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Economic Commission for Europe 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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Agenda item 6 (c) of the provisional agenda

Progress in activities in 2010 and future work: emissions

Present state of emission data and stage 3 in-depth review

Report by the Centre on Emission Inventories and Projections

1. The present report reflects progress in emission reporting under the Convention on Long-range Transboundary Air Pollution in the 2010 reporting round (2008 emission data, including five-yearly reporting of gridded and large point source data not previously reported). It summarizes the main conclusions of the annual review of emission data carried out under the Cooperative Programme for Monitoring and Evaluation of the Long-range Transboundary Transmission of Air Pollutants in Europe (EMEP)¹ in line with item 2.1 of the 2010 work plan of the Convention (ECE/EB.AIR/99/Add.2). Furthermore, this report presents the outcome of the stage 3 in-depth review of national inventories for 2009, the plan for 2010 and a proposed schedule for 2011–2013.

2. This report was prepared by the EMEP Centre on Emissions Inventories and Projections (CEIP)² hosted by Austria's Federal Environment Agency (Umweltbundesamt-Vienna, <http://emep-emissions.at/>).

I. Present state of emission data

3. An up-to-date overview of the data submitted by Parties during the 2010 reporting round is available at <http://www.ceip.at/emission-data-webdab/submissions-under->

¹ This work is carried out in cooperation with the European Environment Agency and its European Topic Centre on Air and Climate Change.

² CEIP was established by the Air Convention's Executive Body at its twenty-fifth session (ECE/EB.AIR/91, para 27 (f)) and began operating on 15 January 2008.

clrtap/2010-submissions/. In addition, the officially reported emission data can be accessed online at <http://www.ceip.at/emission-data-webdab/emissions-as-reported-by-parties/>. All inventories submitted by Parties have been tested via RepDab³ and imported into the central CEIP database. The Guidelines for Reporting Emission Data under the Convention on Long-range Transboundary Air Pollution (hereinafter the Reporting Guidelines) (ECE/EB.AIR/97) and the Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories Reported under the Convention and its Protocols (EB.AIR/GE.1/2007/16) contain background information on the reporting requirements, deadlines and procedures.

4. CEIP prepared data sets of the main pollutants (sulphur dioxide (SO₂), nitrogen oxide (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC), ammonia (NH₃), particulate matter (PM), coarse PM (PM_{coarse}) and fine PM (PM_{2.5})) for modellers based on the gridding system developed by the Meteorological Synthesizing Centre-West (MSC-W). Furthermore, CEIP prepared gridded⁴ data for three heavy metals (mercury (Hg), lead (Pb), cadmium (Cd) and persistent organic pollutants (POPs) such as dioxin, hexachlorobenzene (HCB) and polycyclic aromatic hydrocarbons (PAHs). Gap-filled and gridded 2008 emission data for modellers were distributed to all EMEP centres by 14 April 2010 and have been publicly accessible since 30 June 2010 at <http://www.ceip.at/emission-data-webdab/emissions-used-in-emep-models/>.

5. To provide modellers with historic data consistent with the latest data reported by Parties, CEIP developed software ("RG tool")⁵ for re-gridding the 2000–2007 time series for SO₂, NO_x, CO, NMVOC, NH₃, PM_{coarse} and PM_{2.5}. The RG tool will also be used for the distribution of 2008 emissions⁶ of heavy metals and POPs (dioxin, HCB and PAHs) to make them consistent with the distribution of gridded emissions reported for 2005. Gridded emissions of heavy metals and POPs will be provided to the EMEP centres during July 2010.

6. The technical review of inventories is carried out in three stages.⁷ Stage 1 is an initial check of submissions for timeliness and completeness. Stage 2 is a synthesis and assessment of all national submissions with respect to consistency and comparability of data with recommendations for data quality improvement. Stage 3 is an in-depth review of selected inventories, by pollutant, country and sector, as discussed below. At each stage of review, Parties have the opportunity to clarify issues and to provide additional information.

7. All data submitted to CEIP have been reviewed. The team carrying out the 2010 review communicated actively with the Parties' designated experts, both through bilateral contacts and through the country-specific review reports. The process is seen by Parties as valuable for the improvement of their national emission inventories.

