Convention on Long-range Transboundary Air Pollution

emep

*Co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe*

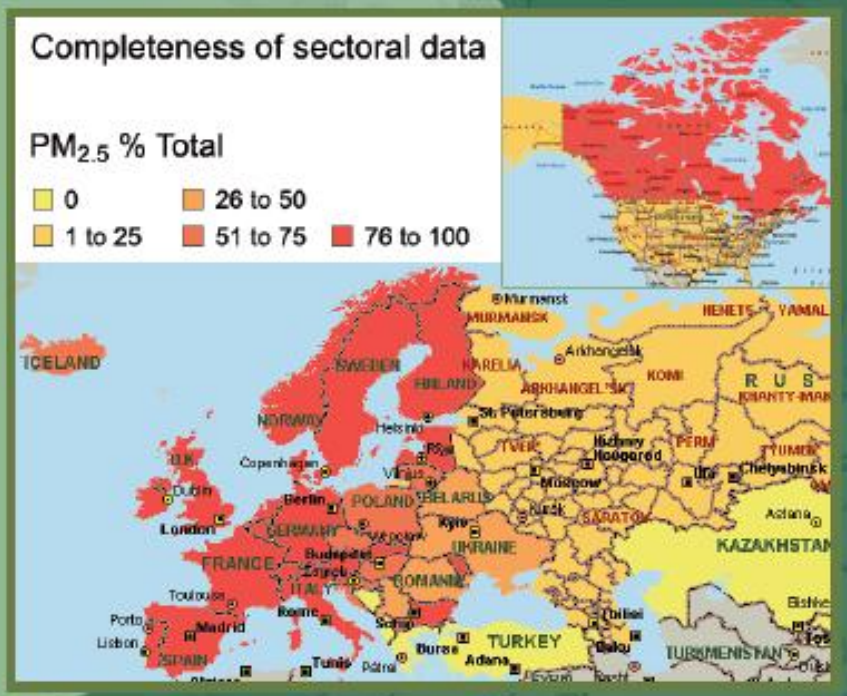
TECHNICAL REPORT CEIP 1/2008

# Inventory Review 2008

## Emission Data reported under the LRTAP Convention and NEC Directive

## Stage 1 and 2 review

## Status of gridded data





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European Environment Agency & CEIP

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# EXECUTIVE SUMMARY

The technical review of national inventories checks and assesses Parties' data submissions with a view to improving the quality of emission data and associated information reported to the Convention on Long Range Transport of Air Pollution (CLRTAP). Another objective of the review is that for reporting under the Convention and for other organisations with similar interests, such as the United Nations Framework Convention on Climate Change (UNFCCC) and the European Union's National Emission Ceilings Directive (NECD), a common approach to prioritising and monitoring inventory improvements is achieved. The review process over the past years has also facilitated the identification of a number of inventory-related issues and improvements have subsequently been implemented. 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 Projections (TFEIP) and is seen by Parties as valuable for the improvement of their national emission inventories.

Parties to the CLRTAP submit air pollutant emission data ($SO_x$, $NO_x$, NMVOCs, $NH_3$, CO, HMs, POPs and PM) annually to the Centre on Emission Inventories and Projections (CEIP) and notify the CLRTAP Secretariat thereof. The deadline for the submission of 2006 data was 15 February 2008. Parties are requested to report emission inventory data using standard formats in accordance with the EMEP reporting guidelines (UNECE, 2003).

The European Union (EU) Member States (MS) also report their emissions of $SO_2$, $NO_x$, NMVOCs and $NH_3$ under the NECD [(1)] and emissions of $NO_x$, CO, NMVOCs and $SO_2$ under the EU Greenhouse Gas Monitoring Mechanism (EU-MM) [(2)].

The review process of these inventories is carried out in three stages. At each stage, national experts have the opportunity to clarify issues or provide additional information. In previous years, the stage 1 and stage 2 test results were combined in a single report. This year, in order to better reflect the review process as defined in the 'Methods and procedures' document, a separate Status report (stage 1) and Synthesis and Assessment report (stage 2) have been produced. Additions to the review stage 1 and stage 2 compared to previous years are described at the beginning of the appropriate chapters and include new indicators like emission per capita and emission per GDP for all Parties submitting data.

Data submitted by Parties during the 2008 reporting round has been made publicly available on the newly released CEIP webpage:
http://www.ceip.at/emission-data-webdab/2008-submissions-under-clrtap/.
In addition, the officially reported emission data submissions were made available on the CEIP website on 15 June 2008
(http://www.ceip.at/emission-data-webdab/emission-as-reported-by-parties/).

(1) Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, *Official journal of the European Communities* L309, 27.11.2001, p. 22.

(2) Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, *Official journal of the European Communities* L49, 19.02.2004, p. 1.

### Timeliness

Thirty-eight Parties (from 51) to the Convention submitted inventories before 31 May 2008. Of these Parties, 30 reported emission data by the due date of 15 February 2008, representing an increase of two compared with the 2007 reporting round. Figure 1 (see chapter 2.1.1) indicates that 59 % of Parties reported on time and that a further eight Parties submitted data before 31 May 2008, increasing the number of submissions to 75 %. This is again an increase compared with last year and represents the highest number of submissions in the history of the Convention[3]. Eleven Parties to the Convention did not submit any data in 2008 (Appendix 1 Table 6a).

Nineteen of the EU-27 Member States provided inventories under the NECD by the required reporting deadline of 31 December 2007, compared to 16 MS submissions in the previous cycle. An additional seven MS submitted inventories before 30 April 2008[4].

### Completeness of reporting

In this 2008 reporting round, 11 Parties (from 39 Parties reporting) submitted only 2006 data. 17 Parties reported emission data for all pollutants or a significant amount of data from 1990 onwards. Additionally, seven Parties (Austria, Denmark, Finland, France, Italy, Sweden and United Kingdom) submitted 1980-2006 time series. Reporting of particulate matter ($PM_{2.5}$, $PM_{10}$) began in 2000, and this year 21 Parties reported the full time series of 2000-2006.

Under the NECD, 26 MS provided the obligatory 2005 final emissions (except Greece) and 27 MS submitted 2006 preliminary emission data. Greece did not report $NH_3$ emissions, neither for 2005 nor for 2006. Updated 2010 projections were not provided by two MS (Hungary and Luxembourg).

### Format

Parties and Member States report in the requested NFR format, but about 50 % alter the reporting templates. The reporting of information in non-standard formats greatly increases the difficulties associated with data processing and analysis and in addition manual editing might introduce errors. Countries are encouraged to use the initial quality control tool, REPDAB, to check their emission data upon submission.

### Transparency

Transparency of reporting under the CLRTAP slightly increased compared to 2007. Twenty-six Parties (66 % of those reporting inventories) submitted an Informative Inventory Report (IIR) in conjunction with their 2008 CLRTAP submissions. Provision of an IIR is essential for an efficient centralised stage 3 review. There is no obligation under the NECD for Member States to submit a report explaining the submitted inventories.

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[3] The European Community submitted CLRTAP inventory data on 10 June and Iceland on 26 June. It was not possible to include these late submissions in the review process and subsequently these data are not reflected in the figures and tables in this report

[4] Luxembourg submitted NECD inventory data in July and it was not possible to include these late submission in the review process.

## Recalculations

The number of countries reporting data both in 2007 and in 2008 was 37 (73 % of all Parties). More than half of these countries (23) recalculated some of their data in 2008. NMVOC is the pollutant for which most recalculations were reported, followed by CO, $SO_x$, $NO_x$, Cd, Pb and $NH_3$.

Only 11 % of all recalculations performed were higher than +-10 % in magnitude. Large recalculations were most frequently observed for HCB, DIOX and Pb emissions. From these results it can be concluded that the emissions of main pollutants might be considered more accurate than of other pollutants. Large POPs recalculations indicate higher uncertainty levels of these emissions.

There is evidence that only a few Parties seem to recalculate their emissions across the whole time series, even though this is essential for obtaining consistent emission trends. The reported recalculations of NECD inventories were in general minor for all four components, with a few exceptions observed for $NO_x$ and NMVOC.

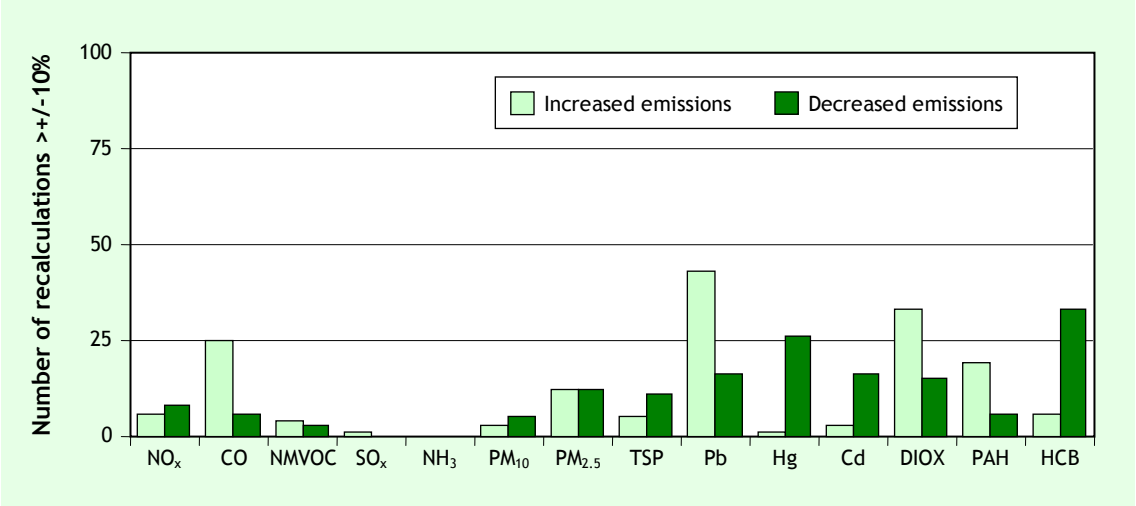



***Figure S1: Number of recalculations in 2008 per component and emission increase/decrease for recalculation ± 10 %.***

## Key category analysis

The results of the KCA (based on the top seven categories for each pollutant) show that *1A3b Road Transportation* is within the top seven source categories for all pollutants except $SO_x$ and $NH_3$, being the most important key category for $NO_x$ and CO and the second most significant source of NMVOC, $PM_{10}$ and $PM_{2.5}$ emissions. *1A1a Public Electricity and Heat Production* is responsible for a significant fraction of $NO_x$ and $SO_x$ emissions, and in Eastern Europe additionally for CO and $PM_{10}$, while *1A2 Manufacturing Industries and Construction* contributes significantly to $NO_x$, CO, $SO_x$ and $PM_{2.5}$ emissions. *1A4b Residential* is the most significant key source for $PM_{10}$ and $PM_{2.5}$ emissions, the second most significant source for CO and important also for NMVOC and $SO_x$ emissions.*4B Manure Management* is the dominant source of $NH_3$ emissions.

The distribution of key categories identified for Eastern and Western Europe is comparable. Some differences such as the higher share of transport in emissions in Western Europe and high sulphur emissions from *1A1a Public Electricity and Heat Production* in Eastern Europe look reasonable, but for example relatively high emissions of $NH_3$ in *waste treatment* in Eastern Europe would require more detailed analysis to be explained. However, this goes beyond the scope of this report.

## Inventory comparison

Performing a comparison of national totals from different inventory submissions is relatively simple and immediately shows potential inconsistencies between inventories. A summary of results showing the EU-27[5] comparison performed between officially reported data to the NECD, CLRTAP and UNFCCC for 1990 and the most recent reporting year (2006) is given in Appendix 5. Differences larger than 0.1 % between emission data submitted under the CLRTAP and under the NECD were found for 11 countries out of the 27 Parties assessed. Differences under the UNFCCC in the respective 1990 and 2006 inventories were found for 18 out of the 31 Parties assessed (Figure S2). Reasons for differences between emissions reported under the CLRTAP, NECD and the UNFCCC are diverse and may occur due to different reporting requirements (Table 1), improvements made to inventories due to different reporting dates and errors in reporting.

[5] Luxembourg and Italy did not communicate 2005 data to the LRTAP Convention, whereas Greece submitted it too late to be included in the testing.

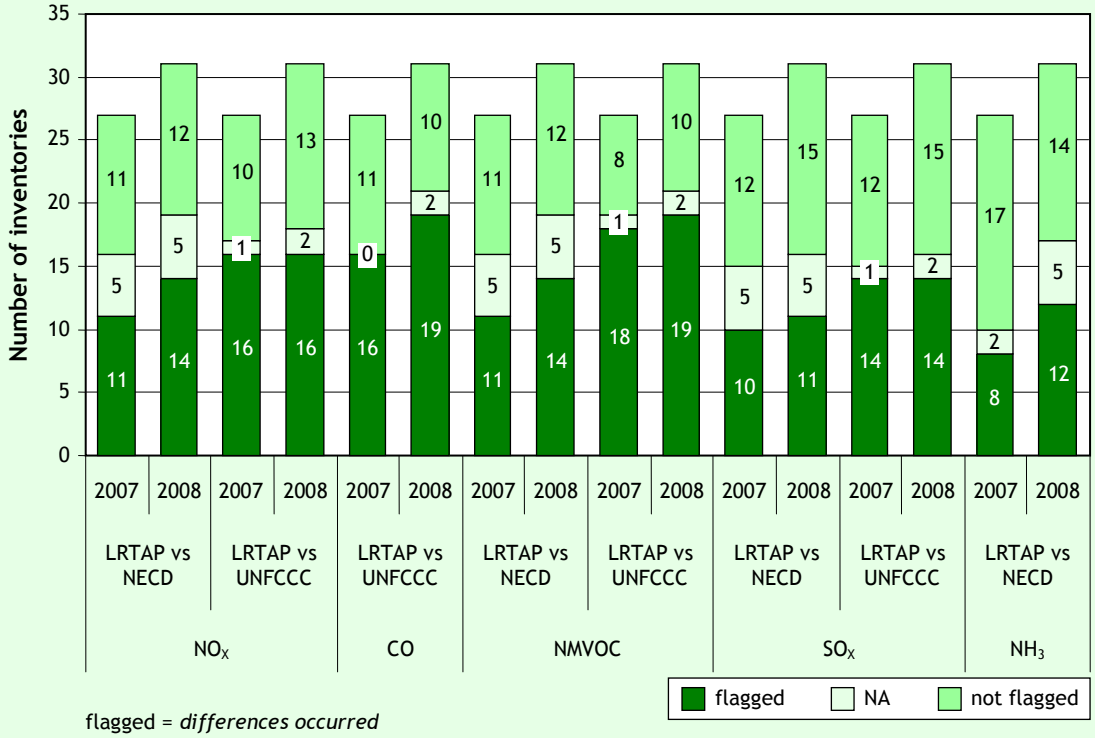



***Figure S2: Overview of differences between 2006 and 2005 inventories submitted under the CLRTAP and UNFCCC.***

## Implied emission factors

A total of 256 IEF-related questions were raised in this year's country reports. Most outliers were found within the Energy Sector. Fewer outliers occurred in the Agriculture, Waste and Solvents sectors, but it must be taken into account that for these sectors the number of tests undertaken was much lower. Industrial processes are not included in the IEF analysis, because it is not possible to aggregate activity data to the level at which tests are undertaken.

In the 2008 review round the number of outliers flagged by experts was higher than in 2007 for all countries, except for the Czech Republic, Estonia, Malta, Romania, Slovakia and Latvia where it remained the same and for France, for which no outlier was flagged for any year. Norway's and Switzerland's inventories were included in the IEF tests for the first time.

## Emissions per capita and emissions per GDP

For the first time new indicators (emissions per capita and emissions per GDP) were calculated for all Parties which submitted national total emissions of main pollutants and PM to CEIP. Outliers could indicate differences in national economies, but also inconsistencies of trends or among Parties. This type of information will serve reviewers during the stage 3 review process as an indicator of potential problems when checking national inventories.

### Gridded data in EMEP models

Gridded data and projections are part of the five yearly 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; Spain for 1990 to 2006; Lithuania and Finland submitted gridded data for the year 2006 Figure 4. CEIP also imported late 2007 submissions of 2005 gridded data for the European Community and Croatia into the system. Based on this new grid data CEIP calculated the new spatial distribution of the emissions in the EMEP grid.

The availability of 2005 gridded sector data used for EMEP modelling improved considerably compared to 2000 gridded sectoral data used before. The increase in reporting of gridded sector data is appreciated, however EMEP is still required to perform spatial distribution of emissions for more than 50 % of Europe by applying its own methods.

# 1 INTRODUCTION

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 Projections and is seen by Parties as valuable for the improvement of their national emission inventories. The technical review of national inventories checks and assesses Parties' data submissions with a view to improving the quality of emission data and associated information reported to the Convention. Another objective of the review is that for reporting under the Convention and for other organisations with similar interests, such as the United Nations Framework Convention on Climate Change (UNFCCC) and the European Union's National Emission Ceilings Directive (NECD), a common approach to prioritising and monitoring inventory improvements is achieved. The review process over the past years has also facilitated the identification of a number of inventory-related issues and improvements have subsequently been implemented[6].

This report has been prepared by the European Monitoring and Evaluation Programme (EMEP) Centre on Emission Inventories and Projections (CEIP)[7], in cooperation with the European Environment Agency (EEA). The report reflects progress in emission reporting under the Convention in the 2008 reporting round and emission reporting under the NECD. It summarises the main conclusions of the annual stage 1 and stage 2 reviews of emission data focusing on future challenges in improving the quality of emission data reported under the Convention and the NECD.

Preliminary results from the 2008 review process were discussed at the joint meeting of the Task Force on Emission Inventories and Projections (TFEIP) and the European Environment Information and Observation Network (EIONET) in Tallinn, Estonia (27-28 May 2008). Based on these discussions, some of the tests will be further revised, removed or substituted in the future.

## 1.1 Reporting obligations

Parties to the CLRTAP submit air pollutant emission data annually to the CEIP and notify the CLRTAP Secretariat thereof. In particular, in 2008 Parties were requested to report emission data on $SO_x$, $NO_x$, NMVOCs, $NH_3$, CO, HMs, POPs and PM. The deadline for submission of 2006 data was 15 February 2008. A summary of the reporting obligations can be downloaded from the CEIP website[8]. Parties to the Convention are requested to report emission inventory data using the nomenclature for reporting (NFR) templates in accordance with the EMEP reporting guidelines (UNECE, 2003) and as subsequently amended by the TFEIP and endorsed by the EMEP Steering Body. Submissions should consist of both quantitative and qualitative information. Qualitative data, including description of methodologies, can be included in the voluntary informative inventory reports (IIR).

[6] For example, through revision of the current Emission Reporting Guidelines, the update of the EMEP/CORINAIR Guidebook and the extension of the Nomenclature For Reporting (NFR) to accommodate more detailed reporting of Persistent Organic Pollutants (POPs), Heavy Metals (HMs), Particulate Matter (PM) and Non-Methane Volatile Organic Compounds (NMVOCs).

[7] (CEIP) was established by Austria's Federal Environment Agency (Umweltbundesamt) in December 2007

[8] http://www.emep-emissions.at/reporting-instructions/

The European Union (EU) Member States also report their emissions of $SO_2$, $NO_x$, NMVOCs and $NH_3$ under the NEC Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants (NECD)[9], and emissions of $NO_x$, CO, NMVOCs and $SO_2$ under the EU Greenhouse Gas Monitoring Mechanism (EU-MM)[10]. This information should also be copied by Member States to the EEA's Eionet Reportnet Central Data Repository (CDR)[11].

The three reporting obligations differ in the number and type of air pollutants, the geographical coverage of countries (for example, France, Spain, Portugal and the UK) and the inclusion of domestic and international aviation and navigation in the national total, but for most countries the differences are minimal. The CLRTAP and UNFCCC emission inventories also differ slightly in the sector split.

***Table 1: Major differences between the reporting obligations under the CLRTAP, NECD and the UNFCCC.***

| | CLRTAP (NFR) | NECD | EU-MM (CRF) |
|---|---|---|---|
| Domestic aviation (LTO) | Included in national total | *Included in national total* | Included in national total |
| Domestic aviation (Cruise) | Included in national total | *Not included in national total* | Included in national total |
| International aviation (LTO) | *Not included in national total* | Included in national total | *Not included in national total* |
| International aviation (Cruise) | *Not included in national total* | *Not included in national total* | *Not included in national total* |
| International navigation on rivers | *Not included in national total* | Included in national total | *Not included in national total* |
| International marine | *Not included in national total* | *Not included in national total* | *Not included in national total* |
| Road transport | Calculations based on fuel sold or used | Calculations based on fuel sold or used | Calculations based on fuel sold |

Parties are requested to check their submissions for correct formatting, internal consistency and completeness before transmitting them to the CEIP secretariat for reviews. To facilitate this task, the latest update of the electronic data-checking tool, REPDAB, including key source analysis and trend plots, was made available to Parties at:
http://www.ceip.at/reporting-instructions/repdab/.

[9] Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, *Official journal of the European Communities* L309, 27.11.2001, p. 22.

[10] Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, *Official journal of the European Communities* L49, 19.02.2004, p. 1.

[11] http://cdr.eionet.europa.eu

## 1.2 Review process

The joint technical review is carried out by EMEP and the EEA. It is performed in accordance with the methods and procedures for the technical review of air pollutant emission inventories endorsed by the Executive Body of the CLRTAP at its 31th session in December 2007 (UNECE, 2007). The review has been performed in line with the 2008 workplan of the Convention (ECE/EB.AIR/GE.1/2007/10).

The process is carried out in three stages. At each stage, national experts have the opportunity to clarify issues or provide additional information. They may also express their views at meetings of the Task Force on Emission Inventories and Projections. The detailed review workplan is prepared annually in cooperation with the EEA and the TFEIP Expert Panel on Review.

As of 2008 the technical review of inventories is being carried out in the following three stages:

- *Stage 1:* An initial check of submissions for timeliness and completeness;
- *Stage 2:* A synthesis and assessment of all national submissions with respect to consistency and comparability of data with recommendations for data quality improvement;
- *Stage 3:* In-depth reviews of selected countries' inventories, by pollutant and sector, according to the workplan agreed by the Executive Body.

In previous years, stage 1 and stage 2 test results were combined in a single report. This year, in order to better reflect the review process as defined in the 'Methods and procedures' document (UNECE, 2007), separate Status reports (Stage 1) and Synthesis and Assessment reports (stage 2) have been produced. Additions to the review stage 1 and stage 2 are described at the beginning of the appropriate chapters and include, for example, new indicators such as emissions per capita and emissions per GDP for all Parties submitting data.

