Progress in emission inventories

Status of reporting under CLRTAP 2016

Review of inventories

Emission data for modelers

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SB meeting, Sept 2016, Geneva
Key deliverables
items 1.1.1.21, 1.1.2.1-1.1.2.7, 1.1.7, 1.3.1, 1.4.1 - 1.4.4 1.7.1. and 3.1 of EMEP WP 2016-2017 (ECE/EB.AIR/133/Add.1).

- CEIP participated at Joint Workshop between AMAP and LRTAP bodies on condensables in Feb 2016.
- CEIP informed EMEP Bureau (March) meeting on the progress and plans for 2016.
- Submissions/resubmissions of 46 Parties have been collected and imported to the WebDab database (http://www.ceip.at/webdab-emission-database/officially-reported-emission-data). Relevant datasets have been published at the CEIP website as well.
- Technical review of inventories: Two rounds have been completed; country reports have been posted on the CEIP website 30 March, resp. 3 May 2016. Summary information was presented at the TFEIP/EIONET meeting in Zagreb. IIR awards were conferred to the Parties during this meeting as well.
- Chapter for the Joint MSC-W & CCC & CEIP status report 1/2016 "Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components" have been drafted and provided to MSC-W, (see http://emep.int/publ/common_publications.html).
- Overview tables for the implementation committee on the status of reporting were updated in March, May and June and provided to the UNECE secretariat.
- The information on status of Parties' reporting in real time is provided at http://www.ceip.at/status_reporting/2016_submissions.
- CEIP website is regularly updated to reflect changes in reporting requirements and status of data (http://www.ceip.at).
- CEIP compiled status report fro EMEP SB meeting: Present state of emission data, review process and new gridding system (ECE/EB.AIR/GE.1/2016/7-ECE/EB.AIR/WG.1/2016/15).
- CEIP provided permanent online assistance to countries, public and modelers.
- In depth review of 10 countries was organised from April to June. Review meeting was organised 20 -24 June 2016 in cooperation with the EEA. Data for the reviewers have been prepared and published at a password protected website and wiki.
- CEIP organised and supported the review of new adjustment applications submitted by 2 countries in 2016 along with the review of 7 applications approved in 2014 and 2015. The adjustment status report was provided to EMEP SB.
- Gap-filled and gridded emission data 2014 were distributed to the modellers and are publicly accessible since June 2016 on the CEIP website.
Review of reported data

• All submitted inventories have been reviewed (S1 & S2)
• Tests improved, Methodology report updated
• Findings provided in S1 and S2 country reports and in http://www.ceip.at/ms/review_results/review_results_2016/
• CEIP Technical report 1/2106

• In depth review 2016 (S3): 10 countries
• All 10 country reports completed by ERT
• 2 ERTs / 22 reviewers (including adjustment review)

• Roster of experts: 23 countries / 91 experts (12 left)
In 2008, the first year in which the annual inventory review took place, 30 Parties reported CLRTAP data, this number rose to 46 in 2016 (90%).

66% of the Parties submitted an Informative Inventory Report (IIR) with their CLRTAP submission in 2008 and 76% in 2016.
# Status of reporting 2016

|               | AL | AM | AT | AZ | BA | BE | BG | BY | CA | CH | CY | CZ | DE | DK | EE | ES | EU | FI | FR | GB | GE | GR | HR | HU | IE |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| **Timeliness**| ☒  | ☒  | ☒  | ☐  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |
| **Completeness** | ☒  | ☒  | ☒  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  | ☐  |
| **IIR** | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |
| **Projections** | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |
| **LPS** | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |
| **Gridded data** | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |
| **NECD** | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |
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| **Completeness** | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  | ☒  |

**Timeliness:** green – submission within deadline, yellow – submission after deadline, red – no submission; empty – no obligations towards NECD

**Completeness (NECD):** green – reported all 4 pollutants; empty – no obligations towards NECD

**Completeness (CLRTAP):** green – full mandatory + activity data all years; yellow – up to ca. 80% mandatory (i.e. 10 of 13) (or all mandatory but not all years and/or no activity data); Red – below 80% mandatory

**IIR (CLRTAP):** green – IIR submitted, structure and content correlate to the template; yellow – IIR submitted, structure and content not like the template; red – no IIR submitted

**Projections (CLRTAP):** green – min. 2020, 2025, 2030 reported; yellow – min. one year reported; red – no projections submitted

**Gridded and LPS data:** green – at least 2010 data reported in 2012 in the required format; yellow – incomplete reporting and/or reported after the reporting year 2012; red – none reported
Completeness of CLRTAP submissions
EMEP West area/ EMEP East area

Based on information provided in the individual cells of the reporting tables
Reporting of pollutants and AD
Black Carbon (BC) emissions

- **BC** / carbonaceous particulate matter that absorbs light reported for the first time in 2015
- From 28 countries reporting BC, 23 submitted time series from 2000 onwards, 13 submitted complete time series 1990/2014
- Compared with 2000, 18 countries reported a decrease of emissions and 5 reported an increase
Black Carbon (BC) emissions cont.

