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**GUIDELINES FOR THE PREPARATION OF INDICATOR-BASED ENVIRONMENT
ASSESSMENT REPORTS**

SUMMARY

This document contains the Guidelines for Indicator-based Environmental Assessment Reports prepared by the Working Group at its seventh session, held on 27–29 November 2006. It includes recommendations for countries of Eastern Europe, Caucasus and Central Asia for the preparation of indicator-based environment assessment reports. Its aim is to make these documents helpful for priority and target setting, for the assessment of the efficiency of environmental protection measures and for the comparison of national indicator values with those of other countries. The Committee is expected to adopt these Guidelines.

I. BACKGROUND

A. Objectives and scope

Environmental indicators are a key tool for environmental assessment, reporting and policy-making. Appropriately chosen indicators based on sufficient time-series data can show key trends and help describe causes and effects of environmental conditions. They can also make it possible not only to track and evaluate environmental policy implementation but also to update environmental and other policies in such environmentally relevant sectors as energy and transport; to set priorities and quantitative targets; and to assess compliance with international commitments adopted.

Taking into account this important role of environmental indicators, countries from Eastern Europe, Caucasus and Central Asia (EECCA) have agreed, in the UNECE Working Group on Environmental Monitoring and Assessment and in close cooperation with the European Environment Agency (EEA), on a core set of environmental indicators for application in these countries. These indicators are

described in detail in the *Guidelines for the Application of Environmental Indicators in EECCA* (hereinafter *Indicator Application Guidelines*).

The present *Guidelines for the Preparation of Indicator-based Environmental Assessment Reports* represent a logical follow-up to the *Indicator Application Guidelines*. Both documents respect approaches applied in pan-European environmental assessment reports, including the widely used D-P-S-I-R (driving forces–pressure–state–impact–response) analytical framework used by EEA (see box).

The objective of these guidelines is to provide the relevant government bodies in EECCA countries with practical guidance on improving the analytical parts of state (national and territorial) environmental assessment reports so that these reports can support the setting of priorities and targets for environmental policy and the assessment of efficiency of environmental measures. Implementation of these guidelines will help the EECCA countries to compare their national indicator values with those in neighbouring countries and in other UN member States.

Box

Analytical Framework

Driving Forces - Pressure – State – Impact - Response

- **Driving forces** mean socio-economic factors and activities which increase or decrease the environmental load. They may relate, for instance, to the volume of industrial production or to the transport demand.
- **Pressure** means direct anthropogenic pressure on the environment through emissions and discharges of pollutants or through the use of natural resources (e.g. emissions into the atmosphere from cars or the use of water).
- **State** means the present status of the environment and trends in changes, including parameters of quality (pollution levels) of the air, waters and soil; biodiversity of particular geographical regions; and availability of natural resources like forests and fresh water.
- **Impact** means the consequences of changes in the environment for the health of humans and other living organisms and for nature and biodiversity (e.g. health effects connected with air pollution in big cities, with poor drinking water quality or with mortality due to road accidents).
- **Response** means concrete activities focused on solving environmental problems. Such activities could include increasing the territory of protected areas, decreasing energy intensity or increasing the percentage of waste reuse and recycling.

Source: European Environment Agency.

In addition to recommendations on the supporting framework (e.g. the legal status of reports, the institutional setting, the use of information technologies, the evaluation and dissemination of reports), these *Guidelines* include recommendations on the structure and content of basic sections of reports.

The EECCA countries that publish state environment assessment reports on a regular basis are advised to revise their structure to permit the use of environmental indicators in accordance with the *Guidelines*. This should lead to the conversion of conventional (descriptive and often compilation-like) reporting into indicator-based environmental reporting. These countries should also supplement the publication of environmental reports with the publication of separate

assessment reports characterizing trends involving particular groups of indicators (e.g. transport or energy indicators).

The EECCA countries that do not publish environment assessment reports on a regular basis are recommended to adopt these *Guidelines* as a first step towards starting the publication of indicator-based reports at least once every two years.

The present *Guidelines* apply both to national and subnational reports (in cases where the latter are prepared). Additional recommendations for the preparation of reports at the territorial level appear at the end of this document.

B. Relation to the Kiev *Guidelines for the Preparation of Governmental Reports on the State and Protection of the Environment*

The *Guidelines for the Preparation of Governmental Reports on the State and Protection of the Environment*, as endorsed by the Kiev (2003) Ministerial Conference “Environment for Europe”, have played an important role in helping the EECCA countries to build capacities in environmental information management. At the same time, recent changes in environmental reporting in the UNECE region have led to new requirements for the preparation of state environmental reports in the EECCA countries.

The basic recommendations of the Kiev *Guidelines* related to legal status and institutional support of state environmental reports will remain valid after the transition to indicator-based reports. This is true for recommendations covering the following items:

- Legal status of reports as official documents submitted to the Government and Parliament;
- Designation of a permanent specially authorized state body responsible for the preparation, publication and dissemination of reports, which should be supported by an inter-sectoral group of experts from key ministries, state administration bodies, scientific institutions and public organizations;
- Financing of the preparation, publication and distribution of environmental reports from the State budget or (in the case of territorial reports) from the budgets of territorial governments.

The present *Guidelines* are expected mainly to replace Part II of the Kiev *Guidelines* so as to focus the state environmental assessment reports of EECCA countries more on the transformation of environmental information into clear messages about assessment and implementation of environmental policy. New reports prepared in accordance with the present *Guidelines* will follow recent European trends in environmental reporting. They will be better structured and shaped, all indicators will be presented in the same format, and conclusions and recommendations will be more prominent.