## 1.3 Accessibility of emission data

The 2008 stage 1 and 2 review assessed emission data (including gridded data) reported under the CLRTAP to the UNECE Secretariat and emissions reported by EU Member States under the National Emission Ceilings Directive before 30 May 2008. The information submitted by Parties during the 2008 reporting round has been made publicly available and is kept up to date. It can be accessed from the CEIP webpage: http://www.ceip.at/emission-data-webdab/2008-submissions-under-clrtap/. In addition, the officially reported emission data were made available on the CEIP website on 15 June 2008 (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 accessible to the public from September 2008. The data reported under the National Ceilings Directive is made available to the public through the EEA's Data Service website[12]. Annual countries' stage 1 *Status reports* (March 2008) and stage 2 *Synthesis and assessment reports* (June 2008) were distributed to the Parties.

A contribution in-kind to EMEP was made by Belarus in 2008. This contribution consists of a report *„Emission inventory guidebook development; view of NIS*" The preface to this paper is provided as an annex to this report. The main report is available on the CEIP website.

[12] EEA DataService: http://dataservice.eea.europa.eu/dataservice/

# 2 STAGE I REVIEW

The stage 1 review performed by CEIP consists of automated tests which assess the *timeliness, completeness and format* of the submitted national inventories. Stage 1 tests applied in the 2008 review were:

- 1a Timeliness of reporting
- 1b Format of submission
- 1c Completeness per pollutant for entire submitted time series and
- 1d Completeness per sector for 2006 emissions.

The results of these initial automated tests were presented to the Parties in the form of individual country *Stage 1 Status reports* by 16 March 2008. Countries were invited to provide comments or resubmissions, if applicable, within two weeks.

## 2.1 Timeliness

***Key messages – Timeliness***

*CLRTAP: A total of 30 Parties (59 %) reported emission data on time by the due date of 15 February 2008, an increase of two Parties since 2007. Between 16 February and 31 May 2008, an additional eight Parties submitted data. The European Community submitted data by 10 June and Iceland by 26 June. This brought the number of submissions to 40 Parties (78 %), an increase of three Parties compared to last year, and the highest number of submissions recorded in the history of the Convention.*

*NECD: The timeliness of MS reporting has improved compared to the previous reporting cycle. By May 2008, 26 of 27 MS provided inventories; Luxembourg submit data in July 2008. 19 MS provided inventories by the required reporting deadline of 31 December 2007, compared to 16 MS submissions in the previous cycle.*

*Timeliness of reporting has slightly improved under both the CLRTAP and NECD reporting obligations. However, it is still not considered satisfactory due to late delivery of data from a number of Parties. This hampers the inclusion of reviewed emission data in the EMEP database and hence assessment work performed under the Convention.*

### 2.1.1 CLRTAP

38 Parties (from 51) to the Convention submitted inventories before 31 May 2008. Of these Parties, 30 reported emission data by the due date of 15 February 2008, representing an increase of two compared with the 2007 reporting round. The above figures indicate that 59 % of Parties reported on time and that a further eight Parties submitted data before 31 May 2008, increasing the number of submissions to 75 %. The European Community submitted inventory data on 10 June 2008 and Iceland on 26 June[13], This brought the number of submissions to 40 Parties (78 %), an

[13] It was not possible to include these late submissions in the review process and subsequently these data are not reflected in the figures and tables in this report. .

increase of three Parties compared to last year, and the highest number of submissions recorded in the history of the Convention. More details are provided in Appendix 1, Table 6a.

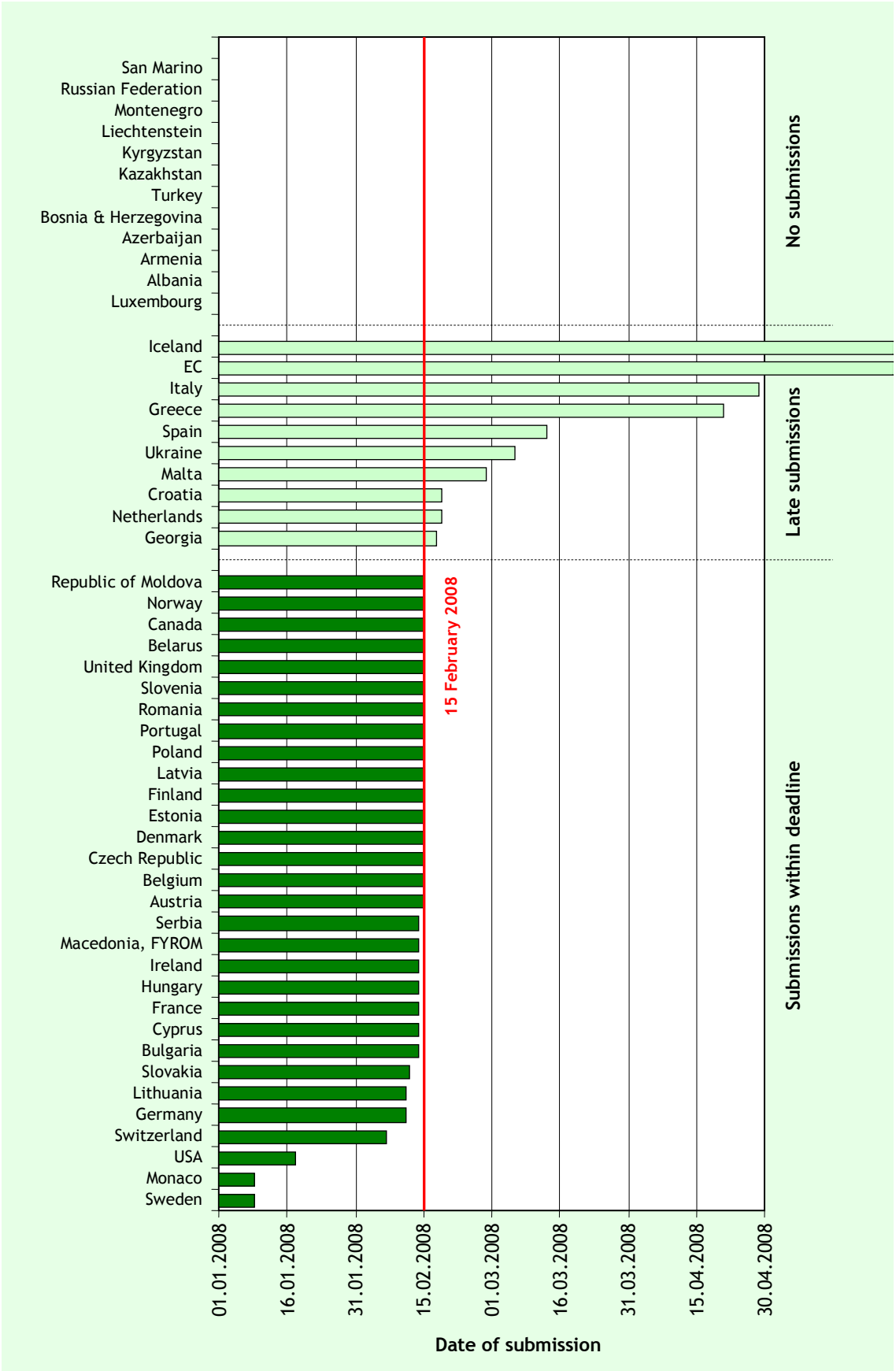



***Figure 1: Status of official submissions to the CLRTAP in 2008.***

### 2.1.2 NECD

Information in this section is based on European Union (EU) Member States' (MS) submissions to the European Commission and the EEA and explanatory information provided by MS to the European Topic Centre on Air and Climate Change (ETC-ACC) before 31 May 2008. An overview of the status of reporting under the NECD is given in Appendix 1, Table 6b.

19 out of 27 Member States submitted national inventories of $SO_x$, $NO_x$, VOCs and $NH_3$ to the EEA's EIONET Reportnet Central Data Repository (CDR) or to the European Commission before 31 December 2007. Poland, Ireland, Lithuania, Italy and the Czech Republic delivered inventories between 1 January and 1 February 2008, Spain by 13 March 2008 and Greece by 21 April 2008. (Figure 2). Luxemburg submitted NECD inventory in July 2008[14].

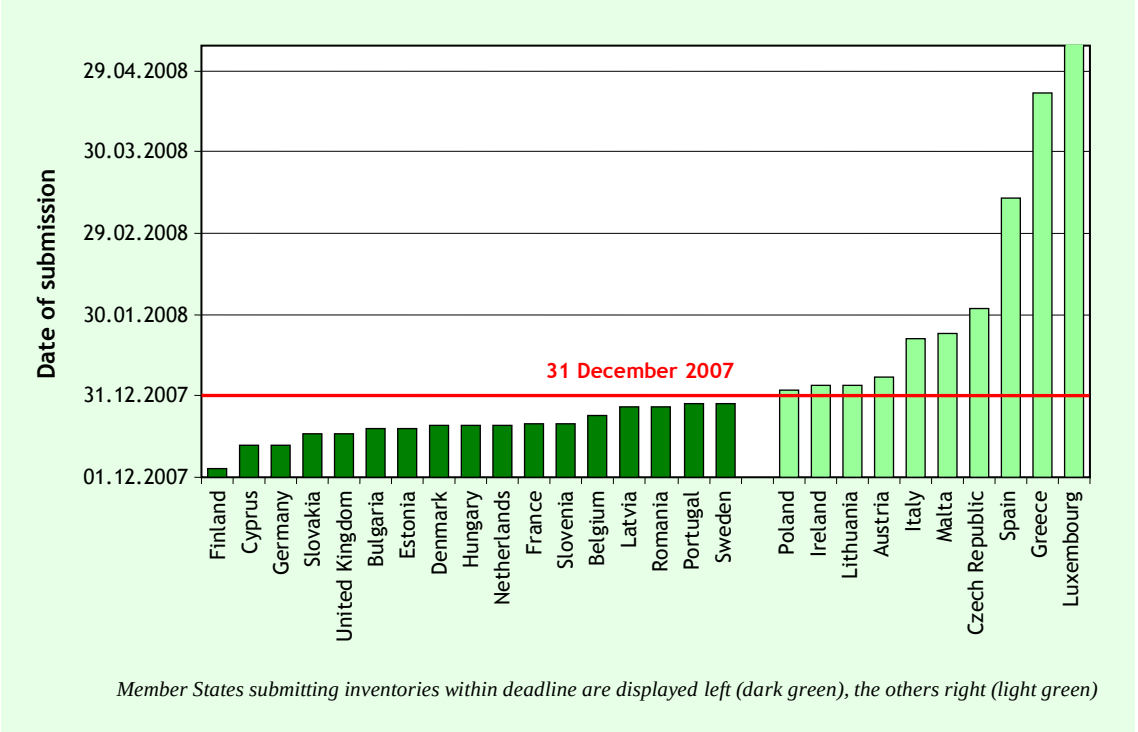



***Figure 2: Status of reporting – date of NECD inventory provision to the CDR or European Commission.***

Timeliness of reporting has slightly improved under both the CLRTAP and the NECD, but is still not considered satisfactory due to late delivery from a number of Parties. This hampers the inclusion of reviewed emission data in the EMEP database and hence assessment work performed under the Convention.

[14] It was not possible to include these late submissions in the review process and subsequently these data are not reflected in the figures and tables in this report.

## 2.2 Completeness

***Key messages – completeness***

*A number of Parties that submitted data in 2008 did not provide complete time series in line with the current reporting requirements. Inventories cannot be compared if countries provide incomplete and/or inconsistent data.*

*CLRTAP: 11 Parties (from 39 Parties reporting) submitted only 2006 data. 17 Parties reported emission data for all pollutants or a significant amount of data from 1990 onwards. Seven Parties (Austria, Denmark, Finland, France, Italy, Sweden and United Kingdom) submitted a complete 1980-2006 time series.*

*Reporting of particulate matter ($PM_{2.5}$, $PM_{10}$) is requested for the year 2000 onwards, and 21 Parties this year reported the full time series from 2000-2006.*

*Reporting of data for years in the 1980s is much lower than from 1990 onwards. For the Main Pollutants in NFR sectors, about half of the countries report emissions back to 1980.*

*A number of Parties do not submit regular information in the annual reporting rounds under the Convention. Three Parties - Luxembourg, Lichtenstein and the Russian Federation - did not submit data in 2008. Efforts to improve the regularity of reporting need to be made by Albania (new party), Azerbaijan, Bosnia and Herzegovina, Iceland, Kazakhstan, Kyrgyzstan and Montenegro (new party), even though these Parties are only Parties to the Convention and not to any of the pollutant specific Protocols, except Iceland, which has ratified the POPs Protocol.*

*NECD: 27 MS submitted inventories under the NECD. However, submitted inventories were not always complete (e.g. Greece did not provide final 2005 data, Greece also did not report 2006 $NH_3$ emissions).*

The Emission Reporting Guidelines under the CLRTAP (UNECE, 2003) asks Parties to submit emissions for 1980 – latest year (2006) for Main Pollutants, 1990 – latest year for HMs and POPs, and for 2000 – latest year for PM. It has to be noted that the pollutant-specific CLRTAP Protocols only formally request reporting from countries which have ratified the Protocol for the Protocol base year, for the year after the entry into force of that Protocol and for subsequent years.

### 2.2.1 CLRTAP

Of the 38 Parties that submitted data (before 31 May 2008) several did not provide full time series in this reporting round, 11 Parties submitted only 2006 data. Complete time series of the *main pollutants* (CO, $NH_3$, NMVOC, $NO_x$ and $SO_x$) in NFR format for 1990-2006, which is the period relevant for the review of the Gothenburg Protocol, were reported by 17 Parties (15 in 2007), and 17 Parties also provided complete time series (1990-2006) *of main heavy metals (Pb, Cd and Hg)*. Out of these, seven Parties (Austria, Denmark, Finland, France, Italy, Sweden and United Kingdom) submitted 1980-2006 time series. Reporting of *particulate matter* ($PM_{2.5}$, $PM_{10}$) is requested for the year 2000 onwards, and 21 Parties reported the full time series of 2000-2006 this year. Out of those, 12 Parties also reported figures back to 1990. 31 Parties provided information on *POPs* (PAH, DIOX and HCB) Appendix 2 Table 7.

An overview of completeness per country, emission year, pollutant and sector from 1980-2006 for Main Pollutants and particulate matter ($PM_{2.5}$ and $PM_{10}$) is provided in separate file as Annex A to this report and can be downloaded using the link
http://www.emep-emissions.at/review-process/review-2008/.
It is apparent that there are large gaps in the emission data coverage and that reporting in the 1980s is much lower than from 1990 onwards.

A number of Parties do not submit regular information in the annual reporting rounds under the Convention. Three Parties – Luxembourg, Lichtenstein and the Russian Federation – did not submit data in 2008. Efforts to improve the regularity of reporting need to be made by Albania (new party), Azerbaijan, Bosnia and Herzegovina, Iceland, Kazakhstan, Kyrgyzstan and Montenegro (new party), even though these Parties are only Parties to the Convention and not to any of the pollutant specific Protocols, except Iceland, which has ratified the POPs Protocol.

The different interpretations of what formally constitutes a 'complete' submission make it difficult to provide a clear message to the Parties on whether their inventory is complete or not. Figure 3 presents the completeness of officially reported data to the CLRTAP in the form of colour maps. This is the visualisation of the test results (1d) provided in the individual Status reports to the Parties. For the main gases ($SO_x$, $NO_x$, CO, NMVOC and $NH_3$) the complete time series from 1980 to 2006 are assessed, for $PM_{2.5}$ and $PM_{10}$ only the years from 2000 to 2006 are taken into account.

While the maps on the left ('Total') in Figure 3 show a very high level of completeness, this only means that *Parties filled in all the cells* in the NFR tables either with a number or with notation keys (i.e. the formal definition of completeness according to the Reporting Guidelines). Closer to actual completeness of sectoral inventory data (as needed e.g. by modellers) are the figures given in the maps on the right side (showing where values or the notation key 'NO' – not occurring – were reported by Parties). Figure 3 indicates that although many countries filled in all cells in the NFR tables, completeness of sectoral inventories in the EMEP database is in the best case under 75 %.

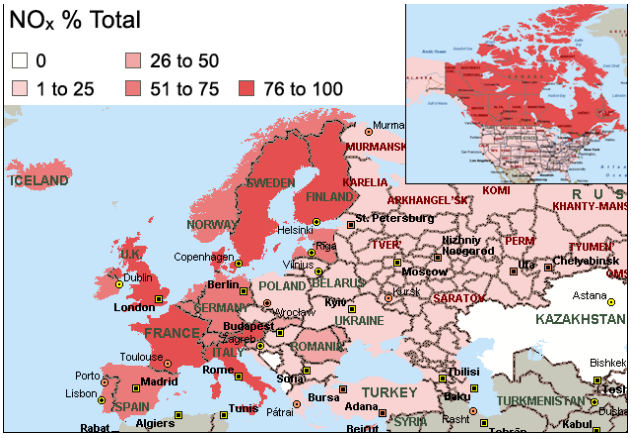
### 2.2.2 NECD

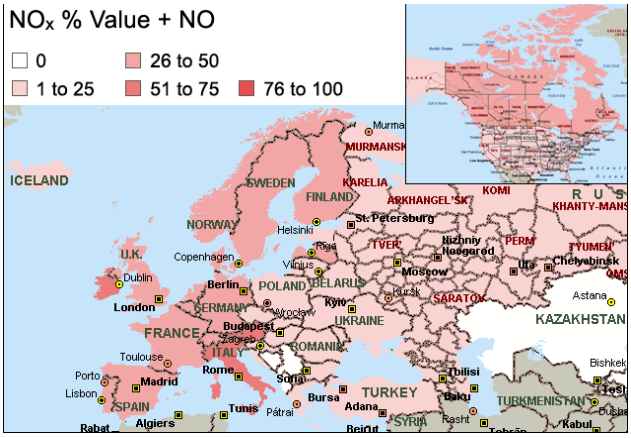
Under the requirements of the NECD, Member States shall by 31 December each year report final emission data for the previous year but one and provisional emissions for the previous year. In the 2007 reporting cycle[15], 24 MS provided the obligatory 2005 final emissions (except Greece) and 27 MS submitted 2006 preliminary emission data. Greece did not report $NH_3$ emissions, neither for 2005 nor 2006.

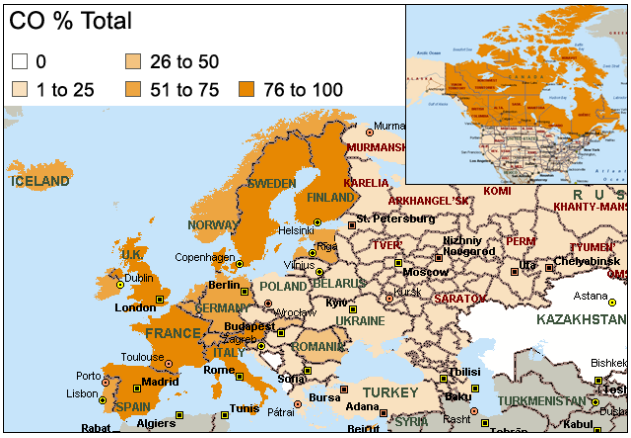
An overview of NECD emission inventory data (status as of 31 May 2008) is given in Appendix 2, Table 8. A more detailed description of the data submitted in the 2007 NECD reporting round is contained in the NECD Status report 2007[16].

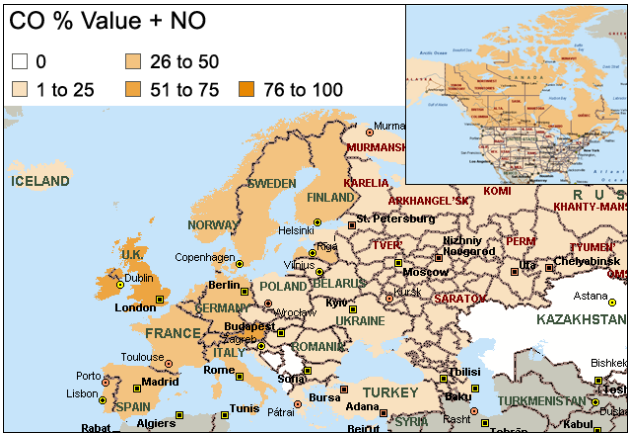
[15] The reporting deadline was 31 December 2007.

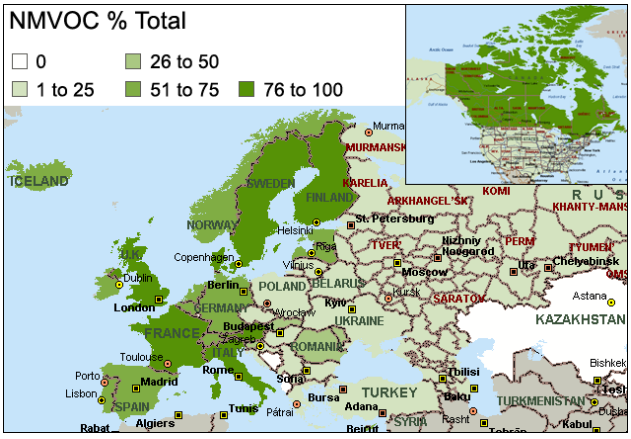
[16] EEA 2008. European Community NEC Directive Status Report 2007. EEA Technical report *(In preparation)*. European Environment Agency, Copenhagen.