³ The RepDab tool is available at the CEIP website (<http://www.ceip.at/reporting-instructions/repdab-check-your-inventory/>)

⁴ Gridding and gap filling of heavy metals and persistent organic pollutants (POPs) is not part of the CEIP workplan in 2010, as it was not part of the activities performed by MSC-W, the predecessor of CEIP. However, CEIP would like to support modellers to the extent possible and prepared 2008 data sets of gridded heavy metals and POPs as reported by Parties and distributed it to the grids based mainly on population data. The development of a specific gridding system for POPs and heavy metals is not part of the current CEIP workplan.

⁵ The RG tool was developed in 2010 to re-grid main pollutants and PM on the SNAP 11 sector level. It is a tool for distributing resubmitted emissions using the given spatial distribution of the particular year.

⁶ For the grid update of heavy metals and POPs, CEIP used the latest available reported gridded national totals as a distribution pattern to distribute emissions reported for 2008.

⁷ Background information on the technical review process is described in ECE/EB.AIR/GE.1/2009/8.

8. In 2010, CEIP introduced a new system for online communication with Parties via the CEIP website. This system increases the efficiency by limiting e-mail communication and data exchange via Excel forms.

9. The findings of the stage 1 review were communicated to the national designated experts through the country-specific “status reports” by 23 March 2010. Countries were given the opportunity to react to the draft reports. The findings from the stage 2 review were included in “synthesis and assessment reports”, which were issued by 31 May 2010. After that date, countries were invited to provide comments and/or resubmissions 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 findings for the stage 1 and 2 reviews is summarized in the *CEIP and EEA⁸ Technical Review Report 2010* to be made available at www.emep.int.

10. CEIP also provides detailed information on an annual basis to the Implementation Committee on how the Parties to the Convention Protocols fulfil their reporting obligations. CEIP assessed the issue of compliance/non-compliance of Parties to the Protocols and provided the corresponding overview tables to the United Nations Economic Commission for Europe (UNECE) secretariat by 10 May 2010.

A. Status of reporting in 2010

11. In 2010, Parties⁹ were invited to submit data directly to CEIP or alternatively to post their data on the European Environment Agency (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 Azerbaijan, Croatia and Malta).

12. The improvement in data quantity has been an important priority for the work under the Convention in 2010 but it also requires considerable resources to compile the data and assess the quality of the reported data. CEIP is continuously improving the efficiency of data processing by adjusting and improving the existing system as well as implementing new software tools, but there will always remain a substantial amount of work which can not be automated.

13. *Timeliness*: Forty-two out of the fifty-one Parties to the Convention submitted inventories before 31 May 2010. Thirty-four Parties reported emission data by the due date of 15 February 2010, representing a significant increase compared with the 2009 reporting round in which 25 Parties reported emission data. Seventeen Parties resubmitted data. No data were provided by two Parties with mandatory reporting obligations, Luxembourg and Iceland.

14. In order to further improve the atmospheric monitoring and modelling under the Convention, it was important that complete emission inventories were also received from countries from which data were currently lacking or insufficient (Albania, Armenia, Bosnia and Herzegovina, Kazakhstan, San Marino, Turkey and the Asian part of the Russian Federation) (see graph showing Parties’ timeliness in reporting to the Convention in 2010 at: http://www.ceip.at/fileadmin/inhalte/emep/pdf/2010/Reporting_2010_Timeliness.pdf).

15. *Completeness/pollutants*: Forty-two Parties to the Convention submitted inventories but not all submissions contained all gases required by the Reporting Guidelines. Forty-one

⁸ European Environment Agency.

⁹ Unless otherwise noted, Parties in this report are considered as Parties to the Convention.

Parties (40 in 2009, 38 in 2008, 35 in 2007) reported their 2008 data of the main pollutants. Cadmium, mercury and lead emissions were provided by 34 Parties, additional heavy metals by 28, PM by 34 (33 in 2009, 31 in 2008) and priority POPs by 34 Parties (31 in 2008). Activity data were reported only by 31 Parties (16 in 2009) — 76 per cent from countries providing emissions (38 per cent in 2009).

