

UNECE Working Group on Environmental Monitoring and Assessment

Workshop on the Application of Environmental Indicators
and on Indicator-based Environmental Reporting

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DRAFT GUIDELINES FOR INDICATOR-BASED ASSESSMENT REPORTS ON THE ENVIRONMENT*

I. GENERAL

A. Objectives and scope

1. 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, help to describe causes and effects of environmental conditions and make it possible not only to track and evaluate environmental policy implementation but also to update environmental policy and other policies in such environmentally relevant sectors like e.g. energy and transport, to set priorities and quantitative targets and to assess compliance with international commitments adopted.

2. Taking into account this important role and meaning of environmental indicators, countries from Eastern Europe, Caucasus and Central Asia (EECCA) agreed, within UNECE Working Group on Environmental Monitoring and Assessment and in close co-operation with the European Environment Agency (EEA), upon 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”).

3. The present Guidelines for Indicator-based Assessment Reports on the Environment represent the logical follow-up to the Indicator Application Guidelines. Both documents respect approaches applied in pan-European environmental assessment reports including the widely used DPSIR analytical framework (driving forces-pressure-state-impact-response), used by EEA (see Box).

4. Objective of these guidelines is to provide the relevant governmental bodies in the EECCA countries with practical guidance on how to improve analytical parts of State (national and territorial) environmental reports in such a way that these reports could support the setting of priorities and targets of 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 neighboring countries and in other UNECE member states.

• Prepared by the secretariat with the assistance of its consultants, Messrs. Vladislav Bizek and Alexander Shekhovtsov.

Box

Analytical Framework

Driving Forces - Pressure – State – Impact - Response

- *Driving forces* mean social-economic factors and activities which increase or decrease the environmental load. They 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 of carbon dioxide from cars or the use of water).
- *State* means present status and trends in changes of the environment, including parameters of quality (pollution levels) of the air, waters, soil; biodiversity of particular geographical region; and availability of natural resources like forests or fresh water.
- *Impact* means consequences of the changes in the environment for human health and the health of other living organisms and also for the nature and biodiversity (e.g. mortality due to road accidents or health effects connected with air pollution in big cities or with poor quality of drinking water).
- *Response* means concrete activities focused on the solution of environmental problems. Increase in the territory of protected areas, decrease in energy intensity or increased percentage of waste recycling may belong to such activities.

Source: European Environment Agency

5. Besides recommendations on supporting framework (legal status of reports, institutional setting, use of information technologies, evaluation and dissemination of reports), these Guidelines include also recommendations on structure and content of basic sections of reports.

6. The EECCA countries which are publishing State environmental reports on a regular basis are recommended to revise their structure to adapt it to the use of environmental indicators in accordance with these 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 by separate assessment reports, characterizing trends in particular groups of indicators (e.g. transport or energy indicators).

7. The EECCA countries that are not publishing environmental reports on a regular basis are recommended to adopt present Guidelines and to start publishing indicator-based reports at least once per two years.

8. Present Guidelines are applicable both in the case of national reports and in the case of territorial (e.g. Oblast or city) reports. Additional recommendations related to the preparation of reports at territorial level are presented in the last part of this document.

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

9. *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 the EECCA countries in building capacities in environmental information management. At the same time, recent changes in environmental reporting in the

UNECE region led to new requirement towards the preparation of State environmental reports in the EECCA countries.

10. 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 the case of recommendations covering the following items:

- Legal status of reports as official documents submitted to the Government and Parliament;
- Analytical approach to the data on the state of the environment and natural resources with respect to the assessment of changes in time, explanation of these changes and prediction of future changes of the environment;
- Use of environmental reports as a background for the preparation of environmentally relevant elements for the development and implementation of new environmental, sectoral, economic and social policies, for new regulatory approaches in the field of environmental protection and use of natural resources, for the development and implementation of environmental programs, for ensuring the environmental safety, for the development of concrete measures in the fields of environmental protection and nature conservation and for the assessment of efficiency of their implementation;
- Financing of preparation, publication and distribution of environmental reports should be carried out from the state budget or (in the case of territorial reports) from the budgets of territorial governments;
- Use of advanced information technologies both in preparation and distribution of the reports (GIS, databases, internet, CDs);
- Definition of target groups which should include competent authorities at different national and territorial levels, universities and scientific institutions, industry, business community and NGOs;
- Designation of a permanent specially authorized state body responsible for the preparation, publication and dissemination of reports which should be supported by inter-sectoral group of experts from key ministries, state administration bodies, scientific institutions and public organizations.