II. BASIC STEPS IN THE PREPARATION OF REPORTS

A. Preparatory activities

As a first step, preliminary data inventory and analysis should be carried out keeping in mind the core set of environmental indicators. Where the data are insufficient, appropriate measures

should be taken to improve the situation. A general data management mechanism should be established which includes the creation and updating of databases, data quality assessment, and so on.

In those EECCA countries where environmental assessment reports are published regularly, the state body responsible for their preparation should revise the existing report structure and the report preparation process to achieve compliance with the requirements of these guidelines. If necessary, a transition mechanism should be established to ensure continuity of environmental reporting.

B. Indicator development procedure

The structure and content of the report should be decided on, as well as the time schedule for report preparation, which must take into account data collection cycles. (Certain data are available only with long delays.)

First, each indicator manager should make a detailed inventory of the availability of the data necessary for developing indicators, as well as an inventory of other necessary information (studies, projections, predictions, prognoses, relevant national and international policy documents, etc.).

If a partial or even full lack of relevant data and/or information is found, the indicator manager should suggest to the report's editor appropriate measures for getting the missing material. If this is not possible, a decision should be taken to omit the indicator temporarily or to present it in a limited way.

Second, the data should be assessed with respect to quality, unambiguousness and (in the case of time-series data) development in time. Where more than one data set exists for the same indicator, a decision must be taken, based on an assessment, as to which set will be used. Where the data for a time series change considerably from year to year, the reason for the phenomenon (e.g. objective reasons, random errors, change of data collection methodology) should be identified.

Third, each indicator should be described in compliance with general recommendations (see part III.C(i)). In addition, specific recommendations for particular groups of indicators should be taken into account (see part III.C(ii)).

Fourth, a decision should be taken about countries and/or groups of countries with which the respective country would like to compare itself and about the choice of indicators used for the comparison.

Fifth, the conclusions and recommendations should be formulated and relevant annexes added.

C. Report Evaluation

A report evaluation procedure should be prepared and carried out regularly based on the opinions of selected experts and users. Both *ex ante* and *ex post* evaluation of the report is recommended, the former for quality assurance, the latter to get feedback on the relevance of issues covered by the report.

The *ex ante* evaluation should be carried by a group of independent experts before final approval and publication of the report. *Ex post* evaluation should be based on reactions by readers/users. These can be obtained via reply cards included in the hard copies of the report or via an online questionnaire linked to the electronic version. It would also be useful to actively research readers' opinions.

III. BASIC SECTIONS OF INDICATOR-BASED REPORTS

The report should include the following chapters:

- Introduction
- General framework,
- Environmental indicators
- Comparisons
- System of environmental protection
- Conclusions and recommendations
- Annexes.

A. Introduction

The introduction should include a brief description of the objectives, structure and content of the report. It is advisable to mention the authors (editor and indicator managers), the members of the inter-sectoral group of experts, and the names of cooperating data-providing institutions and *ex ante* evaluators (if *ex ante* evaluation was carried out).

B. General framework

The general framework should include a brief description of the country covering basic geographical information, natural resources, economic activities, population and the like. A map of the country (or, in the case of a territorial report, the territory) should be provided.

This section should present the general social and economic indicators of the country (GDP, area, population) necessary to develop certain indicators. Other relevant general indicators such as population density, the sectoral and regional composition of GDP, and the density of the transport infrastructure, may also be presented. In the case of indicators which undergo non-negligible change in time (e.g. GDP), time series data and projections (if available) should be presented. GDP should be presented in constant prices both in the national currency and in USD calculated in PPP to enable comparisons.

C. Environmental indicators

The core set of environmental indicators as presented in *Indicator Application Guidelines* represents the main message of the report. It should be presented structured into subchapters on the following groups of indicators: *Air Pollution and Ozone Depletion, Climate Change, Water, Biodiversity, Land and Soil, Agriculture, Energy, Transport and Waste.*

Optionally, country-specific additional indicators could be added.

Each subchapter or group of indicators should start with an introduction describing the position of particular indicators in the D-P-S-I-R framework.

(i) General recommendations for the development and presentation of indicators

General recommendations are applicable to each core environmental indicator as well as each country-specific indicator. Each indicator should be described in the following format:

- Brief definition and purpose (with respect to the D-P-S-I-R framework)
- The latest value/values of the indicator (certain indicators may be expressed in several forms, e.g. as absolute values and as percentages per capita, per area (km²) and/or per unit of GDP)
- Time-series data (where available)
- National projections/predictions (if developed)
- International target (if any)
- Relevance for environmental policy.

The presentation of each indicator should be accompanied by a description of national (subnational) policy goals and targets (if defined) as well as an abridged SWOT analysis (a summary of strengths, weaknesses, positive expectations and negative expectations, preferably in the form of a table). The SWOT analysis may include comparisons. A sample SWOT analysis appears in annex I of these guidelines. Based on the results of the SWOT analysis, specific recommendations should be formulated.

Whenever possible, each indicator should be presented in the form of a graph, diagram, map or other visual format. In addition, the numerical values of indicators may be presented in tabular format to enable the users to work with the data. (Assessment reports are often used as a data source for calculations.) Where appropriate, an explanatory paragraph should be added to support the understanding of indicator values.

In the case of indicators that are directly or indirectly related to GDP, information on the development of the indicator's absolute value and the development of the GDP figure should be presented. The use of graphs to show the level of decoupling (or interaction) is recommended.

Indicator values should be presented in as aggregated a form as possible. This is relevant for the majority of core indicators. When an indicator relates to the state (quality) of the environment and is composed of a large number of entries of differing importance (e.g. the quality of water in rivers is measured at many surveillance profiles of differing importance), a semi-aggregated or even disaggregated presentation is recommended, depending on the number of items. For instance, for the indicator "BOD and concentration of ammonium in rivers", actual concentration values can be presented for several profiles at the biggest rivers, while the rest can be presented in average values. In such cases, presentation in the form of a map is strongly recommended.

