

**FRAMEWORK RECOMMENDATIONS ON
AIR EMISSIONS INVENTORIES AND
ATMOSPHERIC AIR POLLUTION MONITORING
AND MODELING FOR COUNTRIES OF EASTERN
EUROPE, CAUCASUS AND CENTRAL ASIA
THAT ARE NEW PARTIES TO THE
CONVENTION ON LONG-RANGE
TRANSBOUNDARY AIR POLLUTION¹**

¹ Prepared in cooperation with KAZHYDROMET. This document was not officially edited.

These recommendations were developed based on analysis of current situations in Azerbaijan, Armenia, Georgia, Kazakhstan, Kyrgyzstan and the Republic of Moldova. Information on Kazakhstan can be found in a separate report (*Report on air emission inventories and atmospheric air pollution monitoring and modelling in Kazakhstan*), together with detailed recommendations for that country.

The objectives of these recommendations, developed in the framework of a joint UNECE and European Environment Agency (EEA) Project (entitled Support of the UNECE Working Group Activities on Environmental Monitoring) are to improve the system of atmospheric air monitoring and to enhance data collection and reporting on emissions related to obligations under the Convention on Long-Range Transboundary Air Pollution (CLRTAP) in the above-mentioned countries of Eastern Europe, Caucasus and Central Asia (EECCA) that have recently joined this Convention. The recommendations were discussed at an International Meeting held on 8-10 October, 2003, in Almaty, with participation of EECCA and international experts, as well as representatives of concerned enterprises and organizations in Kazakhstan, and were completed in the course of subsequent consultations and discussions.

1. Introduction

The following EECCA countries participated in the joint UNECE-EEA Project and have also recently acceded to the Convention on Long-Range Transboundary Air Pollution:

Country	Armenia	Azerbaijan	Georgia	Kyrgyzstan	Republic of Moldova
Date of accession to the Convention	21 February 1997	3 July 2002	11 February 1999	25 May 2000	9 June 1995

These countries have undertaken various actions to meet their obligations under the Convention in terms of data provision:

- **Armenia** annually provides data on its atmospheric air emissions of harmful substances.
- Statistical reporting in **Azerbaijan** is being brought into compliance with the requirements of the Convention.
- The first national report on air emissions (for the period of 1990-2000) was prepared by **Kyrgyzstan** and was sent to the Secretariat of the Convention. Also, some work is underway to create a database on air polluting emissions.

These countries are also considering accession to key protocols to the Convention:

- **Armenia** is considering accession to the Protocol on Long-term Financing of the Cooperative Program for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), the Protocol on Heavy Metals and also to the Protocol on Persistent Organic Pollutants.
- In **Azerbaijan**, the Protocol on Heavy Metals and the Protocol on Persistent Organic Pollutants are being translated into Azeri so that the Parliament can consider accession.
- **Georgia** is considering accession to the Protocol on Long-term Financing of the Cooperative Program for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) and also to the Protocol on Persistent Organic Pollutants.

- In *Kyrgyzstan*, preparatory work is underway for accession to the Protocol on Long-term Financing of the Cooperative Program for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP).
- The *Republic of Moldova* signed the Protocol on Heavy Metals (HM) and the Protocol on Persistent Organic Pollutants (POPs) on 24 June 1998, and ratified them on 1 October 2002.

1. Emissions Inventories

1.1. Overview of the current situation

Armenia

In Armenia, the Ministry of Nature Protection prepares an annual inventory (each year by February 25th) of harmful emissions, based on data submitted by enterprises (using the statistical reporting form on emissions of harmful substances into the atmosphere by stationary sources). Unfortunately, the quality of this underlying reporting does not fully comply with the requirements of the Convention.

Armenia may provide annual data on relevant emissions, enumerated in the “Draft Guidelines on Estimation and Provision of Emissions Data”, except for PM2.5, PM10, TSP and POPs.

Currently in Armenia there is a gap between the characteristics of the state emissions inventory and EMEP international requirements: methods to estimate emissions of pollutants not directly monitored are not used, and problems are still experienced concerning incomplete information and insufficient inventory transparency.

In its work on the national emissions inventory, Armenia applies the EMEP/CORINAIR Emissions Inventory Guidebook.

Azerbaijan

To carry out inventories of air emissions, Azerbaijan uses the system developed by the former Goscomhydromet of the USSR (Guidelines on atmospheric pollution, 1979).

Azerbaijan may provide UNECE some data, beginning only with years 1999, 2000 and 2001.

