



ECONOMIC COMMISSION FOR EUROPE

COMMITTEE ON ENVIRONMENTAL POLICY

Ad Hoc Working Group on Environmental Monitoring

(Second session, 28 February-1 March 2002)

(Item 3 (d) of the provisional agenda)

METHODOLOGY FOR INDICATORS IN THE KIEV REPORT

Submitted by the European Environment Agency (EEA)¹

1. The Aarhus Ministerial Conference requested EEA to prepare for its next meeting an indicator-based report on progress in environmental performance in Europe. The Ministers asked explicitly for a report based on indicators, which can be translated as a wish for more condensed information than in traditional state-of-the-environment reports. This paper explores the characteristics of indicators and indicator-based reporting. It should be considered in conjunction with the table of contents for the Kiev report (CEP/AC.10/2001/5) that presents the indicators themselves.
2. The paper is intended to facilitate the discussion by the Working Group of the development of sets of (headline) indicators for use in national environmental reporting, especially in countries in transition.

I. THE ROLE OF INDICATORS IN THE POLICY PROCESS

3. An environmental indicator is a piece of numerical information describing the state of the environment and its impact on human beings, ecosystems and materials, the pressures on the environment, the driving forces and the responses steering that system. A thorough selection process precedes the identification of an indicator to enable it to be effective in plotting progress, and in inviting the users to react on what is shown. Indicators generally show progress over time,

they need to be repeated regularly and must always be accompanied by an assessment of the

¹ This document was not formally edited.

reasons of any change. Principally an indicator is “normative”, that means it can be compared with a target or reference value.

4. Indicators can play an important role within the policy preparation and the evaluation stages of the policy cycle (Figure 1). It is these stages that the EEA aims to support EU policies with its two major regular reports: a five-year state and outlook report (see EEA, 1999, which served the appraisal of the 5th and *preparation* of the 6th Environmental Action Programme); and the regular Environmental signals indicators report series (EEA, 2000, 2001), serving the regular *evaluation* of the policies set out in the Action programme.

5. The previous reports produced under the “Environment for Europe” process (EEA, 1995; EEA 1998) can also be seen as inputs into policy *preparation*. These reports have played a role in agenda setting in European environmental policy making. With the Kiev report the policy *evaluation* aspect becomes relatively more important.

6. The reports and indicators however serve not only the main policy makers but also other actors in the policy process which help to bring along changes: informed citizens, NGOs, companies, and lower levels of governments.

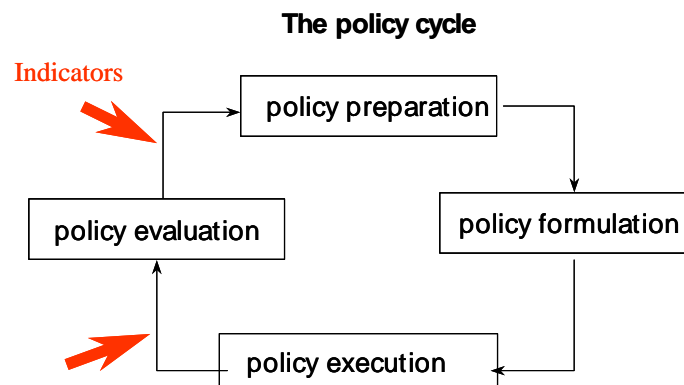


Figure 1: Indicators and the policy cycle

7. To properly support the policy process, EEA pays much attention to the proper link of indicators to the policy processes they serve. That means that before the selection of indicators takes place, an analysis of the main current policy issues and policy questions is carried out.

II. LINKING INDICATORS TO THE POLICY PROCESS

8. Apart from those background indicators that never have been designed to be policy relevant, the most influential indicators are those that are fully integrated in the policy process. The emission of greenhouse gases and the distance to the targets of the Kyoto protocol has in many countries led to a redirection of current policies, a reformulation of national targets and their regular publication in the newspapers. There are a number of similar examples on European and national scale, such as the recycling of packaging waste, the amount of animal manure in areas with severe eutrophication problems, and fish stocks. Indicators that are poorly designed with regard to the link with policies have seldom received that much attention.

