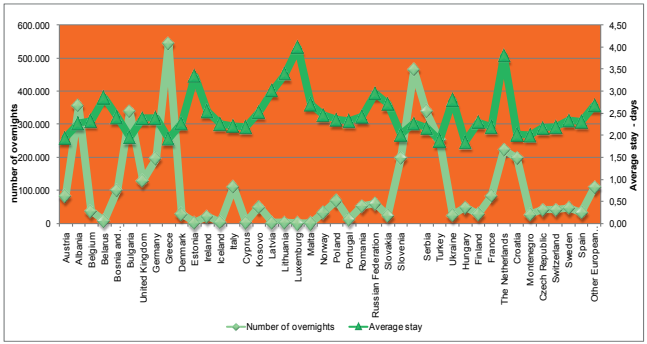


Figure 7. Countries with significant share in the average stay of foreign tourists

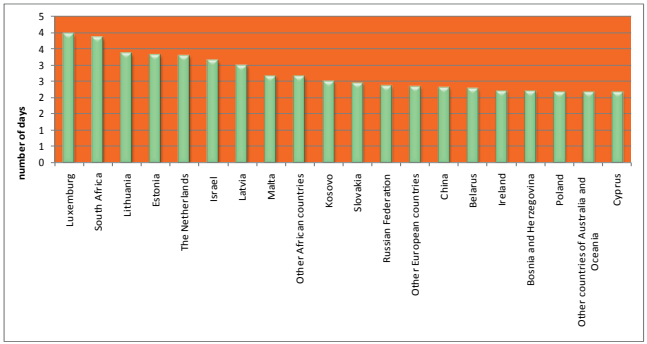
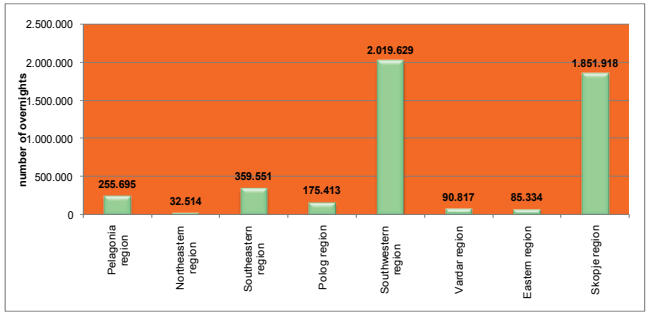


Figure 8. Overnights by foreign tourists by statistical regions



1.3 National tourist intensity

Figure 9. Total number of national tourists, number of overnights and average stay

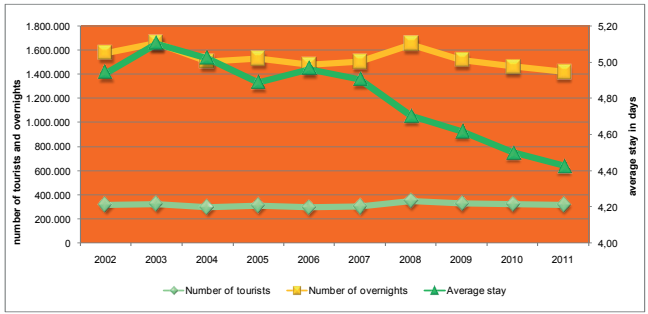
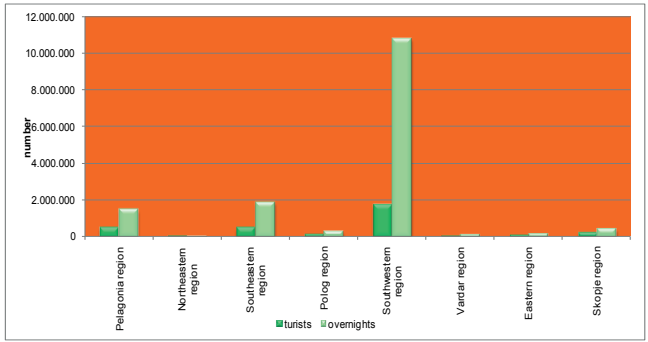


Figure 10. Number of national tourists and number of overnights by statistical regions



Assessment

1.1 International tourist intensity

Data presented in Figures show that the Republic of Macedonia has been visited by tourists from many countries in the world. Tourists from Europe, North America,Asia and Australia dominate. During the ten year reporting period, the structure of visits is dominated by tourists from the immediate neighbourhood. The leading position is occupied by tourists from Greece, Serbia and Montenegro, followed by Bulgaria and Albania, while the most numerous tourists from among other continents come from United States of

America. Development of attractive and receptive base in the Republic of Macedonia should provide grater presence of tourists from Western European countries with longer tourism tradition, and thus higher tourism and culture level.

Regional distribution shows that leading regional centres are Skopje and Southwestern regions, indicating two differentiated regions with different characteristics. Namely, the Southwestern region is predominated by the attractiveness of the resources, while Skopje region offers possibilities for business activities. Other regions incorporate alternative opportunities based on different environments, and therefore it is important to monitor the scale of foreign tourist intensity for the purpose of redistribution of visits.

1.2 Overnights of foreign tourists

The overnights correspond with the intensity of foreign tourists in the Republic of Macedonia. The summary results lead to the conclusion that the highest number of overnights was realized by tourists from European countries, with Luxemburg as a country of highest share in the average stay of tourists which is 3.98 days. From among other continents, the longest average stay was recorded for tourists from South Africa. Observation of this trend can help us assess the rate at which the attractiveness of the environment has adapted to the demands of these visitors.