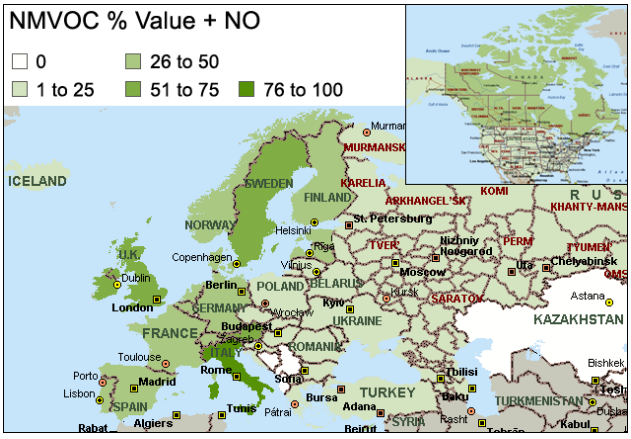


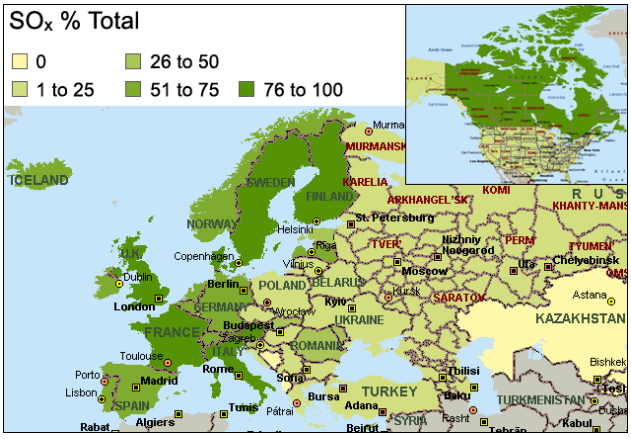



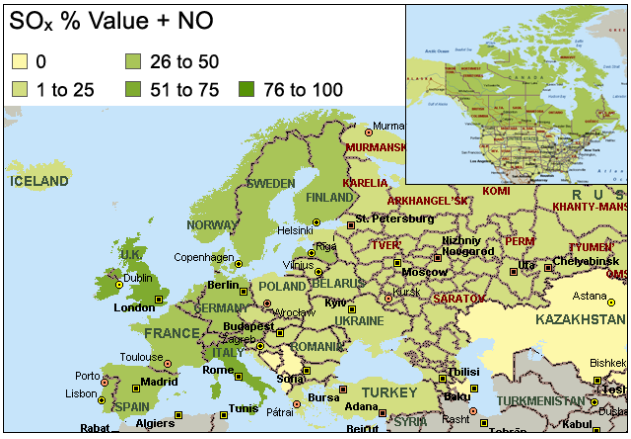



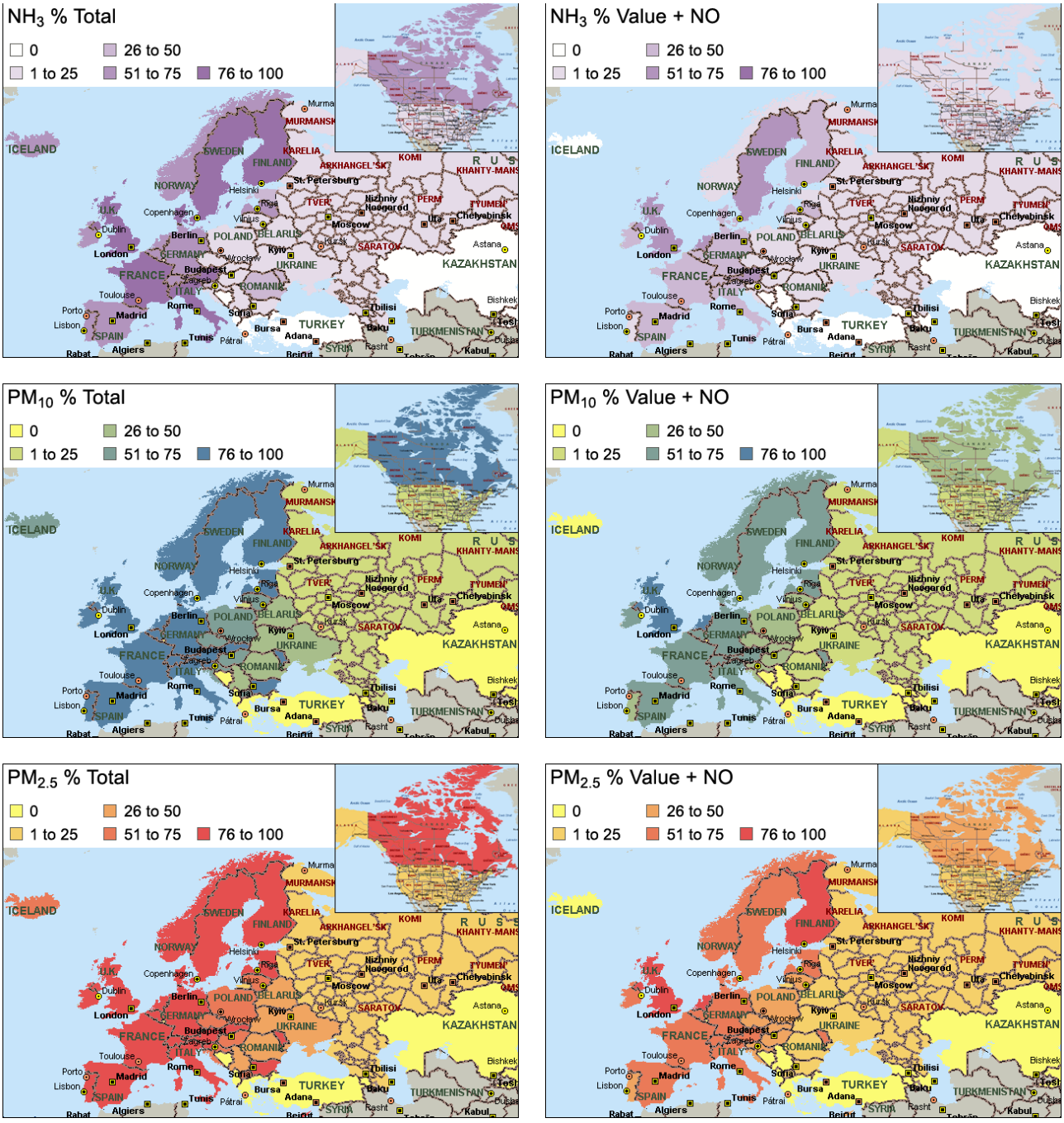






*The maps on the left (Total) show if Parties filled in all cells in the NFR tables either with a number or with a notation key according to the formal definition of completeness in the Reporting Guidelines.*

*The maps on the right (Value + NO) show what percentage of cells contains emission data or the notation key 'NO' – not occurring.*

***Figure 3: Completeness of sectoral data.***

### 2.2.3 Gridded data and projections

*Gridded data and projections* are part of the five 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; Spain for 1990 to 2006; Lithuania and Finland submitted gridded data for the year 2006 (Figure 4). CEIP also imported late 2007 submissions of 2005 gridded data from the European Community and Croatia into the system. The availability of 2005 gridded sector data used for EMEP modelling improved considerably compared to 2000 gridded sectoral data used before.

In 2008, 18 Parties submitted emission projections, out of which only 13 Parties submitted data for 2020. Analysis of the completeness of projections is out of the scope of this evaluation.

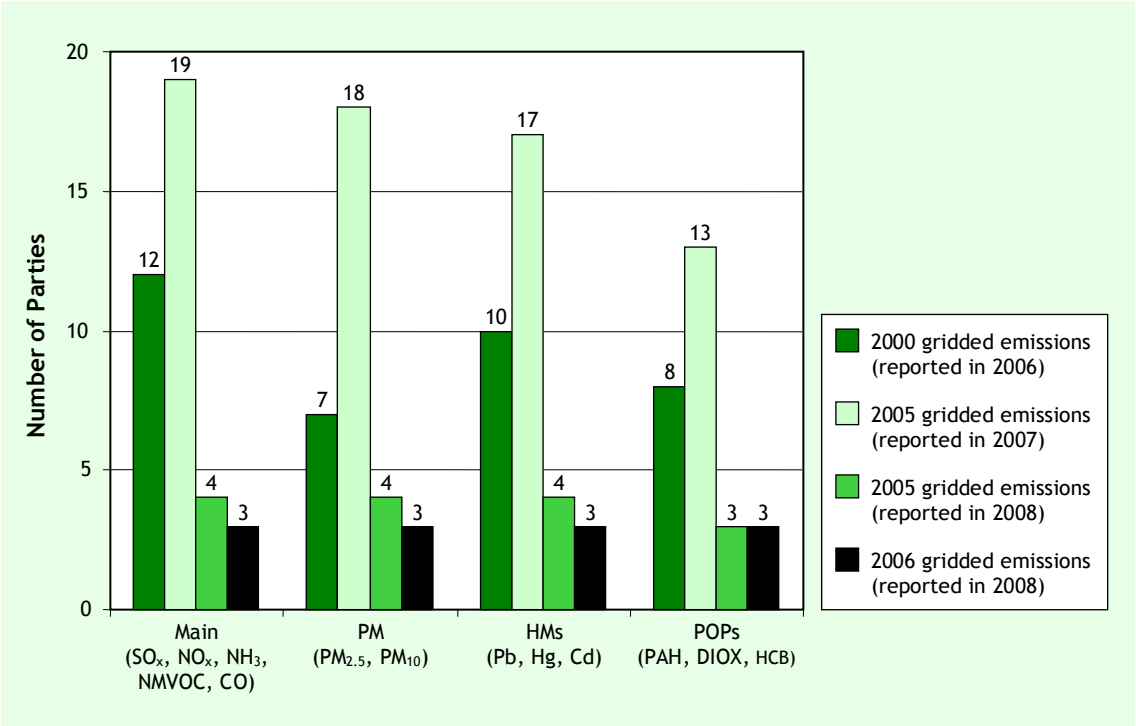



***Figure 4: Reporting of gridded sector data to the CLRTAP in 2008.***

***Note:*** *Iceland, Switzerland and Cyprus resubmitted 2005 gridded data in June 2008 and the United Kingdom submitted 2005 gridded data on 2 July 2008. It was not possible to include these late submissions in the review process and subsequently these data are not reflected in the figures and tables in this report.*

## 2.3 Format

***Key messages – Format***

*CLRTAP: Most Parties (28) reported both gridded and non-gridded emissions using the requested NFR formats, however five Parties altered the reporting templates, which resulted in a need for additional manual processing of submissions. Another five Parties submitted part of the data in NFR and part in other formats.*

*A number of Parties did not submit 1990-1999 data in NFR tables. This hampers comparison of sectoral trends.*

*NECD: Eighteen MS (12 in the previous reporting round) submitted inventories in non-consistent formats (e.g. using modified templates).*

*It is recommended that all Parties use the REPDAB tool for initial quality control before submitting the inventories.*

*The reporting of information in non-standard formats greatly increases the difficulties associated with data processing and analysis.*

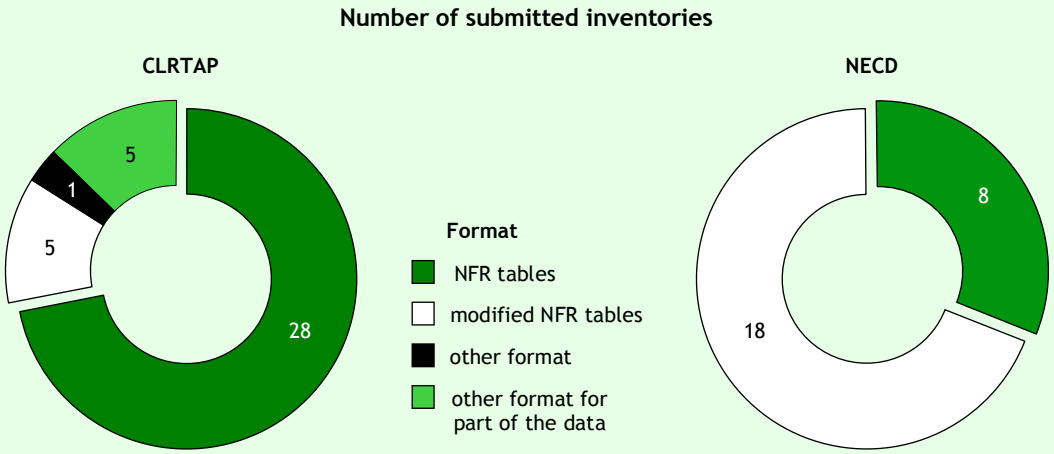



***Figure 5: Format of the CLRTAP (due 15 Feb 2008) and NECD (due 12 Dec 2007) inventories submitted in NFR tables and/or other formats.***

### 2.3.1 CLRTAP

Under the CLRTAP, most Parties (28) reported both gridded and non-gridded emissions in the requested NFR formats, but five Parties (Greece, Macedonia, Monaco, Slovakia and Serbia) altered the reporting templates and five Parties (Belarus, Hungary, Romania, Slovenia and Spain) submitted part of the data in other formats, making manual editing of submissions necessary before the data could be loaded to the database. A number of Parties did not submit 1990-1999 data in NFR tables. This hampers comparison of sectoral trends.

### 2.3.2 NECD

NECD emission inventories from 18 MS were submitted in modified Excel tables. For these 12 countries, automated consistency and completeness tests could be performed only after ETC-ACC had transferred these submissions into NFR standard tables.

The reporting of information in non-standard formats greatly increases the difficulties associated with data processing and analysis. This work is resource demanding and has the potential to introduce errors in the reported data. It is recommended that all Parties take advantage of this easy and rapid way of initial quality control of their emission data upon submission (http://www.emep-emissions.at/reporting-instructions/repdab/).

## 2.4 Transparency and Informative Inventory Reports

***Key messages – Transparency***

*Transparency of reporting under the CLRTAP has slightly increased compared to 2007. 26 Parties (66 % of those reporting inventories) submitted an Informative Inventory Report (IIR) in conjunction with their 2008 CLRTAP submissions.*

*The IIR should be provided in a working language of the UNECE and include key information on inventories, such as reasons for recalculations, new (closed) large emission sources, explanation of trends, geographical coverage and the implementation of country specific methods/ data.*

*To enable the review teams to work efficiently Parties are encouraged to provide key information in English.*

*The provision of an IIR is essential for an efficient centralised stage 3 review.*

*There is no legal obligation under the NECD for Member States to submit a report explaining the submitted inventories.*

Transparency means that Parties should provide clear documentation and report a level of disaggregation that sufficiently allows to understand how the inventory was compiled and assure it meets good practice requirements

In 2008, the number of Informative Inventory Reports (IIRs) submitted by Parties under the CLRTAP has increased by five Parties to 26 (66 % of those reporting inventories) compared to last year. Although, the increase in the number of IIRs submitted is a positive development, the reports do substantially differ in both structure and content. It is therefore time-consuming to find the necessary information in the IIRs. Therefore, Parties are urged to use the template for the recommended structure of IIRs as contained in Annex VI to the revised Emission Reporting Guidelines. In addition, in a number of cases Parties submitted IIRs in their national languages. The present Reporting Guidelines (UNECE, 2003) specify that inventory reports are to be submitted in one of the working languages of the UNECE, and where relevant, Parties are encouraged to submit also a translation of the reports into English. To increase transparency of inventories, it would be essential that key information on inventories, including reasons for recalculations, new (closed) large emission sources, explanation of trends and the implementation of country specific methods/data are reported according to the Guidelines.

Under the NECD there is no legal obligation for Member States to submit an inventory report. In 2007, only five Member States (Austria, Finland, Germany, the Netherlands and Slovakia) provided some explanatory information on their inventories. Member States are encouraged to consider submitting a short informative report in the future including key information as described in the paragraph above and specific NECD information. This information includes for example a) how the national totals reflect the requirements of Article 4 related to maritime traffic and aircraft emissions (LTO cycle/cruise) and b) which territory is covered in the submitted inventory in the case of Member States such as Portugal, Spain and France [17].

The provision of key information in a transparent manner would enable a more targeted comparison of inventories submitted under the CLRTAP and NECD. It has to be noted that an efficient stage 3 review is possible only for Parties which submit an IIR.

[17] In the 2007 reporting cycle, France provided an additional table with national totals excluding overseas areas, Portugal sent an explanatory note saying that Madeira and Azores Islands are included, Spain provided information that Ceuta and Melilla are included along with the Peninsula and Balearic Islands while the Canary Islands are excluded in accordance with Article 2 c.

# 3 STAGE 2 REVIEW

The stage 2 tests assess the recalculations, key category analysis, inventory comparison and trends and time series of the submitted national inventories. The following stage 2 tests were performed in the 2008 review:

- 2a Recalculations
- 2b Key category analysis-CLRTAP
- 2c Key category analysis-NECD
- 2d Inventory comparison
- 2e Trends
- 2f Time series
- 2g Implied emission factors (IEF).

Data included in the stage 2 review were emissions submitted under the CLRTAP, emissions reported under the NECD to the European Commission and the EEA, and emissions reported under the UNFCCC and EEA before 31 May 2008. The results of the tests were made available to the Parties in the form of individual synthesis and assessment reports by 6 June 2008. Parties were requested to respond within four weeks after receiving the report.

## 3.1 Recalculations

***Key messages – Recalculations***

*CLRTAP: The number of countries reporting data both in 2007 and in 2008 was 37 (73 % of all Parties). More than half of these countries (23) recalculated some of their data in 2008, but 11 Parties submitted only 2006 data.*

*The number of recalculations for individual pollutants does not differ significantly. NMVOC is the pollutant that is recalculated the most often, followed by CO, $SO_x$ $NO_x$, Cd, Pb and $NH_3$.*

*Only 11 % of all recalculations performed were higher than +-10 %. Large recalculations were most frequently observed for HCB, DIOX and Pb emissions.*

*From these results it can be concluded that emissions of main pollutants might be considered more accurate than emissions of other pollutants. Large POPs recalculations indicate higher uncertainty levels of these emissions.*

*There is evidence that only a few Parties seem to recalculate their emissions across the whole time series, even though this is essential for obtaining consistent emission trends.*

*NECD: The recalculations were in general minor for all four reported components, with a few exceptions observed for $NO_x$ and NMVOC.*

It is important and necessary to identify inventory recalculations and to understand their origin in order to correctly evaluate the officially reported emission data. This is especially the case when emission ceiling targets are expressed in absolute terms (as in the Gothenburg Protocol and NECD) and not as percentage reduction targets (as in the Kyoto Protocol for greenhouse gases). From a country perspective, it is considered good practice to recalculate the whole times

series when new information (i.e. activity or emission factor data) becomes available in order to provide comparable and consistent data. The magnitude of recalculations also provides some indication of the general uncertainty of the emissions.

### 3.1.1 CLRTAP

In this test (2a), differences between national totals reported by Parties to the CLRTAP in 2008 and 2007 are determined and differences larger than ± 10 % are flagged. The formula used to determine the magnitude of recalculations is $(100*[(X_{2008}–X_{2007})/X_{2007}])$.

From 39 reporting Parties, 23 provided recalculated inventories (11 Parties submitted only 2006 emissions). An overview of all recalculations of the official CLRTAP submissions for the priority pollutants submitted in 2007 and 2008 is presented in Figure 6. A negative value indicates a decrease in emissions reported in the year 2008 relative to emissions reported in 2007. All countries were provided with the results in their country specific stage 2 review reports.

The number of recalculations for individual components does not differ significantly and varies between 179 and 241, whereas NMVOC is the pollutant that is recalculated most often, followed by CO, $SO_x$ $NO_x$, Cd, Pb and $NH_3$. Outside this interval lies HCB with 103 recalculations. Altogether, there are about the same number of positive and negative recalculations.

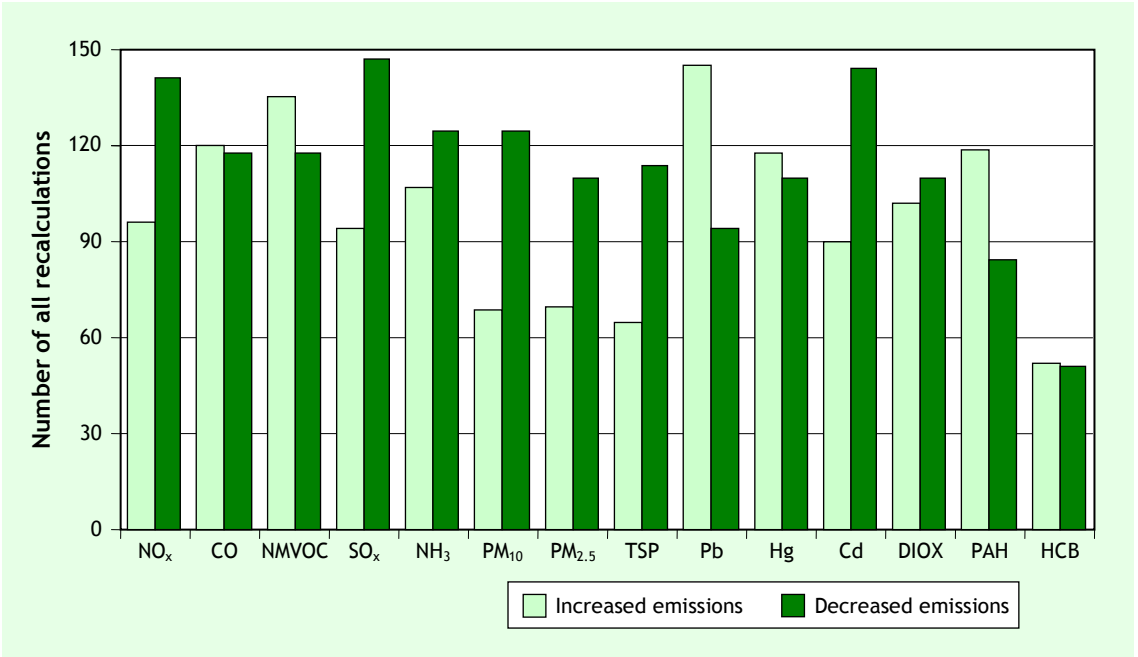



***Figure 6: Number of recalculations in 2008 per component and emission (increased/decreased emissions).***

Focusing on the number of *recalculations larger than ± 10 %* (highlighted cells in Appendix 3, Table 9) it can be seen that only 11 % of all recalculations performed were higher in magnitude than ±10 %. Large recalculations were most frequently observed for HCB, DIOX and Pb emissions (Figure 7). Extreme recalculations were observed in inventories of Cyprus 1990 and 2004-2005 (PAH by around 200 %), Ireland 2000 and 2005 (Pb by more than 100 %), Malta 2004-

2005 ($PM_{2.5}$ by above than 150 %), Romania 2005 ($PM_{10}$ above 800 %, Cd and Hg more than 150 %) and Slovenia 2000-2001 (DIOX by almost 6000 %).

From these figures could be concluded that Parties appear to prioritise their inventories for main pollutants by carrying out frequent, and for all but NMVOC, small percentage recalculations. Hence of emissions of these pollutants might be considered more accurate than emissions of other pollutants. Recalculations performed for $POP_S$, $HM_S$ and PM often lead to relatively large changes in emissions, which indicates higher uncertainty of these pollutants compared to the Main Pollutants.

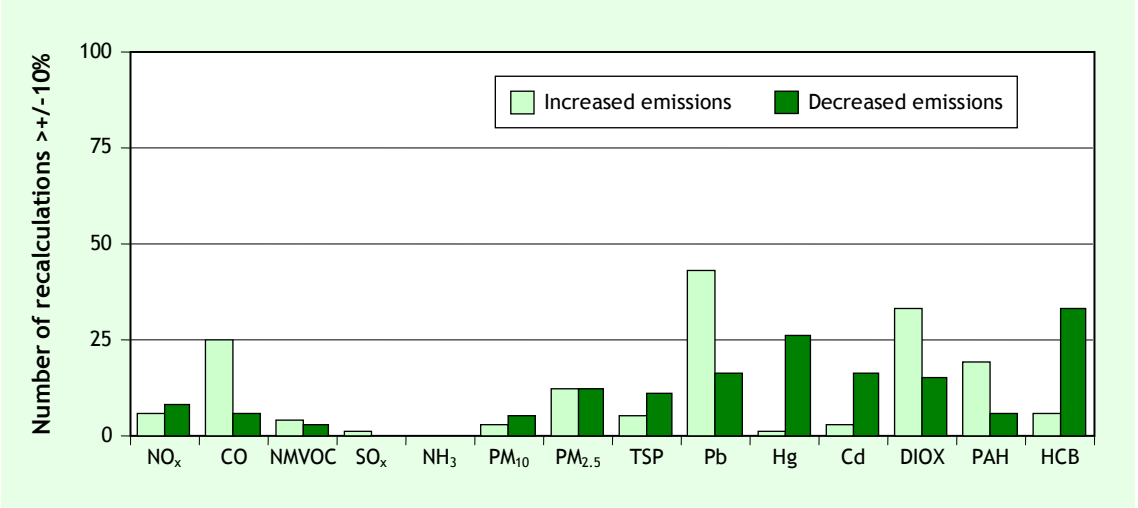



***Figure 7: Number of recalculations in 2008 per component and emission increase/decrease for recalculation ± 10 %.***

The *frequency* and *magnitude of the recalculations varies* considerably over the time series. Errors detected for a specific year may be the reason for some of the big jumps in the size of the recalculations shown in the graph. The recalculation of whole time series used to indicate a revision of inventory methods and/or improvement of activity data. The less frequent recalculation of historical data might indicate inconsistent time series.

