AIR POLLUTION

MK-NI 001

EMISSIONS OF ACIDIFYING SUBSTANCES

Period of indicator assessment

- September 2007— April 2008

Explanation

- Justification for indicator selection

Emissions of acidifying substances cause damage to human health, ecosystems, buildings and materials, through processes like corrosion. The effects associated with emissions of pollutants included in this type of indicators depend on their acidifying potential and on the properties of ecosystems and materials. The deposition of acidifying substances still frequently exceeds the critical levels in ecosystems throughout Europe.

The indicator supports assessment of the progress towards implementation of the Gothenburg Protocol under the 1979 Convention on Long-Range Transboundary Air Pollution (CLRTAP) and the EU Directive on National Emissions Ceilings (NECD) (2001/81/EC).

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 sulfur 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

- Ktonnes (acidifying equivalent)

Policy relevance of the indicator

List of relevant policy documents

The National Environmental Action Plan (NEAP II) provides directions for the measures (presented below) that need to be taken to improve the overall status of air, including the reduction of emissions of acidifying substances:

- Development of National Plan for Ambient Air Protection;
- Development of Programmes for air emissions reduction and air quality improvement in certain local self-government units (LSGUs) with action plans (pilot: City of Skopje);
- Establishment of lists of air quality zones and agglomerations;

- Capacity building in vehicles technical control at vehicles registration, annual technical inspections and control on roads.

According to the Stabilization and Association Agreement between the EU and the Republic of Macedonia, Action Plan for European Partnership, National Programme for Approximation with the Acquis, the following activities should be implemented:

- Preparation of bylaws in the area of air in accordance with the National Approximation Programme with priorities
- Establishment of national emission ceilings for certain atmospheric pollutants (2001/81/EC)
- National Implementation Plan for POPs emissions reduction
- Inventory of Air Pollution by CORINAIR Methodology and reporting to UNECE/ CLRTAP.

Legal grounds

The Law on Environment (adopted in 2005) regulates areas of relevance for the air quality and air emissions, especially in the segments of environmental monitoring, environmental impact assessment (EIA) and Integrated Pollution Prevention and Control (IPPC). Consistent implementation of certain Articles regulating IPPC, EIA/SEA will contribute to air emissions reduction, adoption of Local Environmental Action Plans (LEAPs) and climate change mitigation. The Law on Ambient Air Quality (Official Gazette of the Republic of Macedonia Nos. 67/2004, 92/2007) establishes the legal grounds for adoption of several bylaws and the following have been adopted so far:

- 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 (Official Gazette of the Republic of Macedonia No. 50/05)
- Rulebook on criteria, methods and procedures for ambient air quality assessment (Official Gazette of the Republic of Macedonia No. 82/06)
- Rulebook on the methodology for inventory and determination of the levels of polluting substances in the atmosphere in tons per year for all types of activities, as well as other data to be reported to the European Monitoring and Evaluation Programme (EMEP) (Official Gazette of the Republic of Macedonia No. 142/2007).

Two additional bylaws are in adoption procedure.

It has been envisaged to prepare National Plan for Ambient Air Protection and Programme for Air Pollution Reduction and Quality Improvement. These documents will be prepared in accordance with the requirements of the following EU Directives: 96/61/EC, 2000/81/EC, 2000/76/EC, 99/13/EC and 2001/81/EC. The Law on Ambient Air Quality establishes the legal grounds for the technical check-ups of mobile sources of pollution, performed for the purpose of vehicles registration to include regular compulsory control and demonstrate compliance with legal standards on emission levels.

The Rulebook on air emissions inventory in accordance with the CORINAIR (CoR Inventory Air Pollution) Programme has been adopted and introduced as a national methodology for air emissions inventory.

The UNECE Convention on Long-Range Transboundary Air pollution has been ratified and steps towards ratification of its eight Protocols have been taken.

Unite Nations Framework Convention on Climate Change – UNFCCC.

By means of endorsement method, 19 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.

Key policy issue

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

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 and quality, as well as possibility to reduce the emissions of acidifying pollutants in the air.

Specific policy issue

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 assessment was made for the period 2002-2006, which means that the trend presented has some uncertainty.

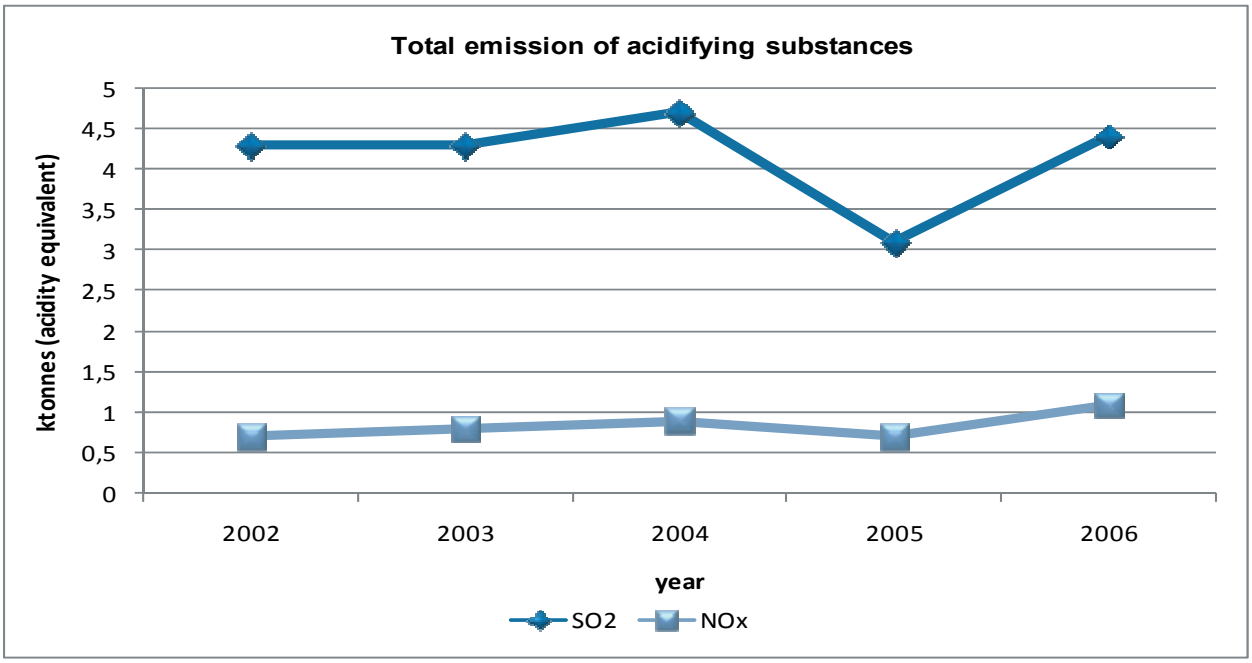
Sectors based on the CORINAIR Methodology and SNAP – selective nomenclature are given in the table below:

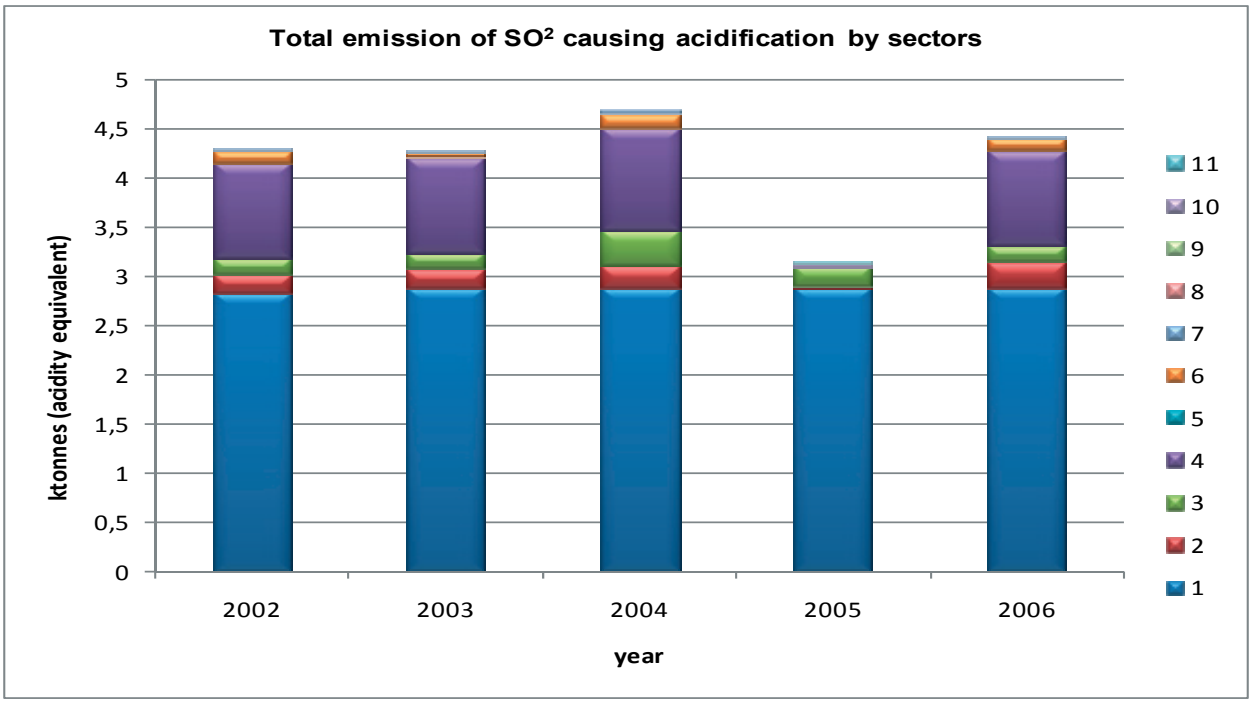
SNAP	
1	CoropCombustion in energy and transformation industries (stationary sources)
2	Non-industrial combustion plants (stationary sources)
3	Combustion in manufacturing industry (stationary sources)
4	Production processes (stationary sources)
5	Extraction and distribution of fossil fuels and geothermal 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