Regional distribution of overnights by foreign tourists indicates that tourists in the Southwestern region accomplished highest number of overnights, followed by Skopje region, which is an unfavourable circumstance in the context of foreign tourism intensity, because they relate to visitors in mainly urban environment. Observation of the relations in the regional distribution of overnights accomplished by foreign tourists will enable the assessment of measures undertaken to redistribute overnights to other regions with specific values.

The average stay of foreign tourists enables us to observe the level of domination of environmental characteristics. The Figure indicates that the length of stay of foreign tourists in the Republic of Macedonia is relatively short. Such length was around 1.95 days in the analyzed period, reflecting significant lagging behind relative to the average length of stay of national tourists.

1.3 National tourism intensity

The number of national tourists has stagnation characteristics. Namely, during the period 2002 to 2011, there was insignificant trend of increase, and in 2006 the number of tourists decreased. This means that no significant improvement in the offer was made. The overnights acquired by national tourists track similar characteristics. Highest number of overnights was recorded in 2006, followed by falling trend by 2011. The results of average length of stay reflect similar relations, with significant drop in the number of overnights from 2007 to 2011. The lowest number of overnights was recorded in 2011, while the average length of stay from 2002 to 2011 recorded drop from 5 to around 4 days.

Dominant region in the context of distribution of national tourists is the Southwestern region, which could be assessed as advantage, but also as unbalanced distribution. Observation of these indicators should facilitate the estimate of the extent to which the number of national tourists will increase in other regions as a result from the promotion of the elements of the environment in tourist supply at the national tourist market.

The number of overnights is also comparable to tourist visits as reflection of the attractiveness of the environment, and thus the highest number of overnights has been recorded in Southwestern region. Observation of overnights will enable to assess the extent to which regions will improve the attractive basis as a factor of acquiring higher number of overnights.

Methodology

- Methodology for the indicator calculation

The trend in tourism development through dynamics and intensity of tourist industry.

The scale and the intensity, as well as the share of individual countries in the total number of foreign tourists arrivals and overnights, national tourists arrivals and overnights, regional distribution and average number of days of stay.

Data specification

Title of the indicator	Source	Reporting obligation
Tourism intensity in the Republic of Macedonia 1.1 International tourism intensity 1.2 Overnights of foreign tourists 1.3 National tourism intensity	– State Statistical Office	– Yearly to EUROSTAT – World Tourist Organization (WTO) – Annual tourist review of tourism and other services – Five-year interview of foreign tourists in accommodation establishments

Data coverage:

1.1 International tourism intensity

Table 1: Foreign tourists arrivals by country of origin

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Total	122.861	157.692	165.306	197.216	202.357	230.080	254.957	259.204	261.696	327.471	2.178.840
Austria	1.919	2.564	2.503	2.736	3.490	5.186	5.315	6.437	6.143	5.681	41.974
Albania	9.086	12.088	13.452	16.868	16.188	17.573	19.314	19.757	17.110	13.614	155.050
Belgium	970	1.243	996	1.157	1.414	1.748	1.711	1.839	1.848	2.519	15.445
Belarus	154	157	197	188	127	114	253	178	101	1.151	2.620
Bosnia and Herzegovina	1.885	2.687	3.648	4.021	4.240	4.887	4.443	4.672	5.619	4.959	41.061
Bulgaria	11.703	14.147	12.156	17.462	17.421	18.901	21.922	23.619	15.513	18.541	171.385
United Kingdom	3.916	4.517	4.049	5.099	5.318	5.789	7.690	5.309	5.647	6.139	53.473
Germany	6.084	6.317	6.522	6.995	7.659	8.840	9.655	9.795	9.573	9.822	81.262
Greece	14.677	27.042	29.901	33.080	30.835	28.618	21.060	22.253	26.843	45.509	279.818

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Denmark	786	1.048	1.379	1.165	1.018	1.168	1.748	1.338	1.273	1.251	12.174
Estonia									176	260	436
Ireland	525	482	522	659	991	1.011	792	610	745	1.500	7.837
Iceland	153	159	118	125	137	115	230	161	164	137	1.499
Italy	3.076	3.626	3.618	4.259	4.651	5.123	5.674	6.050	6.181	7.140	49.398
Cyprus									194	675	869
Kosovo									9.480	9.829	19.309
Latvia									239	308	547
Lithuania									251	280	531
Luxemburg									53	107	160
Malta									23	60	83
Norway	1.059	1.108	962	1.051	1.277	1.263	1.920	1.618	1.503	1.212	12.973
Poland	1.095	1.029	1.233	1.254	1.332	1.728	2.434	5.827	6.182	6.758	28.872
Portugal	308	432	331	365	511	611	552	601	655	727	5.093
Romania	1.255	1.330	1.144	1.733	1.662	2.137	2.240	2.677	3.351	3.882	21.411
Russian Federation	1.246	1.352	1.487	2.092	1.998	1.523	2.091	1.872	2.848	3.545	20.054
Slovakia	481	559	554	554	636	1.496	811	1.140	1.082	1.099	8.412
Slovenia	3.837	4.579	5.444	7.514	9.228	13.046	13.159	13.970	12.606	14.063	97.446
Serbia and Montenegro	23.239	27.325	30.771	39.147	38.208	44.661					203.351
Serbia							45.134	38.744	35.840	35.692	155.410
Turkey	5.180	5.755	6.496	7.379	7.804	8.907	15.561	16.962	20.047	39.251	133.342
Ukraine	908	706	724	617	641	1.079	1.072	772	981	1.042	8.542