Example: Contribution of GNFR sectors to national totals, BC emissions in 2014 (based on reported data)

Road + off road transport (diesel machines) with residential combustion followed by industry seem to be the most important sources of BC
KC emission trends in EMEP area, examples
Uncertainty assessment (in progress)

- reported by countries
- by comparison of Convention data with emission data from other sources
- assessment of recalculations

- Not many parties do provide uncertainty assessment/ quantification
- 16 of the 47 analysed Parties provided quantitative uncertainty estimates of national total NO\textsubscript{x} and SO\textsubscript{x} emissions in 2015
- Uncertainty estimates reported by parties have a big range e.g. the reported uncertainty estimates for NOx ranged from 8.7% (France) to 61.7% (Latvia)
- Considerable recalculations (>5% or <-5%) occur frequently
- Recalculations indicate that some inventories are rather uncertain and that sometimes the indicated uncertainty estimates seem to optimistic
- Comparison of Convention data with ECLIPSE V data (provided by IIASA) gives a further indication of the uncertainty of reported inventory data
- The comparison showed a good match for the EMEP-west region but considerable differences for the EMEP-EAST region (e.g. 2% (EMEP-west and 44% (EMEP-east) for total NO\textsubscript{x} emissions in the year 2005)
- The analysis of this data is on-going (comparison of sectoral estimates, analysis of possible reasons/explanations for differences)
- Comparison of Convention data with emission data from other sources planned
Recalculations > 30% in 2005, 2010

Notes:
M – change in methodology
AD – updated activity data
error – error
EF – change to emission factor
C – correction
EMEP/CEIP emissions compared with data received from TFMM
Total emission changes (Gg) between 2013 and 2014 in the EMEP area, located in the individual SNAP sectors

Changes in individual countries between 2013 and 2014 (shown are only changes larger than 15 %)
In-depth review (S3)

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Note: **Red font** – no data within last 3 years
* no IIR in 2016
yellow background - update to previous version

http://www.ceip.at/review_process/stage3_review_ae/
In-depth review (S3)

- History: 2 cycles
  - 2008 - 2013, 44 countries reviewed
  - 2014 – 2017 (2018); 37 countries until 2016

- System is resource demanding
  - Management (set-up of review teams, communication with Parties,...)
  - Website and DB (data for reviewers)
  - Country reports (proofreading, editing,...)
  - ERTs (about 20-22 reviewers a year needed)
  - Reporting requirements does not support review process (e.g. AD, EFS not in standardised formats)

- CLRTAP inventories are not always considered priority in Parties – limited resources for improvements

- Modification of review process after 2018?

http://www.ceip.at/review_process/stage3_review_ae/
New gridding system

Expert estimates, gridding
New gridding system (0.1 x 0.1 long lat)

- System developed
- Testing and documentation of the new gridding system is progressing, report planned by the end of 2016

Challenges
- Data control
- Expert estimates
- Update of distribution patterns
- Recalculation of historical data?
- Reporting of countries starts 2017
- Comparisons of old/new distributions
- Comparisons with other data sets (ECLIPSE, JRC, Copernicus...)
Completeness of gridded emissions

Independent of the reporting year, 31 Parties (out of 49) reported sectoral gridded emissions for the year 2010.
HM and POPs 2016 – joint report with MSC-e

- Gridded data for 3 HMs (mercury, lead and cadmium) and 6 POPs (dioxins and furans, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k) fluoranthene, indeno(1,2,3-cd) pyrene and hexachlorobenzene).

- All PAH compounds were gap-filled and gridded separately instead of providing only the aggregated PAH.

- Expert estimates and gridding of HMs and POPs was performed for GNFR14 sector level comparing to national total level used in previous years.

- This increased the amount on national total level in sector level in 2015.
Comparisons of gridded emissions in 50x50 km² and 0.1° x 0.1° long/lat resolution

Example of the expert view catalogue; on the left the 50x50 km² grid; on the right the 0.1° x 0.1° grid

a) Pollutant, reporting year, year of gridding and the corresponding number of the sheet lines

- Report in progress
WPlan 2016 – priorities 2017

• The work extended, CEIP resources partly reduced
  o Assessment of uncertainties,
  o improved expert estimates, particularly for HMs and POPs,
  o QA/QC of gridded data, improve distribution, (gridding of BC)
  o Interactive presentation of data
  o Gridding (0.1x0.1) of selected historical years?

• Compliance, Adjustment review?

• Emerging issues
  o a) support to Parties in gridding emissions in the new, finer resolution EMEP grid with a focus on emissions of elemental/black carbon; (1.1.2.2)
  o b) treatment of condensable and semi volatile organic compounds in emission inventories; (1.1.1.21)
  o c) update to the EMEP/EEA air pollutant emission inventory guidebook, in particular, with respect to a) and b)