II. BASIC STEPS IN PREPARATION OF REPORTS

A. Preparatory Activities

11. As a first step, preliminary data inventory and analysis should be carried out having in mind the core set of environmental indicators. In the case of insufficiency of the data, appropriate measures should be taken for improvement. General data management mechanism should be established which includes creation and update of databases, data quality assessment etc.

12. In the EECCA countries, where environmental reports are being published regularly, the State body responsible for its preparation should carry out revision of existing report structure, its preparatory process and form of presentation to achieve compliance with the requirements of these guidelines. If necessary, “transition mechanism” should be defined.

B. Indicator Development Procedure

13. Structure and content of the report should be decided on as well as the time-schedule of report preparation which must take into account the data collection cycles (certain data are only available with long delays).

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

15. In the case that either partial or even full lack of relevant data and or information is found, indicator manager should suggest to the report editor appropriate measure how to get them. If this is not possible, decision should be taken either to omit such indicator temporarily or to present it in a limited way.

16. As a second step, the data assessment should be carried out with respect both to quality and to unambiguousness (and development in time in the case of time-series data). In the case that more than one data set exists for the same indicator, the decision must be taken, based on an assessment, which of them will be used. In the case of time-series where the data are changing year-by-year in a considerable way, the explanation should be found (e.g. objective reasons, random errors, change of data collection methodology etc.).

17. As a third step, 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)).

18. As a fourth step, 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 which are subject to international comparison.

19. As a fifth step, the conclusions should be drafted and relevant annexes should be added.

C. Report Evaluation

20. Report evaluation procedure should be prepared and carried out regularly based on the opinion of both selected experts and users. Both *ex ante* and *ex post* evaluation of the report is recommended; the former as a kind of “quality assurance”, the latter as an assessment of relevance of issues covered by the report (“feedback”).

21. *Ex ante* evaluation procedure should be carried before final approval and publishing the report by a group of independent experts. *Ex post* evaluation procedure should be based on reaction of readers / users obtained through either reply cards included in the hard copies of the report or via internet questionnaire attached to the electronic version. It would also be useful to organize active reader’s opinion research.

III. BASIC SECTIONS OF INDICATOR BASED REPORTS

22. The report should include the following chapters:

- a) Introduction,
- b) General framework,
- c) Environmental Indicators (a core set plus country-specific indicators),
- d) International comparisons based on indicators,
- e) System of environmental protection,
- f) Conclusions,
- g) Annexes.

A. Introduction

23. Introduction should include brief description of objectives, structure and content of the report. It is recommended to present the authors (editor and indicator managers), composition of the inter-sectoral group of experts, names of co-operating data providing institutions and names of ex ante evaluators (if *ex ante* evaluation was carried out).

B. General Framework

24. General framework should include brief description of the country: basic geographical information, natural resources, economic activities, population, etc. Map of the country or territory (region or city) in the case of territorial report should be included.

25. General social and economic indicators – Gross domestic product (GDP), area, population – which serve as denominators in certain indicators must be presented obligatorily. Other relevant general indicators like population density, sector and regional composition of GDP or density of transport infrastructure are recommended to be presented. In the case of indicators which undergo non-negligible change in time (e.g. GDP), time series data and projections (prognoses) should be presented, if available. GDP should be presented in constant prices both in national currency and in USD calculated in PPP (parity of purchasing power) to enable international comparisons.

C. Environmental Indicators

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

27. Optionally, country-specific additional indicators could be added.

28. Each subchapter on group of indicators should start with the introductory part describing the position of particular indicators within the DPSIR framework.

(i) General Recommendations on the Development and Presentation of Indicators

29. General recommendations, presented below, are applicable to each of core environmental indicator as well as to each country specific indicator. Each indicator should be described in the following format:

- Brief definition and purpose (with respect to the DPSIR framework),
- the latest value / values (certain indicators may be expressed in several relevant forms, e.g. in absolute value, in percentage per capita, per square km or per unit of GDP),
- time series data (where available),

- national projections / predictions (where available),
- international target (if any).