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Hungary	1.985	2.173	1.320	1.582	1.835	3.037	3.254	3.365	3.492	3.342	25.385
Finland	683	768	782	835	885	1.018	1.088	1.220	1.233	3.432	11.944
France	2.542	3.513	2.845	3.017	3.133	3.594	4.278	4.914	4.858	4.901	37.595
The Netherlands	2.016	2.470	2.652	4.218	3.809	3.705	5.606	4.988	6.612	22.219	58.295
Croatia	4.097	5.467	6.828	7.667	8.817	12.326	12.302	12.519	12.791	13.885	96.699
Montenegro							2.761	2.653	4.180	3.522	13.116
CzechRepublic	927	1.155	905	1.290	2.108	1.990	2.406	2.583	2.423	2.695	18.482
Switzerland	965	1.485	1.598	1.845	1.924	1.939	2.048	1.848	2.153	2.733	18.538
Sweden	1.082	1.503	1.596	1.854	1.937	1.845	2.311	2.355	2.530	2.702	19.715
Spain	842	1.386	895	1.213	1.154	1.464	1.710	2.091	1.711	1.726	14.192
Other European countries	1.767	2.689	2.911	2.286	2.961	4.114	7.045	9.486	4.274	2.947	40.480
South Africa									32	52	84
Other African countries									196	356	552
Canada	776	970	704	851	906	969	1.160	1.257	1.247	1.366	10.206
USA	6.997	7.403	7.658	7.588	8.275	7.978	8.472	7.826	7.655	8.082	77.934
Other North American countries									451	636	1.087
Brazil									142	252	394
Other North and Middle American countries									229	408	637
Israel	430	526	676	1.207	1.170	1.809	6.532	6.110	2.885	3.309	24.654
Japan	594	1.076	931	1.041	1.212	1.861	1.236	1.268	1.621	2.194	13.034
China									853	1.664	2.517
Republic of Korea									686	1.070	1.756

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Other Asian countries									2.015	2.755	4.770
Australia	844	1.187	1.116	1.563	2.014	2.755	3.165	2.784	3.967	3.974	23.369
New Zeeland	128	99	96	143	264	183	273	203	207	253	1.849
Other countries of Australia and Oceania									982	243	1.225
Other non-European countries	2.644	3.570	3.586	3.496	3.167	3.969	4.529	5.533			30.494

Table 2: Arrivals of foreign tourists by statistical regions

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Total	122.861	157.692	165.306	197.216	202.357	202.357	202.357	202.357	261.696	327.471	2.178.840
Pelagonia region	6.464	9.225	11.238	12.550	12.472	13.025	13.286	11.838	14.166	15.085	119.349
Northeastern region	1.325	985	1.739	2.011	1.580	2.366	2.099	2.124	2.005	2.424	18.658
Southeastern region	5.006	7.792	9.559	16.518	12.696	21.399	21.139	22.582	25.453	50.204	192.348
Polog region	5.013	4.898	7.529	8.506	9.185	8.014	9.222	14.096	14.478	12.957	93.898
Southwestern region	34.234	51.551	53.497	66.226	72.258	80.003	83.007	87.353	79.934	101.869	709.932
Vardar region	3.624	3.323	3.208	3.332	3.894	3.795	4.599	5.385	6.406	8.539	46.105
Eastern region	1.714	1.995	2.330	2.302	3.079	3.792	4.509	4.545	4.591	5.667	34.524
Skopje region	65.481	77.923	76.206	85.771	87.193	97.686	117.096	111.281	114.663	130.726	964.026

1.2 Overnights of foreign tourists

Table 3: Overnights and average stay of foreign tourists by country of origin

	Number of tourists	Number of overnights	Average stay
Total	2.178.840	4.870.871	2,24
Austria	41.974	81.854	1,95
Albania	155.050	352.691	2,27
Belgium	15.445	35.985	2,33
Belarus	2.620	7.466	2,85
Bosnia and Herzegovina	41.061	98.984	2,41
Bulgaria	171.385	335.707	1,96
United Kingdom	53.473	127.671	2,39
Germany	81.262	194.690	2,40
Greece	279.818	538.868	1,93
Denmark	12.174	27.658	2,27
Estonia	436	1.455	3,34
Ireland	7.837	19.941	2,54
Iceland	1.499	3.388	2,26
Italy	49.398	109.359	2,21
Cyprus	869	1.903	2,19
Kosovo	19.309	48.781	2,53
Latvia	547	1.645	3,01
Lithuania	531	1.794	3,38
Luxemburg	160	637	3,98
Malta	83	224	2,70
Norway	12.973	31.823	2,45
Poland	28.872	67.864	2,35
Portugal	5.093	11.849	2,33
Romania	21.411	51.759	2,42
Russian Federation	20.054	59.153	2,95
Slovakia	8.412	22.760	2,71
Slovenia	97.446	196.102	2,01
Serbia and Montenegro	203.351	461.257	2,27
Serbia	155.410	336.427	2,16
Turkey	133.342	251.417	1,89
Ukraine	8.542	23.908	2,80
Hungary	25.385	46.973	1,85
Finland	11.944	27.437	2,30
France	37.595	82.326	2,19

	Number of tourists	Number of overnights	Average stay
The Netherlands	58.295	220.966	3,79
Croatia	96.699	195.832	2,03
Montenegro	13.116	26.323	2,01
CzechRepublic	18.482	39.999	2,16
Switzerland	18.538	40.634	2,19
Sweden	19.715	46.107	2,34
Spain	14.192	32.783	2,31
Other European countries	40.480	108.293	2,68
South Africa	84	325	3,87
Other African countries	552	1483	2,69
Canada	10.206	23.945	2,35
USA	77.934	209.546	2,69
Other North American countries	1.087	2.311	2,13
Brazil	394	812	2,06
Other North and Middle American countries	637	1.393	2,19
Israel	24.654	81.307	3,30
Japan	13.034	23.773	1,82