9. Experience with indicators over the past years also allow for the identification of a number of other success factors related to the use of indicators. These include:

- (a) To be effective, indicators should report progress over time and should be accompanied with an assessment of the reasons explaining their development;
- (b) They should be few in number, and users should get used to their presentation;
- (c) They become more powerful when linked with formal targets or informal or indicative (sustainable) reference values. Linked with targets, indicators become tools for management and to make policy makers accountable;
- (d) With or without targets, using indicators to compare or benchmark individual sectors or companies with each other is another way to make decision makers accountable and to foster progress as both failure and success stories become evident. The question why one sector/country/company is doing better than another is a good entrance to explore still unknown opportunities to do better. At the same time exposing this kind of information to the outside world can lead to “peer pressure” to do better (e.g. the so-called “name and fame” or “name and shame” exercises).

III. THE SELECTION OF INDICATORS

10. During the phase of selecting and developing indicators, a number of tools can be applied to ensure that the resulting set of indicators is most effective in communicating its messages. Frameworks and typologies may also help in bringing a balance in indicators sets. The following paragraphs highlight some tools that have been applied by EEA.

A. Typology of questions and indicators

11. Using a typology of questions and indicators helps in choosing indicators so that they are most relevant for the user.

	TYPE OF QUESTION	TYPE OF INDICATOR
1	How are pressures on the environment and how is the quality of the environment developing?	Descriptive indicator
2	And is that relevant?	Performance indicator
3	Have we become more efficient in our economic processes?	Eco-efficiency indicator
4	What has been the effect of policies?	Policy-effectiveness indicator
5	Are we on the whole better off?	Welfare indicators

12. A first category of indicators answers the question: “How are pressures on the environment and how is the quality of the environment developing?” These are called *Descriptive indicators*, and are usually presented as a line diagram showing the development of a variable over time, for example “cadmium contents in blue mussels”, or “the number of indigenous species in biogeographical regions”.

13. A second category of indicators answers the follow-up question: “and is that relevant?”. These are *Performance indicators*. Generally these indicators use the same variables as descriptive indicators but are connected with target values. “The number of days in which ozone

levels are exceeding WHO standards” is clearly an example of a performance indicator. The “designation of Natura 2000 sites compared with an estimate of important natural areas or an area target per country” is also a performance indicator, as are the indicators linked to targets of international conventions or national action plans (see Figure 3).

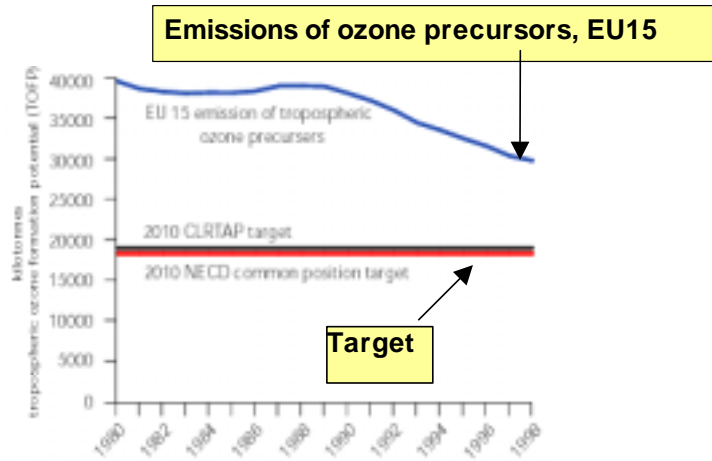


Figure 2. Example of a performance indicator: emissions of ozone precursors, EU15

14. The third category is *Eco-efficiency indicators*. These answer the question “have we become more efficient in our economic processes?” (see Figure 4). It is our experience that it is more understandable to present eco-efficiency indicators as separate lines for the development of an (economic) activity (upper two lines) and for environmental pressures (lower lines), instead of presenting a ratio between them. In the ideal case the lines will after a period of parallel development go in different directions: this represents an (absolute) decoupling of environmental pressure from economic development, which is necessary for sustainable development.