16. *Completeness/time series:* A number of Parties to the Convention that submitted data¹⁰ in the 2010 reporting round did not provide complete time series in line with the current reporting requirements. Complete time series of the main pollutants in Nomenclature for Reporting (NFR) format for the years 1990–2008, which is the period relevant for the review of the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol), were reported by 24 Parties. Twenty-three Parties provided complete time series (1990–2008) of the main heavy metals. Ten Parties to protocols (Austria, Denmark, Finland, France, Italy, the Slovak Republic, Spain, Sweden, the United Kingdom of Great Britain and Northern Ireland and Canada) submitted in addition 1980–1989 time series. Twenty-three Parties reported requested time series of PM (2000–2008). Twenty-four Parties provided full time series (at least 1990–2008) of POPs. Ten Parties submitted only 2008 data. Trend tables with national total emissions can be downloaded from: <http://www.ceip.at/emission-data-webdab/submissions-under-clrtap/2010-submissions/>.

17. *Projections:* In 2010, 18 Parties (20 in 2009, 18 in 2008) submitted emission projections, out of which only 10 Parties (12 in 2009, 13 in 2008) provided data for 2020 and/or 2030 projections, although such projections should be reported under the Gothenburg Protocol (ratified by 22 Parties).

18. *Documentation:* The number of Informative Inventory Reports (IIRs) submitted (28) showed a slight increase compared with 2009 (25), i.e., 67 per cent of those reporting inventories also reported IIRs in 2010. However, many reports do not follow the IIR template and 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 Reporting Guidelines.¹¹ 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 (and closed) large emission sources, explanation of trends and the implementation of country specific methods/data be summarized in English.

19. *Format:* In 2010, Parties in general improved consistency of formats and increased the use of the NFR09 tables. However, a number of tables were submitted with errors. This led to the need for manually editing the submissions by CEIP prior to loading data onto the database. This work was demanding and may have led to errors. All experts designated by Parties are recommended to use RepDab to check their emission data prior to its submission.

¹⁰ Thirty-eight Parties to protocols as well as Azerbaijan, Georgia, Kyrgyzstan, Malta, Montenegro and Poland submitted the inventories in 2009.

¹¹ In particular, according to the Reporting Guidelines, Parties should submit IIR in one of UNECE official languages

20. *Emissions per capita/emissions per gross domestic product (GDP)*:¹² These indicators¹³ were calculated for all Parties which submitted national total emissions of main pollutants, PM, heavy metals and POPs by using information on populations and GDP available at the World Bank database. The results are presented in the 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 in trends or inconsistencies between Parties. This type of information provides reviewers with an indicator of potential problems when checking national inventories during stage 3 reviews.

21. *Gridded data and large point source (LPS) data*: Gridded data are part of the quinquennial reporting obligation and as such were not officially due in 2010. Nevertheless, nine Parties submitted gridded data and six Parties submitted LPS data. These data were checked with respect to their format, internal consistency and completeness. To improve the quality of environmental assessment, modellers require gridded emissions in finer resolution (10x10km or 20x20km) in geographical coordinates and a more detailed sector split (20 Gridding NFR (GNFR) categories). This increases the volume of processed data by one order of magnitude.

22. Detailed information on timeliness, completeness, consistency, transparency, recalculations, key category analyses and inventory comparisons are published in individual country reports (stage 1 and 2) on the CEIP website <http://www.ceip.at/review-process/review-2010/review-results-2010/>. In addition, CEIP, in cooperation with EEA, will be producing an annual inventory overview covering the results of the stage 1 and 2 reviews in a technical report, *Inventory review 2010*.

II. Stage 3 in-depth review

23. The stage 3 review is an in-depth review of inventories from selected Parties, by pollutant, country and sector. The stage 3 in-depth review is conducted by an expert review team (ERT) that meets once a year in a centralized location to review the inventories of up to 10 Parties. The purpose is to complement the Reporting Guidelines in supporting Parties in compiling and submitting high quality inventories, to assess whether Parties are meeting their obligations under the protocols, and to increase confidence in the data used for air pollution modelling. The aim is to conduct a stage 3 review for every Party¹⁴ at least once in a 5-year period. This objective requires an in-depth review of about 10 Parties every year. Resources are required from the ERT, the reviewed Parties and CEIP.

24. As defined in the Methods and Procedures for Review (ECE/EB.AIR/GE.1/2007/16), submission of an IIR is a prerequisite for a Party to be selected for the stage 3 in-depth review. The purpose of the IIR is to transparently document the submitted data, providing an explanation of methods used, relevant activity data, key assumptions and providing reasons for trends and changes therein.