### 3.1.2 NECD

Major recalculations were performed for $NO_x$ and NMVOC, while for $SO_x$ and $NH_3$ only relatively minor recalculations were reported. Relatively large recalculations occurred in Austria ($NO_x$, NMVOC), France ($NO_x$, NMVOC, $SO_x$), Sweden ($NO_x$), Belgium (NMVOC), Italy (NMVOC, $SO_x$), Spain (NMVOC), Germany (NMVOC, $SO_x$) Hungary ($SO_x$) and United Kingdom ($SO_x$). The other countries in general showed either no or only minor recalculations. It was not possible to present an overall estimate of the recalculation for the EU-27 because data for several Member States was missing in the 2007 or 2006 submission. Appendix 4, Tables 10 to 13 present the differences between data reported in 2007 and data reported in 2006.

## 3.2 Key category analysis

A key category[18] is one that has significant influence on a country's total inventory in terms of absolute level of emissions, the trend in emissions, or both. A key category analysis was carried out both for the CLRTAP and the NECD inventories for all Parties that submitted relevant information and were included in the country specific Synthesis & assessment reports that were made available to the Parties in June 2008.

### 3.2.1 Key category analysis for Western Europe and Eastern Europe

In addition, a key category analysis of 2006 CLRTAP inventories for the *Western Europe*[19] and *Eastern Europe*[20] country groups for *main pollutants* and *PM* was undertaken. The share of the top seven key categories is depicted in Figure 8. „Other sources" contain emissions of the remaining categories. It is important to note that several factors affect which emission categories are determined as being key categories at the Eastern/Western Europe level. Specifically, Parties sometimes report using different levels of aggregation within the NFR reporting nomenclature – this of course influences the amount of emissions assigned to specific NFR categories. Similarly, Parties use of the emission inventory notation key IE (included elsewhere) means that emission estimates for one NFR sector can be included in emission estimates of a different sector. As a consequence, the aggregated KCA may not always accurately reflect the share of all main emission sources, but can provide valuable information for the Parties and reviewers. It is also important to note that the results of KCA for individual Parties may differ from key sources determined for Eastern or Western Europe (see Appendix 7).

A number of emission categories were identified as being key for more than one of the seven pollutants assessed. The results of the KCA (the top seven source categories are listed) show that *1A3b Road Transportation* is within the top seven categories for all pollutants except $SO_x$ and $NH_3$, being the most important key category for $NO_x$ and CO and the second most significant source for NMVOC, $PM_{10}$ and $PM_{2.5}$ emissions. *1A1a Public Electricity and Heat Production* is responsible for a significant fraction of $NO_x$ and $SO_x$ emissions, and in Eastern Europe additionally for CO and $PM_{10}$, while *1A2 Manufacturing Industries and Construction* contributes significantly to $NO_x$, CO, $SO_x$ and $PM_{2.5}$ emissions. 1A4b Residential is the most significant key source for $PM_{10}$ and $PM_{2.5}$ emissions, the second most significant source for CO and important also for NMVOC and $SO_x$ Emissions. *4B Manure Management* is the dominant source of $NH_3$ emissions.

The distribution of key categories identified for Eastern and Western Europe is comparable and some differences like the higher share of transport in emissions in Western Europe and high sulphur emissions from *Public Electricity and Heat Production in Eastern* Europe look reasonable,

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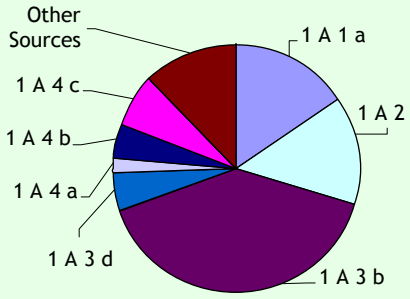
[18] A key category is the one that has significant influence on a country's total inventory in terms of absolute level of emissions, the trend in emission levels or both (IPCC, 2000). The EMEP KCA follows the IPCC definition of a key category – the sectors, in descending order of size, that cumulatively total 95 % of the total Party emissions are identified as being key categories.

[19] **Western Europe countries as used in the EMEP database** = Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Italy, Liechtenstein, Luxemburg, Malta, Monaco, Netherlands, Norway, Portugal, Sweden.

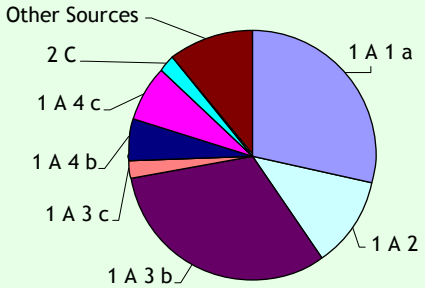
[20] **Eastern Europe countries as used in the EMEP database** = Albania, Armenia, Azerbaijan, Bosnia & Herzegovina, Bulgaria, Belarus, Cyprus, Czech Republic, Estonia, Georgia, Croatia, Hungary, Kyrgyzstan, Kazakhstan, Lithuania, Latvia, Republic of Moldova, Montenegro, Macedonia, Poland, Romania, Serbia, Russian Federation, Slovenia, Slovakia, Turkey, Ukraine.

but for example relatively high emissions of $NH_3$ in *waste treatment* in Eastern Europe would require more detailed analysis to be explained. This, however, goes beyond the scope of this report.

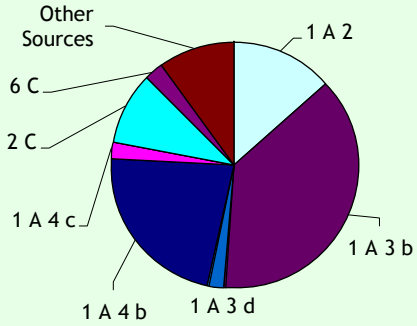
**Western Europe – $NO_x$**



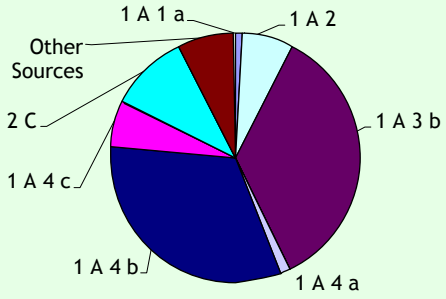

**Eastern Europe – $NO_x$**



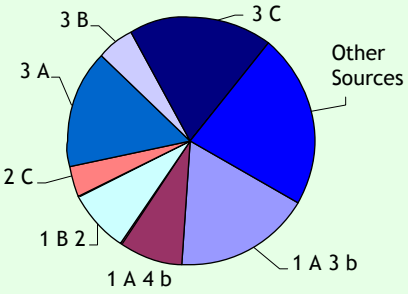

**Western Europe – CO**



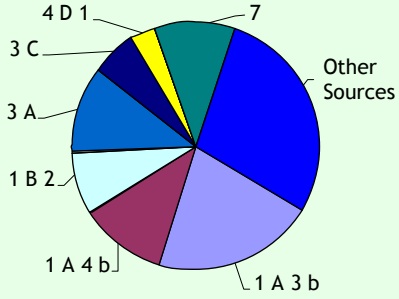

**Eastern Europe – CO**



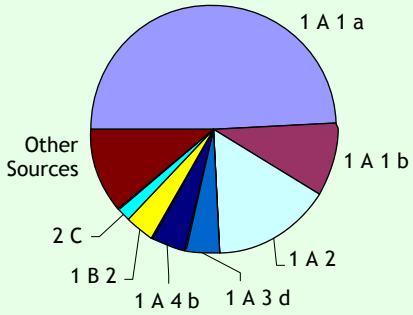

**Western Europe – NMVOC**



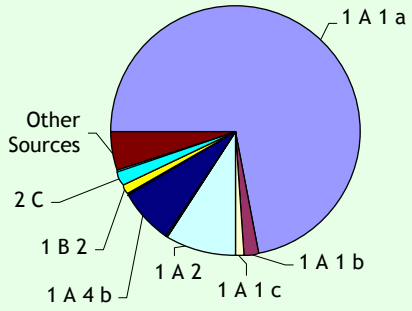

**Eastern Europe – NMVOC**

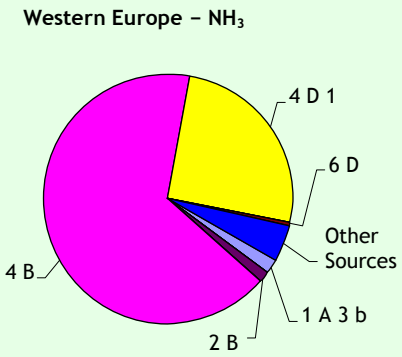


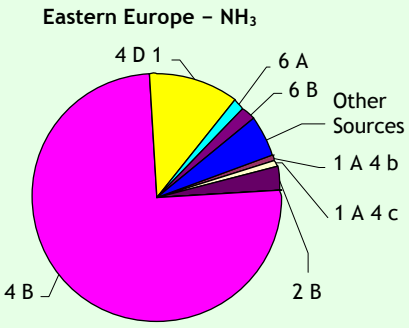

**Western Europe – $SO_x$**

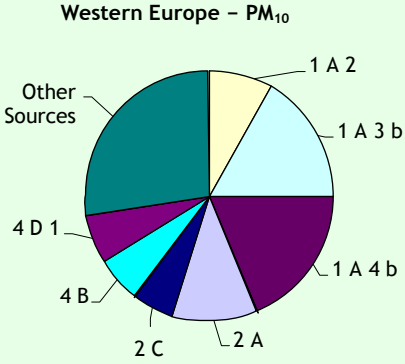


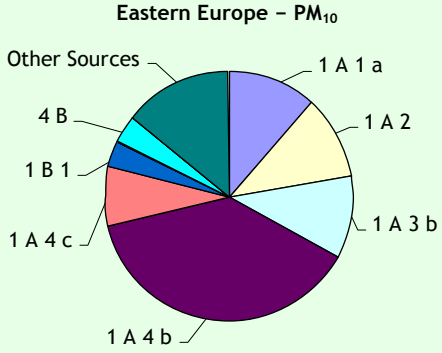

**Eastern Europe – $SO_x$**

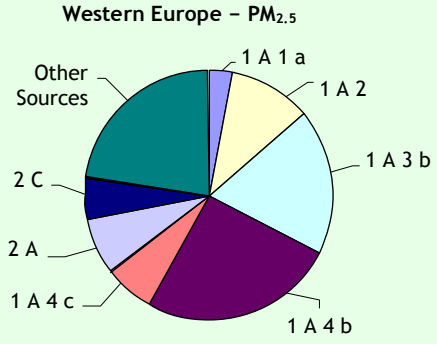


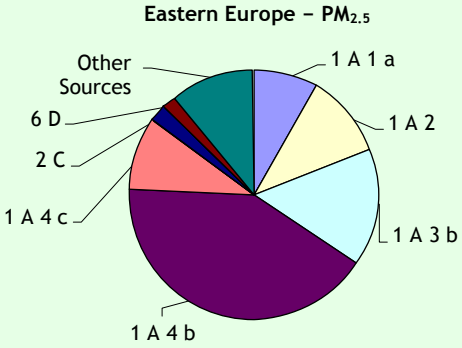



1 A 1 a .... Public Electricity and Heat Production
1 A 1 b .... Petroleum Refining
1 A 1 c .... Manuf. Of Solid Fuels and Other Energy Industries
1 A 2 ..... Manufacturing Industries and Construction
1 A 3 b .... Road Transportation
1 A 3 c .... Railways
1 A 3 d .... National Navigation
1 A 4 a .... Commercial/Institutional
1 A 4 b .... Residential
1 A 4 c .... Agriculture/Forestry/Fishing
1 B 2 ..... Oil and Natural Gas

2 B.... Chemical Industry
2 C.... Metal Production
3 A.... Paint Application
3 C.... Chemical Products, Manufacture and Proceessing
3 D ... Other
4 B.... Manure Management
4 D ... 1 Direct Soil Emission
6 A.... Solid Waste Disposal on Land
6 B.... Waste-water Handling
6 C.... Waste Incineration
6 D ... Other
7 ..... Other

*WEST = Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Italy, Liechtenstein, Malta, Netherlands, Norway, Portugal, Sweden.*

*EAST = Bulgaria, Belarus, Cyprus, Czech Republic, Estonia, Croatia, Hungary, Lithuania, Latvia, Macedonia, Poland, Romania, Slovenia, Slovakia, Turkey, Ukraine*

***Figure 8: KCA results 2006 – CLRTAP inventories comparison of „Eastern" and „Western Europe".***

### 3.2.2 The results of KCA for individual Parties

The results of the key category analyses for all Parties that provided 2006 PM emissions is provided in Appendix 7. Twenty six categories were identified among the top ten key categories („aggregated") in all countries. The number of key categories per Party differs quite significantly; from two („aggregated") key categories for CO (e.g. in Cyprus) to seven („aggregated") key categories (e.g. in the Netherlands).

The structure of emission sources also shows big variations. The categories appearing most frequently in the top ten key categories are the following:

- 1 A 1 a Public Electricity and Heat Production
- 1 A 2 Manufacturing Industries and Construction
- 1 A 3 b Road Transportation
- 1 A 3 c Railways
- 1 A 4 a Commercial/Institutional
- 1 A 4 b Residential
- 1 A 4 c Agriculture/Forestry/Fishing
- C Metal Production
- A Mineral Products
- 4 B Manure Management
- 4 D 1 Direct Soil Emission.

Road Transport is a significant source of $PM_{10}$ and $PM_{2.5}$ emissions with the highest reported share in Canada (55 % and 48 % of national total emissions); in contrast Estonia's share of $PM_{10}$ and $PM_{2.5}$ emission from Road Transportation is rather low (both 4 %). Other common significant sources are Residential Heating, which makes up for the highest share of $PM_{10}$ emissions in Norway (70 %) and Cyprus (55 %), and Electricity and Heat Production (e.g. in Malta 75 %). Further investigation of these differences is beyond the scope of this report and should be part of the stage 3 review.

## 3.3 Comparability – Inventory comparisons

***Key messages – Inventory comparisons***

*Differences larger than 0.1 % between emission data submitted under the CLRTAP and under the NECD were found for 11 countries out of the 27 Parties assessed. The highest differences are observed for $NO_x$ and NMVOC, the lowest ones for $NH_3$.*

*Differences larger than 0.1 % between emission data submitted under the CLRTAP and under the UNFCCC in the respective 1990 and 2006 inventories were found for 18 out of the 31 Parties assessed. Differences occurred most frequently for NMVOC, followed by $NO_x$, CO, and $SO_x$.*

*Reasons for differences between emissions reported under the CLRTAP/NECD and the UNFCCC are manifold and are mainly due to different reporting requirements, but may also be caused by errors. Errors in inventories or inconsistent reporting, which would also lead to differences, cannot be identified by automated tests as they are currently designed.*

*Differences observed in CO and NMVOC emissions seem to be mainly due to differences in reporting of LULUCF/Nature, the memo items and 1A3b Transport.*

The aim of the comparability test is to compare national totals reported to the NECD, CLRTAP and the UNFCCC (under which emissions of the indirect GHGs CO, $NO_x$, NMVOCs and $SO_x$ should be reported). Performing a comparison of national totals from different inventory submissions is relatively simple and immediately shows potential inconsistencies between inventories. A summary of results showing the EU-27[21] comparison performed between officially reported data to the NECD/CLRTAP and the UNFCCC for 1990 and the most recent reporting year (2006) is given in Appendix 5, Tables 14 to 18. Differences are expressed as percentages (%). Flagged values indicate differences of more than +-0.1 % between the respective national totals.

Figure 9 shows the number of flagged values (i.e. differences >0.1 %) by pollutant and by reporting obligation. In 2008, 31 Parties were included in this test, four more than in 2007. As not all emissions were reported by all countries, some differences could not be calculated (NA-not applicable). In general, the number of flagged values for the comparison between the CLRTAP and the UNFCCC was higher than for the comparison between the NECD and the CLRTAP. The highest number of differences was observed for CO and NMVOC, the lowest for $NH_3$.

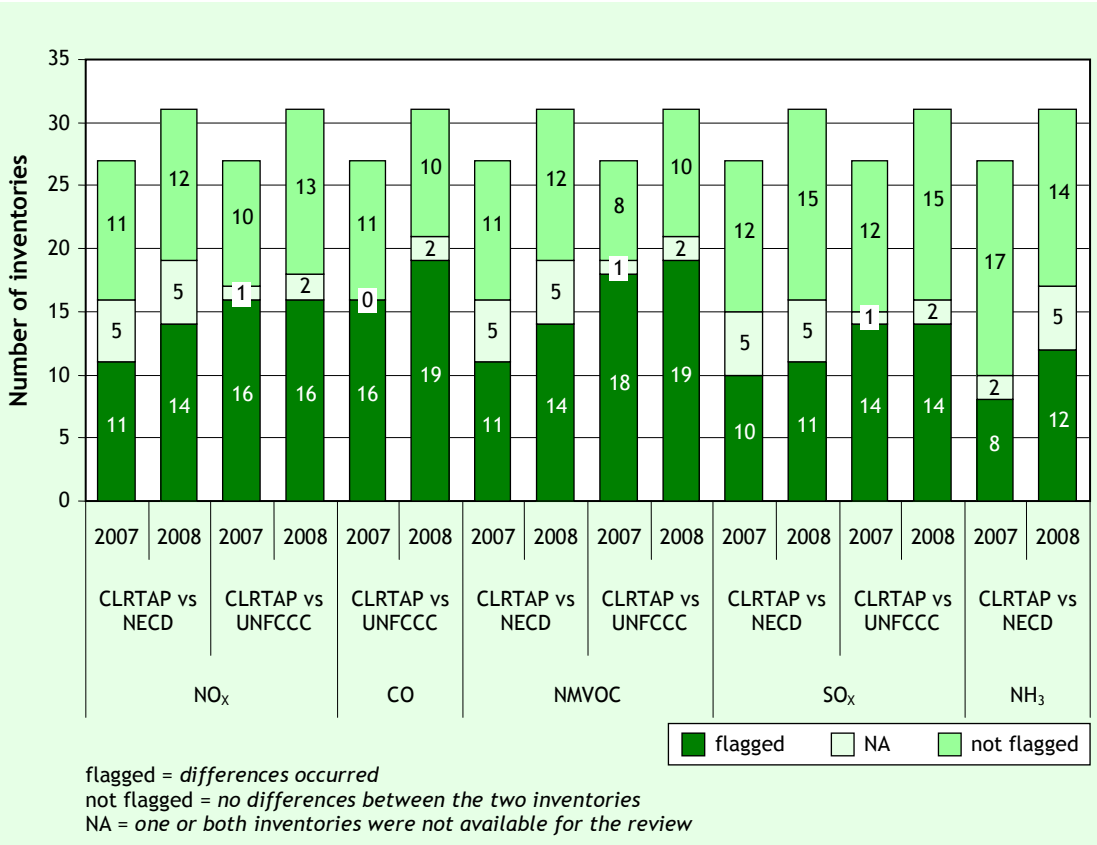



***Figure 9: Overview of differences between inventories submitted under the CLRTAP and UNFCCC in 2008 and NECD in 2007.***

[21] Luxembourg and Italy did not communicate 2005 data for the LRTAP Convention; Greece submitted it too late to be included in the testing.

Table 2 provides a summary of findings for the entire time series. Highlighted cells indicate where differences in the reported national totals were higher than 2 % or higher than 20 % (in one or more years) between the reporting obligations. Differences under 2 % between the CLRTAP and NECD inventories were estimated in nine countries from 28 tested. (0 means that no differences between the two inventories appeared in any of the years listed in the first column).