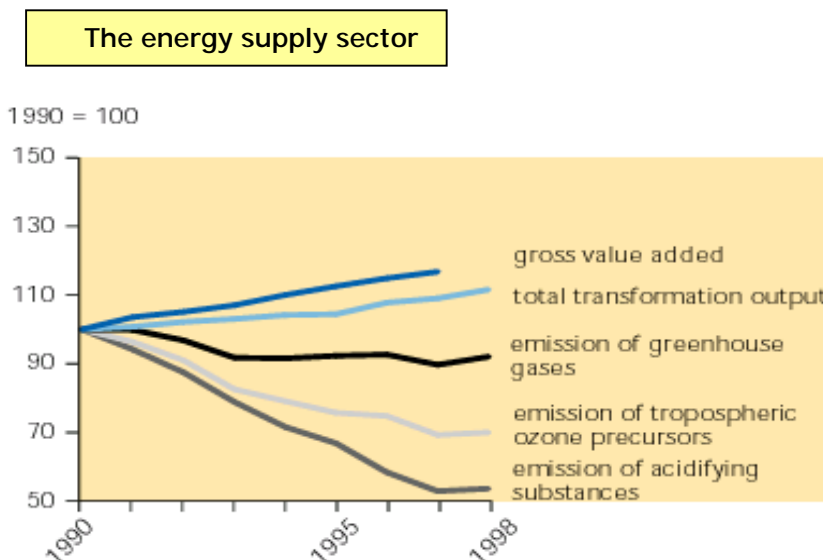


Figure 3. Example of an eco-efficiency indicator: the energy supply sector, EU15

15. *Eco-efficiency indicators* have proven to be useful communication tools: a “two per cent eco-efficiency improvement in a given year” is relatively familiar language, whatever the economic structure of a country or whatever business sector being considered. They give a clear

incentive to continually improve performance.

16. To answer the question “what has been the effect of policy?” a new and fourth category of indicators has been developed: *policy-effectiveness indicators* (Figure 5). Policy effectiveness indicators show the results of the analysis why an indicator is developing in a certain direction. This kind of indicator makes clear what have been the influence of structural changes in the economy or in production processes, and of (environmental) decision-making. The Dutch yearly environmental indicator report (RIVM, 2000) contains several examples of this type of indicator.

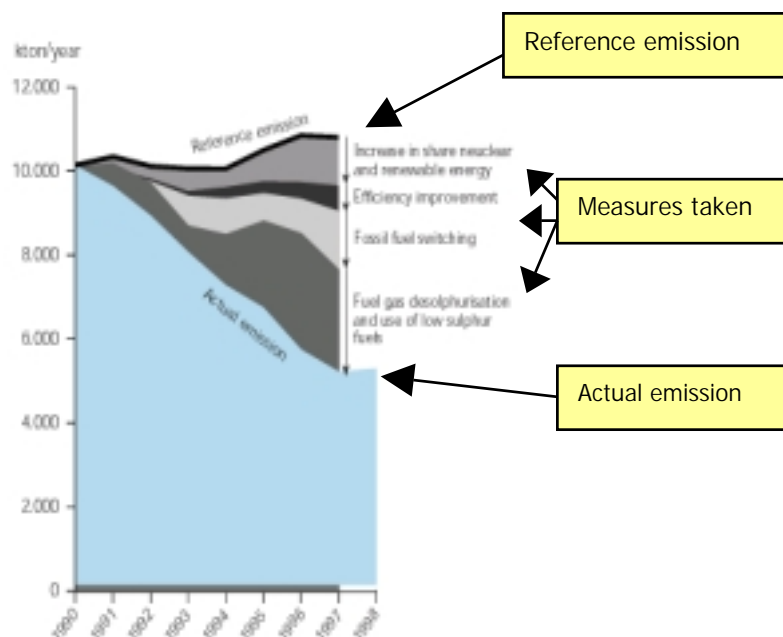


Figure 4. Example of a policy effectiveness indicator: sulphur dioxide emissions by conventional power plants, EU15