Georgia

In Georgia, the classification of the types of stationary air pollution sources and their identification (on the basis of this classification) are carried out using the document “Types of Stationary Atmospheric Air Polluting Sources”, in compliance with the methodological instructions on “Identification of the Types of Atmospheric Air Pollution Sources”, approved by Order of the Minister of Environmental Protection and Natural Resources.

Georgia can provide annual estimated data only for emissions of SO₂, NO_x, NMVOCs and CO.

Due to the lack of relevant methodologies, no inventories are made in Georgia for POPs and heavy metals, and VOC emissions are not separated out. Georgia lacks professionals on site, and there are major big differences in emission factors between the CORINAIR system and the CIS system.

Georgia partly applies the EMEP/CORINAIR Air Emissions Inventory Guidebook. The latest version has not yet been reviewed in terms of introducing and applying calculations required. In Georgia there is no scientific basis for verifying EMEP/CORINAR emission factors, and currently used technologies (of varying origin) are not comparable to technologies specified by CORINAIR. Consequently, it is necessary to work out additional emission factors to estimate

pollution levels for these existing technologies. At present, Georgia lacks the funds required to conduct research in this area.

Kyrgyzstan

The National emissions inventory system is built on the “top-down” principle: enterprises report, using form 2TP-air, to the National Statistics Committee of Kyrgyzstan.

Kyrgyzstan can provide annual data on emissions of the following pollutants: SO₂, NO_x, CO, suspended substances and hydrocarbons (VOC).

Republic of Moldova

The Republic of Moldova uses both the “top-down” and “bottom-up” approaches, as well as the EMEP/CORINAIR Inventory Guidebook, IPCC and UNEP Chemicals guidelines and also some of the methodological principles developed by the Russian Atmosphere Scientific and Research Institute. The Draft Guidelines for Estimating and Reporting Emissions Data, designed by the EMEP Task Force on Emission Inventories and Projections in coordination with the UNECE Secretariat, are available in the Republic of Moldova. However, there are several difficult issues including, for example, calculating emissions of PM_{2.5}, PM₁₀ and others.

For the 11 major emissions categories included in the EMEP/CORINAIR Air Emissions Inventory Guidebook, Republic of Moldova can make calculations for emissions of all pollutants except PM 2.5 and PM 10.

In the Republic of Moldova, there are problems with the completeness and authenticity of information on raw material flows and their breakdown by SNAP categories, as well as with lack of conformity of the statistical reporting forms with draft guidelines. Country needs a methodology guidebook to help with the change of requirements and pollutants composition, as well as training seminars for experts.

The EMEP/CORINAIR Air Emissions Inventory Guidebook has been used in the Republic of Moldova since 1999.

1.2. Recommendations for the Improvement of Air Emissions Inventory Systems

For EECCA countries that are new Parties to the Convention:

I. Organization of Activities on the Convention

- (a) National institutions should establish special working groups for the preparation of national inventories and national emissions data, considering the following issues:
 - Identify the range of tasks for inventory improvement in terms of their importance and the solutions required, and develop a action plan for the upcoming years;
 - Prepare and submit to UNECE national emissions data on an annual basis;
 - Identify criteria to characterize information quality and completeness of annual emissions reports;
- (b) Carry out expert training to improve emissions accounting;
- (c) Establish permanent contacts between the national emissions groups and similar groups of other countries, and promote participation in international seminars, training courses and exchange of experience;
- (d) Reporting on emissions of enterprises shall be transparent;

- (e) Ensure that monitoring data on pollution concentrations in enterprise emissions are accessible for the calculation of emissions factors;
- (f) Consider accession to CLRTAP Protocols.

II. Methodological Basis for Improving Emissions Accounting

- (a) Review and use the EMEP/CORINAIR Air Emissions Inventory Guidebook as a uniform methodology for estimating air emissions and developing procedures for calculating emissions of pollutants previously not covered in reporting by enterprises;
- (b) Make wider use of international methodological and scientific experience in the field of emissions research. This experience is summarized in volumes such as the EMEP Guidebook, IPCC Work Book, AP-42 and others;
- (c) Ensure the active participation of national experts in the work of Task Force on Emissions Inventory and Projections (TFEIP) and the EMEP management body.