***Table 2: Overview of differences between the CLRTAP inventories and inventories submitted under the NECD, period 1990-2006.***

| CLRTAP-NECD – Differences in intervals [%] (From values reported in 2008, CLRTAP = 100%) | | | | | | |
|---|---|---|---|---|---|---|
| | Years | $NO_x$ | NMVOC | $SO_x$ | $NH_3$ | Comment |
| Austria | 1990–2006 | -4 ; 25.9 | -1.3 ; 2.6 | -0.6 ; 2.1 | -1.1 ; 1 | NECD without fuel tourism |
| Belgium | 1990–2006 | -3.9 ; 0.2 | -3.3 ; 9.9 | -2.4 ; 0 | -2.8 ; 9.1 | |
| Bulgaria | 2006 | 0 | 0 | 0 | 0 | |
| Cyprus | 1990–2006 | -2.4 ; 0.1 | -0.4 ; 1.6 | 0 ; 0.1 | -0.2 ; 0.4 | |
| Czech Republic | 2006 | -0.9 | 3.7 | 0.2 | -0.1 | |
| Denmark | 1990–2006 | 0 | 1.1 ; 1.6 | 0 | 14.7 ; 19.4 | |
| Estonia | 1990–2006 | -1.6 ; 0 | -2.2 ; 14.8 | -0.5 ; 0 | -11.7 ; 0 | |
| Finland | 2000–2006 | -1.8 ; 2.3 | -1.1 ; 1.1 | -4.3 ; 14.3 | -0.1 ; 0.4 | |
| France | 1990–2006 | -0.5 ; 0 | -0.6 ; 0 | 0 | 0 | |
| Germany | 1990–2006 | 0 | 0 | 0 | 0 | |
| Greece | 2006 | 0 | 0 | 0 | NA | |
| Hungary | 1990, 2000, 2004–2006 | -0.2 ; 0.1 | -1.1 ; 0.1 | -0.5 ; 0 | -18.6 ; 10.5 | |
| Ireland | 1990–2006 | -5.4 ; 7.3 | -5.4 ; 6.4 | -0.4 ; 0.7 | 0 ; 0.2 | NECD without fuel tourism |
| Italy | 1990–2006 | -2.5 ; 0.6 | -3.2 ; 1.3 | -4.5 ; 0.3 | 0 ; 12.7 | |
| Latvia | 1990–2006 | -1.1 ; -0.4 | -0.1 ; 0 | -1.5 ; 0 | 0 | |
| Lithuania | 2006 | 0 | 0 | 0 | 0 | |
| Luxembourg | NA | NA | NA | NA | NA | |
| Malta | 2000–2006 | -0.4 ; -0.3 | 0 ; 61 | -0.1 ; 0 | -3.1 ; 0.3 | large differences only 2000–2003 |
| Netherlands | 2001–2006 | -14.5 ; -8 | -28.1 ; -1 | -21.8 ; 0.5 | -0.3 ; 3.1 | large differences only 2001–2003 |
| Poland | 2006 | 1.1 | 0.6 | -0.7 | 0 | |
| Portugal | 1990–2006 | 0 | 0 | 0 | 0 | |
| Romania | 2000, 2005–2006 | 0 ; 7.9 | 3.8 ; 30.3 | 3.6 ; 12.5 | 0 ; 6 | large differences only in 2000 |
| Slovakia | 2002–2006 | 0 | 0 | 0 | 0 | |
| Slovenia | 2002–2006 | -20.1 ; 0.2 | -0.2 ; 3.3 | -0.1 ; 0.1 | -0.8 ; 3.9 | large differences only from 2002–2004 |
| Spain | 1990–2006 | 5.3 ; 7.9 | 3 ; 4.4 | 1.8 ; 3.5 | 0.7 ; 0.9 | |
| Sweden | 1990–2006 | 0 | 0 | 0 | 0 | |
| United Kingdom | 2000–2006 | 0 ; 20.4 | -25.8 ; 0.1 | -2.2 ; 2.8 | -1.7 ; 11.5 | large differences only in 2000 |

Differences > 2% Differences > 20%

***Table 3: Overview of differences between the CLRTAP inventories and inventories submitted under the UNFCCC, period 1990-2006.***

| CLRTAP-UNFCCC – Differences in intervals [%] (From values reported in 2008, CLRTAP = 100%) | | | | | |
|---|---|---|---|---|---|
| | Years | $NO_x$ | CO | NMVOC | $SO_x$ |
| Austria | 1990–2006 | 0 | 0 | 0 | 0 |
| Belgium | 1990–2006 | -20.9 ; 17.1 | -15.4 ; 39.8 | -29.6 ; 16 | 9.9 ; 19.3 |
| Bulgaria | 2006 | 35.3 | 15.2 | 31.6 | -17.4 |
| Cyprus | 1990–2006 | -52 ; 14.4 | -9.5 ; 30 | -9.7 ; 3.4 | -22.8 ; 7.2 |
| Czech Republic | 2006 | 1.5 | -15.5 | -1.7 | -3.5 |
| Denmark | 1990–2006 | 0 | 0 | 0 | 0 |
| Estonia | 1990–2006 | -69.2 ; -16.4 | -42.9 ; 15.5 | 27.8 ; 52.8 | -74.1 ; 5.8 |
| Finland | 1990–2006 | -0.2 ; 10.9 | -45.4 ; 5 | -5.1 ; 0.2 | -13.2 ; 9.8 |
| France | 1990–2006 | -1.1 ; 0.8 | -9.8 ; -5.7 | -104.7 ; -41.9 | -6.2 ; -1.8 |
| Germany | 1990–2006 | 0 | 0.2 ; 0.2 | 0 | 0 |
| Greece | 2005–2006 | 0 ; 0.9 | 0 ; 2.1 | 0 ; 0.8 | 0 |
| Hungary | 1995, 2000, 2002, 2004–2006 | 0 ; 2.7 | -4.8 ; 15.3 | -12.9 ; 3.9 | -13.5 ; 0.1 |
| Ireland | 1990–2006 | -0.6 ; 0 | -0.8 ; 0 | 3 ; 5.9 | 0 |
| Italy | 1990–2006 | -0.1 ; 0 | -0.8 ; -0.1 | -0.5 ; -0.1 | -0.1 ; 0 |
| Latvia | 1990–2006 | 0 | 0 | 0 | 0 |
| Lithuania | 2006 | 0.1 | -0.7 | -7.5 | 2.9 |
| Luxembourg | NA | NA | NA | NA | NA |
| Malta | 2000–2006 | -0.5 ; -0.2 | -7720 ; -3592 | -39.3 ; 22.8 | -0.1 ; 0 |
| Netherlands | 1990–2006 | -2.6 ; 1.6 | -4.7 ; 9.9 | -1.6 ; 1.7 | -1.6 ; 3.1 |
| Poland | 2006 | 1.1 | 1.2 | 0.6 | -0.7 |
| Portugal | 1990–2006 | -3.2 ; 6.3 | -33.7 ; 2.9 | -150.3 ; -131 | -1.1 ; 0.4 |
| Romania | 1990–2006 | -18.8 ; 20.8 | -42.7 ; 74.1 | 3.5 ; 58.3 | 8.8 ; 46.2 |
| Slovakia | 2000–2006 | 0 | 0 | 0 | 0 |
| Slovenia | 2000–2006 | 0 | 0 ; 1 | -12.9 ; 0 | 0 ; 3.7 |
| Spain | 1990–2006 | 1 ; 1.2 | 0 | 0 | 0 |
| Sweden | 1990–2006 | 0 | 0 | 0 | 0 |
| United Kingdom | 1990–2006 | 0 | 0.1 ; 0.4 | 0.1 ; 0.2 | 0 |
| Norway | 1990–2006 | 0 | 0 | 0 | 0 |
| Switzerland | 1990–2006 | -4.7 ; 2.1 | -14.6 ; -4.8 | -96.1 ; -36.8 | -0.4 ; 0.5 |
| USA | 2002–2006 | 5.3 ; 6.2 | -2 ; 9.3 | 7.5 ; 18.6 | 0 |

Differences > 2% Differences > 20%

The reasons for differences between emissions reported under the CLRTAP/NECD and the EU Monitoring Mechanism are differences in reporting obligations. The three reporting obligations differ in the following three areas: a) mainly in the geographical coverage of countries (e.g. for France, Spain, Portugal), b) in the inclusion or exclusion of domestic and international aviation and navigation in the national total, c) in the reporting of the Land Use, Land Use Change and Forestry (LULUCF) sector. Additionally, emissions from road transport reported under the EU Monitoring Mechanism have to be calculated based on the amount of fuel sold, whereas emis-

sions reported under the CLRTAP/NECD may be calculated based on the amount of fuel either sold or used[22]. The major differences in reporting obligations are summarised in Table 1.

Possibilities for further streamlining and harmonisation of emission reporting, especially relating to the UNFCCC and the European Community greenhouse gas monitoring mechanism, should be explored.

Errors in inventories or inconsistent reporting, which would also lead to differences between inventories, cannot be identified by automated tests as they are currently designed. These errors can only be detected during the stage 3 review.

## 3.4 Time series consistency

***Key messages – Time series consistency***

*This test identifies trends and sudden changes in time series data reported by countries.*

*Time series with standard deviation greater than 0.2 were flagged, as were individual values within time series if the respective residual value (regression forecast value – reported value) was greater than 2.5 standard deviations from the mean of all residuals within the time series.*

The aim of this test was to highlight instances of dips and jumps in trends in time series data reported by countries. Only data reported in the new NFR reporting format was analysed and data for which at least three years were reported. Flagged data are presented in country reports. Dips and jumps in the inventories were flagged for all countries providing sufficient amount of data to be analysed.

Reported time series data were log 10-transformed prior to analysis in order to reduce intra-series variability and improve general time series linearity. A linear regression was subsequently applied to the log-transformed values for each time series. Time series with a large sigma (standard deviation >0.2) have been generally flagged. An individual value within the time series was identified as a dip/jump if the respective residual value (regression forecast value – reported value) was greater than 2.5 standard deviations from the mean of all residuals within the time series. Only time series responsible for a significant fraction (>3 %) of the national total are included.

Identified dips and jumps have been flagged at both a detailed and aggregated sector level (due to inconsistencies that occur in some cases between the reported subsectors and aggregated sectors). A summary of the findings is not provided here, but country responses to the flagged values will be evaluated and presented during the next joint TFEIP/EIONET meeting planed for October 2008.

[22] Austria and Ireland submitted two versions of inventories, one calculated on the basis of fuel sold (under CLRTAP) and the other adjusted for fuel tourism (under NECD). However, for most of the Parties it is not clear how emissions from combustion of fossil fuels are estimated (e.g. if road transport estimates are based on fuel used or fuel sold).

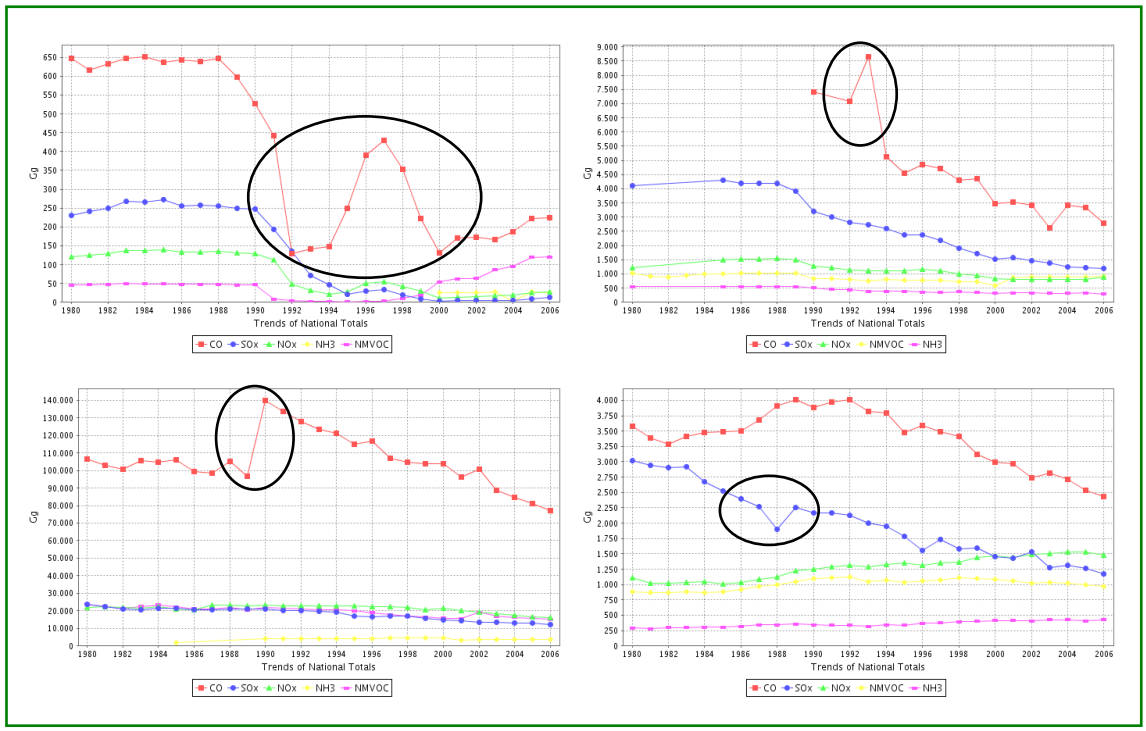



***Figure 10: Examples of dips and jumps highlighted in time series consistency tests***

## 3.5 Consistency – Implied emission factors

***Key messages – Consistency: Implied emission factors***

*Potential inconsistencies were identified by sectoral inventory experts and were flagged to the countries on the basis of automated checks and general and sector-specific criteria.*

*256 IEF related questions were raised in this year's country reports. Most outliers are found within the Energy Sector. Fewer outliers occurred in the Agriculture, Waste and Solvents sectors, but it must be taken into account that for these sectors the number of tests undertaken is much lower. Industrial processes are not included in IEF analyses, while it is not possible to aggregate activity data to the level at which tests are undertaken.*

*In 2008 a new documentation system to record questions to/clarifications from the Parties is being set up. This should prevent flagging issues that have been clarified from the next review round onwards.*

*In the 2008 review round the number of outliers flagged by experts was higher than in 2007 for all countries except for the Czech Republic, Estonia, Malta, Romania, Slovakia and Latvia where it remained the same and for France for which no outlier was flagged for any year. Norway's and Switzerland's inventories have been included in the IEF tests for the first time.*

*Not all parties which submitted CLRTAP inventories could be included in the testing because CRF tables with the required data (activity data) were not always available. From a technical viewpoint, all countries with complete UNFCCC CRF tables could be tested, but that would require timely reporting under both Conventions.*

*From the feedback received during the TFEIP meetings it can be concluded that the IEF test outcomes are useful for national experts and assist countries in improving their national inventories.*

Implied emission factor (IEF) tests were calculated from 2008 CLRTAP submissions for the sectors identified as key categories for Western and Eastern European Countries[23]. The pollutants examined are $NO_x$, CO, NMVOC and $SO_x$, $PM_{10}$ and $PM_{2.5}$. IEF values were derived from:

a. emission data reported by Parties to the CLRTAP and
b. sectoral activity data reported to the European Commission under the EU-MM or under the UNFCCC.

This year's NECD inventories were not included in the IEF test, but instead $PM_{10}$ and $PM_{2.5}$ inventories and two more countries were assessed. The objective of the implied emission factors (IEF) test was to identify significant changes of IEFs within time series and/or between countries. Implied emission factors were calculated for the sectors identified as key categories for Western and Eastern European countries for the year 2006.

Only inventories submitted by the 27 EU Member States plus Norway and Switzerland could be tested due to the lack of activity data[24] for the remaining Parties. It has to be noted that despite reporting of activity data under the CLRTAP, we have not been able to perform the implied emission factor test using reported CLRTAP activity data because of a number of inconsistencies.

The IEFs were analysed with the UNFCCC outlier tool. Due to the multitude of the potential outliers resulting from the automated tests the test results were evaluated manually. In general, dips and jumps of more than 40 % were listed and sent to the countries for consideration.

It should be clearly recognised that flagged IEF values do not necessarily indicate any underlying inconsistency in an inventory: dips and jumps within the time series might simply be due to industries having closed or to changes in the fuel splits in a single year, etc. Differences across countries might similarly be due to different types of activity data used for calculation, use of different abatement equipment, different fuel splits, etc.

Examples of IEFs that have been flagged are shown in Figure 11 for outliers within the IEF time series. The example in the left figure might indicate a real change in the IEF, whereas the outlier in the right graph looks suspicious. Nevertheless, both cases would be flagged to countries.

[23] The Key categories change minimally over time. Using the same key sources in tests enables comparisons to be made across different reporting years.

[24] Only countries which submitted inventories in CRF format to the UNFCCC on time could be included in this test.

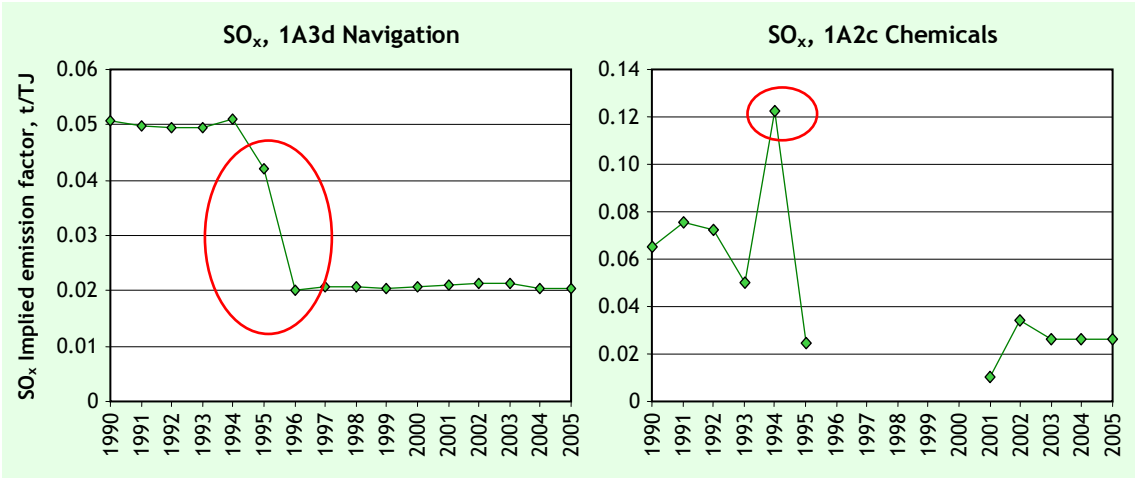



***Figure 11: Example of IEF analysis showing data points that would be flagged as an outlier in the time series 1990-2005 ($SO_x$, 1A3d Navigation and 1A2c Chemicals).***

Figure 12 flags outliers across countries. Whereas in the left hand chart only one number in one country is out of the average range, which most likely indicates an error, the right-hand chart shows that the EF in the whole time series are higher for the respective country. This may indicate either an error or that the country is using other methods, emission factors or activity data.

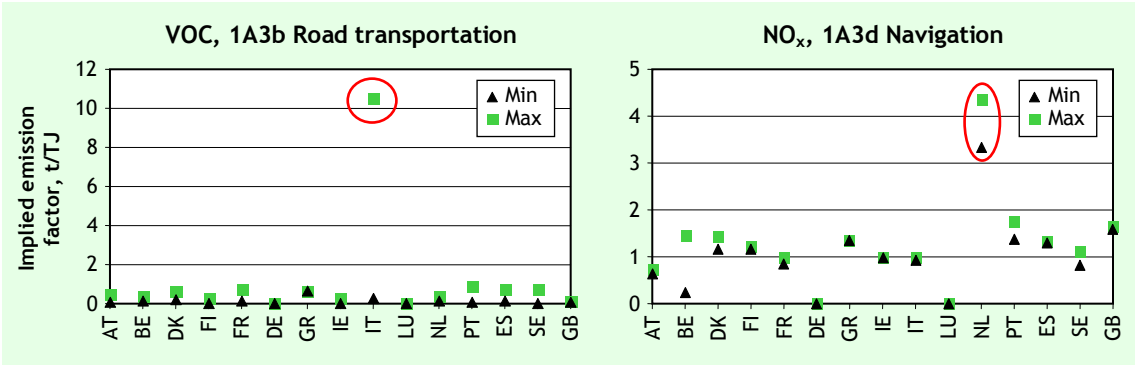



***Figure 12: Examples of IEF analysis showing data points that would be flagged as outliers. The figure presents the highest and lowest IEF 1990-2005 for each country in 2 sectors (VOC, 1A3b Road transportation) and ($NO_x$ 1A3d Navigation).***

It has to be noted that not every outlier highlighted by the automated IEF tool is included in the statistics below. Potential inconsistencies for further consideration were identified by sectoral inventory experts on the basis of general and sector specific criteria. 256 IEF related questions were raised in this year's country reports. It is possible that questions that were already raised/ clarified in previous years were included again in this year's Synthesis and assessment reports. In 2008, a new documentation system to record questions to/clarifications from the Parties is being set up. This should prevent flagging issues that have been clarified from the next review round onwards.

Whereas from the 2006 to the 2007 review the number of findings per country increased for all Eastern countries (probably because of increased reporting), five of them were able to decrease the number of findings in the 2008 review. For the other Eastern countries the number of findings further increased except for Latvia where it remained the same (Figure 13). In the 2008 review round the number of outliers identified by experts was higher than in 2007 for all countries

except for the Czech Republic, Estonia, Malta, Romania, Slovakia and Latvia where it remained the same and for France for which no outlier was identified for any year. Norway and Switzerland are included in the IEF tests for the first time (Figure 13).

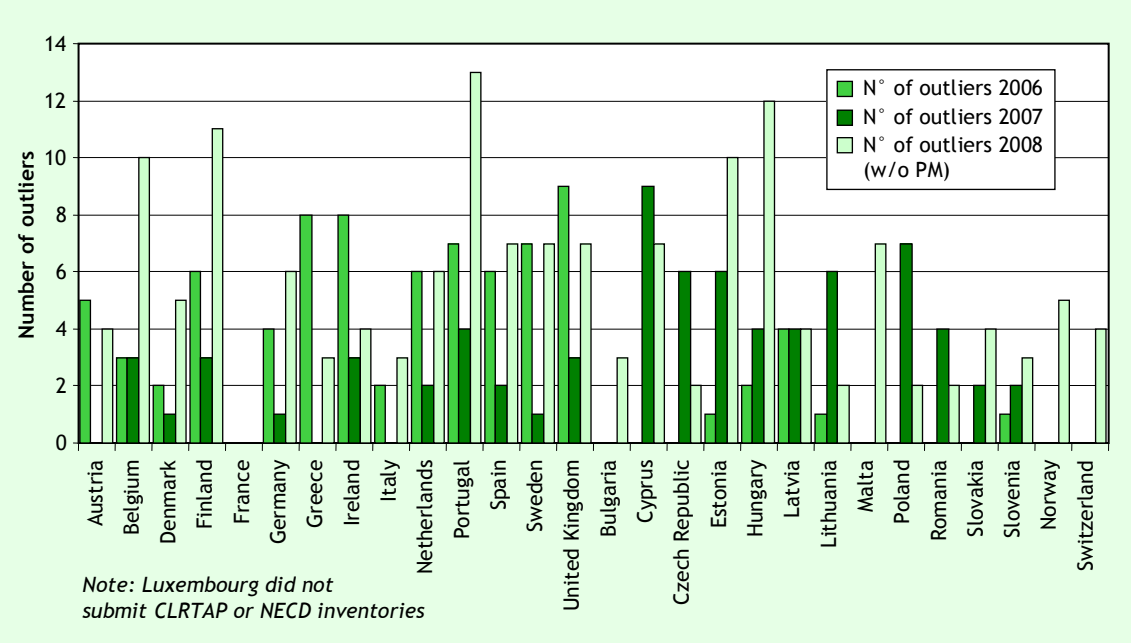



***Figure 13: Comparison of number of outliers for main gases ($NO_x$, CO, NMVOC, $SO_x$, $NH_3$) identified during 2008 review (27 EU MS, Norway and Switzerland).***

In the 2008 review the implied emission factor test for $PM_{2.5}$ and $PM_{10}$ was performed for the first time. Outliers were detected for 17 Parties.