17. Finally a fifth category of indicators (*welfare* indicators) is connected with the question: “and are we on the whole better off?” which asks for a balance between economic, social and environmental progress. Indicators like Genuine Savings, and ‘green’ GDP try to answer this question.

18. Thinking in terms of questions to be answered, and trying to identify the proper questions for solving problems helps in identifying the most suitable indicators. Systematizing these questions helps in getting a balance in indicator sets.

B. The assessment framework and the role of indicators in the policy life cycle.

19. Another important element to structure a collection of indicators and to communicate

their application is the analytical framework for the assessment. EEA uses a slightly extended model of the well known OECD-model, which is called the **Driving forces - Pressures - State - Impact - Responses (DPSIR)** framework (Figure 6).

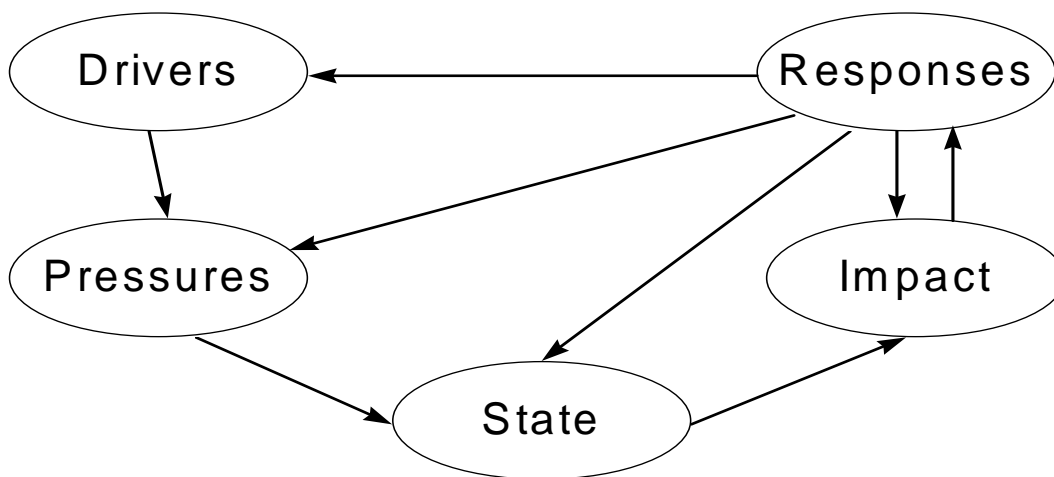


Figure 5. The DPSIR Framework for Reporting on Environmental Issues

20. This extended framework is used because it allows a distinction to be made between the *driving force* (such as the development of industry or the number of vehicle kilometres of passenger cars) and the *pressures* (such as the emission of carbon dioxide by passenger cars). The *state* of the environment is expressed in quality parameters for air, water and soil. *Impact* is a more difficult concept: it stands for the effects of a changed environment on the health of human beings and other organisms and on the effects on nature and biodiversity. It can also relate to economic impacts. To close the loop, all these impacts give rise to *responses* of society.

21. Sometimes indicators can be placed on the links between the DPSIR elements or consist of combinations of them. Eco-efficiency indicators such as “emission coefficients” and “energy productivity” (or its inverse “energy intensity”) show what happens between the driving forces and pressures: in other words they are indicators, or measures, of the processes which act to turn a driving force into a pressure, something which is often dependent on behaviour or the type of technology used. This kind of information allows questions such as “Are we making technological progress?” possible to be answered. The combination in one diagram of the pressure (“release of nutrients from agriculture”) and the state (“development of nitrate concentration in surface waters”) tells a story of time delay in natural processes and the “time bombs” created in the environment. Policy effectiveness indicators summarize the relations between the response and the driving force or pressure.