III. Methodology and Research Activities:

- (a) As a priority, review the national situation concerning emissions inventories. Inventories should be broken down by category of pollutant, with the objective of assessing the completeness of available and received information. It is useful to have experts estimate emissions of key pollutants and to compare the results against available monitoring data;
- (b) Compare national data with the emissions indicators and emissions factors recommended by the EMEP/CORINAIR Inventory Guidebook;
- (c) Adapt, where necessary, the emissions factors recommended by the Guidebook to the local conditions of the EECCA countries; national experts in cooperation with EMEP centers should make assessments of HM and POP emissions within the framework of international projects;
- (d) Develop research into emissions processes and sources;
- (e) As a priority, review current national methods for calculating emissions and measuring pollutant concentrations in emissions, check their correspondence with current international knowledge and approaches, and create a schedule for their revision;
- (f) Improve the classification of economic actors (and sectors), introducing the coding system proposed under the IPCC and SNAP;
- (g) Develop inventory systems on the basis of internationally recognized approaches (e.g., “top-down”), in particular following EMEP methodology; in parallel, improve national inventories (using the “bottom-up” approach).

For Working Bodies of the Convention and the UNECE Secretariat:

- (a) Support new Parties to the Convention in the improvement of emissions inventory systems, taking into account the specific needs of these countries related to their technological capacities and financial and economic difficulties;
- (b) Provide, through the coordinating centers (MSC-W, MSC-E, CCC, CIAM) and EMEP experts, methodological and technical support for the organization and implementation of emissions inventory activities, including internship opportunities and training for specialists of EECCA countries;
- (c) Support projects and seminars for EECCA countries, along the lines of those undertaken by UNECE Working Group on Environmental Monitoring;

- (d) Assist new Parties to the Convention make new expert emissions assessments, especially for POPs and HMs;
- (e) Consider the possibility of arranging workshops on an annual basis for training and for sharing experience in applying the EMEP/CORINAIR Inventory Guidebook, particularly in EECCA countries:
 - Translate into Russian the latest version of the EMEP Inventory Guidebook and adapt the reporting software for Russian;
 - Conduct an initial training workshop on applying the EMEP/CORINAIR Air Emissions Guidebook on “Mobile Air Emissions Sources”; consider Kazhydromet’s offer to host this seminar in Almaty;
 - Hold a consultative working meeting on the preparation of documents and the agenda for the first training workshop (in Moscow in 2004).

2. Atmospheric Air Pollution Monitoring and Modeling in EECCA Countries that are new Parties to the Convention

2.1. Overview of the situation

In practically all EECCA countries participating in the project, environmental pollution monitoring is carried out by specialized monitoring centers.

- In **Armenia**, monitoring of ambient atmospheric air pollution is carried out in six cities on a daily basis (in two cities, dust, sulphur dioxide, carbon monoxide, and nitrogen oxides levels are measured, while in the four other cities, only dust).
- **Azerbaijan** uses instrument sampling and processes samples in stationary laboratories. Azerbaijan controls the concentration of 14 components (including dust, soot, phenol, benz(a)pyrene, furfural, CO, NO, NO₂, Cl, H₂S, SO₂, HCl, H₂SO₄, SO₄). Samples are taken three times a day (at 7 a.m., 1p.m. and 6 p.m.). Parameters such as temperature, air moisture and pressure, wind speed and direction are checked.
- In seven cities in **Georgia**, samples are taken three times a day. In Tbilisi and in two other cities, there is monitoring only of CO and dust. In addition, levels of N₂O, MnO₂, phenols, etc. are monitored in the remaining five cities.
- **Kyrgyzstan** monitors the concentration of suspended particles, nitrogen oxides, sulphur dioxide, and carbon monoxide.
- In the **Republic of Moldova**, regular observations of ambient air pollution are carried out by the State Hydrometeorological Service in the cities of Kishinev (6 pollution observation stations), Tiraspol (3 stations), Beltsy (2 stations), Rybnytsa (2 stations) and Bendery (4 stations) on a short program (three 20 minute sampling periods a day). The main components monitored at each station are: dust, carbon monoxide, nitrogen and sulphur oxides. In addition to these four, in the cities of Kishinev and Tiraspol stations monitor formaldehyde and phenol levels, and in the city of Beltsy, formaldehyde (three 20 minute sampling periods a day). In addition, the monitoring network controls such parameters as atmosphere pressure, wind speed and temperature in °C.

In all the countries involved in the Project, observation networks designed for atmospheric air monitoring are poorly equipped from the technical point of view, and equipment and analytical facilities in their laboratories are in unsatisfactory condition.

Overall, the currently available system of monitoring in the EECCA countries does not comply with the requirements of the EMEP measurement program. To bring it into compliance, it is necessary to receive information and methodological support from EMEP centers and experts.

Modeling to assess pollutant diffusion in the atmosphere is not carried out and therefore it would be timely and useful for EECCA countries to consult with the EMEP centers on the development and use of modeling approaches for assessing pollutant transport in the atmosphere.