	Number of tourists	Number of overnights	Average stay
China	2.517	5.869	2,33
Republic of Korea	1.756	2.127	1,21
Other Asian countries	4.770	9.685	2,03
Australia	23.369	51.928	2,22
New Zeeland	1.849	3.255	1,76
Other countries of Australia and Oceania	1.225	2.705	2,21
Other non-European countries	30.494	77.714	2,55

Table 4: Overnights by foreign tourists by statistical regions

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
TOTAL	274.720	346.200	360.589	442.988	442.845	518.088	587.447	583.796	559.032	755.166	4.870.871
Pelagonia region	11.435	14.708	22.974	31.589	26.676	27.029	26.746	25.260	32.190	37.088	255.695
Northeastern region	2.134	1.661	3.045	3.446	2.939	3.829	3.243	3.466	3.922	4.829	32.514
Southeastern region	8.593	12.143	15.957	27.998	26.107	44.525	43.811	43.810	42.133	94.474	359.551
Polog region	8.335	8.358	14.320	16.824	18.525	15.550	19.085	24.991	26.299	23.126	175.413
Southwestern region	96.323	135.213	141.684	184.048	192.216	223.849	249.315	248.963	219.300	328.718	2.019.629
Vardar region	8.855	7.599	6.514	6.865	7.417	6.561	7.839	10.487	13.207	15.473	90.817
Eastern region	4.343	5.053	6.998	5.579	7.657	9.204	10.312	11.767	11.183	13.238	85.334
Skopje region	134.702	161.465	149.097	166.639	161.308	187.541	227.096	215.052	210.798	238.220	1.851.918

1.3 National tourism intensity

Table 5: Arrivals and overnights of national tourists

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Number of tourists	318.851	325.459	299.709	312.490	297.116	306.132	350.363	328.566	324.545	320.097	3.183.328
Number of overnights	1.575.664	1.660.667	1.504.845	1.527.053	1.474.550	1.501.624	1.648.073	1.517.810	1.461.185	1.417.868	15.289.339
Average stay	4,94	5,10	5,02	4,89	4,96	4,91	4,70	4,62	4,50	4,43	4,80

Table 6: Arrivals of national tourists by statistical regions

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
TOTAL	318.851	325.459	299.709	312.490	297.116	306.132	350.363	328.566	324.545	320.097	3.183.328
Pelagonia region	56.118	54.464	45.472	46.003	39.498	38.690	49.039	38.902	55.546	61.384	485.116
Northeastern region	3.709	3.555	1.634	1.661	853	1.291	1.296	1.436	1.093	1.379	17.907
Southeastern region	26.613	27.521	34.535	45.333	45.881	44.644	62.892	68.416	59.403	58.351	473.589
Polog region	7.414	11.357	15.150	12.049	12.705	9.174	9.931	17.500	17.350	16.196	128.826
Southwestern region	183.790	189.829	169.453	170.208	160.960	175.254	193.662	170.127	154.731	147.877	1.715.891
Vardar region	10.139	9.429	5.145	4.246	4.327	4.624	3.200	4.063	4.166	3.525	52.864
Eastern region	12.803	6.553	7.516	7.061	8.942	7.021	9.230	8.135	8.463	7.948	83.672
Skopje region	18.265	22.751	20.804	25.929	23.950	25.434	21.113	19.987	23.793	23.437	225.463

Table 7: Overnights of national tourists by statistical regions

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
TOTAL	1.575.664	1.660.667	1.504.845	1.527.053	1.474.550	1.501.624	1.648.073	1.517.810	1.461.185	1.417.868	15.289.339
Pelagonia region	187.393	187.716	153.956	147.225	128.785	125.697	145.182	114.439	138.164	171.830	1.500.387
Northeastern region	4.305	4.704	2.639	2.620	1.064	1.848	1.887	2.781	1.706	1.978	25.532
Southeastern region	100.202	156.957	217.781	180.860	191.970	167.094	216.540	233.220	220.654	217.903	1.903.181
Polog region	14.549	31.178	39.130	33.652	35.299	22.436	26.260	36.155	35.156	31.661	305.476
Southwestern region	1.164.009	1.203.809	1.028.797	1.104.087	1.052.271	1.127.957	1.202.890	1.077.229	949.524	880.469	10.791.042
Vardar region	31.802	23.338	11.310	8.985	9.518	8.969	6.022	6.741	6.930	5.666	119.281
Eastern region	42.753	17.040	19.356	14.283	21.277	12.490	18.137	15.742	14.504	15.614	191.196
Skopje region	30.651	35.925	31.876	35.341	34.366	35.133	31.155	31.503	94.547	92.747	453.244

General metadata

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 047	Tourism intensity in the Republic of Macedonia	TOUR 12 TOUR 33	Tourism intesity Overnights spent in tourism accomodations	D,P	A	– Biological diversity – Nature – Policies – Waste – Water – Air – Transport – Soil	Yearly Every five years

Definition

Accomodation establishments are supra-structural facilities facilitating visits and stay of tourists in a given environment. Their observation enables the assessment of regional development. The indicator shows the number of accommodation facilities, rooms and beds.

Units

- Number of facilities, number of rooms and number of beds.

Policy relevance

List of relevant policy documents

- National Strategy for Tourism Development 2009 - 2013
- National Environmental Action Plan - 2 - in Section 4.2.6. Tourism, describes the main challenge for sustainable tourism development, implementation of economic potential with minimum possible impact on the environment.
- Spatial Plan of the Republic of Macedonia – in its Chapter 5.4. «Tourism development and organization of tourist areas», defines the objectives and planning determinations for tourism development.
- National Strategy for Sustainable Development of the Republic of Macedonia – in the section on tourism, presents the directions for sustainable development of tourism, within short, medium, and long-term frames, up to 2030.
- Strategy for Biological Diversity Protection in the Republic of Macedonia with Action Plan – under measure C.5 «Stimulation of traditional use of biological diversity and eco-tourism», defines the action for identification of sites suitable for eco-tourism.