25. Fifteen Parties¹⁵ (Austria, the Czech Republic, Denmark, the European Union (EU), Finland, France, Germany, Italy, Ireland, Kazakhstan, Latvia, Norway, the Netherlands, Sweden, Switzerland and the United Kingdom) accepted the invitation from the Convention

¹² This information is available at http://www.ceip.at/fileadmin/inhalte/emep/pdf/2010/Emissions_per_capita_GDP_2010.pdf.

¹³ Inclusion of these new tests was recommended by the Task Force expert panel on review.

¹⁴ Participation of the United States of America and Canada in the inventory in-depth review process is to be discussed.

¹⁵ Eleven Parties nominated inventory experts to the roster before 2009 and an additional four Parties nominated experts in 2010.

Secretariat for Parties to nominate expert reviewers for the ERT. These Parties nominated a total of 49 inventory experts to the roster. The nominated experts are suitably qualified to review all emission sectors and general inventory issues (good practice, uncertainties, quality assurance/quality control, etc.).

A. 2008 stage 3 in-depth review

26. The 2008 stage 3 in-depth review took place at EEA in Copenhagen (6–10 October 2008) and covered four volunteering Parties: France, Norway, Portugal and Sweden. This review can be accessed at <http://www.ceip.at/review-process/review-2008/>.

B. 2009 stage 3 in-depth review

27. The 2009 stage 3 in-depth review took place at EEA in Copenhagen (22–26 June 2009) and covered 10 Parties approved by the Executive Body Bureau: Belgium, Bulgaria, Denmark, Hungary, Finland, Ireland, Latvia, Lithuania, Poland and Spain. Sixteen experts (one from Austria, two from Denmark, one from the EU, four from France, three from Germany, one from the Netherlands, two from Sweden and two from the United Kingdom) in two ERTs¹⁶ reviewed the inventories of the 10 Parties. This review can be accessed at <http://www.ceip.at/review-process/review-2009/>.

28. Both prior to and during the 2009 stage 3 in-depth review meeting, the ERTs identified a number of questions that were communicated to Parties. CEIP prepared and distributed technical materials to the expert review teams in advance of the stage 3 in-depth review. In cooperation with the EEA European Topic Centre on Air and Climate Change (ETC-ACC), CEIP developed templates for review reports, review transcripts and guidelines for reviewers to ensure a consistent approach. The 2008 and 2009 reviews indicated that the review guidelines and templates used by the ERTs generally provided a good basis for review and enabled a consistent approach to be taken across countries. Before the 2010 review, the templates will be updated where relevant to be consistent with the Convention's Reporting Guidelines. CEIP also undertakes responsibility for communication with the Parties. Good communication between the ERTs and the Parties is considered critical for the success of the process.

C. 2010 stage 3 in-depth review

29. The 2010 stage 3 in-depth review is planned for 20–25 June 2010 at EEA in Copenhagen. Ten countries (Austria, Cyprus, Germany, Italy, the Netherlands, Romania, the Russian Federation, Slovakia, Switzerland and the United Kingdom) will be reviewed. Fifteen experts¹⁷ from 11 countries (one each from Austria, the Czech Republic and the EU, three from France, two from Germany, and one each from Ireland, Italy, Kazakhstan, Netherlands, Norway, Switzerland and the United Kingdom) accepted the invitation to the ERT for 2010.

30. It is estimated that members of the expert review team dedicate around 10–15 days for preparation, participation in the week-long stage 3 in-depth review meeting and follow-up activities, including finalizing the review reports.

¹⁶ One expert review team can review up to five Parties.

¹⁷ EEA supports the stage 3 review by covering travel expenses of two experts (from Kazakhstan and the Czech Republic.)

31. The table below presents a proposed schedule for stage 3 in-depth reviews of Parties from 2011–2013 for consideration by the EMEP Steering Body at its thirty-fourth session (13–15 September 2010) and for subsequent submission to the Convention’s Executive Body at its twenty-seventh session (14–17 December 2010).