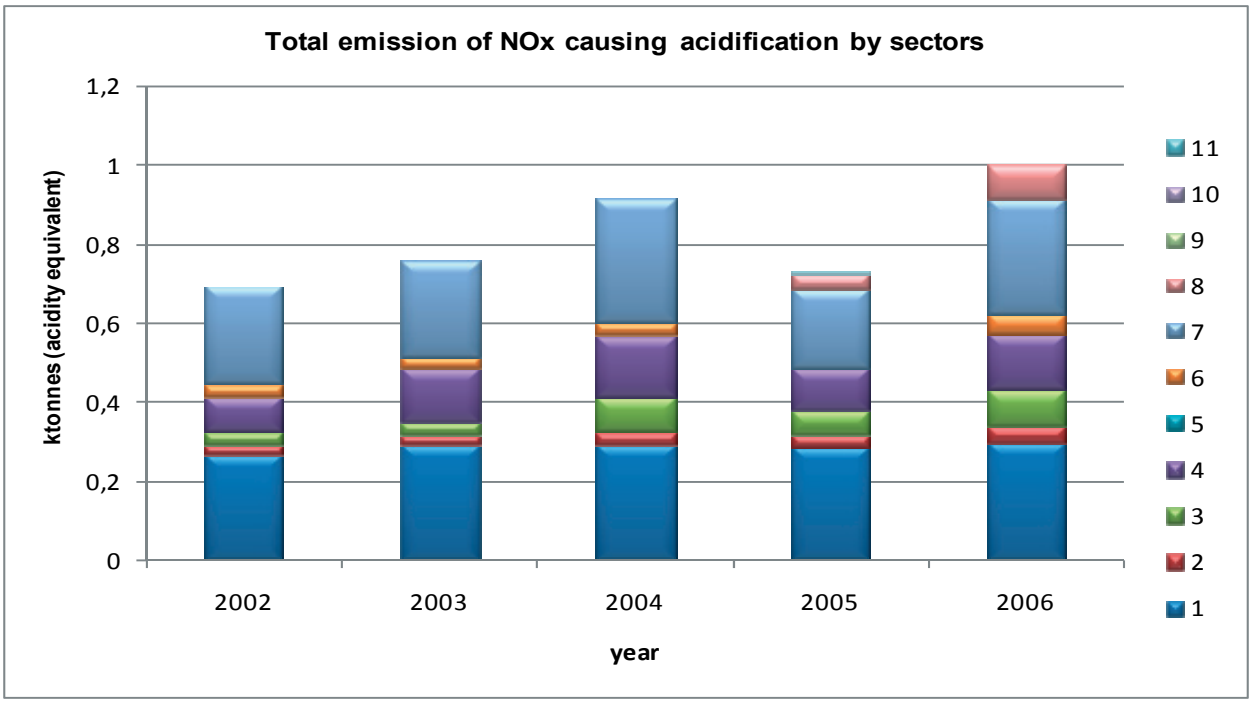
In the period 2002 – 2006, a varying trend in the emissions of certain acidifying substances was observed in the Republic of Macedonia, ranging from mild falling especially for SO_2 (decrease by around 20%) in 2005, to increase to almost stable level in other years. The falling trend in 2005 was due mainly to the decreased number or/and closed production processes in metallurgy which used to be sources of pollution. Taking into account the unstable transition period in the country, the increase in the amounts of emission in 2006 is not surprising. Actually, this is an indication that no continuously falling trend in the quantities of emissions can be achieved at annual level, as well as in longer term, in absence of specific measures and programmes for pollutants emission reduction.

Electricity production remains the main source of pollution with SO_2, mainly as a result of the poor quality (low calorific value) of fuels with high content of sulfur. These processes, together with the transport, are also the main sources of NO_x emissions. Data on NH_3 is available only for 2005 (the main source being the agriculture).

At this moment, there are no integrated programmes or action plans aimed at reducing the emissions of polluting substances in the atmosphere, at any level in the country.







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.

The development of the Cadastre relied on data (2004 - 2005) obtained from business facilities, as well as data obtained by measurement of sulfur dioxide, nitrogen oxides, carbon monoxide and dust, where no data was available. Through this process, data of around 1000 combined air emission sources and around 660 point air emission sources was processed. It

should be noted that the Cadastre of Air Polluters and Pollutants in the Republic of Macedonia requires review, considering the date of its production (2004 – 2005) and the changes taking place meantime.

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, the CORINAIR Methodology and SNAP nomenclature were introduced in order to obtain compatible and comparable data on the given polluting substances.

The introduction of the uniform methodology for air pollution inventory on national level based on CORINAIR (Core Inventory for Air Pollution) is of great importance in terms of the identification of amounts of individual pollutants. The Republic of Macedonia ratified the UNECE Convention on Long-Range Transboundary Air Pollution, but eight Protocols to this Convention remain to be ratified.

The introduction of the uniform methodology for air pollution inventory (CORINAIR) and the distribution of amounts of polluting substances to all 11 sectors in accordance with the SNAP-selective nomenclature of air pollution on national level, has enabled the Republic of Macedonia to report data which is compatible with the relevant data at the EU level.

SO_2 emissions by sectors

By application of the CORINAIR methodology, estimates of series of SO_2 emissions were made for the period 2002 - 2006.

Despite of the mildly falling trend in SO_2 emissions by 2005, which may be attributed to the decreased number of active industrial processes in the country (closure of certain major industrial facilities), there was a rising trend in the amounts of SO_2 emissions in 2006.

The above shows that no persistent falling trend in the quantities of air emissions can be achieved at annual level, as well as in longer term, unless specific measures and programmes for pollutant emissions reduction are introduced.

Electricity production is the main source of this type of emissions. Namely, in 2006, more than 66 % 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 sulfur), and no data is available on any relevant policy for emission reduction, both on local and national levels.

NO_x emissions by sectors

The series of NO_x emissions have been estimated for the period 2002 - 2005.

By application of the CORINAIR methodology in nitrogen oxides emission inventory, it can be concluded that the main sources of NO_x emission in the country include electricity production (28%), again owing to the poor quality of fuel, transport (37%) and other industrial production processes (no. 4 of the SNAP nomenclature, contributing more than 14% to the estimated emission).

NH_3 emissions– initially calculated for 2005. Agricultural sector is the main source of these emissions (84% of the emission), (data taken from CARDS projects). It should be noted that no data is available on NH_3 emissions in 2006.

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 Transboundary Air Pollution, inventory based on the CORINAIR Programme has been introduced, setting the target of regular inventory of pollutants in tonnes per year.

Inventory of pollutants by main sectors of relevance for 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 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

- Methodology for the indicator calculation

The methodology for this indicator calculation is based on aggregation and calculation of data on SO_2, NH_3 and NO_x 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 NO_x 0.02174, SO_2 0.03125 and NH_3 0.05882. The results are expressed in kilotonness equivalent acidity.

- Methodology for deficiencies overcoming

In order to enable analysis of the trend where the countries have not reported data for a period of one or more years, data is interpolated to derive emissions for the missing year or years. If data is missing at the beginning or at the end of the period, it is assumed that the value of the emission is equal to the first or the last reported value. Application of tools for gaps filling may create artificial trends, but they are taken as unavoidable if comprehensive and comparable data set is required on European countries for the purposes of policy analysis. The list of data sets with filled in gaps plus information with reference of data used to fill in the gaps can be

found on EEA Data Service at: http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=818

- Reference of used methodology

EEA/ETC-ACC Technical Report outlining the methodologies for gap filling, applied for 2004. 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 (by years):

Table 1: Total emission of acidifying substances

Substances (k-tons)	2002	2003	2004	2005	2006
SO_2	4,3	4,3	4,7	3,1	4,4
NO_x	0,7	0,8	0,9	0,7	1,1

Table 2: Total emission of SO_2 by sectors presented relative to acidification coefficients

SNAP		2002	2003	2004	2005	2006
1	Combustion in energy and transformation industries (stationary sources)	2,8211	2,8714	2,8714	2,8707	2,8811
2	Non-industrial combustion plants (stationary sources)	0,1968	0,1968	0,2320	0,0332	0,2588
3	Combustion in manufacturing industry (stationary sources)	0,1688	0,1688	0,3656	0,2016	0,1688
4	Production processes (stationary sources) и	0,9581	0,9650	1,0369	0,0111	0,9581
5	Extraction and distribution of fossil fuels and geothermal energy					
6	Solvent and other product use	0,1244	0,0444	0,1383		0,1244
7	Road transport	0,0161	0,0161	0,0308	0,0242	0,0161
8	Other mobile sources and machinery				0,0078	
9	Waste treatment and disposal				0,0001	
10	Agriculture					
11	Nature				0,0012	
total		4,2852	4,3429	4,6750	3,1499	4,4

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

SNAP		2002	2003	2004	2005	2006
1	Combustion in energy and transformation industries (stationary sources)	0,2667	0,2923	0,2923	0,2848	0,2967
2	Non-industrial combustion plants (stationary sources)	0,0246	0,0246	0,0333	0,0326	0,0446
3	Combustion in manufacturing industry (stationary sources)	0,0328	0,0328	0,0885	0,0596	0,0885
4	Production processes (stationary sources)	0,0906	0,1352	0,1541	0,1072	0,1411
5	Extraction and distribution of fossil fuels and geothermal energy					
6	Solvent and other product use	0,0309	0,0309	0,0309		0,0512
7	Road transport	0,2475	0,2467	0,3167	0,2000	0,2914
8	Other mobile sources and machinery				0,0450	0,0871
9	Waste treatment and disposal				0,0005	
10	Agriculture					
11	Nature				0,0037	
total		0,6922	0,7619	0,9157	0,7334	1,0006

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 AP1	Emissions of acidifying substances	**P**	**B**	acidification air	Annually

Geographical coverage: Republic of Macedonia

Temporal coverage: 2002 – 2006

Frequency of data collection:

Guidelines by EMEP/CORINAIR – Manual on Atmospheric Emissions Inventory, Third edition and SNAP – nomenclature of sectors, annual data processing.

In line with the guidelines, the frequency of data collection and processing is set on annual basis.

Note: There is no data available before 2002 to identify the quantity of emissions of acidifying substances.

Uncertainty

- Methodological uncertainty and data uncertainty

Use of factors of acidification potential leads to some uncertainty. It has been assumed that factors are representative for Europe as a whole; at local level, different factors may be assessed. Detailed discussion of uncertainty of these factors can be found with de Leeuw (2002).

EEA uses data reported officially by EU Member States and by other EEA Member States, which observe general instructions on emission data calculation and reporting (EMEP/EEA 2001) with regard to NOx, SO_2 and NH3.

Future activities

- Short-term activities

Indicator update by supplementing annual data from the inventory of emissions of acidifying substances from the preceding year.

a. Description of the activity

Calculation of the indicator and approval of updated and supplemented indicator by the Working Group on the national set of air quality indicators.

b. Required resources

Engagement of national experts in the area of air quality from governmental institutions.

c. Status

In progress

Dead line: 1 year

- Long-term activities

- Transposition of Directives of relevance for the air emissions area, namely Directives 2000/81/EC, 2001/81/EC, 96/61/EC, as well as preparation of bylaws in this regard.
- Preparation of National Plan for Air Protection,
- Preparation of Plan for Air Emissions Reduction.

a. Description of the activity

Upon the completion of the above described activities, conditions should be established to enable the implementation of the listed documents, e.g. establishment of ceiling values of annual emissions and their reduction projection in line with the NEC Directive 2001/81/EC.

Introduction of the system of Integrated Pollution Prevention and Control.

b. Required resources

No resources needs have been established.

c. Status

In progress.