30. Presentation of each indicator will be accompanied by the description of national (sub-national) policy goals and targets (if defined) as well as by an abridged SWOT analysis (which means the brief description of indicator values assessment in terms of strong points, weak points, positive expectations, negative expectations, preferably in the form of a table). SWOT analysis may include international comparison. An example of SWOT analysis is presented in Annex I to these guidelines. Based on the results of SWOT analysis, specific recommendations should be formulated.

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

32. In the case of indicators, related to GDP either directly or indirectly, additional information – development of absolute value of indicator and the development of GDP – should be presented in a table or graph format to show the level of decoupling (or interaction).

33. Preferably, the values of indicators should be presented as much aggregated as possible. This is relevant for the majority of core indicators. In certain cases, where the indicator relates to state (quality) of the environment and is composed from high number of entries of different importance (e.g. quality of water in rivers is measured at many surveillance profiles of different importance), the semi-aggregated or even disaggregated presentation is recommended, depending on the number of items. *For instance in the case of indicator “BOD and concentration of ammonia in rivers”, particular concentration values can be presented for several profiles at the biggest rivers while the rest can be presented in average values.* Presentation in the form of map is strongly recommended in such a case.

34. Original sources of data and information must be presented for each indicator, preferably together with reference to respective web sites. An example of the presentation of an indicator is included in Annex 1 to these guidelines.

(ii) Specific Recommendations for the Development and Presentation of Particular Indicators

35. Specific recommendations which relate to particular core indicators, divided into groups are mostly focused on the ways of presentation.

Air pollution and ozone depletion

36. This group of indicators includes three core indicators: *Emissions of pollutants into the air, Air quality in urban areas, Consumption of ozone depleting substances.*

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

38. If available, emissions of suspended particulate matter PM₁₀ and PM_{2.5} should be presented as well. Where relevant (e.g. acidifying substances), specific emissions per square kilometer or per unit of GDP should be added. It is recommended to present the break-down of emissions of major pollutants (at least dust, sulphur dioxide and nitrogen oxides) by sectors (energy, industry, transport, households).

39. If national emission targets (“emission ceilings”) have been adopted either at international (UNECE CLRTAP and its protocols) or national levels, the comparison with actual emission value and emission projection (if available) should be presented to see the present and expected “distance to target”. Graphical presentation is recommended for this comparison.

40. Optionally, the list of major air polluters (Top 5 or Top 10) could be presented together with their relative (in %) contribution to the national emissions of respective pollutants.

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

42. The list of cities/towns where air quality monitoring is being carried out together with respective population is to be prepared and presented in the form of table (semi-aggregated form with particular values for the biggest cities and aggregated values for the resting ones) and a map showing the location of monitoring stations.

43. Localities where national air quality standards (mainly annual averages and shorter-term limit values) are being exceeded should be presented in the table and on a map.

44. Population living in areas with exceedances can be derived either by simple summarization (all population of respective city/town is included) or by more detailed calculation using the results of dispersion model (percentage of city area where concentrations exceed limit values multiplied by the city population). If so, map with pollutant concentration fields should be presented. 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).

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

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

Climate change

47. This group of indicators includes one core indicator – *greenhouse gas emissions*. National *emissions of greenhouse gases* (GHGs) should be presented in CO₂ equivalent in terms of absolute values, per capita values and per unit of GDP values.

48. If national emission target (percentage of reduction) has been adopted either at international (UN Framework Convention on Climate Change and Kyoto Protocol) or national levels (national

environmental policy), the comparison with actual emission value and emission projection (if available) should be presented to see the present and expected “distance to target”. Graphical presentation is recommended for this comparison.

49. Data on total aggregated GHGs emissions should be complemented by those on emissions of major greenhouse gases (CO₂, CH₄ and N₂O) and by the break-down of emissions and sinks of carbon dioxide by particular sectors (energy, industry, transport, agriculture, forestry).