Legal grounds

The Law on Tourist Activity specifies the conditions and the manner of performing tourist activity (Chapter 15 Services in rural, ethno and eco-tourism); Law on Catering Activity.

The Law on Environment, the Law on Nature Protection, the Law on Waste Management, the Law on Ambient Air Quality and the Law on Waters regulate partially the requirements for environmental protection in tourist activity.

Targets

- Integration of the principles of sustainable development and environmental considerations in tourist sector
- Identification of areas of priority importance for tourism development
- Encouragement of exchange of best practices between

public and private tourist interests

- Protection of natural heritage and biological diversity in tourist destinations

- Adoption and implementation of legislation in the area of tourism to regulate the protection of the environmnet

- Promotion of organic farming, healthy food production and especially traditional production of certain products (e.g. cheese, wine), production of honey, herbs growing, etc.

- Promotion of certain types of tourism such as wine tourism, hunting tourism, birds observation tourism, etc.

Key policy issue

What is the impact of accomodation establishments on the environment?

The number of accomodation units may have both positive and negative impacts. Positive impacts are related to proper utilization of the space for facilities location, and negative impacts are made when the space is occupied iby accomodation establishments in inadequate manner.

Key message

The total number of accommodation establishments – facilities in the period 2002 to 2011 has had a trend of increase by 46.7%. Relative to the number of establishments, the number of rooms and beds has noted falling trend by 1.6% for rooms and 5.7% for beds, which is due to improved standard of accommodation facilities.

Figure 1. Total number of accommodation establishments in the period 2002 to 2011

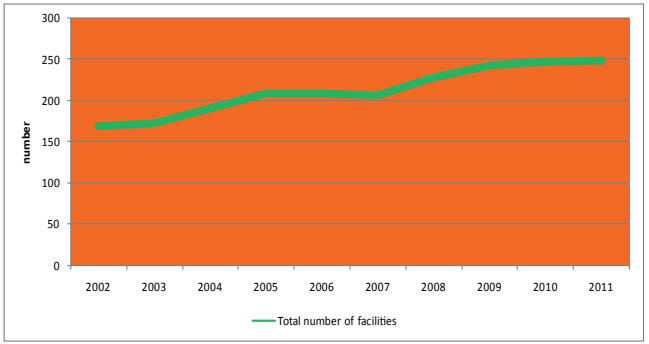


Figure 2. Total number of accommodation establishments – rooms and beds - in the period 2002 to 2011

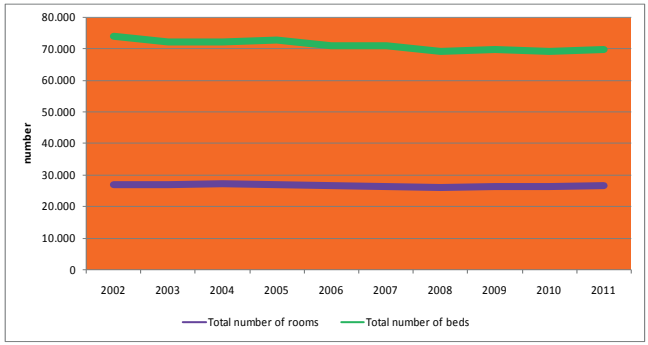


Figure 3. Accommodation establishments – structure

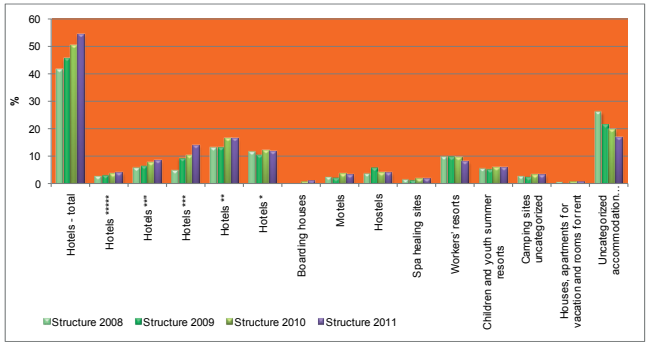


Figure 4. Accommodation establishments – rooms structure

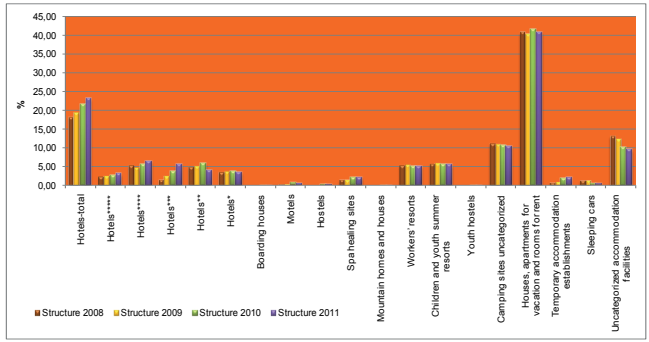
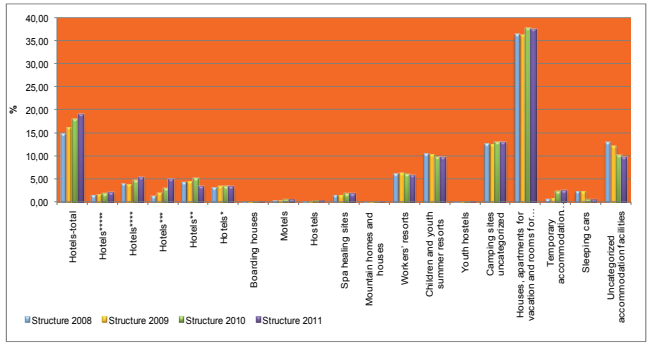


Figure 5. Accommodation establishments – beds structure



Assessment

In 2008, statistical monitoring of accommodation establishments by stars was introduced for the first time. Categorization of establishments by stars cannot be automatically linked with the categorization by which establishments were monitored earlier and this caused interruption in annual data series.

