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APPLICATION OF THE CORE SET OF ENVIRONMENTAL INDICATORS FOR THE COUNTRIES OF EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA[1]

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INTRODUCTION

At the "Environment for Europe" Pan-European Conference of Environment Ministers held in Kiev, Ukraine, in May 2003, the ministers adopted the Guidelines for Developing the State Reports on the State and Protection of the Environment, elaborated by the UNECE Working Group on Environmental Monitoring and Assessment (WGEMA).

As a follow-up to the decisions taken at the Kiev Ministerial Conference, a workshop was organized by WGEMA on June 27-28, 2003 in the suburbs of St. Petersburg, focusing environmental indicators for the countries of Eastern Europe, the Caucasus and Central Asia (EECCA). At the meeting, representatives of EECCA countries selected by expert (inquiry) method the 118 most appropriate indicators for an EECCA core set, relevant to the following priority fields concerning environment, environmental policy and economic sectors:

1. Atmosphere 2. Climate change 3. Waste 4. Water 5. Biodiversity 6. Land resources and soils	I. Agriculture II. Energy III. Transport

This paper attempts to demonstrate how work on application of the indicators selected should be continued, in order to introduce them in EECCA countries in the regular practice of preparing information on the state of the environment and presenting this information to officials responsible for decision-making and to the broad public.

The methodology of the Commission on Sustainable Development (CSD) of the United Nations, presented in the publication *Indicators of Sustainable Development: Guidelines and Methodologies* (September 2001, New York), was used in developing this document. The CSD publication presents 19 environmental indicators. For each, the following elements are described: title, short definition, measuring units, objectives, relation to sustainable/unsustainable development, reference to the international conventions and agreements in which this indicator is cited, recommended norms/standards, connection with other indicators, measuring methods, limiting factors, national and international results and sources, reference information, agencies and organizations dealing with indicator development, references to available publications.

The current paper describes in detail 10 selected indicators from the EECCA core set, representing priority environmental aspects, environmental policy fields and economic sectors agreed upon at the meeting in St. Petersburg.

The 10 indicators are the following:

Environmental aspect or policy field	Code, sub-code EAOC	Indicator
1. Atmosphere – pollution	APE 10a new	Emissions of selected heavy metals (mercury, lead, cadmium) – total and per sector
2. Atmosphere – pollution	APQ 11a rev	Exceedance days of SO_2 target in urban areas with regular observations
3. Climate change	CC5b	GHG emissions of key source sectors (energy, transport, industry, agriculture, waste)
4. Water	WQ6 rev	Share of reused water
5. Land resources and soils	TES1b rev	Proportion of agricultural land under risk of wind erosion and water scouring
6. Biodiversity	BDIV2g rev	Trends of fauna species groups (carnivores, predators, species of economic interest)
7. Wastes	WMF15	Waste recovery
8. Wastes	WMF21a	Waste treatment capacity
9. Energy	EE27	Share of renewable electricity in gross electricity consumption
10. Transportation	TERM1 rev	Transport final energy consumption by mode

The following outline is used for the presentation of indicator methodology:

- definition/description;
- unit of measurement;
- policy relevance;
- monitoring requirements;
- calculation methods;
- national and international standards and requirements;
- practice in EECCA countries (using the Russian Federation as an example);
- difficulties in application in EECCA countries and avenues for resolution;
- references.

The description of indicators is based on existing practice in the Russian Federation. Despite the fact that similar practices are followed in many other EECCA countries, the guidelines should be applied with due regard for each country's specific situation.

DESCRIPTION OF SELECTED INDICATORS FROM THE CORE SET

Indicator 1. Atmosphere – pollution.
Emission of selected heavy metals (mercury, lead, cadmium): total and per sector

Description

These indicators characterize the amount of mercury (Hg), lead (Pb), cadmium (Cd) inputs into the atmosphere from stationary sources emissions of exhaust gases, per time unit: as a rule, per year.

Unit of measurement

The measurement units for these indicators are tonnes per year (for lead and cadmium) and kilograms per year (for mercury).

Policy relevance

These indicators can be presented in terms of total emissions of mercury, lead and cadmium for the country, per region, or per urban area, or in terms of the emissions of these substances per sector of economy (energy, metallurgy, chemicals, etc.). Moreover, these indicators may be used to present the share of specific, large industrial centers in the atmosphere pollution.