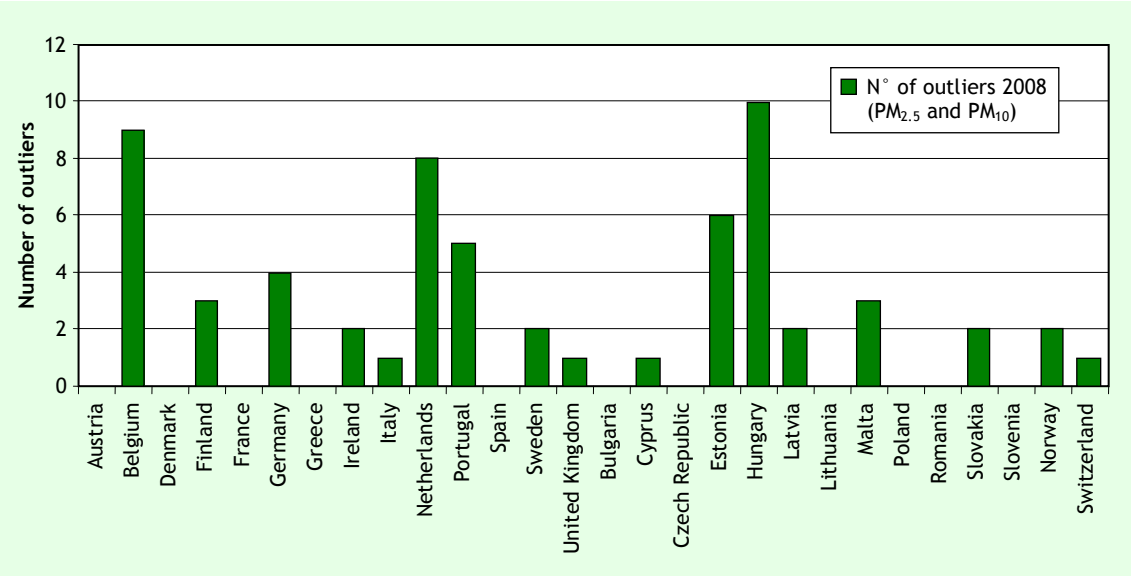



***Figure 14: Comparison of number of outliers for $PM_{10}$ and $PM_{2.5}$ identified during 2008 review (27 EU MS, Norway and Switzerland).***

Most outliers were found within the *Energy Sector (64 %)*. Fewer outliers occurred in the *Agriculture (23 %)*, *Solvents (9 %)* and *Waste (4 %)* sectors, but it must be taken into account that for these sectors the number of tests undertaken was much lower. Concerning pollutants, most outliers were found for $NH_3$ (54), followed by $PM_{2.5}$ (34) and $SO_x$ (30). The pollutant for which fewest outliers were identified was $NO_x$ with 18 outliers (Table 4). A few examples of interesting observations made by the expert review team are included in this report.

***Table 4: List of CLRTAP key categories where most outliers were identified.***

| | NOx | CO | NMVOC | SOx | $NH_3$ | $PM_{10}$ | $PM_{2.5}$ | all pollutants |
|---|---|---|---|---|---|---|---|---|
| 1A1a Public electricity and heat production | 2 | 3 | | 3 | | 4 | 8 | 20 |
| 1A1b Petroleum Refining | 2 | | | 4 | | | 2 | 8 |
| 1A1c Manufacture of Solid fuels and Other Energy Industries | 2 | | | 2 | | | | 4 |
| 1A2 Manufacturing Industries and Construction | 3 | 3 | 1 | 4 | | 4 | 5 | 20 |
| 1A3b Road Transportation | | 1 | 3 | | 5 | 4 | 3 | 16 |
| 1A3c Railways | 2 | | | | | | | 2 |
| 1A3d National Navigation | 4 | 5 | 4 | 8 | | 5 | 5 | 31 |
| 1A4a Commercial/Institutional | 3 | 1 | | 4 | | 8 | 8 | 24 |
| 1A4b Residential | | | 1 | 5 | | 3 | 3 | 12 |
| 3A Paint Application | | | 12 | | | | | 12 |
| 3B Degreasing and Dry Cleaning | | | 5 | | | | | 5 |
| 3C Chemical products, manufacture and processing | | | 2 | | | | | 2 |
| 4B1a Dairy cattle | | | | | 11 | | | 11 |
| 4B1b Non-dairy cattle | | | | | 13 | | | 13 |
| 4B3 Sheep | | | | | 9 | | | 9 |
| 4B6 Horses | | | | | 3 | | | 3 |
| 4B8 Swine | | | | | 13 | | | 13 |
| 6C Waste Incineration | | 8 | | | | | | 8 |
| **Number of outliers per pollutant** | **18** | **21** | **28** | **30** | **54** | **28** | **34** | **213** |

The comparison of total (CO, $SO_2$, $NO_X$, $PM_{2.5}$, $PM_{10}$) IEF values and analysis of trends suggests that most of the Parties use the same (or at least the same type of) activity data for their GHG and air pollution inventories. Absolute levels of IEF (in 1A) indicate that either the Inventory Guidebook (EEA/EMEP, 2007) is widely used for emission calculation and/or that the technological standards are quite similar at least within EU-15 countries[25]. In general, calculated IEFs of new EU-MS show larger fluctuations in trends.

*In category **1A1a Public electricity and heat production*** $SO_2$, $NO_x$ and $PM_{2.5}$ IEF trends look consistent for most of the Parties. In case of some Parties the IEF trend looks „synchronised" for $SO_2$, $NO_x$ and $PM_{2.5}$, which could indicate a stronger use of „modelled" emission factors rather than the use of „bottom-up" plant specific measured data. Trends in $PM_{2.5}$ and $PM_{10}$ IEFs look „congruent" for all Parties.

[25] IEFs of 1.A categories can not be directly compared with the EFs in the Inventory Guidebook (GB) because the GB provides EFs by sector and type of fuel whereas we calculate IEFs by sector and "total fuel consumption

The $SO_2$ IEFs show a decrease since 1990 for all Parties where complete time series are available. For most EU-15 MS the graphs show „harmonic" curves, e.g. without dips and jumps, almost a linear decrease for longer periods. $NO_x$ IEFs have decreased in most countries since 1990 and show similar trends as $SO_2$. In contrast, trends of CO IEFs show a very different picture. The IEF trend has increased since 1990 and/or a number of dips and jumps in time series appear, whereas some „smaller" Parties have almost linear trends in CO IEFs.

The trends in $PM_{2.5}$ and $PM_{10}$ IEFs are quite remarkable for many Parties (e.g. almost linear for longer periods). The $PM_{2.5}$ and $PM_{10}$ IEF trends in Eastern Europe Parties in general show more dips and jumps than in Western Europe Parties.

The IEF trends in category ***1A1b Petroleum refining*** are not as „linear" as in category *1A1a Public electricity and heat production* which is most probably due to the low number of refinery plants per Party. This means that restructuring or emission reduction measures of single plants have a high influence on the IEF although some parties have remarkably „harmonic" IEF trends.

The assessment of IEF trends in category ***1A1c Manufacture of Solid Fuels and Other Energy Industries*** ($SO_2$, $NO_X$) leads to the conclusion that most Parties use the same data for GHG and AP calculation.

The analysis of absolute values and trends of IEFs in category ***1A2 Manufacturing Industries and Construction*** (CO, $SO_2$, $NO_X$, $PM_{2.5}$, $PM_{10}$) leads to the conclusion that most parties use the same data for GHG and AP calculation. According to the Reporting Guidelines (UNECE, 2003) different combustion technologies with different emission characteristics should be included in this category. It is remarkable that despite this fact IEF time series are sometimes „nearly linear" for selected periods.

***1A3 b Road transportation:*** For $NO_x$ and CO there was a trend of decreasing IEFs for all Parties, for most with smooth time series (without dips and jumps). $NH_3$ IEFs showed a broader distribution, and the trend of the IEF reached a maximum, which occurred in different years for different countries. For PM IEFs dips and jumps of several orders of magnitude were identified, most likely they are due to errors.

***1 A 3 d National Navigation*:** for two countries IEFs for all pollutants showed the same striking pattern (dips/jumps or IEFs differing from the average in the same order of magnitude), most likely indicating problems with the activity data for this category. The sudden dip of the $SO_2$ IEF for this category in a number of countries is likely to be due to legal measures concerning the allowed S content in fuels.

***1 A 4 a Commercial and Institutional:*** most of the findings in this category were findings regarding PM IEFs. Given the incompleteness of PM data in this sector a need for improvement of emission factors becomes evident. For the same Parties as in 1A3d IEF patterns for different pollutants are similar, which could also result from problems with activity data.

***1 A 4 b Residential:*** for CO no dips and jumps were flagged. However, the trend is increasing in some countries and decreasing in others. For $SO_2$ several IEFs were flagged, the dips could result from legal measures. For two parties increases of PM IEFs of several orders of magnitude were found, which result most likely from errors.

A number of Parties have not reported complete time series of category ***3 Solvents*** emissions. In some countries activity data are available for certain years, but no corresponding emissions are provided in CLRTAP inventories. Generally, in this sector the comparability of implied emission factors between countries is rather limited, e.g. IEF in 3B range between 0.00025-6.93079 t/t in

the year 2005. The reason for such fluctuations might be the inconsistent use of units or the different definitions of activity data

For category ***3A Paint application*** implied emission factors of 1, close to 1, or even higher than 1 kg NMVOC/kg paint were detected in a number of inventories. This is surprisingly high since all emission factors cited in Table 8.1, chapter 0601 Paint application of the EMEP/CORINAIR Emission Inventory Guidebook – 2007 are lower than 1 kg NMVOC/kg paint.

Category ***4B Manure management***. Although the $NH_3$ implied emission factors per animal category of most of the Parties are at a comparable level, some Parties (especially the Mediterranean countries) show significantly lower values. The level of $NH_3$ emissions highly depends on the level of N excretion rates per animal category and the different animal waste management systems considered. Nitrogen excretion rates could not be subject of this review and should be further examined, e.g. during the stage 3 review. Another reason for the deviation might be a differing consideration of sub-categories of livestock (e.g. the accounting of piglets) or the inclusion of manure spreading in sector 4.D. High inter-annual changes in the time series in the agriculture sector indicate inconsistent activity data and/or incomplete recalculations.

***6C Waste Incineration:*** the IEF analysis was performed for CO only. For numerous countries the trend showed striking dips and/or jumps, which if not an error could be due to the low number of waste incineration plants per Party (measures of single plants have a high influence on the IEF).

Virtually all findings for $PM_{10}$ also held for $PM_{2.5}$, which shows the link between these data sets. For some countries similar findings for the same years and for different pollutants were identified, probably indicating that there might be a problem with the activity data used to calculate the IEFs. In general, PM data was less complete and also less consistent than data for other pollutants, which reflects the priorities of earlier years and efforts made to improve data for the „classic" pollutants.

## 3.6 Comparability – Emissions per capita, emissions per GDP

***Key messages – emissions per capita, emissions per GDP***

*For the first time new indicators (emissions per capita and emissions per GDP) were calculated for all Parties which submitted national total emissions of main pollutants and PM to CEIP.*

*Outliers might indicate differences in national economies, but also inconsistencies of trends or among Parties. This type of information will serve reviewers during the stage 3 review process as an indicator of potential problems when checking national inventories.*

New indicators (*emissions per capita and emissions per GDP*) were calculated for all Parties which submitted national total emissions of main pollutants and PM to CEIP. Inclusion of these new tests had been recommended by the TFEIP.

The two indicators *emissions per capita* and *emissions per GDP* were calculated for all Parties which submitted national total emissions of main pollutants and PM to CEIP. Information on population and GDP comes from the Eurostat database.

For this report two types of graphs for both indicators have been selected: a) minimum, maximum and average value for each Party and b) the 1990 and 2006 value for each Party (Appendix 6). More detailed tables and graphs were sent to all Parties together with the stage 2 Synthesis and assessment reports.

Outliers might indicate differences in national economies, but also inconsistencies of trends or among Parties (for example approximately two times higher $PM_{10}$ and $PM_{2.5}$ emissions per capita in Estonia, Norway and Portugal than in the remaining Parties). This type of information will serve reviewers as an indicator of potential problems when checking national inventories.

# 4 GRIDDED DATA FOR EMEP MODELS

***Key messages – gridded data***

*Gridded data and projections are part of the five 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.*

*The increase in reporting of gridded sector data is appreciated, but EMEP is still required to perform spatial distribution of emissions for more than 50 % of Europe by applying its own methods.*

Gridded sector data is requested in five-yearly intervals from 1990 onwards, but only 12 Parties to the CLRTAP had reported gridded sector data of any vintage in the $50 \times 50\,km^2$ EMEP grid by 2006 (http://www.emep.int/grid). These countries represented 25 % of the area covered by the Parties. In 2007, officially gridded sector data was included in the spatial distribution for 20 countries: Austria, Belarus, Germany, Denmark, Estonia, Finland, France (2000 emissions), Hungary, Ireland, Italy (2000 emissions), Lithuania, Latvia, Netherlands (2000 emissions), Norway, Portugal (2004 emissions), Sweden, Slovenia, Spain, Switzerland and United Kingdom (2004 emissions). These Parties cover 32 % of the area within the EMEP domain. 2005 gridded national totals that were submitted late (September 2007) were imported into the database as well.

Eight Parties (Estonia, Finland, Latvia, Lithuania, Portugal, Romania, Slovakia and Spain) reported gridded national totals and seven Parties (Estonia, Finland, Latvia, Lithuania, Portugal, Romania, Spain) gridded sector data in 2008, whereas three Parties (Finland, Lithuania and Spain) reported new gridded data for 2006. Six Parties also provided new Large Point Source (LPS) data. The data submitted in 2008 were reviewed on format, internal consistency and completeness. The gridded sector data of Romania could not be imported because of undefined NFR codes. Corrections were needed in two cases to be able to import data to the database.

There was also a late submission of gridded data for Cyprus (17 June 2008), and the European Community submitted gridded national totals for the year 2000 for $SO_x$ on 20 June 2008. These late submissions could not be included into the review process.

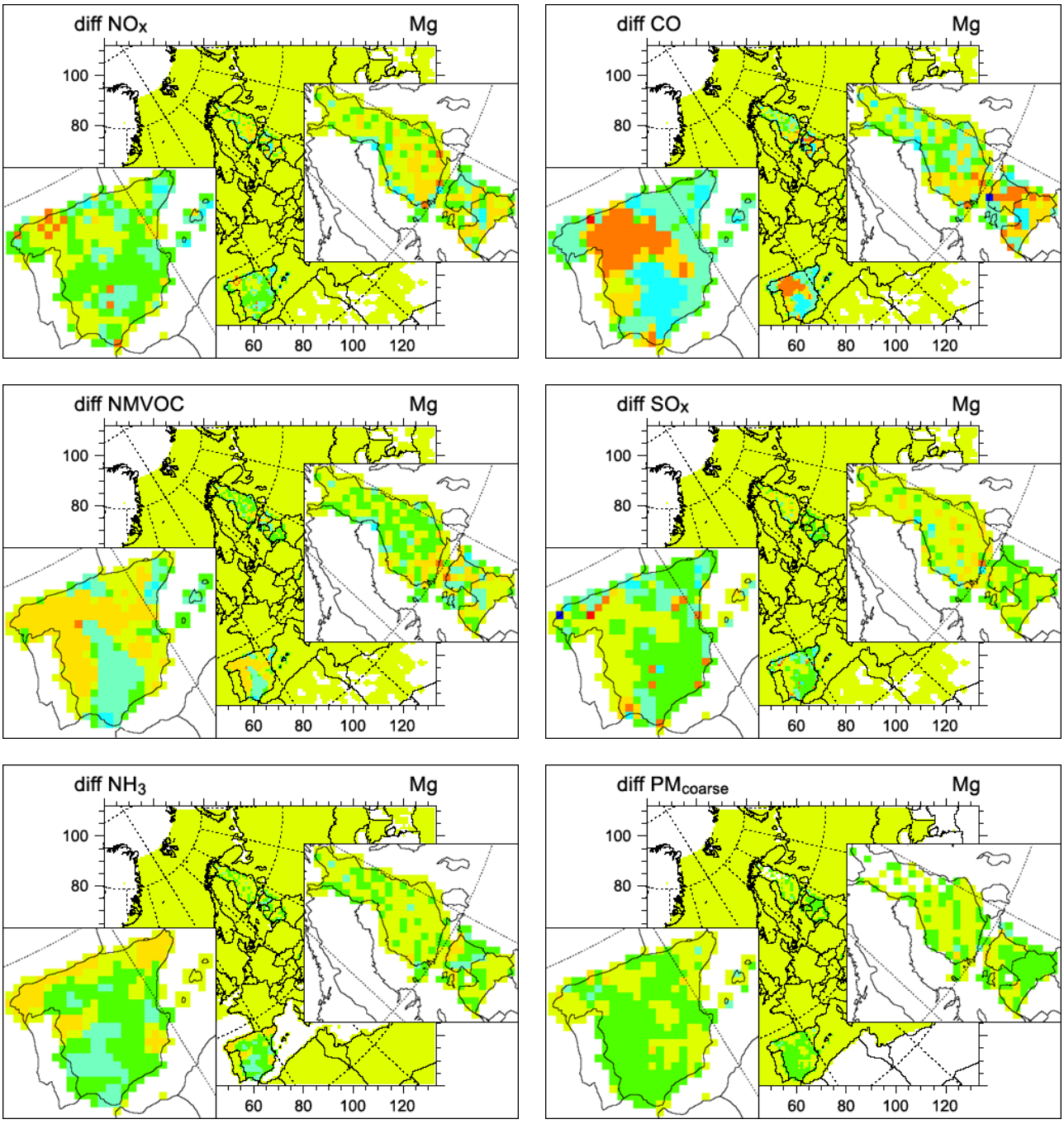
The increase in reporting of gridded sector data is appreciated, but EMEP is still required to perform spatial distribution of emissions for more than 50 % of Europe by applying its own methods.

Based on this new grid data CEIP calculated the new spatial distribution of the emissions in the EMEP grid. In comparison to 2007, CEIP detected distribution differences for six Parties and requested clarification from Spain, Finland, Latvia and Estonia, the countries with the highest changes. For Finland and Latvia explanations were received concerning these changes. For Spain and Estonia the clarification is still ongoing.

The following graphs show the distribution differences between 2007 and 2008. For this purpose, first the national totals submitted in 2008 were distributed as in 2007. Secondly, these national totals were distributed considering the new reported grid and LPS data from 2008. In the end, the difference for each grid cell was calculated.

In a grid cell in Figure 15 a negative value means that the emission level in this cell was lower in the distribution of 2007 than in the new distribution of 2008. In case of a positive value the

emission level in the cell was higher in the distribution of 2007 than of 2008. An emission level of 0 indicates no differences.



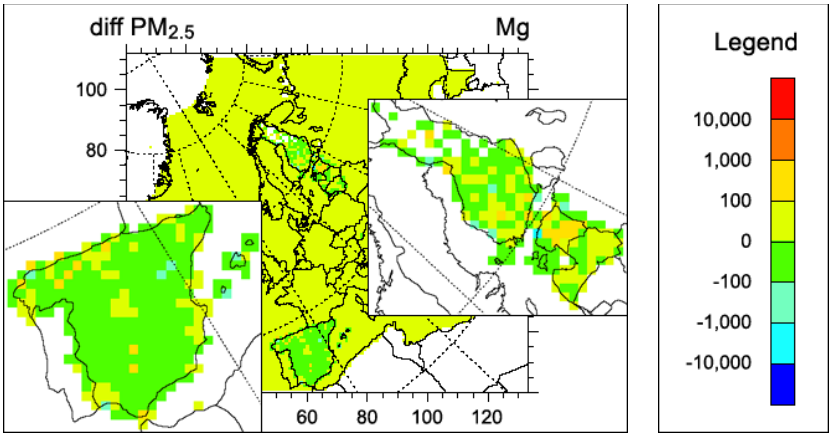



***Figure 15:***
***Changes in distribution of emission data within new submission.***

Before sectoral emission data can be used by modellers missing information has to be filled in. For this, CEIP used two methods[26]: a) linear extrapolation of the last five (three as a minimum) years and b) copying last year's emissions. The overview information on gap filled sectors is listed in Table 16. It has to be noted that only the sectors are gap filled in which emissions for 2005 occurred (original data set as provided by MSC-W and published on http://www.emep-emissions.at/emission-data-webdab/gap-filled-emissions/).

For the year 2006, the 2005 emissions in category *shipping data* were linearly interpolated with ENTEC estimates for 2010, which resulted in a lower value than in 2005 in some cases (in previous years MSC-W used ENTEC data from 2000 and increased it every year by approximately 2.5 % for ships and 3.9 % for ferries).