22. When designing indicator lists, conscious use should be made of the frameworks mentioned here and of the position of the problem under consideration in the policy life cycle (Winsemius, 1986). For problems that are at the beginning of their policy life cycle – that is in the stage of problem identification – indicators on the *state* of the environment and on *impacts* play a major role. They will be mainly descriptive indicators, which identify alarming developments in the state of the environment. The most well known cases of *state* indicators that gave rise to policy reactions are those on the sudden decline of selected species (fish in acidified Scandinavian lakes, seals in the Dutch Waddensea, for instance), surface water quality (salt in

the river Rhine which was used for irrigation in horticulture, for example) and on air quality in cities (summer smog in Paris, Athens). This function of 'state'-indicators is thus limited in time: as soon as a problem is politically accepted and measures are being designed, the attention shifts to *pressure* and *driving force* indicators.

23. There is, however, a long period in which "*state*" indicators support the process of getting political acceptance of policy responses. Greenhouse gas policies provide clear examples where indicators on climate change and its impacts in terms of average temperatures, movement of the tree line, or species distribution are being used to gather and to maintain political support for signing the Kyoto protocol.

24. In the next and longer stages of the policy cycle (formulation of policy responses, implementation of measures and control) policymakers focus on what they can influence. In these stages, performance indicators on changes in *driving forces* and *pressures* are the most used, e.g.: the *driving forces* through measures controlling "volume", and the *pressures* with technical measures and educational projects. The state of the environment is only a derived result of activities in society and policy reactions and hence *state* indicators are of lesser importance here. The exception is, of course, management of biodiversity as such or when organisms play a role in the solution of environmental problems. In these situations indicators such as biomass production, forests as carbon dioxide sinks and forest composition are important measures of progress.

25. *Eco-efficiency* and *policy effectiveness* indicators, as well as *response* indicators, are used to get a wide acceptance of measures and as tools to reach the objectives with the support of all stakeholders.

26. In the last, control phase of the policy cycle, *state* indicators become important again to monitor the recovery of the environment and a limited number of these indicators will be used to continuously monitor the state of the environment. They will be accompanied by an equally limited number of indicators on *driving forces*, *pressures* and *responses* to monitor the behaviour of the whole system.

C. The development of EEA indicator sets

27. For its main stakeholders in the European Union EEA is developing indicator sets to follow progress in the new 6th Environmental Action Programme (CEC, 2001) (see box 1). These indicator lists and the indicators themselves will be published by EEA gradually during 2002.

Themes	Status of EEA developments	Remarks
Climate change	Emission indicators final	
	Climate indicators planned under 2002 work programme	
Nature and biodiversity	Under development in co-operation with DG Environment	
Accidents and disasters	No activities planned yet	
Soil protection	List under development	
Marine ecosystems	List under development with marine conventions	
Environment and health and the quality of life		Co-operation with WHO on definition and development of indicators on human health and environment
Air pollution	List under development	
Water quality	List under development	
Chemicals and pesticides	Headline indicator development by Eurostat	
Noise	No activities planned	
Urban environment		Support to indicator initiatives in co-operation with DG Environment
Natural resources and waste	List under development	

28. For use in reports to high-level policy makers, a selection has been made of hundreds of indicators for environmental issues, resulting in eleven EU Environmental Headline Indicators (Box 2) (EEA, 2001). A first report is expected to be published soon by the European Commission together with EEA and Eurostat.