Original sources of data and information must be presented for each indicator, preferably together with references to relevant websites. A sample presentation of an indicator appears in annex 1 of these guidelines.

(ii) Specific recommendations for the development and presentation of particular indicators

The following recommendations focused on ways of presenting the indicators.

Air pollution and ozone depletion

This group includes three core indicators: *emissions of pollutants into the atmospheric air*, *ambient air quality in urban areas* and *consumption of ozone-depleting substances*.

Annual national *emissions of major pollutants into the air* – dust, sulphur dioxide, nitrogen oxides, carbon monoxide, ammonia, non-methane volatile organic compounds, heavy metals (mainly Cd, Pb and Hg) and persistent organic pollutants (polychlorinated biphenyls, polycyclic aromatic hydrocarbons and dioxins/furans) – should be presented, wherever data are available, in terms of absolute and per capita emissions.

If available, emissions of suspended particulate matter PM₁₀ and PM_{2.5} should be presented as well. Where relevant (e.g. for acidifying substances), specific emissions per square kilometre or per unit of GDP should be included. It is also advisable to present the breakdown of emissions of major pollutants (at least dust, sulphur dioxide and nitrogen oxides) by sector (energy, industry, transport, households).

If national emission targets (“emission ceilings”) or emission reduction targets have been adopted, the comparison with actual emission values or volumes of reduced emissions and with emission projections (if available) should be presented to see the present and expected “distances to target”. Graphical presentation is recommended for this comparison.

Optionally, major air polluters (the top 5 or 10 major pollution sources) could be presented together with their share in the national (territorial) emissions of respective pollutants.

Assessment of *air quality in urban areas* should be presented in terms of urban population living in areas with exceeded limit values. It should at least cover total suspended particulates (preferably PM₁₀, if data are available), sulphur dioxide and nitrogen oxides.

Separately, a list of cities/towns in which the limit values are being exceeded (mainly the annual average values, daily average values and maximum short-term values) should be presented. For the biggest cities there should be a breakdown of areas with exceedances by “functional zone” (residential, industrial, transport, etc.); for other cities/towns the averaged information is sufficient. A map should be included to show the locations of air quality monitoring stations and the basic scope of measurements being carried out there.

The number of people living in areas with increased concentrations of air pollutants can be determined based on the real populations of particular areas and related monitoring data from stations located in those areas, and also using the results of dispersion modeling and data on real emissions from air pollution sources which affect those areas and contribute to the exceedances of limit values. Optionally, this assessment could be based on international air quality standards (e.g. EU ambient air quality limit values as presented in “daughter directives” 1999/30/EC, 2000/69/EC, 2002/3/EC and 2004/107/EC to Air Quality Framework Directive 96/62/EC).

In the case of *ozone-depleting substances* (ODS), the total consumption of ODS, aggregated using respective ozone-depletion potentials, should be presented, as should a breakdown of consumption in terms of in-country production and imports. Optionally, consumption of ODS in particular categories (CFCs, HCFCs, methyl bromide, etc.) could be added.

Those EECCA countries which are Parties to the Vienna Convention and the Montreal Protocol should compare their actual consumption values (and predictions, if available) with their commitments.

Where national monitoring systems in an EECCA country encompass the measurement of ozone concentration in the atmosphere (or UV irradiation), the results of such measurements should be presented together with an assessment of the dynamics and trends.

Climate change

This group includes *air temperature* and *atmospheric precipitation*, two indicators that characterize climate change, and a third indicator, *greenhouse gas emissions*. *Air temperature* should be presented in °C as the annual average for the country as a whole, as well as for particular regions and populated areas. The indicator *atmospheric precipitation* should be presented as the layer thickness of water precipitated in different forms (mm) per given area per given period of time. The relation to long-term average precipitation values should be presented as a percentage.

Optionally, real data on the dynamics of changes in hydro-meteorological parameters (e.g. temperature, precipitation, dangerous events like floods or windstorms) can be presented in graphical form to illustrate trends in climate change.

The greenhouse gas emissions indicator illustrates the impact of anthropogenic activities on climate change. National *emissions of greenhouse gases* should be presented in CO₂ equivalent in terms of absolute values, per capita values and per unit of GDP values.

If a national emission target (percentage of reduction) has been adopted either at the international level (UN Framework Convention on Climate Change and Kyoto Protocol) or at the national level (national environmental policy), the comparison of that target with actual emission values and with emission projections (if available) should be presented to see the present and expected “distances to target”. Graphical presentation is recommended for this comparison.

Data on total aggregated greenhouse gas emissions should be complemented by data on emissions of major greenhouse gases (CO₂, CH₄ and N₂O) and by a breakdown of emissions and sinks of carbon dioxide by sector (energy, industry, transport, agriculture, forestry).

Water

This group includes 10 core indicators: *renewable freshwater resources*, *freshwater abstraction*, *household water use per capita*, *water losses*, *reuse and recycling of freshwater*, *drinking-water quality*, *BOD and concentration of ammonium in rivers*, *nutrients in freshwaters*, *nutrients in coastal waters* and *polluted (non-treated) wastewaters*.

The volume of *renewable freshwater resources* should be presented in absolute value (million of cubic metres). In addition, a map describing important national and international rivers and lakes, which represent a significant source of freshwater for a country, may be included.

The volume of *freshwater abstraction* (total and divided between surface and groundwater resources) should be presented in absolute value, per sector, per capita, and in terms of the WEI.

Household water use per capita should be presented in relevant units (cubic metres per capita per year or litres per capita per day). In addition, the percentage of the population served by the public drinking water supply should be presented (at the national and regional levels). Where appropriate, a map can be included.