Water

50. This group of indicators includes 10 core indicators: *Renewable freshwater resources, Freshwater abstraction, Household water use per capita, Water losses, Reuse and recycling of freshwater in manufacturing industries, Drinking water quality, BOD and concentration of ammonium in rivers, Nutrients in freshwaters, Nutrients in coastal waters, Non-treated urban waste water.*

51. The volume of *renewable freshwater resources* should be presented in absolute value (million of cubic meters). In addition, a map describing important national and international rivers and lakes, which represent considerable source of freshwater for a country, is recommended to be added.

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

53. *Household water use per capita* should be presented in respective units (cubic meters per capita per year or liters per capita per day). In addition, percentage of population served by public drinking water supply should be presented (at the national level and at the regional levels). If appropriate, map could be presented.

54. *Water losses* should be presented both in absolute value (the volume of water sent to the user by the water supplying company minus the volume obtained by the user) and in percentage (absolute value divided by the volume of water sent to the user by the water supplying company and multiplied by 100).

55. *Reuse and recycling of freshwater in manufacturing industries* should be presented in percentage for each relevant sub-sector of manufacturing industry.

56. *Drinking water quality* should be presented in the format of table which includes selected microbiological and chemical quality parameters measured, total number of samples, number of non-compliant samples and the percentage of non-compliant ones in each category. In addition, the same can be done at the territorial level for water supply zone or regional entity. If appropriate, map could be presented. Either national drinking water quality standards can be applied or a set of new ones can be developed (preferably based on the EU legislation – Directive 98/83/EC).

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

58. Optionally, comparison with international standards is recommended (e.g. EU limit values can be used). In the case, that classes of surface water quality are defined by national legislation, a map should be added presenting different classes of quality of major rivers in different colors. If available, the information on total national discharges of BOD and ammonia should be presented as supplementing information. Optionally, the information on the quality of surface waters in terms of insoluble substances or COD (chemical oxygen demand) could be presented as well. Optionally, the list of major water polluters (Top 5 or Top 10) could be presented in terms of BOD and ammonia (and COD, if the data available) together with their relative (in %) contribution to the national discharges of respective pollutants.

59. *Nutrients in freshwater* should be presented in the format of table which includes the semi-aggregated list of surveillance profiles (particular values for the most important ones and aggregated information for the resting ones) and respective annual average concentrations of nitrates and phosphorus compared with national water quality standards. In the form of note, hydrological importance of particular rivers, lakes and groundwater zones should be mentioned. Optionally, comparison with international standards could be presented (e.g. EU limit values can be used). In the case, that classes of water quality are defined by national legislation with respect to nutrients, a map should be added presenting different classes of quality of major rivers, lakes (and groundwater zones) in different colors.

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

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

Land

62. This group of indicators includes two core indicators: *Land uptake*, *Area affected by soil erosion*.

63. *Land uptake* should be presented both in absolute values (hectares or square kilometers) and as percentage in total national territory. In addition, important land use categories (transport infrastructure, urbanized areas, industrial zones, open air mines etc) should be presented in the same format. Map with major areas (especially transport infrastructure, which is important from the point of view of fragmentation) is recommended. If available, information on contaminated land or on “brown-fields”[•] could be presented.

• Brown-fields – abandoned areas of land which had been used for industrial, agricultural, building or other

64. *Areas affected by soil erosion* should be presented separately for water erosion and wind erosion, each type broken-down into four defined categories (light, moderate, strong and extreme). Data format is both absolute values (hectares or square kilometers) and percentage in total agriculture land. Maps are recommended to be added where particular categories are distinguished by different colors.

Biodiversity

65. This group of indicators includes four core indicators: *Protected areas*, *Forest and other wooded land*, *Threatened and protected species*, *Trends in abundance and distribution of protected species*.

66. Total area of *protected areas* should be presented both in absolute figures and in percentage of total country area accompanied by the table presenting the list of major protected areas (national parks and large protected landscape areas) together with aggregated data on minor protected areas. Notices about the level of protection should be added. Map should be presented to show where major protected areas are located. In the case of trans-boundary protected areas, this map should cover relevant neighboring countries as well.

67. Total area of *forests and other wooded lands* should be presented (both in absolute figures and in percentage of total country area) accompanied by the table presenting the portion of different types (e.g. narrow leaved, broad leaved, mixed, sub-tropical) of forests 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 table format. A map of the country should be added to show regional distribution of forests and other wooded land. Additional indicator on the use of forests (harvest/growth ratio) should be presented together with the data on salvage felling or exports of timber.