In urban areas where measurements are made regularly of ambient mercury, lead and cadmium concentrations in the atmosphere, through the consideration of their toxicity it is possible to trace their impact on the health of inhabitants.

Dynamics of changes in emissions of mercury, lead and cadmium by economic sectors over long periods can record the level of development in production patterns, technological processes, and atmosphere protection measures implemented at the enterprises that constitute these sectors.

On the basis of this data, authorities responsible for decision-making should adjust environmental policy, for example by reviewing and upgrading norms/standards in order to modify maximum allowable emissions or temporary agreed emissions levels of pollutants in the atmosphere. The population should have access to available information on the state of the problem and ways to resolve it.

Monitoring requirements

Significant measurement and calculation data for this indicator are available in the statistical reporting forms completed by enterprises.

Calculation methods

The indicator can be measured by instrumental methods and can be calculated (1). It is calculated on the basis of reporting by enterprises and organizations with stationary sources that emit mercury, lead and cadmium into the atmosphere, whether or not they are equipped with abatement facilities.

Estimation of emissions by automotive transport (mainly lead and its compounds) is made using calculation methods. Data on the total number of vehicles of different categories (2) and on fuel consumption by transport in urban conditions (3) is used in calculation.

National and international standards and requirements

Use of the indicator of mercury, lead and cadmium emissions (and indicators of other heavy metals emissions, similarly measured or calculated) shows the amount of these substances entering the atmosphere at the level of urban areas, regions and the country. This information provides the basis for the calculation of transboundary movements of these substances between countries, regulated under the UNECE Convention on the Long-Range Transboundary Air Pollution, as well as their deposition on land and on water bodies.

Practice in the Russian Federation

Reporting by enterprises is analyzed and processed at the regional and national level. In the Russian Federation, data processing is performed on the basis of annual state statistics reporting sheets (2TP-Air), requested by the State Statistics Committee of the Russian Federation.

Information on mercury, lead and cadmium emissions in the atmosphere of the whole country and/or some urban areas, and per economic sector, is presented in annual publications on air pollutants emissions (4).

Difficulties in application in EECCA countries and avenues for resolution

It seems possible to use in this indicator the near future, taking into consideration the fact that in most EECCA countries data on air pollution emissions is obtained in the form of the state statistics reporting sheets, 2TP-Air.

References

1. NII Atmosphere. State Committee for the Environment Protection of the Russian Federation (Goscomecologia Russia). A List of methodological documents for the calculation of air pollutant emissions, valid in 1997. St. Petersburg. 1997.
2. Hydrometeoizdat. Methodological instructions for the calculation of harmful substances emissions by automobile transport. Moscow. 1985. 22 p.
3. Hydrometeoizdat. Guidelines for atmosphere pollution control. L. 1979. 448 p.
4. NII Atmosphere. Annual publications on air pollutants emissions in the cities and regions of the Russian Federation for the years 1996, 1997, 1998, 1999, 2000, 2001, St Petersburg.

Indicator 2. ***Atmosphere – pollution.***
Exceedance days of SO_2 target*
in urban areas with regular observations

Description

The indicator presents the number of days with levels of SO_2 concentrations in the air exceeding the standards, for the urban areas with regular measurements of this pollutant.

Unit of Measurement

The unit of measurement for this indicator is the number of days in a fixed period of time (a week, a month, a year) with a value of SO_2 exceeding the standard.

Policy relevance

Exceedance of maximum allowable concentrations (MAC) of SO_2 in the atmosphere identifies in the first place an impact of this pollutant on the health of the population living in the urban area. The indicator defines duration of this impact, allowing a determination of the population's exposure to the harmful impact and of the correlation between air pollution and health problems.

On the basis of data on SO_2 values exceeding MAC in urban areas, the authorities responsible for decision-making can apply appropriate measures and sanctions to entities violating the law on air protection, regulate emissions by industrial enterprises under unfavorable weather conditions in order to limit harmful pollutants in the atmosphere, warn the population of unfavorable conditions and implement appropriate preventive measures.