Tables 1 and 2 indicate that the intensity of accomodation establishments as facilities in the period 2002 to 2011 track an increase of 46.7%, reflecting an increase that has to be observed. In this context, it is of particular importance to underline that increases have been noted with facilities of hotel nature, while decreases have been observed in the area of workers' resorts. This can be assessed as positive trend because it is a result of the transformation of non-commercial into commercial sector which will have to be more observant of environmental protection standards.

Tables 2 and 3 indicate falling trend in the number of rooms and beds resulting from decreased number of rooms in campingsites. In environmental terms, this is a positive aspect. The highest number of rooms and beds belongs to the category of houses and apartments for vacation and rooms for rent, followed by hotel establishments.

Methodology

- Methodology for the indicator calculation

Development trend of accomodation units.
Share of individual types of accomodation establishments in the total number.

Data specification

Title of the indicator	Source	Reporting obligation
Tourism density and facilities dynamics	– State Statistical Office	– Statistical Year book – WTO – EUROSTAT

Data coverage:

Table 1: Total number of accommodation establishments in the period 2002 to 2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total number of facilities	169	172	191	208	209	206	228	242	247	248
Total number of rooms	26.877	27.017	27.222	26.925	26.503	26.246	25.952	26.390	26.189	26.448
Total number of beds	73.985	72.059	72.276	72.637	71.021	70.898	69.097	69.561	69.102	69.737

Table 2: Accommodation establishments in catering industry – facilities structure

	2008	2009	2010	2011	Structure 2008	Structure 2009	Structure 2010	Structure 2011
TOTAL	228	242	247	248	100	100	100	100
Hotels - total	95	110	124	135	41,67	45,45	50,20	54,44
Hotels *****	8	9	9	10	3,51	3,72	3,64	4,03
Hotels **"	15	17	19	21	6,58	7,02	7,69	8,47
Hotels ***	13	24	25	34	5,70	9,92	10,12	13,71
Hotels **	31	33	41	41	13,60	13,64	16,60	16,53
Hotels *	28	27	30	29	12,28	11,16	12,15	11,69
Boarding houses	2	2	2	3	0,88	0,83	0,81	1,21
Motels	7	7	9	8	3,07	2,89	3,64	3,23
Hostels	10	16	10	10	4,39	6,61	4,05	4,03
Spa healing sites	5	5	5	5	2,19	2,07	2,02	2,02

	2008	2009	2010	2011	Structure 2008	Structure 2009	Structure 2010	Structure 2011
Workers' resorts	24	25	24	20	10,53	10,33	9,72	8,06
Children and youth summer resorts	14	14	15	15	6,14	5,79	6,07	6,05
Camping sites uncategorized	8	8	8	8	3,51	3,31	3,24	3,23
Houses, apartments for vacation and rooms for rent	3	2	2	2	1,32	0,83	0,81	0,81
Uncategorized accommodation establishments	60	53	48	42	26,32	21,90	19,43	16,94

Table 3: Accommodation establishments in catering industry– rooms structure

	2008	2009	2010	2011	Structure 2008	Structure 2009	Structure 2010	Structure 2011
TOTAL	25.952	26.390	26.189	26.448	100	100	100	100
Hotels-total	4.747	5.142	5.651	6.110	18,29	19,48	21,58	23,10
Hotels*****	628	688	709	833	2,42	2,61	2,71	3,15
Hotels****	1.408	1.293	1.453	1.719	5,43	4,90	5,55	6,50
Hotels***	452	728	963	1.522	1,74	2,76	3,68	5,75
Hotels**	1.307	1.402	1.541	1.088	5,04	5,31	5,88	4,11
Hotels*	952	1.031	985	948	3,67	3,91	3,76	3,58
Boarding houses	31	31	31	31	0,12	0,12	0,12	0,12
Motels	104	129	159	152	0,40	0,49	0,61	0,57

	2008	2009	2010	2011	Structure 2008	Structure 2009	Structure 2010	Structure 2011
Hostels	88	78	90	79	0,34	0,30	0,34	0,30
Spa healing sites	412	418	538	533	1,59	1,58	2,05	2,02
Mountain homes and houses	10	10	10	10	0,04	0,04	0,04	0,04
Workers' resorts	1.432	1.508	1.352	1.334	5,52	5,71	5,16	5,04
Children and youth summer resorts	1.548	1.592	1.431	1.431	5,96	6,03	5,46	5,41
Youth hostels	24	24	24	24	0,09	0,09	0,09	0,09
Camping sites uncategorized	2.916	2.903	2.784	2.782	11,24	11,00	10,63	10,52
Houses, apartments for vacation and rooms for rent	10.569	10.624	10.827	10.817	40,73	40,26	41,34	40,90
Temporary accommodation establishments	250	267	506	541	0,96	1,01	1,93	2,05
Sleeping cars	372	372	123	123	1,43	1,41	0,47	0,47
Uncategorized accommodation facilities	3.449	3.292	2.663	2.481	13,29	12,47	10,17	9,38