Environmental headline indicators for the EU (status January 2001)		
ISSUE	CURRENT INDICATORS	PROPOSALS FOR "IDEAL" INDICATORS
6th Environmental Action Programme theme: Climate change		
1. Climate Change	aggregated emissions of 3 main greenhouse gases	aggregated emissions of 6 greenhouse gases of the Kyoto Protocol
6th Environmental Action Programme theme: Nature & biodiversity		
2. Nature & Biodiversity	designated "Special Protection Areas" (Birds Directive)	biodiversity index, or conservation status of key species and habitats
3. Air Quality: acidification	aggregated emissions of acidifying substances	Same
6th Environmental Action Programme theme: Environment & human health		
4. Air Quality: summer smog	aggregated emissions of ozone precursor substances	same, and: number of days of pollution exceeding standards
5. Urban Air Quality	number of days of exceedance (several pollutants)	urban air quality indicators or index; urban transport indicators
6. Water Quality	phosphate and nitrate concentration in large rivers	European index for the status of water bodies
7. Chemicals	production of hazardous chemicals	production of hazardous chemicals, weighted
6th Environmental Action Programme theme: Waste & resources		
8. Waste	municipal and hazardous waste generated & landfilled	resource use in line with the waste strategy
9. Resource Use	gross inland energy consumption	material balance indicator
10. Water Quantity	total fresh water abstraction	intensity of water use
11. Land Use	land use by selected categories	land use change matrix

29. Regular reporting mechanisms based on indicators, have been requested by various EU Councils of Ministers, to support strategies for integrating environment in sectoral policies. Following on the example of the successful Transport and Environment Reporting Mechanism, the EEA is developing with its partners similar indicator based reporting on environment and energy and environment and agriculture. If resources are available, such reporting will also be developed for tourism and fisheries; preparatory work is already underway. Similar to the 'environmental headline indicators' a limited set of main indicators can be selected from the 30 or so currently available integration indicators per sector.

IV. THE INDICATORS PROPOSED FOR THE KIEV REPORT

30. For the selection of indicators for the Kiev report a restricted version of the procedure described above has been applied. Storylines were designed, indicators were selected (but largely based on data availability) and a limited stakeholder consultation has been organized. Although the set of indicators has been selected specifically for this report, it includes a large number of indicators that also fit into other policy processes. The indicators on climate change, air pollution, urban air quality, water and waste selected for the EU headline indicators, for example, also appear in the Kiev report.

31. The Working Group may wish to consider possibilities to derive from the Kiev indicators (and maybe other indicator proposals) a core set of indicators for individual countries and specific country groupings. Reaching full acceptance and country support for these indicators requires, however, a process of stakeholder involvement during its development.

References

CEC, 2001. Environment 2010: Our Future, Our Choice. The Sixth Environment Action Programme. Communication from the Commission to the council, the European Parliament, The Economic and Social Committee and the Committee of the Regions. COM(2001)31 Final.

EEA, 1995. Europe's Environment: the Dobbris Assessment. European Environment Agency. Copenhagen.

EEA, 1995. Europe's Environment, the Second Assessment. European Environment Agency. Copenhagen.

EEA, 1999. Environment in the European Union at the turn of the century. Environmental Assessment report nr 2. European Environment Agency. Copenhagen.

EEA, 2000. Environmental signals 2000. Environmental Assessment report nr 6. European Environment Agency. Copenhagen.

EEA, 2001. Environmental signals 2001. Environmental Assessment report nr 8. European Environment Agency. Copenhagen.

EEA, 2001b. Guidelines for the Data Collection of the Kiev report. Technical report no. 66. European Environment Agency. Copenhagen. (<http://www.unece.org/env/europe/meeting1.htm#First>)

RIVM, 2000. Milieubalans 2000. Het Nederlandse milieu verklaard. [Environmental balance 2000, The Dutch environment explained]. Rijksinstituut voor Volksgezondheid en Milieu/Samson bv, Alphen aan den Rijn.

Winsemius, 1986. Gast in eigen huis, beschouwingen over milieumanagement. [Guest at home, reflections on environmental management]. Samson H.D. Tjeenk Willink, Alphen aan den Rijn.