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**EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE
TRANSBOUNDARY AIR POLLUTION**

Steering Body to the Cooperative Programme for Monitoring and Evaluation
of the Long-range Transmission of Air Pollutants in Europe (EMEP)

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PROGRESS IN ACTIVITIES AND FUTURE WORK

EMISSIONS

PRESENT STATE OF EMISSION DATA

Report by the EMEP Centre on Emission Inventories and Projections (CEIP)¹

1. This report reflects progress in emission reporting under the Convention in the 2008 reporting round (2006 emission data, including 5-yearly reporting of gridded and large point source data not previously reported). It summarizes the main conclusions of the annual review of

¹ The Centre on Emission Inventories and Projections was established by the Executive Body at its twenty-fifth session and began operating on 15 January 2008.

emission data carried out under EMEP² in line with item 2.1 of the 2008 workplan of the Convention (ECE/EB.AIR/91/Add.2) as well as with the methods and procedures for the technical review of emission inventories³ approved by the Executive Body at its twenty-fifth session (ECE/EB.AIR/91, para. 27 (m)). The report focuses on preliminary review results and future challenges in improving the quality of emissions data reported under the Convention.

2. The report was prepared by the EMEP Centre on Emission Inventories and Projection (CEIP) established by Austria's Federal Environment Agency (Umweltbundesamt-Vienna) in December 2007, in line with the decision taken by the Executive Body at its twenty fifth session (ECE/EB.AIR/91, para 27 (f)). CEIP builds on the current emission-related work within EMEP. The CEIP website with information to support Parties on emission reporting was launched on 15 January 2008. It is available at: <http://www.emep-emissions.at/>.

3. An up-to-date overview of the data submitted by Parties during the 2008 reporting round has been made publicly available at <http://www.ceip.at/emission-data-webdab/2008-submissions-under-clrtap/>. In addition, since 15 June 2008, the officially reported emission data can be accessed on-line at <http://www.ceip.at/emission-data-webdab/emission-as-reported-by-parties/>. Gap-filled and gridded emission data for modellers were distributed to all EMEP centres (by 16 April 2008) and will be publicly accessible in September 2008.

4. The review process of emission data has been developed on the basis of feedback from Parties and from the Task Force on Emission Inventories and Projection and is seen by Parties as valuable for the improvement of their national emission inventories. As of 2008, the technical review of inventories will be carried out in three stages, as follows:

(a) Stage 1: An initial check of submissions for timeliness and completeness;

(b) Stage 2: A synthesis and assessment of all national submissions with respect to consistency and comparability of data with recommendations for data quality improvement;

² This work is carried out in cooperation with the European Environment Agency (EEA) and its European Topic Centre on Air and Climate Change (ETC/ACC);

³ Methods and procedures for the technical review of air pollutant emission inventories reported under the Convention and its protocols (ECE/EB.AIR/GE.1/2007/16).

(c) Stage 3: In-depth reviews of selected inventories, by pollutant, country and sector. In 2008, the stage 3 reviews of emission inventories are carried out on a voluntary basis and starting from 2009 as a mandatory exercise.

5. At each stage, Parties have the opportunity to clarify issues and to provide additional information.

I. THE STATUS OF REPORTING IN 2008

6. The volume of officially reported data has increased by more than a factor of 900 between 1992 (the first reporting year recorded in the EMEP database) and 2008. In particular, the number of emission data sets (national total, sector, large point source, gridded total, gridded sector and projections) rose exponentially from 2000 onwards. In addition, the number of sectors reported increased by a factor 10 when reporting the Nomenclature for Reporting (NFR) sectors replaced reporting according to the Selected Nomenclature for Air Pollution (SNAP) source categories. The increase in data quantity has been important for the work of the Convention, but it also requires more resources to assess the quality of the reported data.

7. Parties are requested to provide information on the main pollutants (nitrogen oxides (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC), sulphur oxides (SO_x) and ammonia (NH₃), heavy metals (HMs), particulate matter (PMs) and persistent organic pollutants (POPs)) (ECE/EB.AIR/80, Air pollution series, No15). In 2008, Parties were invited to submit data directly to CEIP or alternatively to post their data on the European Environment Agency's (EEA) central data repository and to inform the UNECE secretariat about the contents of the data submission by means of a notification form. Most Parties that submitted data also provided the secretariat with the notification form (with the exception of Greece, the Former Yugoslav Republic of Macedonia, the Netherlands and Ukraine).