Table 4: Accommodation establishments in catering industry – beds structure

	2008	2009	2010	2011	Structure 2008	Structure 2009	Structure 2010	Structure 2011
TOTAL	69.097	69.561	69.102	69.737	100,00	100,00	100,00	100,00
Hotels-total	10.364	11.307	12.374	13.317	15,00	16,25	17,91	19,10
Hotels*****	1.129	1.288	1.251	1.488	1,63	1,85	1,81	2,13
Hotels****	2.893	2.748	3.150	3.715	4,19	3,95	4,56	5,33
Hotels***	965	1.507	2.072	3.474	1,40	2,17	3,00	4,98
Hotels**	3.094	3.264	3.565	2.393	4,48	4,69	5,16	3,43
Hotels*	2.283	2.500	2.336	2.247	3,30	3,59	3,38	3,22
Boarding houses	75	75	71	71	0,11	0,11	0,10	0,10
Motels	289	359	406	371	0,42	0,52	0,59	0,53
Hostels	181	163	195	184	0,26	0,23	0,28	0,26
Spa healing sites	1.089	1.091	1.217	1.217	1,58	1,57	1,76	1,75
Mountain homes and houses	60	60	60	60	0,09	0,09	0,09	0,09
Workers' resorts	4.378	4.501	4.056	3.996	6,34	6,47	5,87	5,73
Children and youth summer resorts	7.315	7.272	6.668	6.668	10,59	10,45	9,65	9,56
Youth hostels	48	48	48	48	0,07	0,07	0,07	0,07
Camping sites uncategorized	8.800	8.726	8.971	8.971	12,74	12,54	12,98	12,86
Houses, apartments for vacation and rooms for rent	25.119	25.134	26.132	26.132	36,35	36,13	37,82	37,47

	2008	2009	2010	2011	Structure 2008	Structure 2009	Structure 2010	Structure 2011
Temporary accommodation establishments	604	632	1.537	1.692	0,87	0,91	2,22	2,43
Sleeping cars	1.680	1.680	384	384	2,43	2,42	0,56	0,55
Uncategorized accommodation facilities	9.095	8.513	6.983	6.626	13,16	12,24	10,11	9,50

General metadata

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 048	Tourism density and facilities dynamics	TOUR 14	Tourism density	S, P	A	– Biodiversity – Nature – Policies – Waste – Water – Air – Transport	Annually

ECONOMIC VALUE OF TOURISM INDUSTRY

Definition

Share in BDP is the share of the gross value added, in percentage, in the area of tourism in the total Gross Domestic Product on national level.

Units

- %.

Policy relevance

List of relevant policy documents

- National Strategy for Tourism Development 2009 - 2013

- National Environmental Action Plan - 2 - in Section 4.2.6. Tourism, describes the main challenge for sustainable tourism development, implementation of economic potential with minimum possible impact on the environment.

- Spatial Plan of the Republic of Macedonia – in its Chapter 5.4. «Tourism development and organization of tourist areas», defines the objectives and planning determinations for tourism development.

- National Strategy for Sustainable Development of the Republic of Macedonia – in the section on tourism, presents the directions for sustainable development of tourism, within short, medium, and long-term frames, up to 2030.

- Strategy for Biological Diversity Protection in the Republic of Macedonia with Action Plan– under measure C.5 «Stimulation of traditional use of biological diversity and eco-tourism», defines the action for identification of sites suitable for eco-tourism.

Legal ground

The Law on Tourist Activity specifies the conditions and the manner of performing tourist activity; Law on Catering Activity.

The Law on Environment, the Law on Nature Protection, the Law on Waste Management, the Law on Ambient Air Quality and the aw on Waters regulate partially the requirements for environmental protection in tourist activity.

Targets

- Integration of the principles of sustainable

development and environmental considerations in tourist sector

- Identification of areas of priority importance for tourism development
- Encouragement of exchange of best practices between public and private tourist interests
- Protection of natural heritage and biological diversity in tourist destinations
- Adoption and implementation of legislation in the area of tourism to regulate the protection of the environmnet
- Promotion of organic farming, healthy food production and especially traditional production of certain products (e.g. cheese, wine), production of honey, herbs growing, etc.
- Promotion of certain types of tourism such as wine tourism, hunting tourism, birds observation tourism, etc.

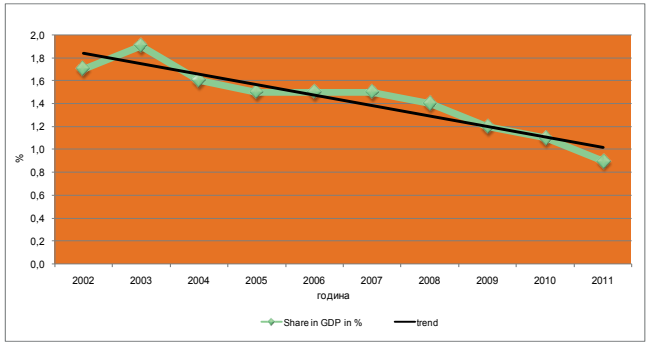
Key policy issue

What is the impact of tourism relying on the characteristics of the environment on the economic development of the Republic of Macedonia?

Key message

Share of tourism in the economic development of the Republic of Macedonia is very low. Its share was the highest in 2003 reaching 1.9%, and it was the lowest in 2011 amounting 0.9%. Share of tourism in the overall gross domestic product notes constant trend of decrease.

Figure 1.Share of tourism in GDP in %



Assessment

The Figure shows that the share of tourism in GDP is relatively low with falling trend. I.e. with no improvement. Its share was the highest in 2003 reaching 1.9%, and it was the lowest in 2011 amounting 0.9%.Observation should enable insight in the extent in which effects from tourist development on the environment improve.

Revenues acquired on the basis of tourist fee and taxes will enable environment planning and protection and also offer the opportunity to legal and natural persons to improve their living and working conditions.

Methodology

- Methodology for the indicator calculation

Share of value added from tourism in GDP.