Monitoring requirements

The data for calculating the indicator are obtained from regular observations at the stationary posts located in urban areas, with separate sampling 3-4 times a day (1). As a rule, in each urban area there are several stations sited considering local pollution sources, specific weather conditions and other factors.

The final result for the indicator is the calculation of number of days with values exceeding the maximum single or daily average MAC level of air pollution for a fixed period of time (a week, a month, a year, etc.).

* The description and use of this indicator is applicable also to the following indicators:
- atmosphere – pollution, APQ 11b rev, Exceedance days of NO2 target in urban areas with regular observations;
- atmosphere – pollution, APQ 11c rev Exceedance days of PM10 target in urban areas with regular observations;
- atmosphere – pollution, APQ 11e rev Exceedance days of CO target in urban areas with regular observations.

Calculation methods

In its initial stage, the indicator is measurable: i.e., SO_2 concentrations are defined by photometric methods based on SO_2 reaction with pararosaniline. In the process of defining SO_2 concentration in the range of 0,05-1 mg/m^3 an aggregate error is 12-25%. Another method to define SO_2 concentrations is based on sampling with solid sorbents and further processing by an absorbing solution (1).

National and international standards and requirements

The health-based MAC for SO_2 in urban areas is the established standard for SO_2 concentrations in the atmosphere.

It is necessary to keep in mind that in the Russian Federation, as in the former USSR, two types of MAC are valid for SO_2: the single daily maximum, 0.5 mg/m^3; and the daily average, 0.05 mg/m^3. Thus, the exceedance of SO_2 targets in urban areas can be calculated according to these two standards.

Practice in the Russian Federation

Information on the number of days that SO_2 has exceeded targets in urban areas is published in the annual volumes on air pollution in the towns of the Russian Federation (2), in the reviews of the environment pollution in the Russian Federation (3), and in the annual national reports on the state and protection of the environment in the Russian Federation (4).

Difficulties in application in EECCA countries and avenues for resolution

For the EECCA countries, the indicator describing SO_2 exceedance is not new, as the above-mentioned air pollution monitoring system in urban areas was introduced in 1970 and 1980s in all republics of the former USSR. The underlying data were included in all standard observation programmes, which specified mandatory measurement of SO_2, NO_x, CO and particulate concentrations in the air. Thus, this indicator can be used in those EECCA countries where the monitoring system is still in operation.

References

1. Hydrometeoizdat. Guidelines on atmospheric pollution monitoring. RD 52.04.186-89. Moscow. 2001. 693 p.
2. Hydrometeoizdat. Annual publications on the state of the atmosphere pollution in urban areas in the Russian Federation for the years 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001. St. Petersburg.
3. Hydrometeoizdat. Reviews of environment pollution in the Russian Federation for the years 1997, 1998, 1999, 2000, 2001. Moscow.
4. The State Ecological Center (Gosecocenter). Annual state reports on the state and protection of the environment in the Russian Federation for the years 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.

Indicator 3. **Climate change.**
GHG emissions of key source sectors
energy, transport, industry, agriculture, waste)

Description

This indicator includes the following greenhouse gases included in Annex A to the Kyoto Protocol (1) of the United Nations Framework Convention on Climate Change (2):

- carbon dioxide (CO_2);
- methane (CH_4);
- nitrous oxide (N_2O);
- hydrofluorocarbons (HFCs);
- perfluorocarbons (PFCs); and
- sulphur hexafluoride (SF_6).

Unit of measurement

Emissions of greenhouse gases are measured in thousand tonnes per time unit (per year, as a rule).

Policy relevance

The most important conditions for the implementation of commitments under the United Nations Framework Convention on Climate Change and the Kyoto Protocol are the preparation of national inventories and the establishment of a monitoring system for anthropogenic emissions of greenhouse gases. This system should meet international requirements and provide data for reports on emissions levels.

Monitoring requirements

Annual reporting on greenhouse gas emissions needs to be introduced in enterprises and organizations on a permanent basis.

Calculation methods

International inventory methodologies for greenhouse gas emissions (3) do not require direct measurements of emissions at source. Data is calculated according to the following general scheme:

(emissions) = (data on some activity, e.g., fuel consumption)
x (calculation coefficients).