8. Timeliness: Thirty-six Parties to the protocols, as well as Georgia, Malta and Poland submitted inventories before 10 June 2008. Twenty-nine Parties to the protocols (and Poland) reported emission data by the due date of 15 February 2008, representing an increase of two Parties to protocols compared with the 2007 reporting round. No data were provided by Iceland, Luxembourg, Lichtenstein and the Russian Federation. The above figures indicate that 59 per cent of Parties to protocols reported on time, and that a further seven Parties to protocols (as well as Georgia and Malta) submitted data before 10 June 2008, increasing the number of submissions to 76 per cent. This is again an increase compared with last year, representing the highest number of submissions in the history of the Convention. However, in order to further improve the atmospheric monitoring and modelling under the Convention, it would be important that emission inventories were also received from countries from which data are currently

lacking or insufficient (Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Kazakhstan, Kyrgyzstan, Montenegro, San Marino and Turkey).

9. Completeness: A number of Parties to protocols that submitted data⁴ in the 2008 reporting round did not provide complete time series in line with the current reporting requirements: ten Parties (and Poland) submitted only 2006 data. Complete time series of the main pollutants in NFR format for 1990–2006, which is the period relevant for the review of the Gothenburg Protocol, were reported by 17 Parties to that Protocol (15 in 2007), and 17 Parties to the Protocol on Heavy Metals also provided complete time series (1990-2006) of the main heavy metals. Seven Parties to protocols (Austria, Denmark, Finland, France, Italy, Sweden and the United Kingdom) submitted 1980-2006 time series. Twenty-one Parties to protocols reported the full time series of particulate matter (2000 – 2006)⁵, with 12 Parties also reporting figures back to 1990. Twenty-nine Parties to the Protocol on POPs as well as Georgia and Poland provided information on POPs.

10. Gridded data: Gridded data are part of the 5-year reporting obligation and as such were not due in 2008. However, seven Parties (Estonia, Finland, Latvia, Lithuania, Portugal, Romania and Spain) submitted gridded sectoral and national total emissions and one Party (Slovakia) re-submitted gridded national total emissions. Parties reported new data and resubmissions as follows: Portugal and Romania for 2005, Latvia for 2000 and 2005, Slovakia and Estonia for 1990, 1995, 2000 and 2005, and Spain for 1990 to 2006. Lithuania and Finland submitted gridded data for the year 2006. In addition, CEIP imported into the database late submissions of 2005 gridded data from the European Community (EC) and Croatia that were due in the 2007 reporting round. The availability of 2005 gridded sector data used for EMEP modelling improved considerably compared to 2000 gridded sectoral data previously used.

11. Projections: In 2008, 18 Parties submitted emission projections, out of which only 13 Parties submitted data for 2020.

12. Documentation: Compared with 2007, the number of Informative Inventory Reports (IIRs) submitted increased from six to 25 (i.e. 64 per cent of those reporting inventories, also reported IIRs) in 2008. Although, the increase in the number of IIRs submitted is a positive signal, the reports differ so substantially in structure and content, that it is time-consuming, and sometimes impossible, to find the necessary information in them. Therefore, Parties are urged to use the template for the recommended structure of IIRs as contained in annex VI to the revised

⁴ Thirty-six Parties to protocols as well as Georgia, Malta and Poland submitted the inventories in 2008.

⁵ Reporting of particulate matter began in 2000.

Emission Reporting Guidelines. In addition, in a number of cases Parties submitted IIRs in their national languages and without an English summary. To increase transparency, it is essential that key information on the inventories, including reasons for recalculations, new (closed) large emission sources, explanation of trends and the implementation of country specific methods/data be summarized in English.

II. PRELIMINARY RESULTS OF THE 2008 REVIEW

13. The team carrying out the 2008 review communicated actively with the Parties' designated experts, both through bilateral contacts and through the country-specific review reports. The findings of stage 1 reviews were communicated to the national designated experts through the country-specific "Status reports" by 15 March 2008. Countries were given two weeks to respond. The findings from the stage 2 review were included in "Synthesis and Assessment reports", which were sent out by 8 June 2008; the countries were invited to provide comments and/or re-submissions within four weeks. The main objective of these reports was to assist countries in improving their data for the next reporting round. An overview of the review stage 1 and 2 findings will be summarised in *CIEP and EEA Technical Review Report 2008*.