***Table 5: Overview of gap-filled sectors in the EMEP 2006 inventory.***

| | CO | $NH_3$ | NMVOC | $NO_x$ | $SO_x$ | $PM_{2.5}$ | $PM_{coarse}$ |
|---|---|---|---|---|---|---|---|
| Albania | S1, S2, S7, S8, S9 | S4, S10 | S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Armenia | S1, S2, S3, S4, S7, S9, S10 | S4, S10 | S1, S2, S3, S4, S5, S6, S7, S9, S10 | S1, S2, S3, S4, S7, S9, S10 | S1, S2, S4, S7, S9, S10 | S1, S2, S3, S7 | S2, S3, S7 |
| Azerbaijan | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S10 | S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9 | S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9 | S1, S2, S3, S4, S7, S8, S9 |
| Belarus | S5 | S5 | S5, S10 | S10 | S5 | S5, S9 | S5, S9 |
| Belgium | | | | | | | S9** |
| Bosnia and Herzegovina | S1, S3, S7, S8, S9 | S4, S10 | S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Bulgaria | | | | | | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Croatia | | | | | | S5, S8, S9 | S5, S8, S9 |
| Czech Republic | | | S10 | | | S5 | S5 |
| Estonia | S6 | | S10 | | S9 | | |
| Finland | S6 | | | | | | |
| Georgia | S1, S2, S3, S4, S5, S7, S9, S10 | | S1, S2, S3, S4, S5, S6, S7, S9, S10 | S1, S2, S3, S4, S5, S7, S9, S10 | S1, S2, S4, S5, S7, S9, S10 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S7, S8 |

[26] Methods are consistent with the ones proposed by ETC/ACC for gap filling of the European Community CLRTAP inventory (ETC/ACC, 2008).

| | CO | $NH_3$ | NMVOC | $NO_x$ | $SO_x$ | $PM_{2.5}$ | $PM_{coarse}$ |
|---|---|---|---|---|---|---|---|
| Germany | | | | | | S5 | S5 |
| Greece | S1*, S2*, S3*, S4*, S5*, S7*, S8*, S10* | S4, S10 | S1*, S2*, S3*, S4*, S5*, S6*, S7*, S8* | S1*, S2*, S3*, S4*, S5*, S7*, S8*, S10* | S1*, S2*, S3*, S4*, S5*, S7*, S8* | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Hungary | | S5 | | | | S10 | S1, S10 |
| Iceland | S1, S2, S3, S4, S7, S8, S9, S10 | S7, S8, S9, S10 | S1, S2, S3, S4, S6, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S8 |
| Ireland | | | | | | S10 | S10 |
| Italy | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S7, S8, S9 | S1, S2, S3, S4, S7, S8, S9, S10 | S2, S3, S4, S7, S8, S9, S10 |
| Kazakhstan | S1, S2, S3, S4, S5, S7, S9, S10 | S10 | S1, S2, S3, S4, S5, S6, S7, S9, S10 | S1, S2, S3, S4, S5, S7, S9, S10 | S1, S2, S3, S4, S5, S7, S9, S10 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S7, S8 |
| Lithuania | | | | | | S4, S5, S9, S10 | S4, S5, S9, S10 |
| Luxembourg | S1, S2, S3, S4, S7, S8 | S4, S9, S10 | S1, S2, S3, S4, S5, S6, S7, S8, S9 | S1, S2, S3, S4, S7, S8, S9 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Malta | S7 | S7, S9, S10 | S1, S2, S3, S4, S5, S6, S7, S8 | S1, S2, S3, S5, S7, S8, S9 | S1, S2, S3, S7, S8, S9 | S1, S2, S4, S7, S9, S10 | S1, S4, S7, S10 |
| Montenegro | S1**, S2**, S3**, S4**, S5**, S6**, S7**, S8**, S9**, S10** | S4**, S10** | S1**, S2**, S3**, S4**, S5**, S6**, S7**, S8**, S9**, S10** | S1**, S2**, S3**, S4**, S7**, S8** | S1**, S2**, S3**, S4**, S7**, S8** | S1**, S2**, S3**, S4**, S5**, S7**, S8**, S9**, S10** | S1**, S2**, S3**, S4**, S5**, S7**, S8**, S9**, S10** |
| Republic of Moldova | S9 | S4 | | | | S5, S9 | S5, S9 |
| Romania | | | | S10 | | S1, S2, S3, S4, S5, S7, S8, S9, S10** | S5, S9, S10** |
| Russian Federation | S1, S2, S3, S4, S5, S7, S8, S9 | S4, S9, S10 | S1, S2, S3, S4, S5, S6, S7, S8 | S1, S2, S3, S4, S5, S7, S8 | S1, S2, S3, S4, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Serbia | S1**, S2**, S4**, S7**, S8**, S9** | S4**, S10** | S1**, S2**, S3**, S4**, S5**, S6**, S7**, S8**, S9**, S10** | S2**, S3**, S7**, S8** | S2**, S4**, S7**, S8** | S1**, S2**, S3**, S4**, S5**, S7**, S8**, S9**, S10** | S1**, S2**, S3**, S4**, S5**, S7**, S8**, S9**, S10** |
| Slovakia | S9, S10 | S9 | | | | S10 | S10 |
| Slovenia | S9 | S9 | | | | | |
| TFYR of Macedonia | S6 | | S9, S10 | | | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |
| Turkey | S1, S2, S3, S4, S7, S8, S9, S10 | S4, S9, S10 | S1, S2, S3, S4, S5, S6, S7, S8, S9 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S7, S8 | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S10 |
| Ukraine | | | | | | S1, S2, S3, S4, S5, S7, S8, S9, S10 | S1, S2, S3, S4, S5, S7, S8, S9, S10 |

* *Data imported from UNFCCC*

** *Copy of last year data*

*** *Replacement by MSC-W*

MSC-W assessed and revised the gap filled data set prepared by CEIP as follows:

- MSC-W re-gridded $SO_x$ emissions in Cyprus using the national total for $SO_x$ and the spatial distribution used in the 2007 reporting round. This changed the sector totals and the spatial distribution in grid cells.
- In previous years expert estimates for PM emissions in the Remaining Asian Areas (ASI) were not available. This year, MSC-W carries out model calculations with the Unified EMEP model for an extended area including Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan. Since the Remaining Asian Areas include parts of Turkmenistan and Uzbekistan and have significant impact on the air concentrations and depositions in the above mentioned five countries, the importance of this area for this year's model run has risen considerably. Therefore, MSC-W introduced expert estimates for PM emission in ASI, which had been derived from $SO_x$ emissions in sector S1, from $NO_x$ in S2-S9 and from $NH_3$ in S10.
- MSC-W considered reported $PM_{2.5}$ and $PM_{10}$ data from Croatia to be underestimated. The officially reported data for 2006 were very similar to those of 2005. Therefore, MSC-W used the same expert emissions in the model as in 2005.

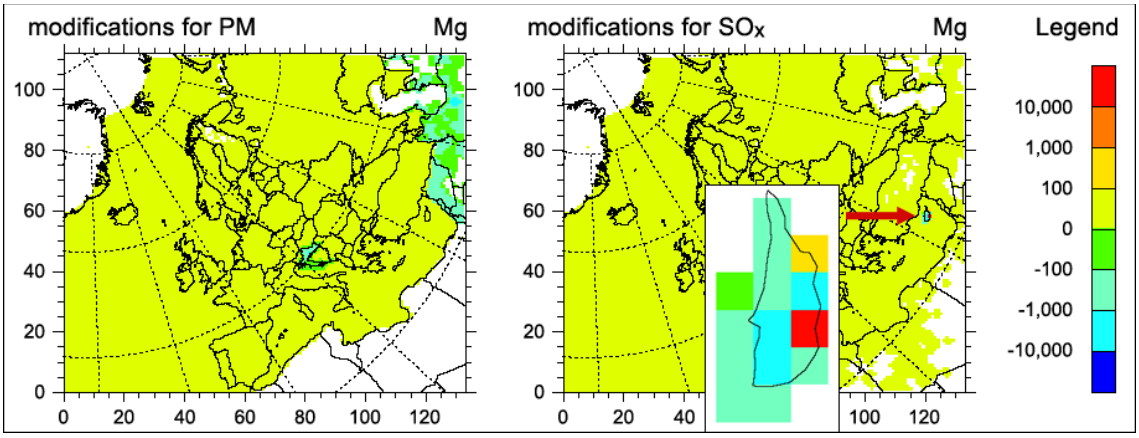



***Figure 16: Changes in distribution of emission data after revisions of MSC-W.***

For more detailed information please see the report *„Transboundary acidification, eutrophication and ground level ozone in Europe in 2006* (MSC-W, 2008).

# 5 CONCLUSIONS

*Timeliness and completeness* of reporting have slightly improved under both the CLRTAP and the NECD, but is still not considered satisfactory due to late delivery of data from a number of Parties. Late submissions hamper the inclusion of reviewed emission data in the EMEP database and hence the assessment work performed under the Convention.

A number of Parties do not submit regular information in the annual reporting rounds under the Convention. Three Parties – Luxembourg, Lichtenstein and the Russian Federation – did not submit data in 2008. Efforts to improve the regularity of reporting need to be made by Albania (new party), Azerbaijan, Bosnia and Herzegovina, Iceland, Kazakhstan, Kyrgyzstan and Montenegro (new party), even though these Parties are only Parties to the Convention and not to any of the pollutant specific Protocols, except Iceland, which has ratified the POPs Protocol.

*Completeness* of data for years in the 1980s was much lower than for years from 1990 onwards. For the Main Pollutants in the NFR sectors the difference is around a factor of 2. Most complete sector data are available from the year 2000 onwards. Inventories cannot be compared if countries provide incomplete and/or inconsistent data. The Guidelines on reporting under the CLRTAP make it difficult to give strong guidance on the completeness of inventory reporting. However, improved clarity of reporting requirements has been incorporated into the proposed revised reporting guidelines, which will be considered by the EMEP Steering Body and Executive Body of the Convention later in 2008.

Most Parties (28) reported both gridded and non-gridded emissions using the requested *NFR formats*. However, ten Parties altered partly or fully the reporting templates, which required additional manual editing of submissions. A number of parties did not submit 1990-1999 data in NFR tables. This hampers comparison of sectoral trends. In addition, under the NECD 18 MS (from 27) submitted inventories in non-consistent formats (e.g. using modified templates). It is recommended that all Parties use the REPDAB tool for initial quality control before submitting the inventories. The reporting of information in non-standard formats greatly increases the difficulties associated with data processing and analysis.

*The results of the KCA* shows that *1A3b Road Transportation* is within the top seven source categories for all assessed pollutants except $SO_x$ and $NH_3$, being the most important key category for $NO_x$ and CO and the second most significant source for NMVOC, $PM_{10}$ and $PM_{2.5}$ emissions. 1A1a Public Electricity and Heat Production is responsible for a significant fraction of $NO_x$ and $SO_x$ emissions, and in Eastern Europe additionally for CO and $PM_{10}$, while 1A2 Manufacturing Industries and Construction contributes significantly to $NO_x$, CO, $SO_x$ and $PM_{2.5}$ emissions. 1A4b Residential is the most significant key source for $PM_{10}$ and $PM_{2.5}$ emissions, the second most significant source for CO and important also for NMVOC and $SO_x$ Emissions. 4B Manure Management is the dominant source of $NH_3$ emissions. Parties' use of the emission inventory notation key IE (included elsewhere) means that emission estimates for one NFR sector can be included in emission estimates for a different sector. As a consequence, the aggregated KCA may not always accurately reflect the share of all main emission sources, but can nevertheless provide valuable information for the Parties and reviewers.

*Parties recalculate inventories* frequently, but there is evidence that only few Parties appear to recalculate their emissions across the whole time series, even though this is essential for obtaining consistent emission trends. On the other side, only 11 % of all recalculations performed were higher than +-10 % of national total emissions. Large recalculations were most frequently observed for HCB, DIOX and Pb emissions. The accuracy of the emissions of main pollutants might

be considered higher than the emissions of other pollutants. Large POPs recalculations indicate higher uncertainty levels of these emissions. The recalculations under the NECD were in general minor for all four reported components, with a few exceptions observed for $NO_x$ and NMVOC.

*The transparency of reporting* under the CLRTAP and the NECD slightly increased compared to 2007. 26 Parties (66 % of those reporting inventories) submitted an Informative Inventory Report (IIR) in conjunction with their 2008 CLRTAP submissions. The provision of a transparent IIR is essential for an efficient, centralised stage 3 review.

Potential IEF inconsistencies requiring further consideration were flagged by sectoral inventory experts. Although general criteria to be applied in this process have been agreed upon, the application of these criteria will always be expert and/or sector specific. There is presently no „easy" system to record questions asked to Parties and answers received. This situation should be improved from the next review round onwards when a more transparent documentation system will be in place.

In the 2008 review round the number of *IEF outliers* flagged by experts was higher than in 2007 for all countries except for the Czech Republic, Estonia, Malta, Romania, Slovakia and Latvia where it remained the same, and for France for which no outlier was flagged for any year. Norway's and Switzerland's inventories have been included in IEF tests for the first time. Most outliers are found within the Energy Sector. Fewer outliers occurred in the Agriculture, Waste and Solvents sectors. However, it must be taken into account that for these sectors the number of tests undertaken was much lower. Industrial processes are not included in IEF analyses because it is not possible to aggregate activity data to the level on which tests are undertaken.

Not all parties which submitted CLRTAP inventories could be included in the IEF testing because the CRF tables with the required data (activity data) were not available. From a technical viewpoint, all countries with completed UNFCCC CRF tables could be tested, but that would require timely reporting under both Conventions and additional resources to be allocated for this task. From the feedback received during the TFEIP meetings it can be concluded that the IEF test outcomes are useful for national experts and assist countries in improving their national inventories.

New indicators *(emissions per capita and emissions per GDP)* were calculated for all Parties which submitted national total emissions of main pollutants and PM to CEIP. Outliers may indicate differences in national economies, but also inconsistencies of trends or among Parties. This type of information will serve reviewers during stage 3 as an indicator of potential problems when checking national inventories.

This fourth review round shows that many findings are similar to the findings in previous years. For future review reports, the practise of running automated tests and producing country reports might be continued, but overview tables might no longer be produced annually. Instead selected sectors and/or pollutants might be assessed.

# 6 UNITS AND ABBREVIATIONS

kg..... 1 kilogram = $10^3$ g (gram)
t ..... 1 tonne (metric) = 1 megagram (Mg) = $10^6$ g
Mg ..... 1 megagram = $10^6$ g = 1 tonne (t)
Gg..... 1 gigagram = $10^9$ g = 1 kilotonne (kt)
Tg ..... 1 teragram = $10^{12}$ g = 1 megatonne (Mt)
TJ..... 1 terajoule

As ..... arsenic
ASI ..... Remaining Asian Areas
Cd..... cadmium
CDR..... central data repository of EEA's Eionet Reportnet
CEIP ..... EMEP Centre on Emission Inventories and Projections
$CH_4$..... methane
CLRTAP..... LRTAP Convention
CO ..... carbon monoxide
$CO_2$ ..... carbon dioxide
Cr..... chromium
CRF ..... UNFCCC common reporting format for greenhouse gases
Cu..... copper
EEA..... European Environment Agency
Eionet ..... European environmental information and observation network
EMEP ..... Co-operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe
ETC/ACC ..... European Topic Centre on Air and Climate Change
EU ..... European Union
GDP..... Gross Domestics Product
HFCs ..... hydro-fluorocarbons
Hg..... mercury
HMs..... heavy metals
IIR ..... informative inventory report
IEF..... Implied emission factor
KCA ..... key category analysis
LRTAP Convention..... UNECE Convention on Long-range Transboundary Air Pollution
$N_2O$..... nitrous oxide
NECD..... National Emission Ceilings Directive (2001/81/EC)
NFR..... UNECE nomenclature for reporting of air pollutants
$NH_3$..... ammonia
Ni..... nickel
NMVOCs..... non-methane volatile organic compounds
$NO_2$..... nitrogen dioxide
$NO_x$..... nitrogen oxides
Pb ..... lead
PFCs ..... perfluorocarbons
PM..... particulate matter

$PM_{10}$ ..... particles measuring 10 µm or less
$PM_{2.5}$..... particles measuring 2.5 µm or less
POPs..... persistent organic pollutants
QA/QC..... quality assurance/quality control
Se..... selenium
$SF_6$ ..... sulphur hexafluoride
SNAP..... selected nomenclature for air pollution
$SO_2$ ..... sulphur dioxide
$SO_x$ ..... sulphur oxides
TFEIP ..... UNECE Task Force on Emission Inventories and Projections
TFIAM..... Task Force on Integrated Assessment Modelling
TSP..... total suspended particles
UNECE..... United Nations Economic Commission for Europe
UNFCCC ..... United Nations Framework Convention on Climate Change
VOCs..... volatile organic compounds
Zn ..... zinc

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# APPENDIX 1: Status of reporting

***Table 6a:Status of reporting under the LRTAP Convention as of 31 May 2008.***

| | Annual reporting | | | | Minimum 5 year reporting | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Party | Submission date *) | Re-submission | NFR template | Other format | Projections | Activity data | Gridded data | LPS emissions | IIR 2008 |
| Albania | | | | | | | | | |
| Armenia | | | | | | | | | |
| Austria | 15.02.2008 | | 1980–2006 | | | 1990 1995 2000 2005 | np | np | x |
| Azerbaijan | | | | | | | | | |
| Belarus | 15.02.2008 | | 2006 | DIOX (2004–2005); HMs (1990–1995) | | np | np | np | x |
| Belgium | 15.02.2008 | 27.02.2008 | 1990–2006 | | 2010 | np | np | np | x |
| Bosnia & Herzegovina | | | | | | | | | |
| Bulgaria | 14.02.2008 | | 2006 | | | np | np | np | x |
| Canada | 15.02.2008 | | 2006 | | 2010 2015 2020 | np | np | np | np |
| Croatia | 19.02.2008 | 21.02.2008 | 2006 | | | 2006 | np | np | x |
| Cyprus | 14.02.2008 | | 1990–2006 | | | np | np | np | x |
| Czech Republic | 15.02.2008 | 15.04.2008 | 2006 | | | np | np | np | x |
| Denmark | 15.02.2008 | | 1980–2006 | | 2010 2015 2020 | 1990 1995 2000 2005 2010 2015 2020 | np | np | x |
| Estonia | 15.02.2008 | | 1990–2006 | | 2010 2015 | np | 1990 1995 2000 2005 | np | np |
| European Community | 10.06.2008 | | 1990–2006 | | | np | np | np | np |
| Finland | 15.02.2008 | 29.02.2008 | 1980–2006 | | 2010 2020 | 2006 | 2006 | 2006 | x |
| France | 14.02.2008 | | 1980–2006 | | 2010 2020 | 1990 1995 2000 2005 2010 2020 | np | np | x |
| Georgia | 18.02.2008 | | | 2000–2006 | | np | np | np | np |
| Germany | 11.02.2008 | | 1990–2006 | | 2010 2015 2020 | 1990 1995 2000 2005 2010 2015 2020 | np | np | np |
| Greece | 21.04.2008 | | 2006 | | | np | np | np | np |
| Hungary | 14.02.2008 | 20.03.2008 | 2002–2006 | Main (1980–2005); POPs (1990–2004) | | np | np | np | x |
| Iceland | 26.07.2008 | | | | | | | | |
| Ireland | 14.02.2008 | | 1987, 1990–2006 | | | np | np | np | np |
| Italy | 29.04.2008 | | 1980–2006 | | | np | np | np | np |
| Kazakhstan | | | | | | | | | |
| Kyrgyzstan | | | | | | | | | |
| Latvia | 15.02.2008 | 25.02.2008 14.03.2008 | 1990–2006 | | | 1990 1995 2000 2005 | 2000 2005 | 2000 2005 | x |
| Liechtenstein | | | | | | | | | |
| Lithuania | 11.02.2008 | | 2006 | | 2010 | 2006 | 2006 | 2006 | x |
| Luxembourg | | | | | | | | | |
| Macedonia, FYROM | 14.02.2008 | | 2006 | | | 2006 | np | 2006 | x |

| | Annual reporting | | | | Minimum 5 year reporting | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Party | Submission date *) | Re-submission | NFR template | Other format | Projections | Activity data | Gridded data | LPS emissions | IIR 2008 |
| Malta | 29.02.2008 | | 2000–2006 | | | np | np | np | np |
| Monaco | 09.01.2008 | | 2006 | | 2010 | 2006 | np | 2006 | np |
| Montenegro | | | | | | | | | |
| Netherlands | 19.02.2008 | | 1990–2006 | | 2010 2015 2020 | np | np | np | np |
| Norway | 15.02.2008 | | 1990–2006 | | | np | np | np | x |
| Poland | 15.02.2008 | 19.02.2008 | 2006 | | | np | np | np | np |
| Portugal | 15.02.2008 | 20.02.2008 29.02.2008 16.05.2008 | 1990–2006 | | 2010 | 1990 to 2006 | 2005 | 2005 | x |
| r. Moldova | 15.02.2008 | | 2006 | | 2010 2015 2020 | np | np | np | np |
| Romania | 15.02.2008 | 14.03.2008 | 2005, 2006 | 1980–2004 | 2010 2020 | 2005 2006 | 2005 | np | x |
| Russia | | | | | | | | | |
| San Marino | | | | | | | | | |
| Serbia | 14.02.2008 | | 2006 | | | np | np | np | x |
| Slovakia | 12.02.2008 | | 2000–2006 | | 2010 2015 2020 | np | 1990 1995 2000 2005 | np | x |
| Slovenia | 15.02.2008 | 25.04.2008 | 2000–2006 | | 2010 2015 2020 | np | np | np | x |
| Spain | 13.03.2008 | 31.03.2008 | 1990–2006 | 1980–1989 | 2010 2015 2020 | 1990 1995 2000 2005 2010 2015 2020 | 1990 to 2006 | 1990 to 2006 | x |
| Sweden | 09.01.2008 | | 1980–2006 | | 2010 2015 2020 | np | np | np | x |
| Switzerland | 07.02.2008 | | 1990–2006; | | 2010 2015 2020 | 1990 to 2020 | np | np | x |
| Turkey | | | | | | | | | |
| Ukraine | 06.03.2008 | 11.03.2008 | 2006 | | | np | np | np | |
| United Kingdom | 15.02.2008 | | 1980–2006 | | | np | np | np | x |
| USA | 18.01.2008 | 22.02.2008 | 2002–2006 | | | np | np | np | x |

***Table 6b: Status of reporting under the NEC Directive as of 31 May 2008.***

| Member State | First submission | | Re-submissions | Years covered | Format | $SO_2$, $NO_x$, $NH_3$, NMVOC | | Projections table | updated NECD Programmes |
|---|---|---|---|---|---|---|---|---|---|
| | Uploaded to CDR | to the EC | | | | 2005 final | 2006 pre-liminary | | |
| Austria | 20.12.2007 | | | 1990–2006 | NFR | x | x | Sectoral (2010) as pdf file | |
| Belgium | 24.12.2007 | | | 1990–2006 | modified NFR 2004 | x | x | Sectoral (2010) | |
| Bulgaria | 19.12.2007 | | 11.02.2008 | 2005–2006 | modified NFR 2004 | x | x | Totals (2010/15/20) | |
| Cyprus | 13.12.2007 | | | 2005–2006 | modified NFR 2004 | x | x | Sectoral (2010) | |
| Czech Republic | 01.02.2008 | | | 2005–2006 | NFR modified | x | x | Sectoral (2010) | |
| Denmark | 20.12.2007 | | | 1980–2006 | NFR 2002 | x | x | Totals (2010/15/20) | |
| Estonia | 19.12.2007 | | | 1990–2006 | modified NFR 2004 | x | x | Sectoral (2010) | 19 Dec 2007 |
| Finland | 04.12.2007 | | | 2005–2006 | modified NFR 2004 | x | x | Totals (2010) | |
| France | 21.12.2007 | | | 1980–2006 | NFR | x | x | | 21 Dec 2007 |
| Germany | 13.12.2007 | | | 2005–2006 | modified NFR 2004 | x | x | Totals (2010/15/20) | |
| Greece | 21.04.2008 | | | 2006 | NFR | np | x | Totals (2010) | |
| Hungary | 20.12.2007 | | 07.02.2008 | 2005–2006 | SNAP; NFR | x | x | np | np |
| Ireland | 04.01.2008 | | 31.01.2008 | 1990–2006 | NFR 2002 | x | x | | 4 Jan 2008 |
| Italy | 21.01.2008 | | | 2005–2006 | NFR | x | x | Sectoral (2010/15/20) | |
| Latvia | 27.12.2007 | | 15.02.2008 | 1990–2006 | modified NFR 2004 | x | x | Sectoral (2010) | |
| Lithuania | 04.01.2008 | | 04.01.2008 28.01.2008 | 2004–2006 | NFR 2004 | x | x | Totals (2010) | |
| Luxembourg | 09.07.2008 | | | 1990–2006 | NFR | x | x | np | np |
| Malta | 23.12.2007 | | | 2000–2006 | modified NFR 2004 | x | x | Sectoral (2010) | |
| Netherlands | 20.12.2007 | | | 2005–2006 | modified NFR 2002 | x | x | Totals (2010) | |
| Poland | 02.01.2008 | | 11.02.2008 | 2006 | NFR | x | x | | 2 Jan 2008 |
| Portugal | 28.12.2007 | | 22.02.2008 | 1990–2006 | NFR 2002 | x | x | Totals (2010) | |
| Romania | 27.12.2007 | | | 2005–2006 | modified NFR 2004 | x | x | Sectoral (2010) | |
| Slovakia | 17.12.2007 | | | 2002–2006 | modified NFR 2004 | x | x | Totals (2010/15/20) | |
| Slovenia | 07.01.2008 | 21.12.2007 | 20.03.2008 | 2005–2006 | modified NFR 2004 | x | x | Totals (2010/15/20) | 20 Mar 2008 |
| Spain | 13.03.2008 | | | 1990–2006 | NFR 2002 | x | x | Totals (2010) | 11.Feb 2008 |
| Sweden | 28.12.2007 | | | 1988–2006 | modified NFR 2004 | x | x | Totals (2010/15/20) | |
| United Kingdom | 20.12.2007 | 17.12.2007 | | 2002–2006 | modified NFR 2004 | x | x | Totals (2010/15/20) | |