The methods offer specific numerical values for calculation coefficients related to each type of activity.

These methods call for the collection and presentation of data on emissions of the following main sectors:

- energy;

- industrial processes;
- solvents use;
- agriculture;
- land-use change and forestry;
- wastes.

Establishing a monitoring system for greenhouse gases emissions and preparing the inventory is a long and complicated process.

A calculation of emissions from fuel consumption is given below as an example:
Calculation is performed as follows:

a) on the basis of data on the total consumption of different fuel types – *the basic approach*; and
b) on the basis of *the source categories*, under which the amount of fuel consumed is calculated separately by sector and source category and then totaled.

The actual quantities of different fuels consumed are the background data.

National and international standards and requirements

According to the provisions of Annex 1 to the United Nations Framework Convention on Climate Change, the countries listed in that Annex are obliged to submit national reports every three years to the Secretariat of the Convention. Belarus, the Russian Federation and the Ukraine are among the EECCA countries in Annex 1.

One of the key chapters of the national reports is the Inventory of greenhouse gases emissions (per sectors). Other important chapters are on Policy and measures to reduce emissions and Measures to adapt to climate change.

Practice in the Russian Federation

The first national report was submitted by the Russia Federation in 1995 (for the year 1990); the second in 1998 (for 1994); and the third in the second half of 2002 (for the period of 1997 – 1999).

Appropriate measures have been taken in Russia to estimate greenhouse gases emissions in the atmosphere. Legal entities (enterprises, organizations, etc.) compile and submit on a voluntary basis annual reports on their air emissions of CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6. However, in order to obtain good results in terms of data accuracy and comprehensiveness, it is necessary to develop a system of data collection and analysis across the whole country.

Difficulties in application in EECCA countries and avenues for resolution

Inventory data in Russia:

- inventory calculated according to the most simple methodology (3);
- data is available for only five years – 1990, 1994, 1997-1999;

- the data are not easily comparable with those of other countries, as the standard working sheets were filled-in according to the standard methodology (3) for 1997-1999 only;
- data is published in the national reports only, not in regular national or ministerial publications (such as annual Reports on the State and protection of the environment).

According to available information, some EECCA countries (Belarus, Turkmenistan, and others) have prepared national reports, but the data are not widely used as the indicator.

References

1. Kyoto Protocol (1997) to the United Nations Framework Convention on Climate Change;
2. United Nations Framework Convention on Climate Change. 1992;
3. Revised IPCC Guidelines for National Greenhouse Gas Inventories, 1996.

Indicator 4. Water.
Share of reused water

Description

The indicator shows the amount of fresh water saved due to the use of secondary and recovered water, including wastewater and drainage water. Water used in municipal and industrial heating supply systems is not included.

Unit of measurement

According to the definition, the indicator is based on calculations and expressed in percent of the total quantity of water used for industrial/production needs.

Policy relevance

This indicator can help to track trends in technological developments in different industrial sectors of a region. This indicator is important for environmental management and monitoring bodies, as well as for managers of industrial enterprises, from the viewpoint of the development of production processes that use natural resources efficiently.

Monitoring requirements

Monitoring data for this indicator been obtained over an extensive period and there are possibilities to develop long time-series for this issue.

Calculation methods

The percent of reused water in the total amount of water consumed for production needs is calculated as a proportion of reused and secondary water use to the amount of total water consumption for production needs (excluding agricultural needs). In general, this indicator can be expressed by the following equation:

$$\%\ \text{reused/cons.} = \frac{Q_{ret.} + Q_{cons.}}{(Q_{ret.} + Q_{cons.}) \times Q_{prod.}}$$

where:

% re./cons. - percent of reused water;
Q ret. - volume of reused water;
Q cons. - volume of secondary water used;
Q prod. - volume of total water consumption for production needs.

National and international standards and requirements

This indicator is derived from volume indicators (water volume used for production needs, water volume in the systems that reuse industrial water, volume of secondary waters used), which are reported in the Russian state statistic reporting form 2TP-water, introduced in the former USSR and still valid with some amendments.

The information for the calculation of this indicator comes from the following main sources: economic entities, city/town/settlement administrations; regional administrations (republic, kraj, oblast, and autonomous entity), and the national government. Moreover, the information is analyzed by economic sector.