68. In the case of *threatened and protected species*, the total number of species living on the territory should be presented in the table format for the main categories: mammals, birds, fish, reptiles, amphibians, vascular plants. Percentage of protected and endangered species should be presented for the same main categories.

69. List of selected species should be presented in the table format together with the estimates of their number. Territorial distribution of selected species should be presented in map (maps).

Agriculture

70. This group of indicators includes two core indicators: *Fertilizer consumption*, *Pesticide consumption*.

71. The *consumption of fertilizers* should be presented both in aggregated form (total consumption) and broken-down according to basic nutrient components (N, K₂O, P₂O₅). In addition, the information on the consumption of calcium-based fertilizers could be presented.

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

activity which might have lead to their contamination or depletion.

Energy

73. This group of indicators includes four core indicators: *Final energy consumption*, *Total energy consumption*, *Total energy intensity*, *Renewable energy consumption*.

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

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

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

77. *Renewable energy consumption* should be presented both as the percentage 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, photo-voltaics, wave power, tidal power). If available, country's potential for renewable energy sources should be added (at least for hydropower and biomass).

Transport

78. This group of indicators includes five core indicators: *Passenger transport demand*, *Freight transport demand*, *Composition of road motor vehicle fleet by fuel type*, *Average age of road motor vehicle fleet*, *Road traffic accidents, mortality and injury rate*.

79. *Passenger transport demand* should be presented both in total and broken down by main modes of transport (individual car transport, municipal public transport, long-distance public road transport, railway transport, water transport and air transport). Besides the values in passenger-kilometers, the presentation of the values for individual car transport in vehicle-kilometers is recommended (which is important for calculation of air pollution, e.g. by PM₁₀ or PM_{2.5}). If available, prognosis (projection) of passenger transport demand should be added.

80. *Freight transport demand* should be presented both in total and broken down by main modes of transport (road transport, railway transport, water transport and air transport). Besides the values in ton-kilometers, the presentation of the values for road transport in vehicle-kilometers should be added (which is important for calculation of air pollution, e.g. by PM₁₀ or PM_{2.5}). If available, prognosis (projection) of freight transport demand should be added.

81. Information on *composition of road motor vehicle fleet by fuel type* should cover the following categories of road vehicles: passenger cars, light-duty cars, buses, heavy-duty vehicles (trucks), tractors (in agriculture and forestry). Information on respective consumption of gasoline and diesel fuel should be presented; in the case of gasoline broken down by type (leaded versus unleaded). If available, information on other types of fuel should be added (gas, bio-fuels) as well as that on electro-mobiles. Percentage of passenger and light duty cars equipped with catalyst should be presented. Brief information on national fuel quality standards is recommended (mainly regarding sulphur content in diesel fuel or lead content in gasoline).

82. *Average age of road motor vehicle fleet* should be presented separately for at least two major categories of vehicles - passenger cars and heavy-duty cars (trucks) in the table format, recognizing 4 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 respective UN ECE/EURO standards should be presented (both in absolute values and in percentage).

83. Number of *road traffic accidents* should be presented both in aggregated form and broken-down by “result” (deaths and injuries). Presentation of localities (highways, motorways) with the highest rate of accidents could be added.

Waste

84. This group of indicators includes four core indicators: *Waste generation, Trans-boundary movement of hazardous waste, Waste recycling, Final waste disposal*.

85. *Waste generation* should be described both in terms of total national waste generation and broken-down by major categories (industrial, hazardous, municipal). Besides the data in mass units, municipal waste generation should also be presented in terms of “per capita” while industrial and hazardous waste generation should be presented in relation to GDP. Industrial waste generation should be broken-down by main sub-sectors of industry (e.g. energy, mining industry, metallurgy, chemical industry, manufacturing industries etc.). Additional information on special categories of waste should be presented (e.g. production of radioactive waste, especially in the countries operating nuclear power stations – provided that such information is open).