Water losses should be presented both as absolute values (the volume of water sent to the user minus the volume obtained by the user) and as percentages (the absolute value divided by the volume of water sent to the user by the water supplying company and multiplied by 100).

Reuse and recycling of freshwater should be presented as percentages (in total and broken down for economic sector).

Drinking water quality should be presented in the form of a table which includes selected microbiological and chemical quality parameters measured, the total number of samples, the number of non-compliant samples and the percentage of non-compliant samples in each category. The same can be done for the territorial level. If appropriate, a map may be included. National drinking water quality standards can be applied or a set of new ones developed (preferably based on the EU legislation – Directive 98/83/EC).

BOD and concentration of ammonia in rivers should be presented in the format of a table which includes the semi-aggregated list of surveillance profiles (particular values for the most important ones and aggregated information for the rest) and annual average concentrations of BOD and ammonia compared with national surface water quality standards. The hydrological importance of particular rivers should be mentioned in a note.

A comparison with international standards is recommended (for example, using EU limit values). If classes of surface water quality are defined in the country, a map should be added presenting different classes of water quality of major rivers in different colors. If available, aggregated information on BOD and ammonium concentrations in rivers should be presented. Information on the quality of surface waters in terms of insoluble substances or chemical oxygen demand (COD) could be presented as well. In addition, a list of major water polluters (the top 5 or 10) could be presented in terms of BOD and ammonia (and COD, if data are available), along with their individual contributions to national discharges of specific pollutants.

Nutrients in freshwater should be presented in the form of a table which includes the semi-aggregated list of surveillance profiles (particular values for the most important ones and aggregated information for the rest) and annual average concentrations of nitrates, phosphates, total phosphorus and total nitrogen compared with national water quality standards. The hydrological importance of particular rivers, lakes and groundwater zones should be mentioned in a note. Optionally, a comparison with international standards could be presented (for example, using EU limit values). If classes of water

quality are defined in the country, a map should be added presenting different classes of water quality of major rivers, lakes and groundwater zones in different colours.

Nutrients in coastal water should be presented in the form of a table which includes the semi-aggregated list of surveillance profiles (particular values for the most important ones and aggregated information for the rest) and respective annual average concentrations of nitrates and phosphates compared with international water quality targets (relevant sea-related conventions or national targets, if defined). The ecological importance of particular locations should be mentioned in a note.

Polluted (non-treated) wastewater should be presented as the percentage of wastewaters discharged into water bodies without any treatment at the national and regional levels (if data are available). Various supplementary indicators could be added: the percentage of the population served by public sewers, the percentage of the population served by public sewers connected to wastewater treatment plants, the difference between the percentage of the population served by the public drinking water supply and the percentage of the population served by public sewers, the percentage of wastewaters treated mechanically, the percentage of wastewater treated mechanically and biologically, and the percentage of wastewater treated in plants equipped with the “third stage” (removal of nitrates and phosphorus).

Biodiversity

This group includes four core indicators: *protected areas, forest and other wooded land, threatened and protected species* and *trends in the number and distribution of protected species*.

The total area of *protected areas* should be presented both as an absolute figure and as a percentage of the total country area. It should be accompanied by a table listing the major protected areas (national parks, protected landscape areas, etc.) together with aggregated data on minor protected areas. In the case of international comparisons, this indicator could also be presented in terms of the World Conservation Union (IUCN) categories. The level(s) of protection should be specified. The locations of major protected areas should be shown on a map. In the case of transboundary protected areas, this map should include relevant neighbouring countries.

For some EECCA countries, information on the share of areas with very low economic activity (population density less than 5 inhabitants per km²) in the total area of the country is relevant and should be presented.

For some EECCA countries, information on the share of areas where natural and climatic conditions are not favorable for the growth of forests in the total area of the country is relevant and should be presented.

The total area of *forests and other wooded lands* should be presented (both in absolute figures and as a percentage of the total country area) accompanied by a table presenting the shares of different types of forests (narrow-leaved, broad-leaved, mixed, subtropical, etc.) and another table presenting the portion of particular categories (primary functions) of forests. If available, data on the health status (defoliation) of forests should be presented in appropriate tabular format. A map of the country should be included showing the regional distribution of forests and other wooded land. An additional indicator on the use of forests (harvest/growth ratio) should be presented together with data on salvage felling and exports of timber.

In the case of *threatened and protected species*, the total number of species living on the territory of the country should be presented in tabular format for the main categories: mammals, birds, fish, reptiles, amphibians and vascular plants. For these categories the percentage of protected and endangered species should be presented.

A list of selected species should be presented in tabular format together with estimates of their numbers. The territorial distribution of selected species should be presented in the form of map(s).

Land and soil

This group includes two core indicators: *land uptake (off its production function)* and *area affected by soil erosion*.

Land uptake (off its productive function) should be presented both in absolute values (hectares or square kilometres) and as a percentage of the total national territory. Important land-use categories (transport infrastructure, urbanized areas, industrial zones, open-air mines, etc) should be presented in the same format. The inclusion of a map showing major areas (especially transport infrastructure, which is important from the point of view of fragmentation) is recommended. If available, information on contaminated land, or “brownfields”[•], could be presented.

Areas affected by soil erosion should be presented separately as those affected by water erosion and those affected by wind erosion. Each type should be broken down into four defined categories (light, moderate, strong and extreme). The data are given both as absolute values (hectares or square kilometres) and as percentage of total agriculture land. The addition of maps, with each category shown in a different colour, is recommended.

Agriculture

This group includes two core indicators: *fertilizer consumption* and *pesticide consumption*.

The *fertilizer consumption* (in the case of arable land and land under permanent crops) should be presented in aggregated form, broken down by mineral and organic fertilizers, and broken down according to basic nutrient components (N, K₂O, P₂O₅). Information on the consumption of calcium-based fertilizers could also be presented.