Practice in the Russian Federation

The data for the calculation of this indicator is published in the Russian statistics annuals (1) issued by the State Statistics Committee of the Russian Federation (Goscomstat), in the specialized publications, Basic Environmental Indicators (2), and in annual national reports on the state and protection of the environment in the Russian Federation (3). The most comprehensive information on this issue is compiled in the State Water Register (4).

Difficulties in application in EECCA countries and avenues for resolution

It is possible to use the indicator already in the near future, as in most EECCA countries data on water use and wastewater discharge are available from the state statistics reporting forms 2TP-water.

References

1. Goscomstat. Russian statistic annual. Statistic documents collection. Moscow, 1999. 624 p.
2. Goscomstat. Basic Environmental Indicators. Statistic documents collection. Moscow. 2003. 100 p.
3. Gosecocenter. Annual reports on the state and protection of the environment in the Russian Federation for the years 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.
4. Ministry of Natural Resources of the Russian Federation. State water register for the years 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.

Indicator 5. ***Land resources and soils.***
Proportion of agricultural land under risk of wind erosion and scouring.

Description

The indicator characterizes the area of agricultural land exposed to degradation caused by wind and water.

Unit of measurement

The unit of measurement for this indicator can be the area of agricultural land exposed to wind erosion and water scouring in thousand hectares, or the percent of eroded land in terms of the total agricultural land area.

Policy relevance

This indicator allows the assessment of the area exposed to erosion processes, such as decrease in humus layer, dehumification, secondary carbonate formation, change in granulometric composition of soil, and loss of nutrients.

This indicator depicts special features of the erosion process, particularly the extent of humus layer washed out, as well as the dynamics of change in agricultural land exposed to degradation.

Monitoring requirements

The information basis for estimating the area of agricultural land exposed to wind and water erosion in the Russian Federation is the official statistical reporting data on the state and monitoring of lands, compiled for many years.

Calculation methods

On the basis of this data, the percent of agricultural land exposed to wind erosion and percent of agricultural land exposed to water erosion are calculated separately. Calculation is made for the whole country and per economic region (in Russia there are 11 such regions – Northern, Povolzhskij, Uralskij, etc.).

The data on eroded agricultural land and on land threatened by erosion is subdivided into data on arable land, meadows and pastures.

Information on agricultural land exposed to wind and water erosion includes separately the data on eroded land and the data on land threatened by erosion .

National and international standards and requirements

This subchapter needs further study.

Practice in the Russian Federation

Characteristics of erosion processes and the state of lands in the Russian Federation are published in the annual national reports on the state and use of land in the Russian Federation (1), prepared and issued by the Federal Service of Land Cadastre of the Russian Federation.

General information on agricultural land exposed to wind and water erosion is also published in the annual state reports on the state and protection of the environment in the Russian Federation.

Difficulties in application in EECCA countries and avenues for resolution

Erosion processes are typical across EECCA countries; for this reason, that is why the indicator should be taken into account, and the implementation of appropriate measures to reduce erosion are very important for the countries.

In order to reduce negative impacts of erosion processes on land resources, the authorities responsible for decision-making should implement comprehensive anti-erosion measures and introduce a landscape-adaptive system of agriculture.

References

1. RUS-SLIT Publishing House. National reports on the land state and use in the Russian Federation for the years 1995, 1996, 1997, 1998, 1999, 2000. Moscow.
2. Gosecocentre. Annual state reports on the state and protection of the environment in the Russian Federation for the years 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.

Indicator 6. ***Biodiversity*****.**
Trends of fauna species groups
(carnivores, predators, species of economic interest)

Description

This indicator describes changes in the number of animal species over a time unit, per year as a rule, in a country, kraj, oblast, district, reserve or national park.

Unit of measurement

Unit of measurement is the population of animals, in thousand species.

Policy relevance

This indicator shows the population of animals (including rare species), habitats, game species, and artificial breeding of wild animals and birds.

This indicator tracks changes in different species of animals to regulate their population, to maintain optimal population levels, to estimate the impact of weather conditions and to take appropriate measures to protect rare and endangered species.