14. Stage 1 review of non-gridded emissions:

(a) Timeliness: The timeliness of the data submission was not satisfactory. This hampered the review of emission data for inclusion in the EMEP database and the Convention's assessments for the year in question. Furthermore, with the late submissions, the review team had less time to analyse the review results and the EMEP centres had only limited time to evaluate the EMEP inventory prior to reporting to the EMEP Steering Body. CEIP completed the EMEP database to the extent possible, including all the data submitted late (received by 30 May 2008). In addition, CEIP imported the late submissions of 2005 data from Greece, Croatia and the European Commission.

(b) Completeness: Thirty-six Parties to protocols (as well as Poland, and Malta) submitted NFR tables but not all submissions contained all gases. Thirty-eight countries (35 in 2007) reported their 2006 data for the review of the main pollutants, cadmium, mercury and lead emissions were provided by 34, additional HMs by 28, and PMs and priority POPs by 31 countries.

(c) Format: Most Parties reported their emissions in the requested NFR formats, but about 50 per cent of the submissions have altered the reporting templates. Four Parties to protocols: Belarus, Hungary, Romania and Spain (as well as Georgia) submitted part of the data in other formats than NFR); this led to the need for manually editing the submissions prior to

loading data onto the database. This work was resource demanding and could have led to errors. Parties' designated experts are urged to use standard NFR tables and check the format using the interactive data-checking tool (REPDAB) before submission.

15. Initial quality assurance/quality control (QA/QC): Many Parties used REPDAB as a tool to check their submissions before sending them to CEIP. All Parties that reported according to correct reporting templates had used REPDAB (50 per cent of those reporting). Parties' designated experts are recommended to make use of this easy and rapid initial quality control of their emission data prior to its submission.

16. Stage 2 review of non-gridded emissions, consistency and comparability tests:

(a) Inventory comparison (Convention – European Union (EU) National Emission Ceilings (NEC) Directive⁶): Generally, only a few countries reported differences greater than 20 per cent between the EU NEC Directive and Convention emission totals (two countries for SO_x, three for NMVOC and one for NH₃) and nine countries reported differences greater than 5 per cent for at least one of the components. Seven Parties submitted the same national totals under both reporting obligations. These preliminary results indicate two potential and related problems that need to be addressed in more detail. On the one hand, there are countries reporting the same national totals for SO₂, NO_x, NMVOC and NH₃ both to the European Commission (for the NEC Directive) and to EMEP; this means that maritime traffic and aircraft emissions (landing and take off cycle/cruise) might be not treated in line with reporting obligations in one of the inventories. On the other hand, some differences between the data reported to the European Commission and to EMEP seem too large to be attributed to differences in the reporting guidelines. In addition, differences sometimes occur for pollutants not affected by the differences in the reporting requirements (e.g. NH₃).

(b) Inventory comparison (Convention – United Nations Framework Convention on Climate Change (UNFCCC)): The differences observed between the Convention and UNFCCC in national totals are more significant than those between the Convention and the EU NEC Directive. Although reporting obligations under the two Conventions are almost identical, Parties to this Convention may choose whether to calculate energy emissions on the basis of fuel used or fuel sold. Only five Parties⁷ reported the same national totals to both Conventions for all pollutants (SO_x, NO_x, CO, NMVOC). For 11 Parties⁸ there were differences greater than 20 per

⁶ Twenty-seven EU Member States have to report their emission inventories under the NEC Directive.

⁷ Comparisons were possible for 27 EU Member States plus Norway, Switzerland and the United States.

⁸ Differences greater than 20 per cent; NO_x in 5, CO in 7, NMVOC in 8 and SO_x in 3 Parties

cent between the emission data reported to the Convention and that reported to UNFCCC. The preliminary results indicate that some differences in emissions can be explained by differences in reporting of Land Use, Land-Use Change and Forestry (LULUCF) sector emissions particularly for NMVOCs, but other differences indicate potential inconsistency in reporting.