2.2. Recommendations on Atmospheric Air Pollution Monitoring and Modeling in EECCA Countries that are new Parties to the Convention

The Cooperative Program for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) is the main instrument for international cooperation in the area of monitoring and modeling atmospheric phenomena. In accordance with the purposes and objectives of the Cooperative Program for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), it is recommended that:

For EECCA countries that are new Parties to the Convention:

1. Consider accession to the Protocols to the Convention;
2. Use a comprehensive approach, based on the joint use of data obtained as a result of both monitoring and modeling, that would optimize the number of monitoring stations located on national territory, verify modeling data, evaluate the level of transboundary pollution and also estimate long-term trends;
3. Review existing EMEP Manuals on carrying out measurements in the air pollution monitoring system;
4. Achieve familiarity with the available models and participate in trial exercises;
5. Develop a plan of activities aimed at setting up and carrying out the EMEP monitoring program in each country, covering the following items:
 - optimization of the observation network for environmental monitoring, through the identification of stations for monitoring elements suggested under the EMEP monitoring program;
 - technical upgrading and modernization of equipment in monitoring stations and in chemical and analytical service facilities;
 - equipping central and network services with modern communication means (e.g., modems, computers, software, copying and other office equipment) and with facilities for the automated processing of data obtained from monitoring related studies;
6. In the process of working on the elements accepted under the EMEP monitoring program, fully use the support provided by the EMEP centers in the following areas:
 - methods and methodological coverage of work on the elements of the program of air pollution monitoring;
 - training for EECCA specialists through international courses and workshops and also through international programs and projects;
 - the development of national models for pollutant transportation; and
 - the selection of monitoring stations to verify model estimates.

For Working Bodies of the Convention and UNECE Secretariat:

1. Support new Parties to the Convention in their effort to improve their air pollution monitoring systems and the development of modeling, taking into account the specific needs of EECCA countries (technological capacities, financial problems, transition period, etc.);
2. Support the organization of projects similar to the one completed in Kazakhstan and conduct workshops with the participation of the EECCA countries, to exchange experience in the field of air pollution monitoring and modeling and the implementation of these recommendations;
3. Provide training to specialists from EECCA countries on EMEP including international training courses and workshops.
4. Support the development of a national programme to develop and carry out the EMEP system of monitoring (over the medium term) in every country. Such programme would assist in the development of national monitoring networks and monitoring and measurements, including the development of procedures for chemical analysis and the preparation of recommendations for instruments and equipment, analysis and processing of monitoring and measurement data, and exchange of information.

3. Additional Recommendations

The analysis of emissions inventories and of the state of air pollution monitoring and modeling in selected EECCA countries has allowed the preparation of additional recommendations, as follows:

1. The EECCA countries that are new Parties to the Convention need to coordinate, in the most efficient way possible, their national efforts for combating air pollution. In this respect, environmental protection bodies, health services and research institutes should closely cooperate to use resources efficiently and avoid undesirable duplication.
2. The EECCA countries that are new Parties to the Convention should start making voluntary contributions to reporting under auspices of the European Union.
3. In cooperation with the Task Force on Emissions Inventory and Projections (TFEIP) and the Task Force on Monitoring and Modeling (TFMM), the EECCA countries that are new Parties to the Convention should apply to participate in the Environment Information and Observation Network (EIONET), coordinated by the European Environment Agency. As a rule, TFEIP meetings are held jointly with EIONET, and TFMM meetings are also held in close cooperation with EIONET. Information on EIONET can be found at the following Internet addresses:
 - <http://www.nilu.no/projects/ccc/tfmm/oslo/index.html> and
 - http://air-climate.eionet.eu.int/docs/meetings/031106_8th_EIONET_AQ_WS/meetings031106.html
4. The EECCA countries that are new Parties to the Convention should coordinate their activities within the framework of different international environmental Conventions, in particular the Stockholm Convention on Persistent Organic Pollutants (POPs) and the United Nations Framework Convention on Climate Change.
5. The EECCA countries that are new Parties to the Convention should apply to the EMEP Bureau (meeting in Geneva in March 2004) and request assistance for the development of monitoring, modeling and emissions inventories, through the Task Force on

Measurements and Modeling and the Task Force on Emissions Inventory and Projections.

6. It is proposed that the delegation of Kazakhstan inform the Executive Body of the Convention (meeting in Geneva in December 2003) of the results of the International Meeting in Almaty, of the intention of Tajikistan and Uzbekistan to accede to the Convention, and of the intention of Armenia, Georgia, Kyrgyzstan, and Azerbaijan to accede to the EMEP Protocol on Long-term financing and some other Protocols to the Convention.