86. *Trans-boundary movement of waste* should be presented separately for exports and imports. Both aggregated data and those broken-down by main categories of exported/imported wastes should be included. Export and import of wastes could also be broken down by red, amber and green lists. Additional information on the countries of origin of imported waste and countries of destination in the case of exported waste is recommended.

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

88. Information on *final waste disposal* – incineration or landfill on a controlled site - should be presented both in total and broken down by category (municipal, industrial and hazardous). Numbers, types and total nominal capacity of both waste incinerators and landfills should be presented supplemented by the map of locations. In addition, the presentation of other types of waste treatment and or disposal facilities (e.g. waste separation plants or waste biological treatment plants) is recommended.

(iii) Country-specific indicators

89. This group can include all other indicators which are considered relevant for the description of country’s environment (e.g. *carbon monoxide emissions, noise pollution, oil discharges into waters, status of glaciers, fishery related indicators, impact of natural disasters on population*, etc). If available, additional information on environmental policy response could be presented (e.g. *environmental investments* presented both in absolute terms and in relation to GDP or *number of*

companies certified under ISO 14 000). Formally, these additional indicators could be presented in the same way as the core environmental indicators.

D. International Comparison based on Indicators

90. Besides the international comparison presented for particular indicators in respective parts of the report (SWOT analyses prepared for each indicator), the summarized comparison should be given in this chapter.

91. International comparison should cover the whole set of core indicators (excluding those which are not relevant – e.g. *nutrients in coastal waters* in the case of inland countries or those where the data is not available) and should be presented in format of table, accompanied by brief assessment for which the semi-SWOT format is recommended (i.e. where the values of respective country's indicators are better or worse than those of comparable countries). Country specific indicators can be included into the international comparison.

92. Comparison with neighboring EECCA countries is mandatory, comparison with all EECCA countries 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. In the case of the comparison with the group of countries, the average based interpretation is recommended (i.e. the respective country is on average, better than average or worse than average).

E. System of Environmental Protection

93. In this chapter, all relevant additional information should be briefly presented 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, system of environmental monitoring, economic instruments applied, public participation in environmental decision-making, start of new major environmental projects and programs and progress in execution of existing ones, compliance with existing international commitments and adoption of new ones). As far as possible, policy response indicators should be used, which have been developed at the international level, in particular the indicators which are being used by the Task Force for the Implementation of Environmental Action Programme for Central and Eastern Europe, Caucasus and Central Asia for the assessment of progress in achieving the objectives set in the Environmental Strategy for EECCA countries.

F. Conclusions

94. Conclusions should be prepared in the form of executive summary to enable the reader to get sufficient information without studying all the details (this is especially important in the case that the report is to be approved and used by official decision-making bodies which are not the environmental experts but should know the real problems and especially risks and negative trends).

95. Major findings from particular SWOT analyses, prepared for each core environmental indicator, and from related specific recommendations, should be stated, especially: the most urgent environmental problems, negative trends, positive trends.

96. Table presentation of the whole group of core environmental indicators filled with suitable graphical symbols (like good, bad, attention, no future problems) is recommended strongly. Similar form of presentation is being used in many environmental reports.

97. In addition, certain policy recommendations should be presented how to solve urgent environmental problems, to support positive developments and to prevent negative developments. Limited number of priorities should be proposed (no more than five) as well as their order of importance (limited number of priorities is of utmost importance as too much of them leads to the loss of focus). Existing national environmental policy targets may be suggested to be revised or updated and the new ones can be proposed based on information presented in the report.

98. In addition, recommendations related to the improvement in preparation of indicator based environmental reports in coming years should be presented.

G. Annexes

99. Annexes to reports should include:

- References to specialized national environmental reports (e.g. water, air, climate change, biodiversity),
- References to existing national sectoral reports (e.g. energy, transport, industry, agriculture, forestry, fishery),
- References to territorial, municipal and sectoral environmental reports,
- References to relevant national and international institutions,
- List of international environmental conventions and protocols the respective country is a Party to (preferably in the form of table including the dates of signature and ratification).

100. Any other relevant references can be presented (e.g. policies, strategies, legislation etc.).

IV. Recommendations for preparation of reports at territorial level

101. In general, regional (sub-national) environmental reports could be prepared in a structure similar to that presented above for the national level with modifications described below.