Monitoring requirements

Monitoring of changes in the population of different species is carried out on a regular basis, over long period of times, by hunting bodies, state reserves and national parks.

Calculation methods

This indicator is based on reporting submitted, using the format 2-TP-hunting, by the state and cooperative enterprises, state forestry and hunting services, collective farmers, hunting societies and other organizations engaged in the protection and management of wildlife. State reserves, hunting reserves and units as well as national parks submit reports using the format 1-reserve. The reports are analyzed and processed at the regional and federal levels. The State Statistics Committee of the Russian Federation is responsible for this work.

The state statistic reporting format 2-TP-hunting and 1-reserve were introduced in practice in the former Soviet Union and were mandatory for all republics in the USSR; at present they are still valid in EECCA countries.

National and international standards and requirements

It is necessary to implement commitments under international conventions and agreements for the protection and conservation of flora, fauna, habitats and biodiversity.

Practice in the Russian Federation

In Russia, information for this indicator is published in annual statistic publications issued by the State Statistics Committee of the Russian Federation (1). Moreover, information on the number of main animal species is regularly published in

the annual reports on the state and protection of the environment of the Russian Federation (2).

The Red Book of Russia (3) is updated regularly in the Russian Federation. The Red Book contains lists of animal species registered in the Red Book, species extinct in the Russian Federation, species that need special attention and species excluded from the Red Book.

In 1996, the Russian Federation acceded to the Agreement on the Book of Rare and Endangered Species of Flora and Fauna – the Red Book of Newly Independent States (NIS, corresponding to the EECCA countries).

Difficulties in application in EECCA countries and avenues for resolution

Application of the indicator is not only possible and very useful, but also underway in EECCA countries, as all are acting in this direction.

References

1. Goscomstat. Basic Environmental Indicators. Statistic documents collection. Moscow. 2003. 100 p.
2. Gosecocentre. Annual State Reports on the State and Protection of the Environment of the Russian Federation, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.
3. The Red Book of the Russian Federation.

Indicator 7. Waste.
Waste recovery

Description

This indicator presents the amount of production and consumption wastes reused or recycled in manufacturing and other economic activities (including services) or recovered in energy production.

Unit of measurement

Information on waste recovery is given in tonnes.

Policy relevance

This indicator shows material balance and is presented along with indicators that show the total amount of waste generation and the amount of waste disposed in landfills.

The indicator characterizes the level of technological development in industry and of national policy in the field of production and consumption waste management.

Monitoring requirements

On the basis of primary records and specialized accounting data, divisions of enterprises and organizations should annually calculate the mass balance of materials and substances used and products manufactured during production processes and/or other economic activities (including services) and that could not be used at the given enterprise/organization or which have completely or partially lost their consumer qualities/properties. It is also necessary to calculate consumption waste (products, materials, substances, which completely or partially lost consumer qualities/properties in the process of public or individual consumption).

Calculation methods

The indicator is calculated based on the data compiled from primary records and accounting. When primary records are not available, the reporting sheets are filled in on the basis of estimations, mass balance calculations and other data. Opportunities and cost-effectiveness of production and consumption waste recovery as well as the availability of appropriate production capacities, are estimated in the process of the indicator calculation.

National and international standards and requirements

Observations and statistical data collection for this indicator started in 1970 and 1980s, i.e. in the former USSR, so for EECCA countries these indicators are not new. A unified state reporting system on toxic waste generation, use, decontamination and disposal was established in the Russian Federation in 1993, when the annual statistical reporting form 2-TP (toxic waste) was developed and adopted. By 2002, this reporting system covered more than 13 000 enterprises where production and consumption toxic

waste hazardous for human health and the environment were generated, delivered, used, decontaminated, stored or landfilled.

Practice in the Russian Federation

Data on waste recovery (total and classified according to the category of hazard) is regularly published in the Russian Federation (1-2). Information reflects the situation in the whole country, in the subjects of the Russian Federation and in the economic sectors.

Difficulties in application in EECCA countries and avenues for resolution

It is advisable to use the indicator in the near future due to the fact that for most EECCA countries, data on waste generation and recovery is very important. Together with other environmental indicators, this indicator plays one of leading roles relevant to the existing problems of waste management. Moreover, most EECCA countries have similar reporting formats on the indicator related to waste recovery.