Dead line: 01.01.2099

a. Description of the activity

Improvement of the quality of national data reported to the UNECE/CLRTAP/EMEP.

b. Required resources

The Gothenburg Protocol enters into force. Ratification has not reached the required number of 16 countries.

c. Status

In progress

Dead line: 01.01.2099

MK - NI 002

EMISSIONS OF OZONE PRECURSORS

Period of indicator assessment

- September 2007—April 2008

Explanation

- Justification of indicator selection

Emissions of non-methane volatile organic compounds (NMVOCs), nitrogen oxides, carbon monoxide and methane contribute to the formation of ground-level (tropospheric) ozone. Their relative contributions can be assessed on the basis of their tropospheric ozone-forming potential (TOFP) (de Leeuw 2002).

Ozone is a powerful oxidant and tropospheric ozone can have adverse effects on human health and ecosystems. It is a problem mainly during the summer months. High concentrations of ground-level ozone adversely affect the human respiratory system and there is evidence that long-term exposure accelerates the decline in lung function with age and may impair the development of lung function. Some people are more vulnerable to high concentrations than others, with the worst effects generally being seen in children, asthmatics and the elderly. High concentrations in the environment are harmful to crops and forests, decreasing yields, causing leaf damage and reducing disease resistance.

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

- Ktonnes (NMVOC - equivalent)

Policy relevance of the indicator

List of relevant political documents

The National Environmental Action Plan (NEAP II) provides directions for the measures (presented below) that need to be taken to improve the overall status of air, including the reduction of of emissions of ozone precursors:

- Development of National Plan for Ambient Air Protection;

- Development of Programmes for air emissions reduction and air quality improvement in certain local self-government units (LSGUs), including the City of Skopje;
- Establishment of lists of air quality zones and agglomerations;
- Capacity building in vehicles technical control at vehicles registration.

According to the Stabilization and Association Agreement between the EU and the Republic of Macedonia, Action Plan for European Partnership, National Programme for Approximation with the Acquis, the following activities should be implemented:

- Preparation of bylaws in the area of air in accordance with the National Approximation Programme with priorities
- Establishment of national emission ceilings for certain atmospheric pollutants (2001/81/EC)
- National Implementation Plan for POPs emissions reduction
- Inventory of Air Pollution by CORINAIR Methodology and reporting to UNECE/ CLRTAP.

Legal grounds

The Law on Environment (adopted in 2005) regulates areas which make direct impact on air quality and air emissions. Thus, the Law regulates issues related to IPPC, EIA/SEA, Local Environmental Action Plans (LEAPs) and climate change.

The Law on Ambient Air Quality was adopted in 2004 (Official Gazette of the Republic of Macedonia Nos. 67/2004, 92/2007) as framework law in the area of air. This Law establishes the legal grounds for adoption of a number of bylaws in line with the requirements of the relevant *Acquis Communitaire*.

The following regulations have been adopted so far:

- 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)
- Rulebook on criteria, methods and procedures for ambient air quality assessment (Official Gazette of the Republic of Macedonia No. 82/06)
- Rulebook on the methodology for inventory and determination of the levels of polluting substances in the atmosphere in tons per year for all types of activities, as well as other data to be reported to the European Monitoring and Evaluation Programme (EMEP) (Official Gazette of the Republic of Macedonia No. 142/2007).

The requirements of the relevant EU Directives have been transposed in the above listed regulations, and two additional bylaws are in adoption procedure.

It has been envisaged to prepare National Plan for Ambient Air Protection and Programme for Air Pollution Reduction and Quality Improvement. These documents will be prepared in accordance with the requirements of the following EU Directives: 96/61/EC, 2000/81/EC, 2000/76/EC, 99/13/EC and 2001/81/EC. The Law on Ambient Air Quality establishes the legal grounds for the technical checkups of mobile sources of pollution, performed for the purpose of vehicles registration to include regular compulsory control and demonstrate compliance with legal standards on emission levels.

The Rulebook on air emissions inventory in accordance with the CORINAIR (CoR Inventory Air Pollution) Programme has been adopted and introduced as a national methodology for air emissions inventory.

The UNECE Convention on Long-Range Transboundary Air pollution has been ratified and steps towards ratification of its eight Protocols have been taken.

Unite Nations Framework Convention on Climate Change – UNFCCC.

By means of endorsement method, 19 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

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.

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:

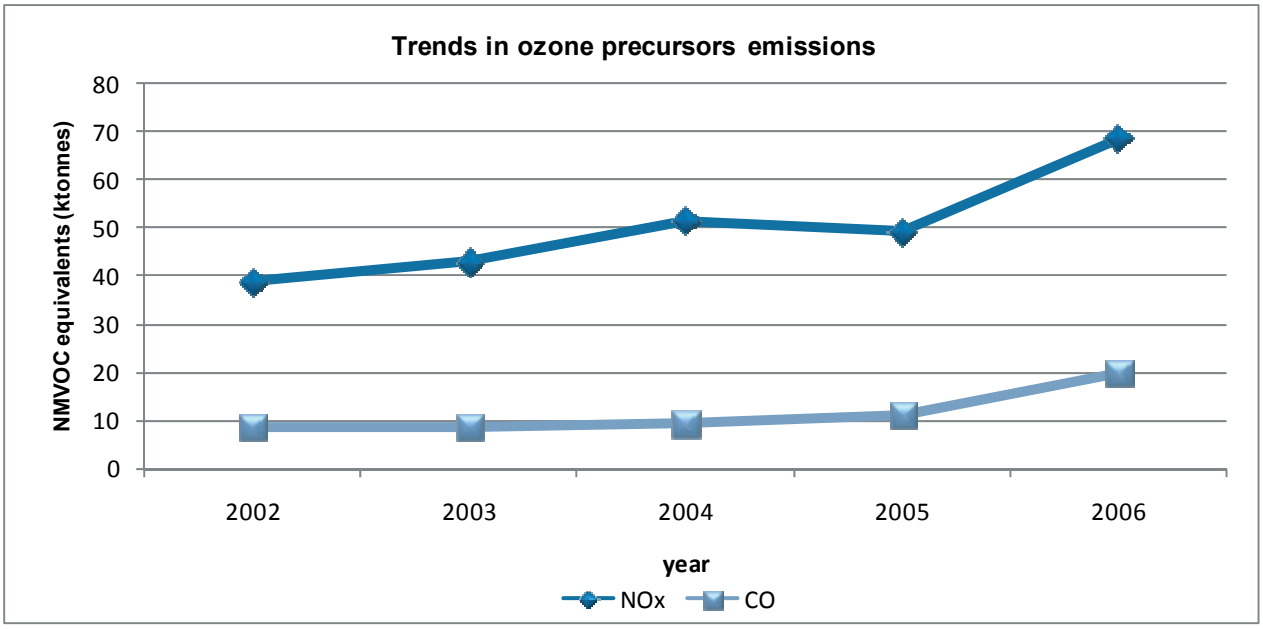
SNAP	
1	Combustion in energy and transformation industries (stationary sources)
2	Non-industrial combustion plants (stationary sources)
3	Combustion in manufacturing industry (stationary sources)
4	Production processes (stationary sources)
5	Extraction and distribution of fossil fuels and geothermal 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

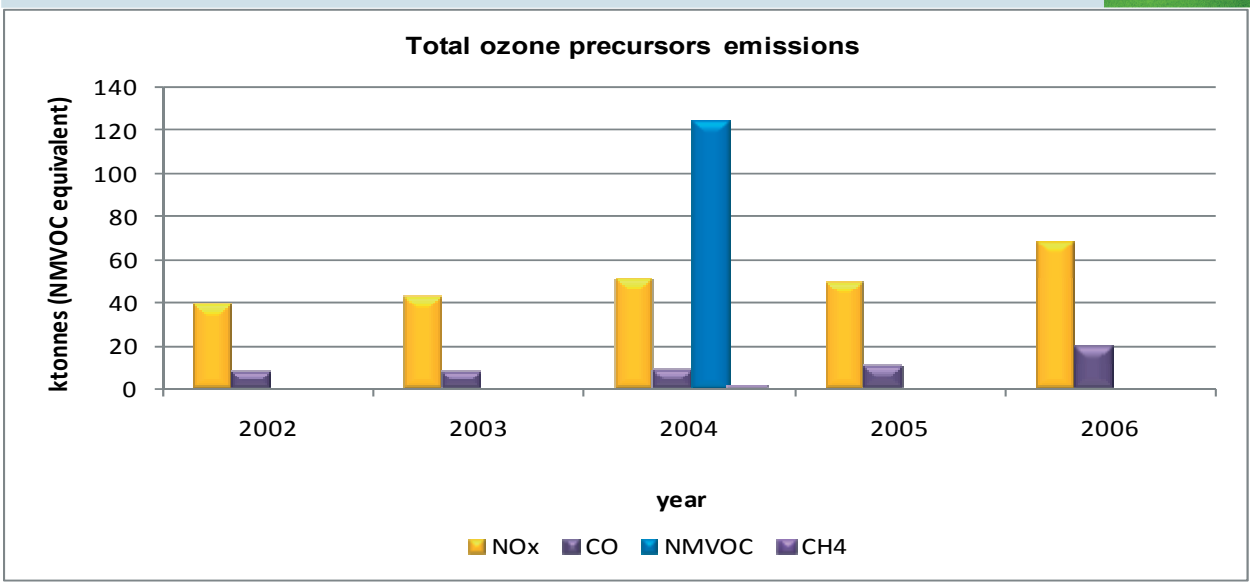
In the period 2002 – 2006, a rising trend has been tracked in the emissions of ozone precursors in the Republic of Macedonia, with an exception of NMVOC and CH_4 presented only for 2004 as major contributors to air emissions in that year.

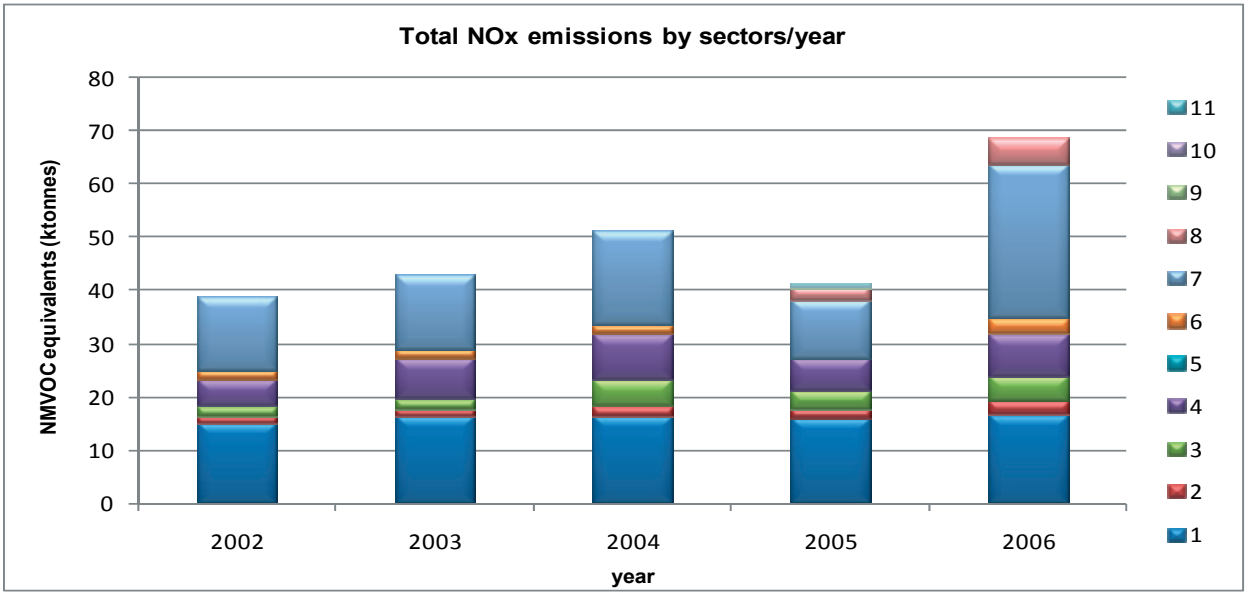
Electricity production - sector 1, road transport - sector 7, and nature - sector 11 are the main sources of ozone precursors emission.