The *pesticide consumption* should be presented both in aggregated form (total consumption) and broken down by basic categories: herbicides, fungicides and insecticides.

Energy

This group includes four core indicators: *final energy consumption*, *total energy consumption*, *energy intensity* and *renewable energy consumption*.

• Brownfield: abandoned land formerly used for industrial, agricultural, building or other activities which may have led to its contamination or depletion.

Final energy consumption should be presented both in total and broken down by major users (industry, transport, agriculture, services, households). The use of a diagram is recommended.

Total energy consumption should be presented both in total and broken down by sources (solid, liquid and gaseous fossil fuels, nuclear energy and renewable energy sources). The use of a diagram is recommended. Data on exports and imports of energy (including major exporters and importers) should be presented separately.

Energy intensity should be presented both in the national currency and in USD to enable international comparisons. Separate presentation of electro-energy intensity (both in the national currency and in USD) is recommended.

Renewable energy consumption should be presented both as the percentage (share) of all renewable energy in country's total energy consumption and broken down by major categories of renewable energy sources (biomass, biogas, hydropower, wind power, geothermal power, solar power, photovoltaic power, tidal power, wave power). If available, the country's potential for renewable energy sources should be given (at least for hydropower and biomass).

Transport

This group includes four core indicators: *passenger transport demand*, *freight transport demand*, *composition of the road motor vehicle fleet by fuel type* and *average age of the road motor vehicle fleet*.

Passenger transport demand should be presented in passenger-kilometres, both as a total and broken down by main modes of public transport (taxi, long-distance bus, municipal bus, trolleybus, tram, underground (metro), railway, inland water, maritime and air) and individual car transport. The presentation of the values for individual car transport in vehicle-kilometres is recommended (and is important for calculation of air pollution, e.g. by PM₁₀ or PM_{2.5}). If available, a prognosis (projection) of passenger transport demand should be included.

Freight transport demand should be presented in ton-kilometres, both as a total and broken down by main modes of transport (road, railway, water, pipeline and air). The values for road transport in vehicle-kilometres should be included (and are important for calculation of air pollution, e.g. by PM₁₀ or PM_{2.5}). If available, a prognosis (projection) of freight transport demand should be included.

Information on the *composition of the road motor vehicle fleet by fuel type* should cover the following categories of road vehicles: passenger and light-duty cars, buses, heavy-duty vehicles (trucks), tractors (in agriculture and forestry). Information on each category's consumption of gasoline and diesel fuel should be presented, and in the case of gasoline broken down by type (leaded versus unleaded). If available, information on other types of fuel (e.g. gas, biofuels) and on electric vehicles should be included. The percentage of passenger and light-duty cars equipped with catalytic converters should be presented. The inclusion of brief information on national fuel quality standards is recommended (mainly regarding sulphur content in diesel fuel and lead content in gasoline).

The *average age of the road motor vehicle fleet* should be presented separately for at least two major categories of vehicles – passenger cars and heavy-duty cars (trucks) – in tabular format using four age categories (0–2 years, 2–5 years, 5–10 years, more than 10 years). If available, information on the

numbers of vehicles complying with the relevant UNECE/EURO standards should be presented (both in absolute values and as percentages).

Waste

This group includes four core indicators: *waste generation*, *transboundary movements of hazardous waste*, *waste reuse and recycling* and *final waste disposal*.

Waste generation should be described both in terms of total national waste generation and broken down by major categories (industrial, hazardous, municipal). In addition to the absolute data in mass units, municipal waste generation should be presented in per capita terms, while industrial and hazardous waste generation should be presented in relation to GDP. Industrial waste generation should be broken down by the leading economic sectors (energy, mining, metallurgy, manufacturing industries, etc.). Additional information on special categories of waste should be presented (e.g. the production of radioactive waste, especially in countries operating nuclear power stations – provided such information is publicly available).

Transboundary movements of hazardous waste should be presented separately for exports and imports. Both aggregated data and data broken down by main categories of exported/imported wastes should be included. Exports and imports of wastes could also be broken down by red, amber and green lists as defined by the Basel Convention. The inclusion of information on the countries of origin of imported waste and of the countries of destination for exported waste is recommended.

Information on *waste reuse and recycling* should be presented separately for particular categories of waste (including packaging). The presentation of reuse and recycling information in terms of commodities (paper, glass, metals, plastics) is recommended.

Information on *final waste disposal* – via incineration or landfills on controlled sites – should be presented both in total and broken down by category (municipal, industrial and hazardous). Numbers, types and total nominal capacity of waste incinerators and landfills should be presented, supplemented by a map showing locations. The presentation of information about other types of waste treatment and/or disposal facilities (e.g. waste separation plants or biological treatment plants) is recommended.

(iii) Country-specific indicators

This group can include additional indicators considered relevant for a given country (e.g. noise pollution, radioactive waste, radioactive contamination, oil discharges into waters, fishery-related indicators). These additional indicators could be presented in the same format as the core environmental indicators.

D. Comparison based on indicators

This chapter should give both the comparisons presented for particular indicators in respective parts of the report (the SWOT analyses prepared for each indicator) and a global comparison.

The comparison should cover the whole set of core indicators (excluding irrelevant ones – e.g. *nutrients in coastal waters* for inland countries, or those for which data are not available) and should be presented in tabular format, accompanied by a brief assessment for which the semi-SWOT format is

recommended. This assessment should show how the values of the country's indicators are better or worse than those of comparable countries. Country-specific indicators can be included in the comparison.

Comparison with the EECCA countries, especially neighbouring ones, is strongly recommended. Comparison with other countries or groups of countries is optional; each EECCA country can choose another country or group of countries with which it wants to be compared. For comparisons with groups of countries, the use of average-based interpretation (showing whether the country's situation is average, above average or below average compared with the group) is recommended.