Data specification

Title of the indicator	Source	Reporting obligation
Economic value of tourism industry	– State Statistical Office	– Yearly publication on GDP – Statistical Year book

Data coverage:

Table 1: Share of "Catering and tourism" i.e. "Hotels and restaurants" sector in gross domestic product (production method)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Share in GDP in %	1.7	1.9	1.6	1.5	1.5	1.5	1.4	1.2	1.1	0.9

General metadata

Code	Title of the indicator	Compliance with CSI EEA or other indicators		Classification by DPSIR	Type	Linkage with area	Frequency of publication
MK NI 049	Economic value of tourism industry	TOUR 35	Economic value of tourism industry	D	B	– Biodiversity – Nature – Policies – Waste – Water – Air – Transport	Annually

LIST OF ABBREVIATIONS

CSI	Core Set of Indicators
EC	European Community
EEA	European Environment Agency
ENHIS	European Environment and Health Information System
EUROSTAT	Statistical Office of the European Communities
ISO	International Organization for Standardization
NEAP	National Environmental Action Plan
WHO	World Health Organisation
GDP	Gross Domestic Product
DPSIR	Driving forces - Pressure - State - Impact - Response
LSGUs	Local Self-Government Units
EU	European Union
EC	European Commission
IHP	Institute for Health Protection
PHI	Public Health Institution
MEPP	Ministry of Environment and Physical Planning
UN	United Nations
OUN	Organization of United Nations
RIHP	Republic Institute for Health Protection
HMA	Hydrometeorological Administration
HBI	Hydrobiological Institute

Air pollution and ozone depletion	
CLRTAP	Convention for Lon Range Transboundary Air Pollution
NECD	National Emission Ceilings Directive
POPs	Persistent Organic Pollutants
UNECE	United Nations Economic Commission for Europe
CORINAIR	CoR Inventory Air Polution
IPPC, EIA/SEA	Integrated Pollutant Prevention Control, Environmental Impact Assessment
CEN	Comite Europeen de Normalisation
SNAP	Selected Nomenclature for Air Pollution
CARDS	Community Assistance for Reconstruction, Development and Stabilization
UNFCCC	United Nations Framework Convention on Climate Change
EMEP	European Monitoring and Evaluation Program Note: The EMEP has been established in the framework of the UN/ECE Convention on Long-Range Transboundary Air Pollution
EEA/ETC-ACC	European Environment Agency/European Topic Center – Air and Climate Change
GHG (CRF).	Green house gases (Common reporting format)
TOFP	Tropospheric ozone formation potential
NMVOCs	Non-methane volatile organic compounds
CH_4	Methane
CSI	Core set of indicators
PM	Particulate matter
SO_2	Sulphur dioxide
PM_{10}	Particulate Matters up to 10 micrometers in size
$PM_{2.5}$	Particulate Matters up to 2.5 micrometers in size

NO_2	Nitrogen oxide
O_3	Ozone
NO	Nitrogen monoxide
NOx	Nitrogen oxides
UV	Ultraviolet
CFC	Chlorofluorocarbons
HCFC	Hydrochlorofluorocarbons
CCl_4	Chloroform
ODS	Ozone depleting supstances
HBFC	Hydrobromofluorocarbons
MT	Metric tonnes
ODP	Ozone Depletion Potential
UNEP	United Nation Environmental Programme
UNIDO	United Nation Industrial Development Organisation
DGENV	European Commission, Environment Directorate-General
Biological Diversity	
IUCN	International Union for Conservation of Nature and Natural Resource
NCSA	National Capacity Self-Assessment
UNESCO	United Nations Educational, Scientific and Cultural Organization
SNR	Strict Natural Reserve
NP	National Park
MN	Monument of Nature

NP	Nature Park
PL	Protected Landscape
MPA	Multipurpose Area
ASCI	Areas of Special Conservation Interest
CDDA	Common Database on Designated Areas
FAO	Food and Agriculture Organisation
SEBI 2010	Streamlining European 2010 Biodiversity Indicators
CDB	Convention on Biological Diversity
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
Climate Change	
IPCC	Intergovernmental Panel on Climate Change
GHG	Green House Gases
LUCF	Land Use Change and Forestry
UNFCCC	United Nations Framework Convention on Climate Change
CDM	Clean development machanizm
EE	Energy Efficiency
RES	Renewable Energy Sources
TPP	Thermal Power Plant
EEC	Economic European Community
WASP	Energy system planning tool
GACMO	Green house gases Costing Model

Soil	
CORINE Land Cover	Coordination of information on the environment
JRC	Joint Research Centre
Waste	
ERM	Environmental Resources Management
Water	
WEI	Water exploitation Index
PE	Public Enterprise
OECD/ EUROSTAT	Organisation for Economic Co-operation and Development / Statistical Office of the European Communities
BOD	Biological Oxigen Demand
NH_4^+	Ammonium ion
FWD	Framework Water Directive
EEC	European Economic Community
IPPS	Integrated Pollution Prevention and Control
pH	Measure of solution acidity or alkalinity
(NO_3^-)	Nitrates
COD	Chemical Oxygen Demand
Agriculture	
OECD	Organisation for Economic Co-operation and Development
Energy	
ECE/UN	Economic Commission for Europe United Nations
IEA/OECD	Institute of European Affairs/ Organisation for Economic Co-operation and Developmen
NAC	National Activities Classification

PARE	Price Adjusted Rate Exchange
Fishering	
FAO	Food and Agriculture Organisation
Transport	
ECMT	European Conference of the Ministers of Transport
UNECE	United Nations Economic Commission
UIC	L'Union Internationale des Chemins
DG TREN	Directorate-General for Transport and Energy
ECMT/UNECE	European Conference of the Ministers of Transport/ United Nations Economic Commission for Europe
ROD	Report Obligation Database
Tourism	
WTO	World Tourism Organization

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