102. As a first step, the selection of core environmental indicators should be made which are able to describe the environmental problems of given territory in the best achievable way. Environmental indicators which are being used at territorial level should be more concrete to enable the assessment of the environmental status of particular regions, cities, districts and objects which represent considerable environmental risk. Regular and systematic assessment of environmental indicators at territorial level should be in place 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 survey in the regions (districts, municipalities).

103. While preparing territorial environmental reports, attention should be paid to the specific issues characteristic for environmental, economic and social developments of given territory. It is recommended to use such environmental indicators which could help to solve environmental problems and which would support the rational use of natural resources and the implementation of complex development plans for given territory.

104. It is recommended to territorial authorities to stimulate the major polluters to carry out regular self-monitoring of their emissions, discharges and wastes and to check their compliance with environmental standards and other legal requirements at a periodical basis.

105. It is recommended to invite major polluters to participate in preparation of environmental reports through utilization of their reporting documents, outputs of inspections and other relevant information available.

106. Preparation of territorial (municipal) reports should be carried out in close co-operation 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

EXAMPLE: DESCRIPTION OF AN INDICATOR

This indicator has been developed for the Czech Republic

Notes and recommendations are presented 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 and Purpose of the Indicator:

3 – 5 rows describing how the indicator is constructed, “what does it say” and whether (how) is it related to other indicators within 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 is in causal relation with the impact indicator “Air quality in urban areas”.

Value (values) of indicator “Emissions of pollutants into the atmospheric air” are presented in Table 1:

Table 1: The development of national emissions of basic pollutants in the Czech Republic in the period 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:

Number of columns is given by the availability of time series data.

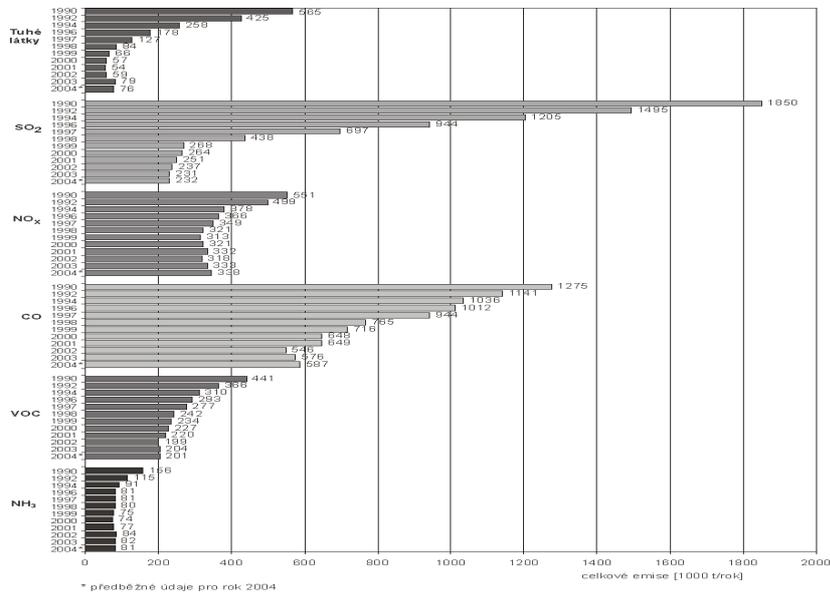
Indicator values for the years before 1990 are not recommended to be presented in general.

In the case of indicators, which are presented in one form only (e.g. in %), the second and third groups of rows in the table are not applied. In the case of indicators, which are presented in several forms (e.g. absolute value, value per

capita, value per square km or value per unit of GDP), the second and following groups of rows should be applied. In the case of indicators, which are presented in semi-aggregated form, the respective values (both aggregates and important single values) should be presented in particular rows.

Diagram or map, presenting the indicator values in Table 1 (examples).