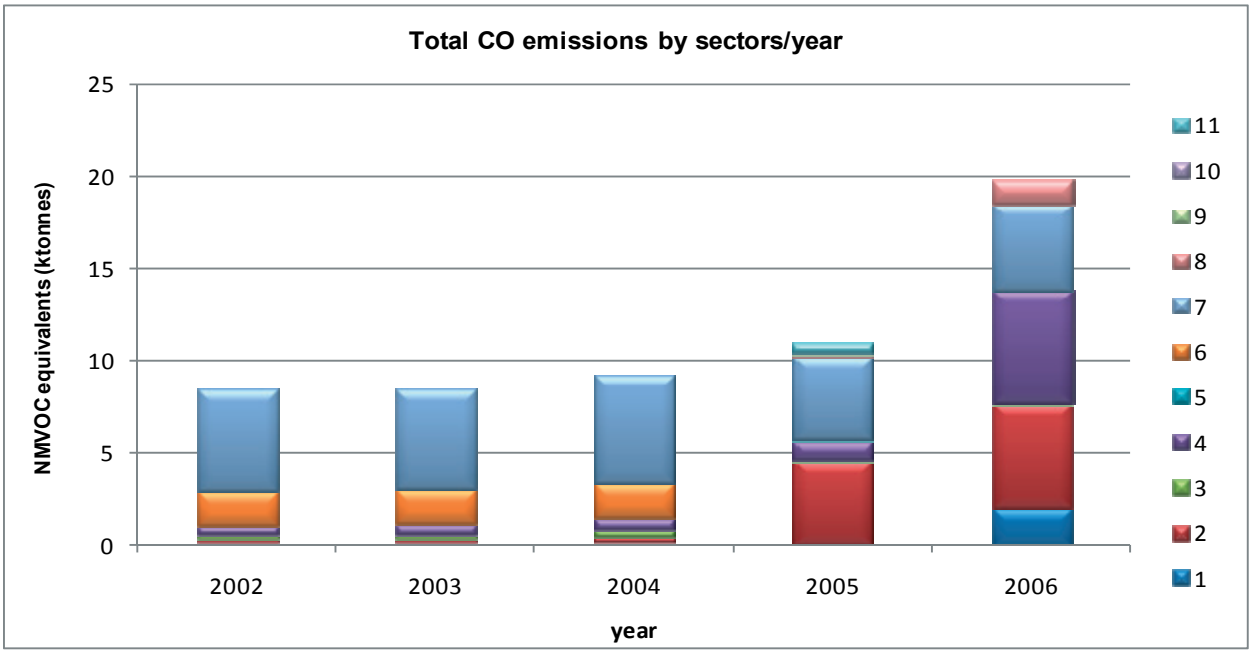
At this moment, there are no integrated programmes or action plans aimed at reducing the emissions of polluting substances in the atmosphere, at any level in the country.

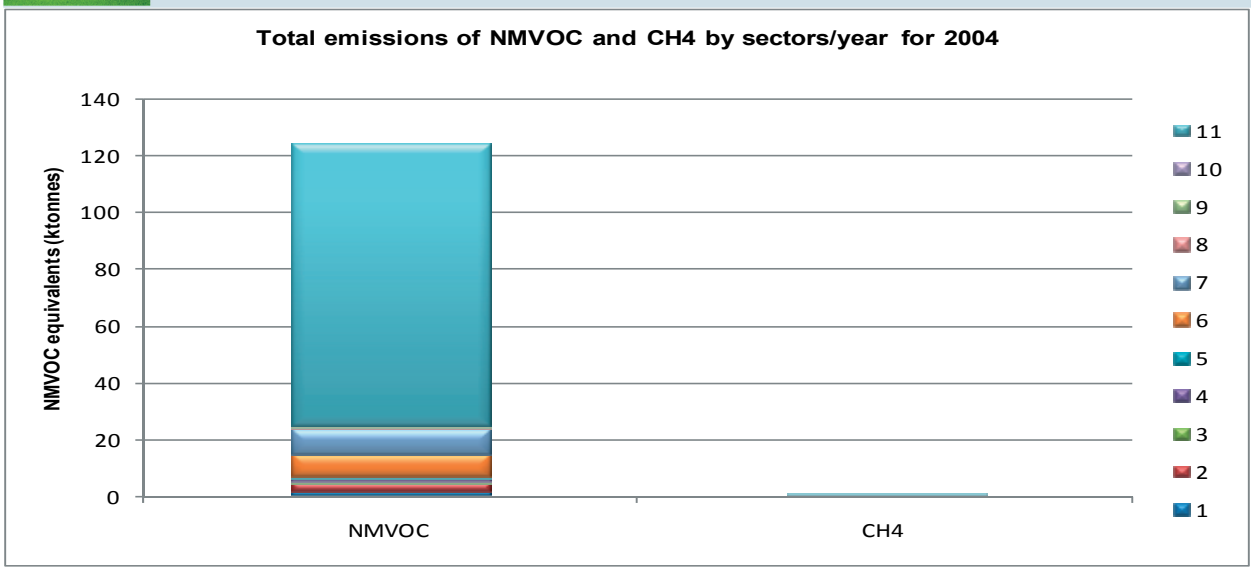
The Diagram below shows the annual trend in the emissions of CO (carbon monoxide) and nitrogen oxides presented as ozone precursors:




Total ozone precursors emissions
ktonnes (NMVOC equivalent)
140
120
100
80
60
40
20
0
2002
2003
2004
2005
2006
year
NOx
CO
NMVOC
CH4


Total NOx emissions by sectors/year
NMVOC equivalents (ktonnes)
80
70
60
50
40
30
20
10
0
2002
2003
2004
2005
2006
year
11
10
9
8
7
6
5
4
3
2
1


Total CO emissions by sectors/year
NMVOC equivalents (ktonnes)
25
20
15
10
5
0
2002
2003
2004
2005
2006
year
11
10
9
8
7
6
5
4
3
2
1



Assessment

For the purpose of identifying the amounts of air emissions of the main polluting substances, the Cadastre of Air Polluters and Pollutants in the Republic of Macedonia was developed in 2004-2005.

The development of the Cadastre was based on data obtained from business facilities, as well on measurements of sulfur dioxide, nitrogen oxides, carbon monoxide and dust.

This Inventory was based on polluting substances at the level of facility. However, in an observation of the requirements of the relevant international agreements, such as UNECE/ CLRTAP, the CORINAIR Methodology and SNAP nomenclature were introduced in order to obtain compatible and comparable data on the given polluting substances.

The introduction of the uniform methodology for air pollution inventory on national level as recommended by CORINAIR (Core Inventory for Air Pollution) is of great importance in terms of the identification of amounts of individual pollutants. This methodology made the data of the Republic of Macedonia compatible with the relevant data in the European Union. methodology of air pollution inventory (CORINAIR) presents the quantities of air pollutants emissions distributed to all 11 sectors in accordance with the SNAP – selective nomenclature of air pollution on national level.

Total emission of ozone precursors

Series of emissions of ozone precursors were assessed for the period 2002 - 2006.

Although there are no major temporal annual series of data on ozone precursors, it is possible to conclude the following with regard to total emission of ozone precursors on annual level in the analyzed years from 2002 to 2006: NO_x and CO remained with rising trend, while quantities of NMVOC and CH_4 emissions could be presented for 2004 only. Namely, these two pollutants were covered in the inventory and their identification was conducted in the process of development of the Cadastre of air emissions, by application of the CORINAIR methodology for 2004. Most of the quantities of NMVOC and CH_4 emissions derive from the sector 11, sector 7 and sector 6 under SNAP.

Emissions of NO_x as ozone precursor by sector

Series of NO_x emissions were assessed for the period 2002 - 2005..

Through application of the CORINAIR methodology in the inventory of nitrogen oxides emission, it was found out that the main sources of NO_x 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 - 2005.

Emissions of CO as ozone precursor show mild increase in the total quantity in the given years. If presented by SNAP sectors, sector 7, i.e. transport is prevailing in this regard. Also, CO emission results from combustion processes in heat producing plants (sector 2).

Emissions of NMVOC and CH_4 as ozone precursor by sectors

Series of NMVOC and CH_4 were not available for the period 2002 - 2006. Data available covers only 2004.

The application of the CORINAIR methodology in the inventory of NMVOC and CH_4 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 Transboundary 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 Uited 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 NO_x 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 precursors. These factors are specific to each pollutant, namely for NO_x 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.

- Methodology for deficiencies overcoming

In order to enable analysis of the trend where the countries have not reported data for a period of one or more years, data is interpolated to derive emissions for year or years for which such data is missing. If data is missing at the beginning or at the end of the period, it is assumed that the value of the emission is equal to the first or the last reported value. Application of tools for gaps filling may create artificial trends, but they are taken as unavoidable if comprehensive and comparable data set is required on European countries for the purposes of policy analysis. The list of data sets with filled in gaps plus information with reference of data used to fill in the gaps can be found on EEA Data Service at: http://dataservice.eea.europa.eu/dataservice/metadetails.asp?id=818

- Reference of used methodology

Methodology applied in the calculation and presentation of this indicator has been taken fro 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; 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, as well as to EEA – Annual report of processed data on air emissions.