E. Environmental protection management

In this chapter, indicators describing the efficiency of environmental policy could be presented (e.g. *environmental investments* presented both in absolute terms and in relation to GDP or *number of ISO 14000 certified companies*). As far as possible, it is advisable to use policy response indicators developed at the international level, in particular the indicators being used by the Task Force for the Implementation of the Environmental Action Programme for Central and Eastern Europe, Caucasus and Central Asia to assess progress in achieving the objectives of the EECCA Environment Strategy.

This chapter should include a brief presentation of all relevant additional information which cannot be expressed easily or at all in the form of indicators (e.g. changes in the system of state administration in the field of environment or in the system of environmental monitoring, economic instruments applied, public participation in environmental decision-making, initiation of new major environmental projects and programmes and progress in execution of existing ones, compliance with existing international commitments and adoption of new ones).

F. Conclusions and recommendations

The conclusions should be prepared as an executive summary so as to enable readers to glean the essentials without studying all the details.

The major findings of SWOT analyses prepared for each core environmental indicator should be given along with related specific recommendations, especially regarding the most urgent environmental problems, negative trends and positive trends.

Tabular presentation of the whole group of indicators using suitable symbols (representing categories such as "good", "bad", "needs attention", "no problems foreseen") is strongly recommended. This approach is now used in many environmental reports.

In addition, policy recommendations should be presented on how to solve urgent environmental problems, support positive developments and prevent negative developments. A limited number of priorities (no more than five) should be proposed, as well as their order of importance. (Limiting the number of priorities is very important as having too many of them leads to a loss of focus.) For example, the revision or updating of existing national environmental policy targets could be proposed, and new ones can be proposed based on information presented in the report.

This chapter should also include recommendations for improving the preparation of indicator-based environmental assessment reports in coming years.

G. Annexes

Annexes to environmental reports should include:

- References to specialized environmental reports (e.g. on water, air, climate change, biodiversity)
- References to existing sectoral reports (e.g. energy, transport, industry, agriculture, forestry, fishery)
- References to relevant territorial reports (where prepared)
- References to relevant national and international institutions
- A list of international environmental conventions and protocols to which the country is a Party (preferably in a table that includes the dates of signature and ratification)

Any other relevant material (e.g. policies, strategies, legislation) can be presented in annexes.

IV. ADDITIONAL RECOMMENDATIONS FOR PREPARATION OF REPORTS AT THE TERRITORIAL LEVEL (IN COUNTRIES WHERE SUCH REPORTS ARE PREPARED)

In general, territorial environmental assessment reports can be prepared using a structure similar to that presented above for the national level, with the modifications described below.

To begin with, core environmental indicators should be chosen which make it possible to describe a given territory's environmental problems in the most effective way possible. Environmental indicators being used at the territorial level are obviously more concrete to enable assessment of the environmental status of particular regions, cities, districts and objects which present considerable environmental risks. Regular and systematic assessment of environmental indicators at the territorial level makes it possible to see the real dynamics of the state of the environment, to propose and implement concrete measures to stabilize it, and to carry out more detailed surveys in the regions.

In preparing territorial environmental assessment reports, attention should be paid to the specific character of the territory, its pressing problems, and issues characteristic of its environmental, economic and social development. It is advisable to use environmental indicators which can help to solve environmental problems and which support the rational use of natural resources and the implementation of complex development plans for the territory.

Territorial authorities are advised to stimulate the major polluters to carry out regular self-monitoring of their emissions, discharges and wastes and to periodically check their compliance with environmental standards and other legal requirements.

It is advisable to invite major polluting enterprises to participate in the preparation of territorial environment assessment reports by using their reporting documents, inspection outputs and other relevant information available (e.g. voluntary environmental reports or reports on sustainable development).

Territorial reports should be prepared in close cooperation with all local competent authorities responsible for the collection and publication of environmental data and information. Potential sources of information necessary for the development of environmental indicators at the territorial level are presented in annex II.

Annex I

SAMPLE DESCRIPTION OF AN INDICATOR

This indicator has been developed for the Czech Republic. Notes and recommendations appear in *italics*.

Name of the group of indicators: Air pollution and ozone depletion

Name of the indicator: Emissions of pollutants into the atmospheric air

Brief description of the indicator and its purpose:

3–5 lines describing how the indicator is constructed, what it represents and whether (how) it is related to other indicators in the DPSIR framework.

This indicator is based on the results of national emission inventories and national emission projections. It provides a measure of existing and expected **pressure** on the environment in terms of emissions of basic harmful substances into atmospheric air and (in several cases) “distance to the target”, as expressed through national emission ceilings. This indicator has a causal relationship with the impact indicator “Ambient air quality in urban areas”.

Values of the indicator “Emissions of pollutants into the atmospheric air” are presented in Table 1.

Table 1: Trends in national emissions of basic pollutants in the Czech Republic, 1990–2005

Year	1990	1995	2000	2004	2005
Total national values						
Dust (kt/year)	565	211	75		74	76
Sulphur dioxide (kt/year)	1 850	1 103	264		227	227
Nitrogen oxides (kt/year)	551	370	321		288	285
GDP in current prices (CZK billion)	-	1 466.7	2 150.1		2 750.3	2 978.2
GDP in constant prices (previous year = 100%)		105.9%	103.9%		104.4%	106.1%
Per capita values (for 2005, EU-15 average values are presented in brackets)						
Dust (kg /capita)	55.4	20.7	7.3		7.3	7.5
Sulphur dioxide (kg/capita)	181.4	108.1	25.9		22.3	22.3 (15.0)
Nitrogen oxides (kg/capita)	54.0	36.3	31.5		28.2	27.9 (24.7)
Per unit of territory value (for 2005, EU-15 average values are presented in brackets)						
Dust (t/km ²)	7.2	2.7	0.95		0.94	0.96
Sulphur dioxide (t/km ²)	23.5	14.0	3.3		2.9	2.9 (1.8)
Nitrogen oxides (t/km ²)	7.0	4.7	4.1		3.7	3.6 (2.9)

Data source: Czech Hydro-meteorological Institute (www.chmi.cz).