Proposed Time schedule¹⁸ for future stage 3 in-depth reviews of Parties

| | |
|------|---|
| 2011 | Czech Republic, Belarus,* Croatia, Estonia,* Greece,* Iceland,* Luxembourg,* Malta,* Slovenia and Ukraine* |
| 2012 | Georgia,** European Union, Kyrgyzstan,* Kazakhstan,** Liechtenstein,* Serbia,* the former Yugoslav Republic of Macedonia, the Republic of Moldova,* Monaco,* and Turkey** |
| 2013 | Albania,** Armenia,** Azerbaijan,* Bosnia and Herzegovina,** Montenegro,** France, Norway, Portugal and Sweden |

* Country did not submit complete inventory and/or did not submit an IIR in the 2008 and 2009 reporting rounds.

** Country submitted neither inventory data nor an IIR in the last three reporting rounds.

III. Conclusions

A. Status of reporting

32. *Timeliness*: In 2010, there was a significant increase in submission of reporting data by the Parties by the 15 February deadline as compared with the 2009 reporting round.

33. *Completeness*: The completeness of information on the main pollutants, main heavy metals, and PM emissions is reasonable for the European region, but information provided to EMEP/CEIP covers less than 50 per cent of the extended EMEP area. EMEP should consider options to further increase awareness in the countries of Eastern Europe, the Caucasus and Central Asia, Turkey and the Balkan countries to improve their reporting of emission data in the near future.

34. *Gridded data and LPS*: Information reported to EMEP/CEIP on gridded and LPS data is rather limited in spite of the fact that such information is in many cases available at country¹⁹ level. Parties are invited to improve completeness of LPS reporting, as complete and consistent information submitted to CEIP will be critical for the quality of emission distribution in a new gridding system. A new “gridding system” should be developed that can process more detailed emissions and provide data in finer resolution from 2012 onwards. Such a system should be more flexible and reflect the needs of modellers. This would increase the robustness of gridded emissions. EMEP may wish to consider allocating resources to cover this important activity.

35. CEIP appreciates the effort to submit emission information from new Parties to the Convention (Kyrgyzstan, Azerbaijan, Georgia and Montenegro). At the same time,

¹⁸ The 2011–2013 plan can be revised at the 2010 EMEP Steering Body Bureau meeting if listed Parties do not report required information.

¹⁹ E.g., information on facilities reported by countries under the European Pollutant Release and Transfer Register or the EU Integrated Pollution Prevention and Control (IPPC) and LCP Directives.

countries such as Kazakhstan, Turkey and the Asian part of the Russian Federation have not reported emission data to EMEP within the last five years. Increased support to emission experts in the region will assist designated emission experts with reporting of more complex data in the EMEP standard formats.

B. Stage 3 in-depth review

36. Parties clearly recognize the value of the review process in terms of improving the quality of their national inventories, but difficulties were encountered in establishing the two ERTs²⁰ for the stage 3 in-depth review in 2010. As a result, the ERTs can only focus on the key emission sources of the main pollutants (NO_x, SO_x, CO, NH₃, NMVOC and PM). The submitted heavy metals and POPs data can probably not be reviewed in 2010.

37. One of the key constraints for the stage 3 in-depth review is the limited number of nominations to the roster of review experts. A pool of 49 experts is not sufficient for a sustainable review process. Each year a subset of these experts cannot accept the invitation due to technical reasons or unavailable resources (in 2010, 20 reviewers could not accept the invitation). The number of experts in the roster would have to be increased in order to ensure that the stage 3 in-depth review can be completed in full scope. EMEP may wish to consider how best to financially support²¹ participation of experts from Eastern Europe, the Caucasus and Central Asia and Balkan countries in the review process.

38. To increase efficiency, consistency and sustainability of the review process EMEP may wish to consider support of other activities:

- (a) Further development of review tools (e.g., data tools/locator tools/implicit emission factors);
- (b) Support participation of the Chair of the Task Force on Emission Inventories and Projections in the stage 3 review;
- (c) Further development of the review guidelines and templates;
- (d) Organizing training for review experts (online and/or training workshop); and
- (e) Organizing training and an emissions workshop for the countries in Eastern Europe, the Caucasus and Central Asia, Turkey and Balkan countries.

²⁰ Only 15 Parties (out of 51) nominated experts (altogether 48 experts were nominated). Only 15 experts accepted the invitation for the 2010 review round, therefore it was not possible to frame review teams with eight sectoral experts plus two lead reviewers as planned.

²¹ In 2010, EEA covered travel costs of two experts (from Kazakhstan and the Czech Republic) to enable their participation in stage 3 review.