Data coverage (by years):

Table 1: Total emission of ozone precursors

NMVOC equivalent (k-tonnes)	2002	2003	2004	2005	2006
NOx	38,8	42,8	51,4	49,1	68,517
CO	8,4	8,4	9,2	10,9	19,768
NMVOC			124,1		
CH_4			0,8		

Table 2: Total emission of NOx by sectors

SNAP		2002	2003	2004	2005	2006
1	Combustion in energy and transformation industries (stationary sources)	14,965	16,405	16,405	15,981	16,649
2	Non-industrial combustion plants (stationary sources)	1,379	1,379	1,867	1,831	2,501
3	Combustion in manufacturing industry (stationary sources)	1,842	1,842	4,965	3,347	4,965
4	Production processes (stationary sources)	5,084	7,590	8,647	6,018	7,917
5	Extraction and distribution of fossil fuels and geothermal energy					
6	Solvent and other product use	1,732	1,732	1,732		2,873
7	Road transport	13,888	13,845	17,773	11,224	28,731
8	Other mobile sources and machinery				2,524	4,88
9	Waste treatment and disposal				0,025	
10	Agriculture					
11	Nature				0,205	
total		38,847	42,756	51,387	41,158	68,516

Table 3: Total emission of CO by sectors/year

SNAP		2002	2003	2004	2005	2006
1	Combustion in energy and transformation industries (stationary sources)	0,181	0,181	0,181	0,042	2,037
2	Non-industrial combustion plants (stationary sources)	0,203	0,203	0,241	4,559	5,621
3	Combustion in manufacturing industry (stationary sources)	0,214	0,214	0,428	0,061	0,054
4	Production processes (stationary sources)	0,520	0,579	0,601	0,990	6,062
5	Extraction and distribution of fossil fuels and geothermal energy				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
8	Other mobile sources and machinery				0,223	1,235
9	Waste treatment and disposal				0,001	
10	Agriculture					
11	Nature				0,533	
total		8,366	8,426	9,238	10,971	19,768

Table 4: Total emission of NMVOC and CH_4 by sectors/year, for 2004

SNAP		NMVOC	CH_4
1	Combustion in energy and transformation industries (stationary sources)	1,6901	0,0007
2	Non-industrial combustion plants (stationary sources)	3,5088	0,0306
3	Combustion in manufacturing industry (stationary sources)	0,2105	0,0020
4	Production processes (stationary sources)	1,1078	0,0002
5	Extraction and distribution of fossil fuels and geothermal energy	0,4249	0,1626
6	Solvent and other product use	8,4847	0,0000
7	Road transport	8,8241	0,0026
8	Other mobile sources and machinery	0,9692	0,0002
9	ТретиWaste treatment and disposal рање на отпад	0,0010	0,2023
10	Agriculture	0,0000	0,3877
11	Nature	98,8666	0,0119
total		124,0877	0,8008

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 002	**Emissions of ozone precursors**	CSI 002 AP19	Emissions of ozone precursors	**P**	**A**	air air quality	Annually

Geographical coverage: Territory of the Republic of Macedonia

Temporal coverage: 2002 – 2006

Frequency of data collection

Data is collected throughout the year, but data processing, presentation and reporting takes place once a year. In this context, Guidelines by EMEP/CORINAIR – Manual on Atmospheric Emissions Inventory, Third edition and SNAP – nomenclature of sectors, annual data processing, are used.

Note: There is no data available before 2002 to identify the quantity of ozone precursors emissions.

Uncertainty

- Methodological uncertainty and data uncertainty

Use of factors of the potential for ozone production by precursors leads to some uncertainty. It has been assumed that factors are representative for Europe as a whole; at local level, different factors may be assessed. Detailed discussion of uncertainty of these factors can be found with de Leeuw (2002).

EEA develops this indicator of ozone precursors emissions once a year and it uses it in the reporting on the state of the environment. The uncertainty involved in the calculations and in data sets should be clearly stated in the assessment, in order to prevent misleading messages to impact the policy actions or processes.

Future activities

- Short-term activities

Indicator update by supplementing annual data from the inventory of emissions of ozone precursors from the preceding year.

a. Description of the activity

Calculation of the indicator and approval of updated and supplemented indicator by the Working Group on the national set of air quality indicators.

b. Required resources

Engagement of national experts in the area of air quality from governmental institutions.

c. Status

Continuous activity

Deadline: 1 year

- Long-term activities

1. Medium and long-term activities include transposition of Directives of relevance for the air emissions area, namely Directives 2000/81/EC, 2001/81/EC, 96/61/EC, as well as preparation of bylaws in this regard.
2. Preparation of National Plan for Air Protection.
3. Preparation of Plan for Air Emissions Reduction.

a. Description of the activity

Upon the completion of the above described activities, conditions should be established to enable the implementation of the listed documents, e.g. establishment of ceiling values of annual emissions and their reduction projection in line with the NEC Directive 2001/81/EC.

Introduction of the system of Integrated Pollution Prevention and Control.

MK - NI 004

EXCEEDANCE OF AIR QUALITY LIMIT VALUES IN URBAN AREAS

Period of indicator assessment

- September 2007 – April 2008

Explanation

- Justification of indicator selection

Urban populations are exposed to air pollution with sulphur dioxide, particulate matter (PM), nitrogen oxides and ground-level ozone. Sulphur dioxide (SO_2) is directly toxic to humans, its main action being on the respiratory functions. Indirectly, it can affect human health as it is converted to sulphuric acid and sulphate in the form of fine particulate matter.

Epidemiological studies have reported statistical significant associations between short-term, and especially long-term exposure to increased ambient PM concentrations and increased morbidity and (premature) mortality. PM levels that may be relevant to human health are commonly expressed in terms of the mass concentration of inhalable particles with an equivalent aerodynamic diameter equal to or less than 10 micrometer (PM_{10}). Health effect associations for the $PM_{2.5}$ fraction are even more clearly evident. Although the body of evidence concerning the health effects of PM is increasing rapidly, it is not yet possible to identify a concentration threshold below which health effects are not detectable. There is therefore no recommended WHO Air Quality Guideline for PM.

PM_{10} in the atmosphere can result from direct emissions (primary PM_{10}) or emissions of particulate precursors (nitrogen oxides, sulphur dioxide, ammonia and organic compounds) which are partly transformed into particles by chemical reactions in the atmosphere (secondary PM_{10}).

Short-term exposure to nitrogen dioxide may result in airway and lung damage, decline in lung function, and increased responsiveness to allergens following acute exposure. Toxicology studies show that long-term exposure to nitrogen dioxide can induce irreversible changes in lung structure and function.

Exposure to high ozone concentration for periods of a few days can have adverse health effects, in particular inflammatory responses and reduction in lung function. Exposure to moderate ozone concentrations for longer periods may lead to a reduction in lung function in young children.

Definition

The indicator shows ambient air concentrations of pollutants in excess of the limit value set for the quality of air in urban environments.

Exceedance of air quality limit values occurs when the concentration of air pollutants exceeds

the limit values for SO_2, PM_{10}, 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), wherein the requirements of the Daughter Directives 1999/30/EC, 2000/69/EC and 2002/3/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 (PM_{10}): the annual limit value
- Ozone (O_3): the short term objective

Units

Concentrations of sulphur dioxide (SO_2), particulate matter sized up to 10 micrometer (PM_{10}), nitrogen dioxide (NO_2) and ozone (O_3) in the ambient air are expressed in microgramme/m^3 ($\mu g/m^3$).

Policy relevance of the indicator

List of relevant policy documents

The National Environmental Action Plan II (2006) specifies the improvement of the quality of the air through measures intended to reduce the emissions of the main pollutants as one of its priority objectives. The same document indicates two basic measures that need to be taken, namely: preparation of National Plan for Ambient Air Protection and strengthening the monitoring process and air quality assessment.

Legal grounds

The Law on Environment regulates areas which make direct impact on air quality and thus may contribute to air emissions reduction. Thus, the Law regulates issues related to IPPC, EIA/SEA, Local Environmental Action Plans (LEAPs) and climate change.

The Law on Ambient Air Quality was adopted in August 2004 (Official Gazette of the Republic of Macedonia Nos. 67/2004). It was later amended (Official Gazette of the Republic of Macedonia No. 92/2007), 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 Acquis Communitaire.

The following regulations have been adopted so far:

- 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)

- Rulebook on criteria, methods and procedures for ambient air quality assessment (Official Gazette of the Republic of Macedonia No. 82/06)

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, PM_{10}, NO_2 and target values for O_3.

Limit values for concentrations of sulfur dioxide in ambient air

In accordance with the said Decree, two limit values are specified for **sulfur** dioxide for the purpose of human health protection. Both limit values should be achieved by 1 January 2012:

- 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. Both limit values should be achieved by 1 January 2012:

- 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. The achievement of limit values has been planned in two phases. In the first phase, both limit values should be achieved by 1 January 2010, where:

- 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 .

In the second phase, both limit values should be achieved by 1 January 2012, where:

- 24-hourly limit value is 50 μg/m^3, shall not be exceeded by more than seven times during one calendar year
- The mean annual concentration shall not exceed 20 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 value is calculated from the hourly concentrations in each day. The maximum daily 8-hourly value of ozone shall nor 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 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, PM_{10}, NO_2) and target values (for O_3) set in the Decree?

Key message

Sulphur dioxide - SO_2

Excess of mean daily concentrations of **sulfur** dioxide above limit values has been recorded in Skopje, but not in other cities in the Republic of Macedonia.

Suspended particulate matter of size up to 10 micrometers

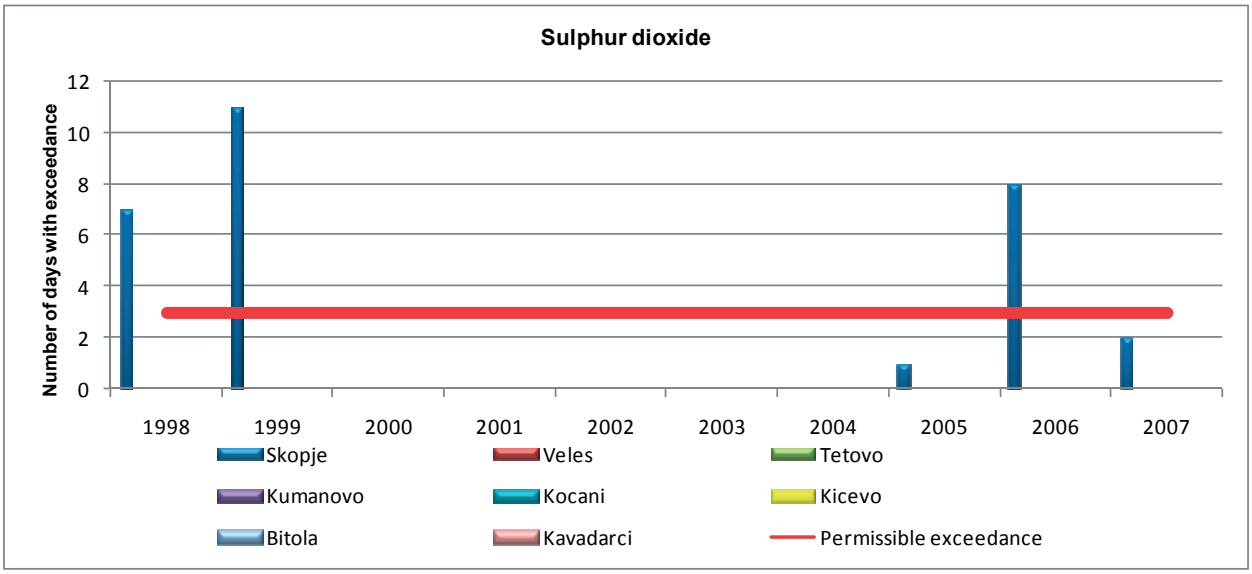
Concentrations of suspended particulate matter of size up to 10 micrometers exceed the limit values specified in the Decree in all urban areas where measurements take place. There frequent events of very high concentrations of suspended particulate matter of size up to 10 micrometers.