Notes:

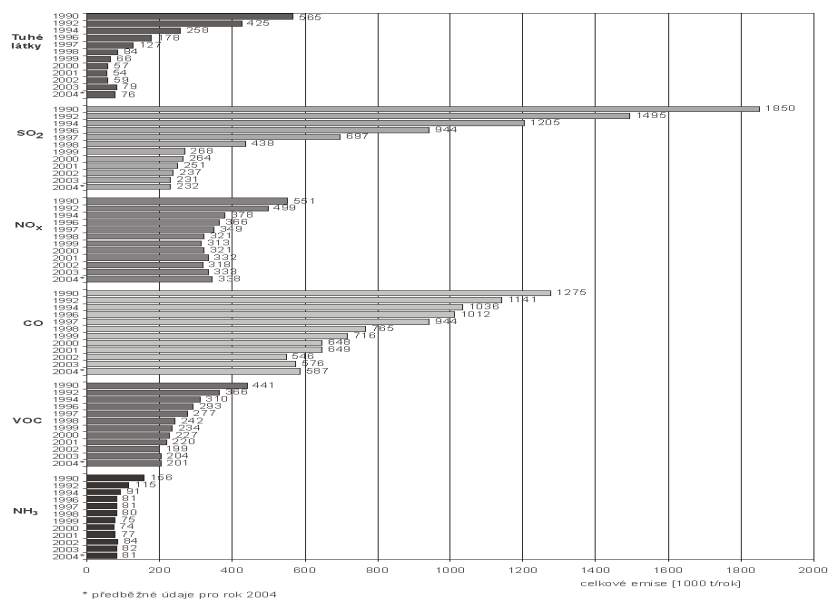
The number of columns depends on the availability of time series data.

In general, it is not advisable to present indicator values for the years before 1990.

For indicators which are presented in only one form (e.g. in %), the second and third groups of rows in the table do not apply. For indicators which are presented in several forms (e.g. absolute value, value per capita, value per square km and/or value per unit of GDP), the second and following groups of rows should be applied. For indicators which are presented in semi-aggregated form, the respective values (both aggregates and important single values) should be presented in separate rows.

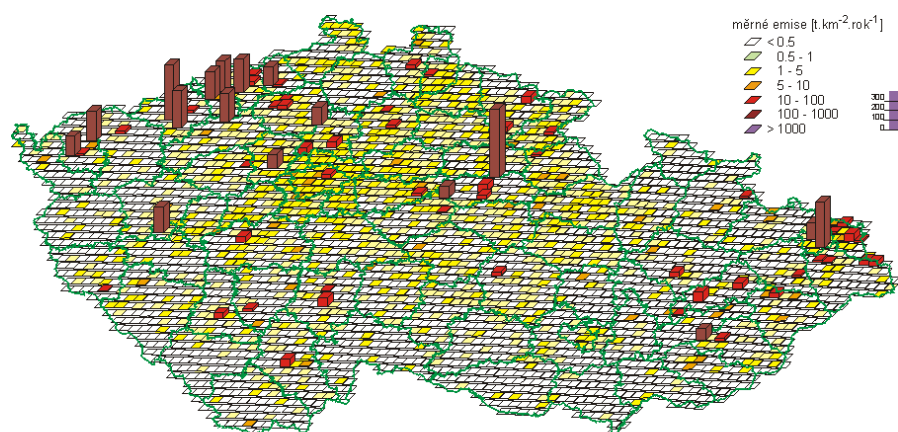
Sample diagram and map presenting the indicator values in Table 1:

Figure: Total national emissions of major pollutants in the Czech Republic, 1990–2004



Celkové emise základních druhů látek znečišťujících ovzduší v České republice, 1990–2004

Map: Emission densities of sulphur dioxide (t/km²) in the Czech Republic, 2003 (grids 5 × 5 km)



Emisní hustoty oxidu siřičitého ze čtverců 5x5 km, 2003

Note:

Whether a diagram or a map is used depends on the nature of the indicator (see specific recommendations). For indicators which may be influenced by economic development, a separate curve representing GDP should be added to enable assessment of decoupling.

National/international target:

A description of the national/international target should be presented (if the target has been accepted by the country), including the value and related deadline. Where there is no numerical target, a brief description of relevant policy goals should be presented instead.

International target values – national emission ceilings for sulphur dioxide and nitrogen oxides to be complied with by 2010 – were adopted via the Gothenburg Protocol to CLRTAP and revised (to the more stringent values) in relation to Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants. In the case of dust, national emission target is to be set by the National Emission Reduction Program.

Table 2 shows the expected development of indicator values, along with the targets.

Table 2: Expected trends in the Czech Republic's national emissions of dust, sulphur dioxide and nitrogen oxides for the period until 2010 compared with the last real value and with the target

Year	2005	2010	Target 2010
Dust (kt/year)	76		72	(69?)
Sulphur dioxide (kt/year)	227		217	265
Nitrogen oxides (kt/year)	285		276	286

Data source: DHV CR Ltd. (www.dhv.cz).

Notes:

The number of columns depends on the availability of time series data.

The second column should give the latest known real value of the indicator.

For indicators which are presented in semi-aggregated form, the respective values (both aggregates and important single values) should be presented in particular rows.

Where numerical projections are not available, Table 2 should be replaced by an expert opinion on the expected development of the indicator value.