(c) Consistency of trends: Implied emission factor (IEF) tests can only be performed for countries that submit sectoral data in NFR tables as well as inventories in the Common Reporting Format (CRF) tables under UNFCCC (source of activity data). In 2008, the IEF test could be performed for 29 Parties. Reviewers checked IEFs for key categories of main pollutants and PMs (54 subsectors/pollutant). Outliers were identified in all the inventories checked. The findings were included in the country-specific synthesis and assessment reports distributed to the Parties.

(d) Recalculations showing greater than ± 10 percent for SO₂, NO_x, NMVOC, NH₃, PM_{2.5}, PM₁₀ (only data reported in NFR format for both 2007 and 2008 were considered): Twenty-two countries had recalculated some of their emissions data. It is interesting to note that re-calculations were often not made for whole time series, but rather for single years or a small fraction of the series. This suggests that the resulting time series might no longer be consistent, or that errors have been detected and corrected. In-depth analysis (e.g. stage 3 review) of the emission trends is needed to solve this issue for each case.

(e) Emissions per capita/Emissions per gross domestic product (GDP): These indicators⁹ were calculated for all Parties which submitted national total emissions of main pollutants and PMs, by using information on populations and GDP available at the Eurostat database. The results are presented in form of graphs and tables, which were made available to all Parties and EMEP centres. Outliers could indicate differences in national economies but might also show inconsistencies of trends or inconsistencies between Parties (for example approximately two times higher PM₁₀ and PM_{2.5} emissions per capita in Estonia, Norway and Portugal). This type of information will provide reviewers with an indicator of potential problems when checking national inventories.

17. Stage 3 in-depth-review of inventories:

(a) A stage 3 in-depth review of emission inventories is planned for September 2008. This centralized review will be hosted by the EEA in Copenhagen. Three Parties (France, Norway and Portugal) have so far volunteered to be reviewed and eight Parties (Austria,

⁹ Inclusion of these new tests was recommended by Task Force expert panel on review.

Denmark, Finland, France, Ireland, the Netherlands, the United Kingdom and the European Community nominated reviewers for the roster of review experts. Further nominations of national experts for the roster of review experts as well as further offers from Parties to volunteer to be reviewed in 2008 are still needed.

(b) CEIP in cooperation with the Task Force on Emission Inventories and Projections and EEA will set up a review team and will coordinate and provide technical support to it.

(c) The review team will prepare individual review reports (within 6 weeks following the review) containing key findings and recommendations. The review reports will be finalized on the basis of the comments received from the Parties reviewed (from the designated emission expert) and sent to the Party (to the Party's Head of Delegation to the Executive Body). The key review findings will also be forwarded to the Convention's Implementation Committee for information.

(d) In addition, CEIP will produce an annual inventory overview covering the results of the stage 3 reviews. All the reports will be published on the CEIP website, following their approval by the EMEP Steering Body¹⁰. As both the review meetings and the EMEP Steering Body's meetings are scheduled to take place in September, unless the Steering Body or Executive Body can provide an alternative mechanism, this would result in publishing the review reports only after a delay of one year. For this reason, the Task Force on Emission Inventories and Projections has invited the EMEP Steering Body to consider mandating the Steering Body Bureau to approve the review reports on its behalf to enable their timely publishing on the EMEP-CEIP website¹¹.

18. Review of gridded data:

(a) As gridded data are part of the 5-year reporting obligation, these data were not due in 2008. Only seven Parties (Estonia, Finland, Latvia, Lithuania, Portugal, Romania, Slovakia and Spain) submitted gridded sectoral and national total emissions in this reporting round. These data were checked with respect to their format, internal consistency and completeness. Format of the provided data had to be corrected in two cases to enable the import of data to the database. The newly reported gridded sector data of Romania could not be imported due to undefined NFR sector codes.

¹⁰ For more information on the stage 3 reviews, see document ECE/EB.AIR/GE.1/2007/16, Methods and procedures for the technical review of air pollutant emission inventories reported under the Convention and its Protocols.

¹¹ ECE/EB.AIR/GE.1/2008/6, (para. 45 (d)).

(b) Based on these new data, CEIP detected differences in emission distributions in comparison with the year 2005. Explanatory information was requested from the Parties with the highest number of changes (Spain, Finland, Latvia, and Estonia). For Finland and Latvia, the differences could be explained, whereas for Spain and Estonia clarification is still ongoing.