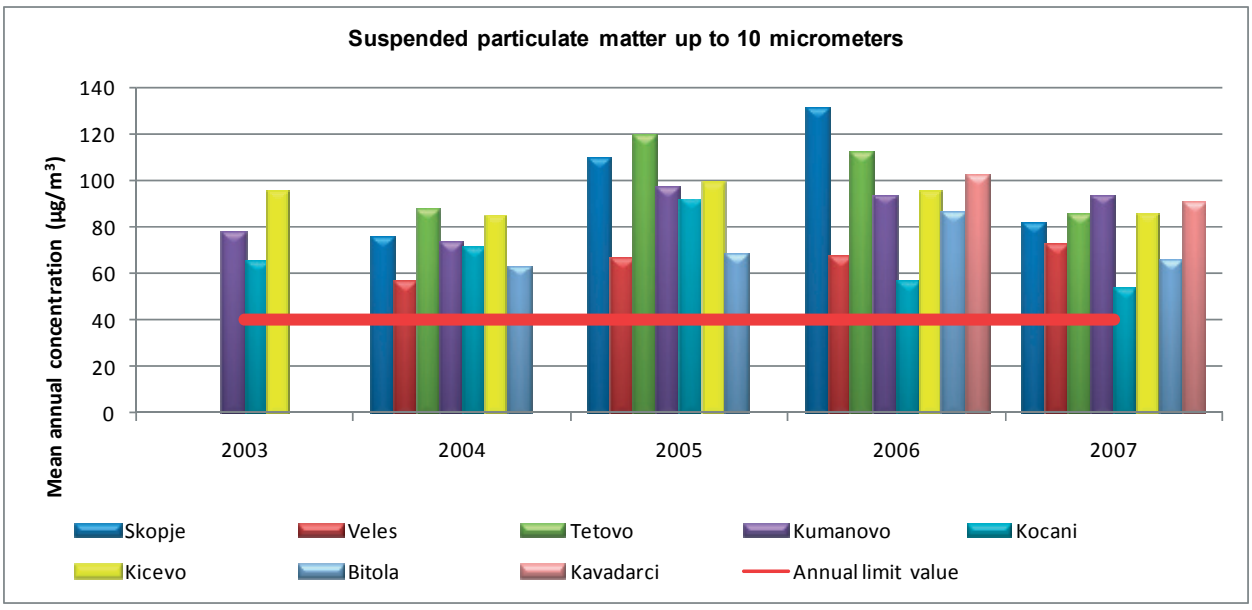
Nitrogen dioxide

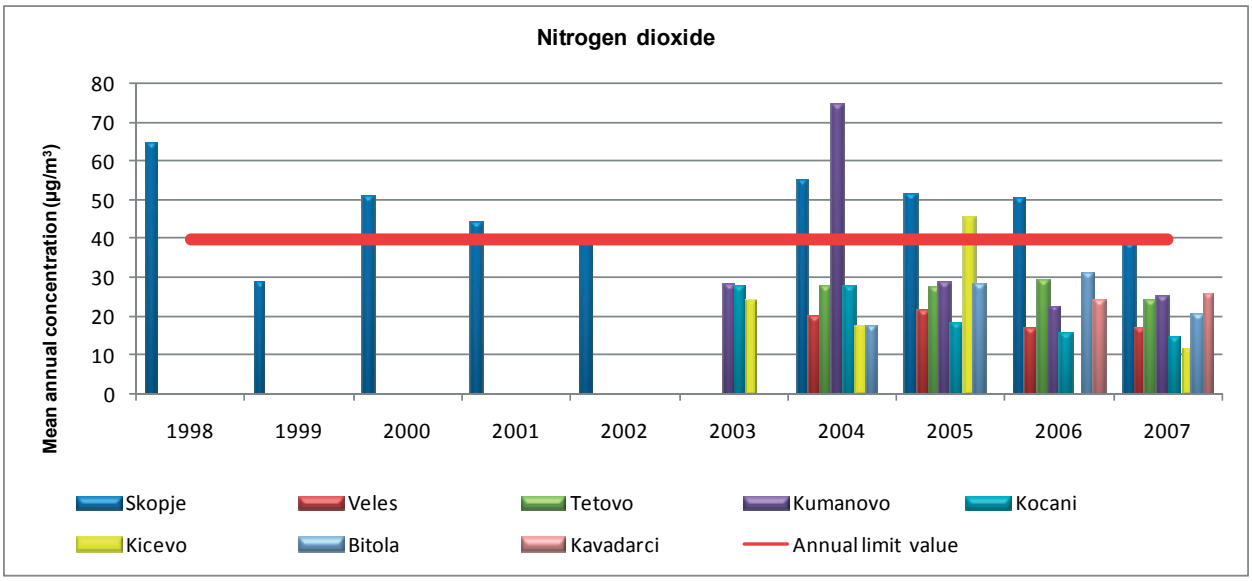
The measured concentrations of nitrogen dioxide are bellow limit values specified in the Decree, at all measuring points, with an exception of Skopje and Kumanovo in the course of 2004 and Kicevo in the course of 2005.

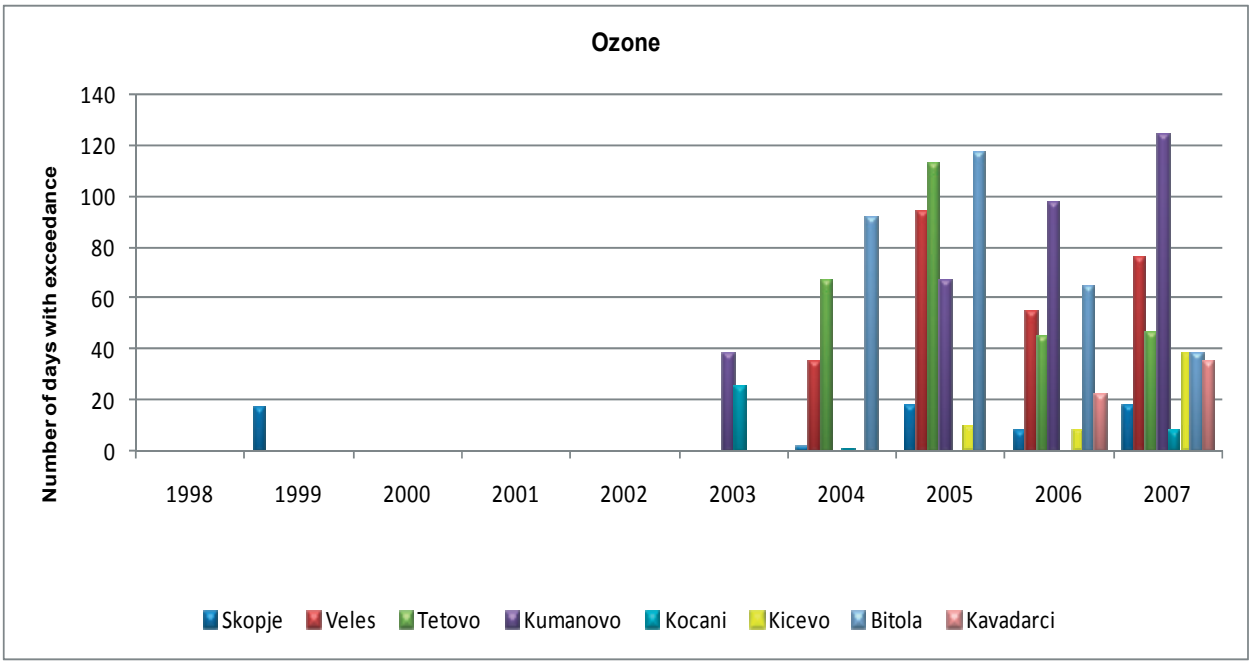
Ozone

The Decree does not specify limit values for ozone, but it sets target value to be applied until 2010. The target value for ozone is in excess in all cities in the Republic of Macedonia where measurements of this pollutant are conducted.


Sulphur dioxide
Number of days with exceedance
12
10
8
6
4
2
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Skopje
Veles
Tetovo
Kumanovo
Kocani
Kicevo
Bitola
Kavadarci
Permissible exceedance


Suspended particulate matter up to 10 micrometers
Mean annual concentration (µg/m³)
140
120
100
80
60
40
20
0
2003
2004
2005
2006
2007
Skopje
Veles
Tetovo
Kumanovo
Kocani
Kicevo
Bitola
Kavadarci
Annual limit value


Nitrogen dioxide
Mean annual concentration (µg/m³)
80
70
60
50
40
30
20
10
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Skopje
Veles
Tetovo
Kumanovo
Kocani
Kicevo
Bitola
Kavadarci
Annual limit value



Assessment

Sulphur dioxide - SO_2

Sulfur 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, sulfuric acid, lead and zinc ores smelting).

According to the available data, the mean daily concentrations of sulfur dioxide have been in excess only in the City of Skopje, in 998, 1999 and 2006. The occurrence of this excess of concentrations above the limit values is due to the higher frequency in traffic, i.e. fuels combustion in transportation means.

PM_{10}

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. 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 show that concentrations of suspended particulate matter up to 10

micrometers are in excess of the mean annual concentration of 40 μm/m^3, in all cities where measurements of this pollutant take place. The highest mean annual concentration of this pollutant was recorded in Skopje, in 2006, which is most probably due to the living style, density of population, high level of solid fuels in use for households heating in winter period, as well as to sources from industry.

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

Processed data showed that excess in the mean annual concentration of nitrogen dioxide was recorded in 1998, 2000, 2001, 2004, 2005 and 2006, in Skopje. However, in the period from 2004 to 2007, a decreasing trend was tracked in the concentration of this pollutant.

Among other cities, excess in the mean annual concentration of nitrogen dioxide was recorded in Kumanovo, in 2004 and in Kicevo in 2005. This was most probably due to the high frequency of traffic and operation of industrial facilities in these cities.

In 2007, no excess in the mean annual concentration of nitrogen dioxide was recorded in any of the measuring points in the Republic of Macedonia.

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 the course of the day (intensity of solar radiation), as well as annual seasons.