Optional diagram or map presenting the projected indicator values in Table 2.

Notes:

Whether a diagram or a map is used depends on the nature of the indicator (see specific recommendations). For indicators which may be influenced by economic development, a separate curve representing GDP should be added to enable assessment of decoupling.

When numeric projections of the indicator are not available, a map or diagram should not be included.

Additional information (explanatory paragraph):

This should include any data or information recommended in indicator-specific recommendations which may lead to better understanding of the problem.

The Czech Republic is a party to the Convention on Long-range Transboundary Air Pollution and its eight protocols.

State environmental policy provides for the reduction of emissions into the air of atmospheric pollutants (in general terms).

National legislation (the Clean Air Act and related decrees) in full compliance with the legal provisions of the European Communities and its implementation are being supported through national and regional emission reduction programmes which set concrete targets.

The energy sector (power stations, large heating stations) currently produces 80% of national emissions of sulphur dioxide, 50% of national emissions of nitrogen oxides and 20% of national emissions of dust. Mobile sources (transport and non-road machinery) represent 35% of national emissions of dust and 45% of national emissions of nitrogen oxides. Local (household) heating represents 40% of national emissions of dust and 15% of national emissions of sulphur dioxide.

The top 5 polluters of dust (2 steel mills, 2 coal-fired power stations and one coke oven plant) together emit 3.7 kt of dust, which represents 5% of total national emissions.

The top 5 polluters of sulphur dioxide (5 coal-fired power stations) together emit 46 kt of sulphur dioxide, which represents 20% of total national emissions.

The top 5 polluters of nitrogen oxides (5 coal-fired power stations) together emit 49 kt of nitrogen oxides, which represents 20% of total national emissions.

SWOT analysis

<i>Strengths</i>	<i>Weaknesses</i>
<p><i>Results of assessment of the data presented in Table 1; comparison of real situation with the target (if any)</i></p> <p>Emissions of all three pollutants decreased dramatically between 1990 and 2000 (due to the restructuring of the national economy, accompanied by active emission reduction measures). Since 2000 the annual emission values have more or less stabilized.</p> <p>Decoupling from economic growth has occurred. Present emissions of sulphur dioxide are well below the target, while nitrogen oxide emissions are at the target level. Actual dust emissions are slightly above the national target.</p>	<p><i>Results of assessment of the data presented in Table 1; comparison of real situation with the target (if any)</i></p> <p>Despite the substantial decrease in dust emissions, the country still suffers from considerable exceedance of air quality limit values for PM₁₀ (see indicator <i>Air quality in urban areas</i>).</p> <p>Per capita and per km² emission values for sulphur dioxide and nitrogen oxides are higher than the EU-15 average.</p>
<i>Opportunities (positive expectations)</i>	<i>Threats (negative expectations)</i>
<p><i>Results of assessment of the data presented in Table 2 or of expert opinion, comparison of expected development with the target (if any).</i></p> <p>Emissions of all three pollutants are expected to decrease until 2010. There is high probability that the national emission ceiling</p>	<p><i>Results of assessment of the data presented in Table 2 or of expert opinion; comparison of expected development with the target (if any).</i></p> <p>The risk of non-compliance with the national emission ceiling for nitrogen oxides is still high (the reserve is only 3.5%). For dust, the</p>

will be complied with for sulphur dioxide and certain probability that this will happen for nitrogen oxides.	expected reduction of emissions by 4% by 2010 will probably not be sufficient to solve the PM ₁₀ problem or achieve the proposed national target.
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Recommendations:

Additional measures leading to further reduction of emissions seem to be necessary in the case of nitrogen oxides and especially dust.

References:

References for the data and information used.

Czech Hydro-meteorological Institute (www.chmi.cz)

Ministry of Environment of the Czech Republic (www.envi.cz)

Czech Environmental Information Agency (www.cenia.cz)

Annex II

SOURCES OF INFORMATION NECESSARY FOR THE DEVELOPMENT OF CORE ENVIRONMENTAL INDICATORS AT THE TERRITORIAL LEVEL

It is advisable to obtain the information needed for the development of core environmental indicators from the following territorial competent authorities:

Competent authorities in the field of environment

Indicators:

- Emissions of pollutants into the atmospheric air
- Renewable freshwater resources
- Protected areas
- Threatened and protected species
- Forests and other wooded land
- Trends in the number and distribution of selected species
- Waste generation
- Waste reuse and recycling
- Final waste disposal

Competent authorities in the field of water management

Indicators:

- Freshwater abstraction
- Household water use per capita
- Water losses
- Reuse and recycling of freshwater

Competent authorities in the field of hydro-meteorology and monitoring

Indicators:

- Ambient air quality in urban areas
- Air temperature
- Atmospheric precipitation
- Greenhouse gas emissions
- BOD and concentration of ammonium in rivers
- Nutrients in freshwater
- Nutrients in coastal waters

Competent authorities in the field of hygiene

Indicator:

- Drinking water quality

Competent authorities in the field of municipal services

Indicators:

- Water losses
- Polluted (non-treated) wastewaters
- Waste generation
- Final waste disposal

Competent authorities in the field of land use

Indicators:

- Land uptake
- Area affected by soil erosion

Competent authorities in the field of agriculture

Indicators:

- Fertilizer consumption
- Pesticide consumption

Competent authorities in the field of energy

Indicators:

- Final energy consumption
- Total energy consumption
- Energy intensity
- Renewable energy consumption

Competent authorities in the field of transport

Indicators:

- Passenger transport demand
- Freight transport demand
- Composition of road motor vehicle fleet by fuel type
- Average age of road motor vehicle fleet.
-

Competent authorities in the field of statistics collect and treat the majority of the above-mentioned information owing to their role in environmental reporting.