References

1. Goscomstat. Basic Environmental Indicators. Statistic data collection. Moscow. 2003. 100 p.
2. Gosecocenter. Annual State Reports on the State and Protection of the Environment in the Russian Federation for 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.

Indicator 8. ***Waste.***
Waste treatment capacity.

Description

In the EECCA countries, billions of tonnes of waste are accumulated and stock-piled at storage, collection, and landfills sites (in Russia this amount exceeds 44 billion tonnes). Annually, some of this waste is reused, recycled or recovered at special facilities.

In order to assess the situation in this field, this indicator presents the rate of annual introduction of facilities for production waste reuse and recycling.

Unit of measurement

The units of measurement for this indicator are thousand roubles (investments in construction) and thousand tonnes (capacity put into operation).

Policy relevance

This indicator tracks the development of technologies for waste recycling in different branches of industry or regions. This indicator is important for environmental management and monitoring bodies and for managers of industrial enterprises, from the viewpoint of investments for waste management.

Monitoring requirements

This indicator was introduced by the State Statistics Committee of the Russian Federation in the statistical reporting form 18-KC (Investment in environmental protection and the rational use of natural resources), which includes the following data pertinent to the indicator:

- investment in the construction of facilities for industrial waste reuse and recycling (in thousand roubles);
- investment in the construction of facilities for waste reuse, treatment and landfilling (in thousand roubles);
- facilities put into operation for industrial waste reuse and recycling (number of facilities and capacity in thousand tonnes per year);
- facilities put into operation for waste reuse, treatment and landfilling (number of facilities and capacity in thousand tonnes per year).

Calculation methods

These indicators are statistical indicators. The data is collected and analyzed at different administrative levels (city/town, settlement, oblast, kraj, region, etc.) and then totaled for the whole country. Moreover, the situation in this field is analyzed per economic sector and then the data is totaled for the whole economy.

National and international standards and requirements

This statistical reporting format is common for EECCA countries, as the reporting form 18-KC became valid in the former USSR, when a unified reporting system was established for the whole territory.

Practice in the Russian Federation

Information on existing capacities for waste recycling is published regularly in annual statistical reports issued by the State Statistics Committee of the Russian Federation: one is the publication Basic Environmental Indicators (1). Overview data are included in the annual national Reports on the state and protection of the environment in the Russian Federation (2).

Difficulties in application in EECCA countries and avenues for resolution

In most EECCA countries, data on production capacities for waste recycling and on investment in the construction of such facilities is kept in the form of the state statistic reporting forms similar to the 18-KC form described above. Therefore, it is possible to use this indicator in the near future.

References

1. Goscomstat. Basic Environmental Indicators. Statistic data collection. Moscow. 2003. 100 p.
2. Gosecocenter. Annual State Reports on the State and Protection of the Environment in the Russian Federation for 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.

Indicator 9. ***Energy.***
Share of renewable electricity in gross electricity consumption

Description

The indicator covers the following energy sources:

- wind;
- electricity generated by large and small hydroelectric power stations;
- solar;
- biomass;
- geothermal energy.

Hydroelectric plants supply 15-19% of the total electricity produced in the Russian Federation; the contribution of other types of renewable energy sources is estimated in the range of 1%. In perspective, the development of wind energy will reach 3% and biomass energy, to 8%.

Under the present structure of the official information collection, data for the indicator is not completely available, including data on the electricity production by the renewable energy sources mentioned above. In Russia, for example, published information contains the data on electricity produced by hydroelectric power stations, but there is no data on other types of renewable electricity production (wind, solar, etc.).

Unit of measurement

The unit of measurement for this indicator is billion kilowatt-hours.

Policy relevance

All EECCA countries pay great attention to indicators that describe the activity of the energy sector. This is connected in the first place with the importance of this sector for economic development of any country. The variety of data on energy sources include the data on electricity production by thermal, hydro and nuclear power stations.

The dynamics of electric energy production over the long term describes the trends in the development of energy sources in the country.

Monitoring requirements

Monitoring requirements are defined by the necessity to control and keep records of electricity production by enterprises that use alternative energy sources.