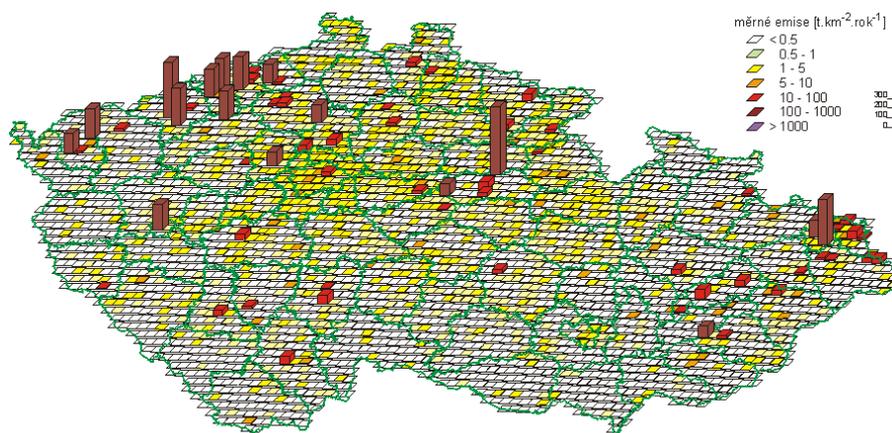
Figure: Total national emissions of major pollutants in the Czech Republic in 1990 – 2004



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

OR

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



Emisní hustoty oxidu siřičitého ze čtverců 5x5 km, 2003

Note:

Choice between diagram or map is given by the character of the indicator (see specific recommendations). In the case of indicators, which may be influenced by the economic development, a separate curve representing the development of GDP should be added to enable the assessment of decoupling.

National / international target:

Description of national / international target should be presented (if accepted by the country), including the value and related deadline. In the case that the national / international target does not exist in a numerical shape, a brief description of relevant policy goal 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.

Projection of the expected development of indicator values as well as the targets are presented in Table 2:

Table 2: The projection of the Czech Republic's national emissions of dust, sulphur dioxide and nitrogen oxides for the period till 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:

Number of columns is given by the availability of time series data.

In the second column, the latest known real value of the indicator should be presented.

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

In the case that numerical projection is not available, Table 2 should be replaced by the expert opinion on the expected development of the indicator value.

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

Note:

Choice between diagram or map is given by the character of the indicator (see specific recommendations. In the case of indicators, which may be influenced by the economic development, a separate curve representing the projection of the development of GDP should be added to enable the assessment of decoupling.

In the case that numeric projection of the indicator is not available, map or diagram is not presented.

Additional information (Explanatory paragraph):

Data or information as recommended in indicator specific recommendations should be presented, which may lead to better understanding of problem.

The Czech Republic is a party to the Convention on Long-range Trans-boundary Air Pollution and its 8 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 is being supported through national and regional emission reduction programs, which set concrete targets.

At present the energy sector (power stations, large heating stations) 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

Strong Points	Weak Points
<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 national economy accompanied by active emission reduction measures). After 2000, the annual emission values are more or less stabilized. Decoupling from the economic growth is in place. Present emissions of sulphur dioxide are fairly below the target while in the case of nitrogen oxides the emissions are at its level. The actual dust emissions are slightly above the expected 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>Regardless the substantial decrease in dust emissions, country still suffers from considerable exceedance of air quality limit values for PM₁₀ (see indicator Air quality in urban areas).</p> <p>Per capita as well as per km² emission values are higher than the EU-15 average in the case of both sulphur dioxide and nitrogen oxides.</p>
Positive Expectations	Negative Expectations (risks)
<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 till 2010. National emission ceiling will be complied with very high probability in the case of sulphur dioxide and with certain probability in the case of nitrogen oxides.</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>Risk of non-compliance with the national emission ceiling for nitrogen oxides is still high (reserve is 3.5 % only). In the case of dust, the expected reduction of emissions by 4 % till 2010 will most probably not be sufficient to solve the problem with PM₁₀ or to achieve the proposed national target.</p>

Recommendations

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

References

References on 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 recommended to obtain the information, necessary 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 abundance and distribution of selected species
- waste generation
- waste 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 in manufacturing industry

Competent authorities in the field of hydro-meteorology and monitoring

Indicators:

- air quality in urban areas
- BOD and concentration of ammonium in rivers
- nutrients in freshwaters
- 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
- non-treated urban waste waters
- 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:

- area affected by soil erosion
- fertilizer consumption
- pesticide consumption

Competent authorities in the field of energy

Indicators:

- final energy consumption
- total energy consumption
- total 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
- road traffic accidents, mortality and injury rate

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