The diagram above shows the number of days with excess in target value set for ozone in Macedonian urban environments. As presented, a number of days with excess in ozone target value is tracked in all cities where measurements of this pollutant take place. In the period from 2004 to 2006, the highest number of days with excess in ozone target value was recorded in Bitola, and in 2007 in Veles.

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 of125 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 – PM_{10}

For each measuring station located in urban environment, the mean annual concentration (annual limit value is 40 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 mean annual concentration in a city is obtained by averaging the mean annual concentration of all stations located in that city.

Nitrogen dioxide - NO_2

For each measuring station located in urban environment, the mean annual concentration (annual limit value is 40 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 mean annual concentration in a city is obtained by averaging the mean annual concentration of all stations located in that city

Ozone – O_3

For each measuring station located in urban environment, the number of days in which the maximum daily 8-hourly 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.

Data specification

Title of the indicator	Source	Reporting obligation
Exceedance of air quality limit values in urban areas	MOEPP	– 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 (by years):

Table 1: Number of days with SO_2 concentrations in excess of mean daily limit value - 125 µg/m^3 in urban environments in Macedonia.

City	Unit	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Skopje	Number of days	7	11					0	1	8	2
Veles	Number of days							0	0	0	0
Tetovo	Number of days							0	0	0	0
Kumanovo	Number of days						0	0	0	0	0
Kocani	Number of days						0	0	0	0	0
Kicevo	Number of days						0	0	0	0	0
Bitola	Number of days							0	0	0	0
Kavadarci	Number of days									0	0

Source: Ministry of Environment and Physical Planning, Macedonian Environmental Information Centre

Table 2: Mean annual concentration of PM_{10} (annual limit value is 40 µg/m^3)

City	Unit	2003	2004	2005	2006	2007
Skopje	µg/m^3		75,69	110,1	131,5	82,25
Veles	µg/m^3		56,76	67,4	68	73
Tetovo	µg/m^3		87,76	119,7	112	86
Kumanovo	µg/m^3	78	74,03	97,34	94	94
Kocani	µg/m^3	65,46	71,97	92,2	57	54
Kicevo	µg/m^3	95,47	84,91	99,65	96	85
Bitola	µg/m^3		63,41	68,68	86,5	66,5
Kavadarci	µg/m^3				103	91

Source: Ministry of Environment and Physical Planning, Macedonian Environmental Information Centre

Table 3: Mean annual concentration of NO_2 (annual limit value is 40 µg/m^3)

City	Unit	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Skopje	Number of days	0	17,5					2	18,5	8,33	18
Veles	Number of days							35,5	94	55,5	76,5
Tetovo	Number of days							67	113	45	47
Kumanovo	Number of days						38	0	67	98	124
Kocani	Number of days						26	1	0	0	8
Kicevo	Number of days						0	0	10	9	38
Bitola	Number of days							92	118	64,5	38,5
Kavadarci	Number of days									23	35

Source: Ministry of Environment and Physical Planning, Macedonian Environmental Information Centre

Table 4: Number of days with excess in ozone target value in Macedonian urban environments (highest mean 8-hourly value > 120 µg/m^3)

City	Unit	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Skopje	µg/m^3	64,83	29	51,26	44,3	39,9		55	51,6	50,67	38,52
Veles	µg/m^3							20,1	21,4	17,27	17
Tetovo	µg/m^3							28	27,7	29,42	24,67
Kumanovo	µg/m^3						28,5	74,5	28,9	23,01	25,5
Kocani	µg/m^3						28,3	28	18,5	15,8	15,07
Kicevo	µg/m^3						24,2	17,7	45,4		12,21
Bitola	µg/m^3							17,5	28,6	31,12	20,63
Kavadarci	µg/m^3									24,56	25,87

Source: Ministry of Environment and Physical Planning, Macedonian Environmental Information Centre

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 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	Annually

Geographical coverage: Republic of Macedonia

Temporal coverage: 1998 – 2007

Frequency of data collection: Data from automatic air quality monitoring system is obtained on hourly basis, by modem support through telephone line, collected in the central station located in the Macedonian Environmental Information Centre, MEPP.

Uncertainty

- Methodological uncertainty

In general, data is not representative for all urban environments in the Republic of Macedonia. The indicator is subject to changes from year to year depending on meteorological conditions. 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, because there is only one urban background station, located in the Municipality of Gazi Baba, Skopje.

- Data uncertainty

In general, data is not representative for all urban environments in the Republic of Macedonia. According to the methodology adopted by the European Environmental Agency, only series of data produced by monitoring stations with at least 75% during one year are taken into account in the indicator calculation (in other words, more than 274 valid daily data in the course of one calendar year). In our case, this was not taken into account in using data from monitoring stations. Representativeness of selection is different for different cities and this decreases the possibility for comparisons between cities. At this stage, it is not possible to select sufficient number of monitoring stations covering the whole temporal period, due to the fact that stations with available data change from year to year.

Future activities

- Short-term activities

Indicator update by supplementing new data (Data from the State Automatic Air Quality Monitoring System for 2008).

a. Description of the activity

Calculation of the indicator and approval of updated and supplemented indicator by the Working Group on the national set of air quality indicators.

b. Reqiuered resources

Engagement of national experts in the area of air quality from governmental institutions.

c. Status

Continuous activity.

Deadline: 1 year.

- Long-term activities

1. Calculation of data uncertainty

a. Description of the activity

Application of ISO and CEN standards in the area of air quality.

Proper development of the State Automatic Ambient Air Quality Monitoring System, including regular maintenance, servicing and calibration of instruments in the monitoring stations should result in more valid data in the course of one year. The goal is to apply the defined methodology of the European Environmental Agency in indicator calculation, i.e. to use only these series of data from monitoring stations with a coverage of at least 75% during one year (i.e. more than 274 valid daily data in the course of one calendar year).

b. Required resources

Allocated budget for regular maintenance of the State Automatic Ambient Air Quality Monitoring System, in accordance with the prepared Operational Programme.

c. Condition

Continuous activity.

Revision of the classification of monitoring stations in order to use only series of data from urban background stations in indicator calculation.

Establishment of new monitoring stations based on Strategic Planning of the MEPP.

MK - NI 006

CONSUMPTION OF OZONE DEPELTING SUBSTANCES

Period of indicator assessment

- September 2007 – April 2008

Explanation

- Justification of indicator selection

In the middle of 1970s, the world scientific community detected the phenomenon of ozone layer depletion positioned at 25-40th km above the Earth surface in the upper layers of the atmosphere, i.e. stratosphere. The identified cause of ozone molecules destruction is related to organic compounds (hydrocarbons) the molecule of which contains atoms of halogen elements (chlorine or bromine). One molecule of the chemicals as CFCs, HCFCs, CCl_4, halons, methyl chloroform, and methyl bromide released in the atmosphere during ozone molecules reaction in stratosphere is able of destroying 100.000 molecules of ozone and result in ozone layer depletion. Recognizing the issue of the ozone layer depletion, the international community has adopted two key documents, namely the 1985 Vienna Convention for the Protection of the Ozone Layer and 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, which initiate aggressive action aimed at reduction and full elimination of substances that deplete the ozone layer at global level.

Vienna Convention is a framework document establishing the basis for introduction of rigorous measures for restriction of the use of ozone depleting substances (ODSs), while the Montreal Protocol establishes precise rules and time frames within which the reduction and the elimination of ODSs by means of prohibition and restriction of their production, import and export shall take place. ODSs emissions are not addressed either by the Convention, nor by the Protocol.

In 1994, the Republic of Macedonia ratified both the Vienna Convention and the Montreal Protocol, and in the period 1998 - 2002, the four Amendments to the Protocol (London Amendment, Copenhagen Amendment, Montreal Amendment, and Beijing Amendment) were ratified, too.

The national action towards ODSs elimination has been carried out since 1997, when the Ozone Unit was established within the Ministry of Environment and Physical Planning. Under the financial support provided by the Multilateral Fund of the Montreal Protocol, as much as more than 97% of the total consumption in the country has been eliminated, through substitution of ODSs in all economic branches of their application.

Considering the fact that the Republic of Macedonia has never been producing ODSs, the Ministry of Environment and Physical Planning/Ozone Unit carries out permanent of ODSs import in, export from and consumption in the Republic of Macedonia. Consequently, the indicator will track the ODSs consumption.

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 in the period between 1995 and 2005.

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 2007.

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 2006, more than 97% 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 (Official Journal of SFRY No. 1/90), 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 (Official Journal of SFRY No. 16/90), adopted by the Republic of Macedonia by means of succession in 1994.
- Law on the Ratification of London Amendment to the Montreal Protocol (Official Gazette of the Republic of Macedonia No. 25/98)
- Law on the Ratification of Copenhagen Amendment to the Montreal Protocol (Official Gazette of the Republic of Macedonia No. 25/98)

- Law on the Ratification of Montreal Amendment to the Montreal Protocol (Official Gazette of the Republic of Macedonia No. 51/99)
- Law on the Ratification of Beijing Amendment to the Montreal Protocol (Official Gazette of the Republic of Macedonia No. 13/02)
- 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 (Official Gazette of the Republic of Macedonia Nos. 53/2005 and 81/2005)
- Order banning the import of used refrigerators, freezers and other cooling or freezing devices and import of ozone depleting substances (Official Gazette of the Republic of Macedonia No. 87/2006)
- As of 1 January 2008, equipment (new refrigerators, freezers, cooling devices, heat pumps, air-conditioners) may be imported only upon permit issued by the Ministry of Environment and Physical Planning.

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

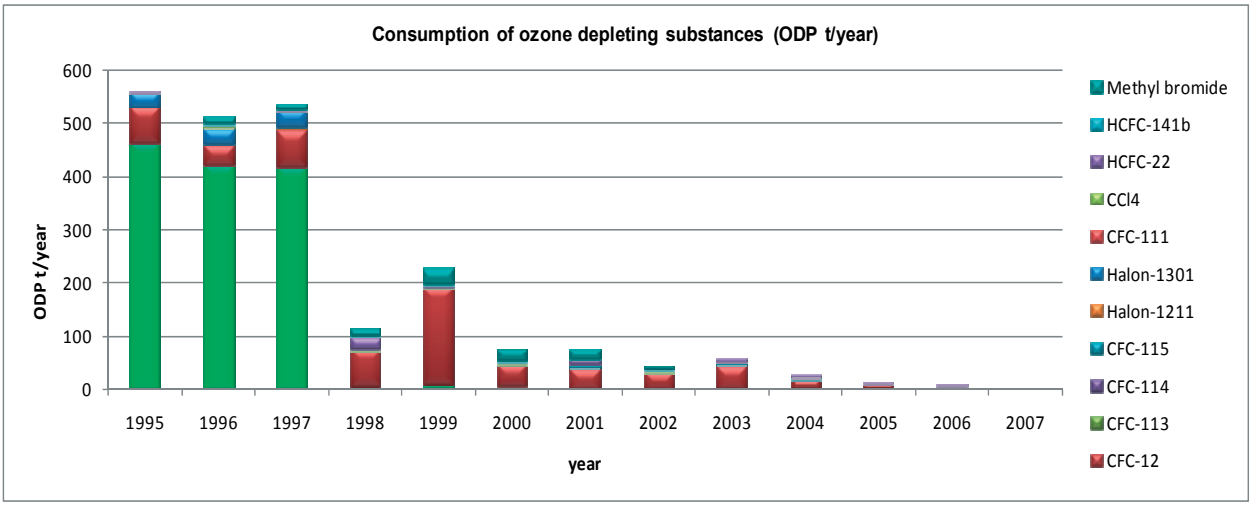
Taking into account the extent of ODSs elimination in the Republic of Macedonia, it may be concluded that the percentage of elimination of more than 97% reflects the fact that our country has achieved much more advanced level of compliance that the one required under the Protocol.