Methods of calculation

The data on electricity production by hydro plants is recorded and totaled on the basis of reporting by large and small energy generating enterprises.

Practice in the Russian Federation

Information on electric energy production by hydro stations is published regularly in statistics annuals (1) issued by the State Statistics Committee of the Russian Federation. Final indicators for the broad public have yearly coverage, but in the statistics annuals (1) the presentation of trends for this indicator starts in 1970.

In addition, information on electric energy production by hydro stations is published in specialized collections, such as Basic Environmental Indicators (2), and in the annual state reports on the state and protection of the environment in the Russian Federation (3).

Difficulties in application in EECCA countries and avenues for resolution

None of the information connected with this indicator is new for EECCA countries: data has had been collected and processed since the 1970s and 1980s and published in statistics collections issued in EECCA countries. At the same time, it is necessary to make efforts to develop data on other renewable energy sources and to ensure the monitoring of the energy produced and recording of the data.

References

1. Goscomstat. Russian statistic annuals. Statistic data collection. Moscow. 1999. 624 p.
2. Goscomstat. Basic Environmental Indicators. Statistic data collection. Moscow. Russia. 2003. 100 p.
3. Gosecocenter. Annual State Reports on the State and Protection of the Environment in the Russian Federation, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002. Moscow.

Indicator 10. ***Transport.***

Transport final energy consumption by mode

Description

In all almost EECCA countries, the transportation sector is the largest polluter of the environment among economic sectors.

The indicator presents total electricity consumption by all types of transport, as well as by transport type:

- railroads, water, air, and motorized transport; electricity consumption by the railroad transport (electric traction) is singled out separately;
- urban trams and trolleys;
- urban metro systems;
- main oil and oil products pipelines; and
- main gas pipelines.

In addition, the Russian Federation for example has statistical reporting on the total consumption of the following fuel types by transportation enterprises and organizations:

- jet fuel;
- gasoline for motor vehicles;
- diesel fuel;
- kerosene;
- coal and coal processing products.

Unit of measurement

This indicator characterizes consumption of different energy types by transport and is expressed in the total annual sum. The unit of measurement for this indicator is billion kilowatt-hours (for calculation of electric energy consumption by transport) or million (thousand) tonnes (for calculation of fuels consumption by transportation enterprises and organizations).

Policy relevance

The dynamics of electricity and fuel consumption by transport over the long term can characterize the level of technological development of the transport complex, as well as trends of transport development with regard to its types.

Monitoring requirements

These requirements are determined by the necessity to monitor and keep records on energy consumption by enterprises engaged in the transportation sector and to meet the requirements of the state reporting system.

Methods of calculation

Information components included in the indicator can be calculated (to calculate electricity consumption by transport on using data on electricity consumption per transport unit, on the period of use and on depreciation). Data components can be also

derived (fuel consumption can be is derived from sales amounts). Information for the indicator is completed using reporting by the enterprises and organizations in the transport sector.

Reports from enterprises are processed on different levels (urban area, subject of the Russian Federation), and the information is then submitted to the State Statistics Committee for further assessment, analysis and processing and for the preparation of summarized data for the whole country.

National and international standards and requirements

The share of transport does not exceed 10% of the total volume of electricity consumption in the Russian Federation.

Economic growth should be the top priority in the state policy for transportation sector development in the EECCA countries. In the Russian Federation, for example, this economic growth is envisaged in the provisions of the Federal Programme on Modernization of the transportation system in Russian (2002-2010). Implementation of this programme began in 2002. At present, in EU countries transport policy is oriented towards the restriction of transport activity. Although the share of transportation systems in these countries greatly exceeds the share in Russia, it is necessary to take into account their experience already and not wait until this problem is "ripe".

Practice in the Russian Federation

Information on electric energy and fuels consumption by transport is regularly published in Russian statistics annuals (1) issued by the State Statistics Committee of the Russian Federation. The statistic annuals include the data since 1990.

Difficulties in application in EECCA countries and avenues for resolution

None of the information related to the indicator Transport final energy consumption by mode is new for EECCA countries, and it is rather simple to compile it. This information is traditionally published in statistics documents issued in EECCA countries.

References

1. Goscomstat. Russian statistics annuals. Statistics documents collection. Moscow. 1999. 624p.