Key policy issue

During the last ten years (1997 - 2007), the Republic of Macedonia has phased-out more than 97% of ODSs consumption, which means that it has not only fulfilled its obligations under the Montreal Protocol, but reached beyond the requirements specified in the Protocol.

Key message

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 2007, under the coordination of this Unit, the implemented projects for ODSs phasing-out achieved removal of more than 97% 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.



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 1995 - 2007.

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 ten years (1997 - 2007), 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$ 5.000.000.

Reports of the UNEP's Secretariat for the Protection of the Ozone Layer certify that in the ten year period, through specific investment projects and technical assistance provided by UNIDO, as much as more than 97% of ODSs consumption in the Republic of Macedonia has been phased-out.

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 ten years (1995 – 2005). 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, 109 sets of equipment for cooling fluids and 20 sets of equipment for collection, treatment and recycling of cooling devices have been delivered so far to services dealing with cooling devices and three centres for cooling fluids recycling were established (in Skopje, Ohrid and Strumica). In parallel with the above, in the period 2000 – 2007, more than 220 service technicians were trained in proper handling and management of cooling substances and devices, and 366 customs officers were trained in ODSs control and detection at all border-crossings in the country.

The national action for ozone layer protection has resulted in elimination of more than 97% 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	ODP value
CFC-11	1.0
CFC-12	1.0
CFC-113	0.8
CFC-114	1.0
CFC-115	0.6
CFC-111	1.0
CCl_4	1.1
Halon 1211	3.0
Halon 1301	10.0
HCFC-22	0.055
HCFC-141b	0.11
Methyl Bromide	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 (by years):

Table 1: Consumption of ODSs in the period 1995-2007

Substances	ODP t*/year											
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
CFC-11	464,8	420	418,41	7	8,8	7,12						
CFC-12	64,74	41	69,1	70,84	183,07	39,6	39,58	34,07	44,53	21,35	11,83	6,99
CFC-113						0,02						
CFC-114												
CFC-115					0,02	2,72	7,1	0,04	4,8	0,5		
Halon-1211			3,87									
Halon -1301	30	30	32,4									
CFC-111					1,36							
CCl4		4,4	0,02	0,1	0,06	0,04		0,01			0,012	
HCFC-22	1,5	2,31	1,83	22,16	6,57	4,93	10,36	3,81	5,96	4,76	1,86	2,36
HCFC-141b		0,11		2,31	0,11	0,05		0,11				
Methyl bromide		12	12	12,9	27,24	23,37	19,92	5,32				
Total	**561,04**	**509,82**	**537,63**	**115,31**	**227,23**	**77,85**	**76,96**	**43,36**	**55,29**	**26,61**	**13,7**	**9,35**

***** 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 OD3	Consumption of ozone depleting substances	**P**	**B**	DG ENV EEA Eurostat	Annually

Geographical coverage: Republic of Macedonia

Temporal coverage: 1995 - 2007

Methodology and frequency of data collection: data is collected and processed by the Ministry of Environment and Physical Planning/Ozone Unit at annual basis.

Information on quality (at data level):

Based on the feedback received every year upon delivery of the annual report to international bodies responsible for the implementation of the Montreal Protocol, data meets all international criteria in this field.

Future activities

■ Short-term activities

Implementation of the project for final elimination of CFCs in the Republic of Macedonia

a. Description of the activity

Project "Plan for full elimination of CFCs in the Republic of Macedonia"

The Project "Plan for full elimination of CFCs in the Republic of Macedonia" is another step forward made by the Republic of Macedonia, but this time the final one after several years of efforts towards full elimination of substances characterized by their highest value of ozone depletion potential, i.e. the well-known chlorofluorocarbons or CFCs.

The main goal of the Project is to ensure timely, sustainable and intensified phasing-out of CFCs through improvement of the current legislation, stakeholders training, use of existing stockpiles, active participation of affected stakeholders and support by decision-makers.

The project will be implemented through the following phases:

- Review of existing and drafting of new legislation (compliant with EU Directives in this area) in relation to import, export and consumption of ozone depleting substances;
- Provision of additional equipment for collection, treatment and recycling of freons for cooling equipment service technicians;
- Establishment of sustainable system for education in acceptable management of CFC-cooling fluids in vocational secondary schools for service technicians of cooling devices and incorporation of CFC-fluids collection and recycling as topics in their curriculum;
- Updating of existing system for continuous monitoring of collected and recycled amounts of CFC-cooling substances;
- Organization of intensive campaign by involvement of public information media and non-governmental sector in activities aimed at informing the general public of undertaken activities.

The Project is actually an advanced phase of the previous Plan for Management of Cooling Substances and Devices. The new activity envisages new, more sophisticated scheme of collection, treatment and re-use of CFCs in cooling systems:

- recording the service providers in need for equipment for CFC-freons collection;
- training in introduction of the procedure for freons collection - recycling (treatment) - refilling;
- delivery of equipment for freons collection - recycling (treatment) - refilling;
- practical application of the equipment;
- reporting to the Ozone Unit on collected/recycled amounts of CFC-freons.
- In addition to the above, the Project has included training of customs officers in CFCs identification and control at border-crossings and granting of detection equipment.

The new approach in the process enables implementation of the entire cycle (collection-recycling-refilling) on the spot, thus making the procedure economically more cost-effective,

both for the service provider and for the client. In addition to this, the possibility for refilling fluids that have not been treated to the level which will not damage the system is minimized.

Activities for application of new methods of CFC-cooling media collection and reuse enable strict restrictions of the import of ozone depleting substances, within the following frames:

- 15.000 kg in the period between 1 January 2006 and 31 December 2006;
- 10.000 kg in the period between 1 January 2007 and 31 December 2007;
- 5.000 kg in the period between 1 January 2008 and 31 December 2008;
- substances listed in Annex A, Group I of the Montreal Protocol on the Substances that Deplete the Ozone Layer shall not be imported after 31 December 2009.

All the above indicates that the Project "Plan for full elimination of CFCs in the Republic of Macedonia" will enable finalization of activities for full elimination of CFCs in the Republic of Macedonia and thus fulfillment of the obligations deriving from the Montreal Protocol: 100% reduction by 1 January 2010.

Demonstration project for substitution of ODSs containing centrifugal chillers

The goal of the Project is to demonstrate the reduction in the consumption of ozone depleting substances through substitution of centrifugal chillers that contain these chemicals in the National Bank of the Republic of Macedonia and OHIS.

Specifically, the Project will enable:

- meeting the obligations arising from the Montreal Protocol,
- enhancing the energy efficiency through energy saving, as well as reduction of GHG emissions in the cooling sector and air-conditioning,
- facilitation of the substitution of ODS containing chillers with environment friendly devices of high energy saving performance.

b. Required resources

The funds required for the project implementation have been provided by the Multilateral Fund of the Montreal Protocol.

c. Status

Project "Plan for full elimination of CFCs in the Republic of Macedonia"

In the course of one year from the project initiation (2006), the following activities have been implemented:

- Teaching personnel was trained in nine vocational secondary schools, regarding good practices in cooling substances and devices management and handling,
- Ten vocational secondary schools have been furnished with demonstration equipment for collection, treatment and recycling of cooling substances,
- 216 service technicians of cooling devices have been trained and certified in proper management and handling of cooling substances and devices,
- Provision of collection, treatment and recycling equipment for 22 services for cooling devices,

- 99 customs officers have been trained in ODSs detection and control on border-crossings
- Manual for service technicians of cooling appliances and Manual for service technicians of small commercial equipment, have been prepared.

Demonstration project for substitution of ODSs containing centrifugal chillers

The Demonstration project for substitution of ODSs containing centrifugal chillers is implemented in the National Bank of the Republic of Macedonia and OHIS, Skopje. This Project has enabled substitution of ODS containing cooling equipment with equipment using cooling fluid with ozone depletion potential equal to zero. Premises envisaged for installation of the new equipment have been adjusted to the new system, the equipment has been installed in both the National Bank of the Republic of Macedonia and OHIS, and final preparations for putting the new chillers into operation are in progress.

Deadline: 1 January 2010

- Long-term activities

Institutional support – Ozone Unit

The Ozone Unit has operated under the Ministry of Environment and Physical Planning since February 1997. All activities of the Ozone Unit have been financed by the Multilateral Fund of the Montreal Protocol, while the role of implementing agency has been given to UNIDO. The main task of the Unit is to coordinate the implementation of the Country Programme for ODSs Phasing-out, i.e. implementation of the activities aimed at ODSs reduction and phasing-out in the Republic of Macedonia. In this context, during the last ten years, the Unit has implemented several projects in industry, agriculture, private sector, etc., thus phasing-out more than 97% of the total consumption of ODSs in the country.

In parallel to the above, the Unit is active in the field of awareness rising of the issue of ozone layer depletion with persons that are professionally engaged in economic branches which apply ODSs and with the general public. To that end, high number of thematic brochures, documentary films, posters, picture book etc., has been produced.

The Unit attributes particular priority to the activity of permanent monitoring of ODSs import, export and consumption in the Republic of Macedonia. For this purpose, in 1997, a special software (database) was developed, which makes it possible to have a clear picture of the status of ODSs in the country at any moment. Software was developed for records keeping of collected and recycled amounts of ODSs. The two databases facilitate timely meeting of the reporting obligations towards international bodies responsible for the implementation of the Montreal Protocol, as well as of the binding provisions of the Montreal Protocol in general.

b. Required resources

During the last ten years (1997 - 2007), the activities of the Ozone Unit under the Ministry of Environment and Physical Planning, as responsible office for the coordination of the activities for ODSs reduction and phasing-out at national level, have been financed by the Multilateral Fund of the Montreal Protocol.

c. Status

In the frames of the Ozone Unit under the Ministry of Environment and Physical Planning,

database containing detailed data on the import, export and consumption of ODSs in the country has been established. The database is exceptionally useful tool in the preparation of annual reports towards international bodies responsible for the implementation of the Montreal Protocol. According to data in the database, in the period between 1995 and 2005, more than 97% of the total consumption of ODSs in the Republic of Macedonia was phased-out.

Deadline: underway.