*np – not provided,*

*x – provided;*

*NFR – nomenclature for reporting – sectoral classification system developed by UNECE/EMEP for the reporting of air emissions*

# APPENDIX 2: Completeness

***Table 7: Completeness of CLRTAP submissions as of 31 May 2008.***

| Party | $SO_2$, NOx, CO, $NH_3$, NMVOC | Cd, Hg, Pb | Additional HMs | $PM_{10}$, $PM_{2.5}$ | TSP | POPs (PAH, DIOX, HCB) |
|---|---|---|---|---|---|---|
| Albania | | | | | | |
| Armenia | | | | | | |
| Austria | 1980 to 2006 | 1985 to 2006 | np | 1990 to 2006 | 1990 to 2006 | 1985 to 2006 |
| Azerbaijan | | | | | | |
| Belarus | 2006 | 2006 | 2006 | 2006 | 2006 | 2006 |
| Belgium | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 2000 to 2006 | 2000 to 2006 | 1990 to 2006 |
| Bosnia & Herzegovina | | | | | | |
| Bulgaria | 2006 | 2006 | np | np | np | 2006 |
| Canada | 2006 | 2006 | np | 2006 | 2006 | 2006 |
| Croatia | 2006 | 2006 | 2006 | 2006 | 2006 | 2006 |
| Cyprus | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 2000 to 2006 | 2000 to 2006 | 1990 to 2006 |
| Czech Republic | 2006 | 2006 | 2006 | 2006 | 2006 | 2006 |
| Denmark | 1980 to 2006 | 1990 to 2006 | 1990 to 2006 | 2000 to 2006 | 2000 to 2006 | 1990 to 2006 |
| Estonia | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 2000 to 2006 | 1990 to 2006 | 1990 to 2006 |
| European Community | 1990 to 2006 | np | np | 2000 to 2006 | np | np |
| Finland | 1980 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| France | 1980 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| Georgia | 2000 to 2006 | np | np | np | 2000 to 2006 | 2000 to 2006 |
| Germany | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1995 to 2006 | 1995 to 2006 | 1990 to 2006 |
| Greece | 2006 (no $NH_3$) | np | np | np | np | np |
| Hungary | 1980 to 2006 | 2002 to 2006 | 2002 to 2006 | 2002 to 2006 | 2002 to 2006 | 1990 to 2006 |
| Iceland | | | | | | |
| Ireland | 1987 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | np |
| Italy | 1980 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | np | 1990 to 2006 |
| Kazakhstan | | | | | | |
| Kyrgyzstan | | | | | | |
| Latvia | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| Liechtenstein | | | | | | |
| Lithuania | 2006 | 2006 | 2006 | 2006 | 2006 | 2006 |
| Luxembourg | | | | | | |
| Macedonia, FYROM | 2006 | np | np | np | 2006 | np |
| Malta | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 | np |
| Monaco | 2006 | 2006 | 2006 | np | 2006 | 2006 |
| Montenegro | | | | | | |
| Netherlands | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| Norway | 1990 to 2006 | 1990 to 2005 | 1990 to 2005 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| Poland | 2006 | 2006 | 2006 | 2006 | 2006 | 2006 |
| Portugal | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| r. Moldova | 2006 | 2006 | 2006 | 2006 | 2006 | 2006 |
| Romania | 1980 to 2006 | 2005 2006 | 2005 2006 | 2005 2006 | 2005 2006 | 2005 2006 |
| Russia | | | | | | |
| San Marino | | | | | | |

| Party | $SO_2$, NOx, CO, $NH_3$, NMVOC | Cd, Hg, Pb | Additional HMs | $PM_{10}$, $PM_{2.5}$ | TSP | POPs (PAH, DIOX, HCB) |
|---|---|---|---|---|---|---|
| Serbia | 2006 | np | np | np | np | np |
| Slovakia | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 | 2000 to 2006 |
| Slovenia | 2000 to 2006 | 2000 to 2006 | np | 2000 to 2006 | 2000 to 2006 | 1990 to 2006 |
| Spain | 1980 to 2006 | 1990 to 2006 | 1990 to 2006 | 2000 to 2006 | 2000 to 2006 | 1990 to 2006 |
| Sweden | 1980 to 2006 | 1990 to 2006 | 1990 to 2006 | 1980 to 2006 | 1980 to 2006 | 1980 to 2006 |
| Switzerland | 1990 to 2006 | 1990 to 2006 | np | 1990 to 2006 | 1990 to 2006 | 1990 to 2006 |
| Turkey | | | | | | |
| Ukraine | 2006 | 2006 | 2006 | np | 2006 | np |
| United Kingdom | 1980 to 2006 | 1980 to 2006 | 1980 to 2006 | 1980 to 2006 | np | 1990 to 2006 |
| USA | 2002 to 2006 | 2002 | np | 2002 to 2006 | np | np |

***Table 8: Completeness of NECD emission data status as of 31 May 2008.***

| Member State | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|
| Austria | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Belgium | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Bulgaria | | | | | | | | SUBM07 | SUBM07 |
| Cyprus | SUBM06 | SUBM06 | SUBM06 | SUBM06 | SUBM06 | SUBM06 | SUBM06 | SUBM07 | SUBM07 |
| Czech Republic | | | SUBM06 | SUBM06 | SUBM06 | SUBM06 | SUBM06 | SUBM07 | SUBM07 |
| Denmark | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Estonia | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Finland | | | SUBM03 | SUBM03 | SUBM03 | SUBM05 | SUBM06 | SUBM07 | SUBM07 |
| France | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Germany | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Greece | SUBM04 | SUBM04 | SUBM04 | SUBM04 | SUBM04 | SUBM05 | SUBM05 | SUBM06 | SUBM07 |
| Hungary | PROG05 | | PROG06 | | | SUBM05 | PROG06 | SUBM07 | SUBM07 |
| Ireland | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Italy | SUBM05 | SUBM05 | SUBM05 | SUBM05 | SUBM05 | SUBM05 | SUBM06 | SUBM07 | SUBM07 |
| Latvia | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Lithuania | | | | | SUBM04 | SUBM04 | SUBM07 | SUBM07 | SUBM07 |
| Luxembourg | | | | | | | | | |
| Malta | PROG06 | PROG06 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Netherlands | | | | SUBM03 | SUBM04 | SUBM05 | SUBM06 | SUBM07 | SUBM07 |
| Poland | | | | | | PROG05 | PROG06 | SUBM06 | SUBM07 |
| Portugal | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Romania | | | PROG07* | | | | | SUBM07 | SUBM07 |
| Slovakia | | | | | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Slovenia | | | | | SUBM05 | SUBM05 | SUBM06 | SUBM07 | SUBM07 |
| Spain | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| Sweden | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |
| United Kingdom | | | SUBM03 | SUBM06 | SUBM07 | SUBM07 | SUBM07 | SUBM07 | SUBM07 |

*Notes: SUBM07 = submission due 31 Dec 2007; SUBM06 = submission 2006, SUBM05 = submissions due 31 Dec 2005; PRO06 = Program submitted in 2006, PROG05 = program submitted in 2005*

*Greece did not report $NH_3$ in 2003-2006, Hungary reported only national totals and for the year 2005 $NH_3$ and NMVOC are not provided; Spain sent for the years 1990-1999 only national totals*

# APPENDIX 3: Recalculations of CLRTAP emission data

The aim of this test is to identify differences between **national totals** reported by Parties to the Convention in 2008 and 2007.
Difference are calculated as follows: $(100*[(X_{2008}-X_{2007})/X_{2007}])$.

Differences larger than ±10% are flagged: > +10% < -10%

***Key:***
*Blank cell:* Data for one or both of the reporting years are missing,
*Zero (no decimals):* Data (value or notation key) for the two years are identical,
*Value:* Percentage difference between 2008 and 2007 reporting.

***Table 9: Recalculations of official CLRTAP submissions of priority pollutants in 2008 (Unit: %).***

| Albania | no reporting | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Armenia | no reporting | | | | | | | | | | | | | |
| Austria | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 1980 | -5.1% | -0.4% | -6.4% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1981 | -4.3% | 1.6% | -6.2% | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1982 | -4.0% | 3.5% | -6.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1983 | -4.1% | 4.2% | -6.2% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1984 | -3.6% | 4.3% | -5.8% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1985 | -3.6% | 4.7% | -5.8% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.1% |
| 1986 | -4.3% | 5.0% | -6.0% | 0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% | 0.2% |
| 1987 | -4.9% | 5.7% | -6.4% | 0.5% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% | 0.2% |
| 1988 | -5.4% | 8.2% | -5.8% | 0.6% | 1.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.2% | 0.1% | 0.4% |
| 1989 | -5.6% | 11.3% | -4.2% | 0.6% | 3.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.2% | 0.1% | 0.3% |
| 1990 | -8.8% | 18.3% | -0.5% | 0.1% | 3.3% | -25.1% | -9.7% | -12.2% | 0.2% | 0.2% | 0.0% | 0.2% | 0.2% | 0.3% |
| 1991 | -8.9% | 22.0% | 1.2% | 0.1% | 4.9% | 0.0% | 0.0% | 0.0% | 0.3% | 0.3% | 0.0% | 0.2% | 0.1% | 0.2% |
| 1992 | -8.4% | 23.8% | 3.0% | 0.2% | 6.1% | 0.0% | 0.0% | 0.0% | 0.4% | 0.5% | 0.0% | 0.4% | 0.3% | 0.4% |
| 1993 | -8.0% | 25.5% | 4.4% | 0.1% | 7.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.5% | 0.0% | 0.3% | 0.2% | 0.3% |
| 1994 | -7.0% | 25.2% | 5.1% | 0.1% | 7.1% | 0.0% | 0.0% | 0.0% | 0.4% | 0.5% | 0.0% | 0.3% | 0.2% | 0.3% |
| 1995 | -5.6% | 25.5% | 5.1% | 0.1% | 6.6% | -19.3% | -6.2% | -11.7% | 0.0% | 0.6% | 0.0% | 0.2% | 0.2% | 0.2% |
| 1996 | -3.9% | 22.0% | 4.7% | -0.1% | 6.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.0% | 0.0% | 0.1% | 0.0% |
| 1997 | -3.2% | 21.0% | 4.7% | -0.5% | 5.5% | 0.0% | 0.0% | 0.0% | -0.4% | -0.2% | -0.3% | -0.4% | 0.0% | -0.1% |
| 1998 | -1.8% | 21.2% | 5.0% | 0.0% | 5.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.0% | 0.0% | 0.2% | 0.1% |
| 1999 | -0.5% | 19.5% | 4.7% | 0.2% | 4.8% | -25.5% | -11.6% | -13.3% | -1.1% | -0.5% | -0.4% | -0.5% | 0.0% | -0.3% |
| 2000 | 0.3% | 19.5% | 4.4% | 0.7% | 4.4% | -17.4% | -3.5% | -10.5% | 0.4% | 1.3% | 0.0% | 0.8% | 0.6% | 0.6% |
| 2001 | 0.6% | 17.9% | 9.2% | -1.0% | 4.1% | -20.0% | -5.8% | -11.7% | -1.9% | -0.8% | -0.7% | -0.9% | -0.4% | -1.3% |
| 2002 | 2.1% | 18.9% | 13.3% | -0.9% | 4.1% | -19.6% | -5.5% | -11.8% | -0.7% | -0.3% | -0.6% | 0.6% | 1.3% | -0.4% |
| 2003 | 2.7% | 18.3% | 12.5% | -0.6% | 3.7% | -17.3% | -4.6% | -10.7% | -0.9% | 0.0% | 1.4% | 2.5% | 3.3% | 0.7% |
| 2004 | 3.9% | 16.3% | 11.9% | -1.2% | 3.6% | -21.4% | -6.2% | -12.0% | -0.6% | 0.2% | -0.4% | 3.4% | 3.9% | 0.6% |
| 2005 | 5.3% | 14.3% | 6.2% | 0.9% | 3.1% | -19.9% | -5.5% | -11.1% | 1.0% | 2.4% | 2.1% | 4.8% | 3.6% | 0.4% |
| Azerbaijan | no reporting | | | | | | | | | | | | | |
| Belarus | no resubmission | | | | | | | | | | | | | |
| Belgium | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 1991 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1992 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1993 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1994 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2004 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2005 | -2.8% | -4.2% | -24.2% | -1.9% | -0.7% | -3.1% | -6.6% | -5.3% | -1.3% | -15.7% | -5.0% | -8.4% | -0.6% | 29.2% |
| Bosnia & Herzegovina | no reporting | | | | | | | | | | | | | |
| Bulgaria | no resubmission | | | | | | | | | | | | | |
| Canada | no resubmission | | | | | | | | | | | | | |
| Croatia | no resubmission | | | | | | | | | | | | | |
| Cyprus | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 0.1% | 0.0% | 1.6% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -25.0% | 35.2% | 209.1% | -22.7% |
| 1991 | -0.1% | 0.0% | 1.6% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -22.7% | 29.6% | 0.0% | -28.6% |
| 1992 | -0.1% | 0.0% | 1.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -23.0% | 32.7% | 0.0% | -26.1% |
| 1993 | -1.7% | 0.0% | 1.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% | -1.4% | -23.1% | 30.8% | 0.0% | -32.0% |
| 1994 | -0.8% | 0.0% | 1.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -22.1% | 26.9% | 0.0% | -38.5% |
| 1995 | -2.3% | 0.0% | 1.5% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -23.8% | 25.4% | 0.0% | -36.0% |
| 1996 | -1.2% | 0.0% | 1.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% | 1.4% | -24.1% | 19.6% | 0.0% | -44.4% |
| 1997 | -1.7% | 0.0% | 1.5% | 0.0% | 0.4% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -21.9% | 15.3% | 0.0% | -50.0% |
| 1998 | -1.7% | 0.0% | 1.4% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -20.8% | 16.9% | 0.0% | -44.0% |
| 1999 | -1.5% | 0.0% | 1.4% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | -0.1% | 0.0% | -19.4% | 15.5% | 0.0% | -40.0% |
| 2000 | -0.1% | 0.0% | 0.1% | 0.0% | 0.2% | 42.2% | 6.8% | -2.2% | -54.5% | 0.0% | -21.1% | 8.6% | 0.0% | -48.1% |
| 2001 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 34.7% | 4.8% | -3.8% | -60.5% | -1.1% | -19.5% | 11.3% | 0.0% | -44.0% |
| 2002 | 0.0% | 0.0% | 0.2% | 0.0% | 0.2% | 35.8% | 7.3% | 0.0% | -59.3% | 0.0% | -18.2% | 12.8% | 0.0% | -40.0% |
| 2003 | 0.0% | 0.0% | 0.1% | 0.0% | -0.2% | 18.2% | -13.0% | -22.1% | -54.3% | 0.0% | -23.2% | 10.6% | 0.0% | -59.4% |
| 2004 | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 4.9% | 8.6% | 11.1% | 0.0% | 0.0% | 0.0% | 18.3% | 267.7% | -51.7% |
| 2005 | -0.1% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 14.2% | 464.5% | -61.3% |
| **Czech Republic** | no resubmission | | | | | | | | | | | | | |
| **Denmark** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1980 | 0.0% | 0.0% | 0.0% | -0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1981 | 0.0% | 0.0% | 0.0% | -0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1982 | 0.0% | 0.0% | 0.0% | -0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1983 | 0.0% | 0.0% | 0.0% | -0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1984 | 0.0% | 0.0% | 0.0% | -1.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1985 | 1.1% | 15.6% | 10.6% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1986 | 0.6% | 15.9% | 10.2% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1987 | 0.4% | 19.8% | 11.2% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1988 | 1.0% | 19.4% | 10.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1989 | 0.4% | 30.9% | 13.5% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1990 | 0.2% | -1.4% | 1.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -1.9% | 0.0% | -3.3% | 0.0% | 0.0% | 0.0% |
| 1991 | -0.5% | -1.4% | 1.1% | -0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 1.5% | 5.9% | 4.2% | 0.0% | 0.0% | 0.0% |
| 1992 | -0.5% | -1.6% | 1.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 1.6% | 5.9% | 4.4% | 0.0% | 0.0% | 0.0% |
| 1993 | 0.6% | 0.0% | 2.2% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 5.2% | 5.7% | 4.7% | 0.0% | 0.0% | 0.0% |
| 1994 | 1.5% | 1.2% | 3.1% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 13.5% | 5.6% | 6.9% | 0.1% | 0.1% | 0.0% |
| 1995 | 0.8% | -1.4% | 1.8% | 0.7% | -0.1% | 0.0% | 0.0% | 0.0% | 13.5% | 5.7% | 6.9% | 0.1% | 0.0% | 0.0% |
| 1996 | 0.4% | -2.1% | 1.4% | 0.3% | -0.1% | 0.0% | 0.0% | 0.0% | 6.0% | 0.4% | -0.1% | 0.0% | 0.0% | 0.0% |
| 1997 | -0.1% | -2.4% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1998 | -0.5% | -2.6% | -0.3% | -0.4% | 0.1% | 0.0% | 0.0% | 0.0% | 0.1% | 0.9% | 0.1% | 0.0% | 0.0% | 0.0% |
| 1999 | -0.7% | -2.8% | -0.7% | -0.8% | 0.2% | 0.0% | 0.0% | 0.0% | 0.2% | 1.3% | 0.1% | 0.0% | 0.0% | 0.0% |
| 2000 | -0.8% | -2.8% | -1.8% | -1.8% | 0.3% | -0.3% | -0.4% | -0.5% | -2.3% | -0.3% | -5.9% | -1.4% | 0.0% | 0.0% |
| 2001 | -0.8% | -3.9% | -3.0% | -2.0% | 0.1% | -0.3% | -0.3% | -0.5% | -2.5% | -1.0% | -5.0% | -0.5% | 0.0% | 0.0% |
| 2002 | -1.3% | -4.9% | -2.0% | -2.6% | 0.0% | -0.4% | -0.4% | -0.7% | -3.9% | 0.3% | -7.7% | -0.7% | 0.0% | 0.0% |
| 2003 | -0.9% | -5.5% | -3.6% | -1.9% | -4.7% | -0.3% | -0.4% | -0.6% | -0.8% | 1.9% | -1.8% | -0.2% | 0.0% | 0.0% |
| 2004 | -0.9% | -6.2% | -2.9% | -2.9% | -0.3% | -0.4% | -0.4% | -0.6% | -2.9% | 0.0% | -6.1% | 0.1% | 0.7% | 0.0% |
| 2005 | -0.9% | -3.1% | -2.2% | -0.3% | 0.5% | 2.0% | 2.3% | 2.7% | 2.5% | 4.4% | 4.8% | 2.6% | 4.9% | 0.0% |
| **Estonia** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1990 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1991 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1992 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1993 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1994 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 1.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1995 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1996 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1997 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1998 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1999 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2000 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2001 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2002 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2003 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2004 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2005 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| **European Community** | too late reporting last year (September 2007) | | | | | | | | | | | | | |

| Finland | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% |
| **France** | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 1980 | 2.7% | -3.2% | 0.0% | 0.1% | -2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1981 | 3.0% | -3.1% | 0.0% | 0.0% | -2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1982 | 3.2% | -2.9% | 0.0% | 0.0% | -2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1983 | 3.2% | -2.8% | 0.0% | 0.0% | -2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1984 | 3.2% | -2.9% | 0.0% | 0.1% | -2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1985 | 3.5% | -2.7% | 0.0% | 0.1% | -2.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1986 | 4.0% | -3.0% | 0.0% | 0.2% | -2.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1987 | 4.4% | -3.0% | 0.0% | 0.2% | -2.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1988 | 4.8% | -3.2% | -3.1% | 0.2% | -2.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1989 | 4.3% | -2.9% | -3.5% | 0.3% | -2.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1990 | 0.8% | -3.0% | -0.6% | 0.0% | 0.5% | -1.2% | -1.6% | -1.3% | -0.2% | 5.5% | 0.0% | -0.3% | 0.3% | 0.0% |
| 1991 | 0.7% | 0.3% | -0.7% | -0.1% | 0.5% | -0.9% | -1.2% | -0.9% | -0.4% | 6.7% | 0.0% | -0.1% | 0.2% | 0.0% |
| 1992 | 1.3% | 0.7% | -0.2% | 0.2% | 0.5% | -0.6% | -0.8% | -0.6% | -0.3% | 5.8% | 0.2% | 0.0% | 0.5% | 0.0% |
| 1993 | 1.3% | 1.9% | -0.3% | 0.2% | 0.5% | -0.6% | -0.7% | -0.5% | -0.2% | 5.8% | 0.3% | 0.0% | 0.5% | 0.0% |
| 1994 | 1.6% | 1.5% | 0.0% | 0.2% | 0.4% | -0.5% | -0.6% | -0.3% | -0.2% | 5.8% | 0.3% | 0.0% | 0.6% | 0.2% |
| 1995 | 2.5% | 1.0% | 0.2% | 0.2% | 0.2% | -0.6% | -0.7% | -0.5% | 0.0% | 6.5% | 0.3% | 0.0% | 0.6% | 0.2% |
| 1996 | 3.4% | 0.4% | -0.8% | 0.1% | 0.1% | -0.5% | -0.6% | -0.4% | 0.3% | 6.4% | 0.3% | 0.0% | 0.5% | 0.2% |
| 1997 | 5.1% | -0.2% | 0.1% | 0.1% | 0.0% | -0.5% | -0.6% | -0.3% | 0.4% | 7.2% | 0.4% | 0.0% | 0.6% | 0.2% |
| 1998 | 7.0% | -0.6% | -0.1% | 0.0% | -0.1% | -0.5% | -0.5% | -0.2% | 0.3% | 6.5% | 0.4% | -0.1% | 0.6% | 0.2% |
| 1999 | 9.1% | -0.4% | 0.7% | 0.0% | 1.0% | -0.4% | -0.3% | 0.0% | 0.4% | 7.1% | 0.5% | -0.4% | 0.7% | 0.2% |
| 2000 | 10.8% | -0.8% | 0.0% | 0.5% | 1.0% | -0.3% | -0.2% | 0.1% | 1.1% | 6.8% | 0.6% | -0.7% | 0.6% | 0.2% |
| 2001 | 12.3% | -3.4% | -2.0% | 0.5% | 1.0% | -1.2% | -2.2% | -2.8% | 0.7% | 6.9% | 0.5% | -1.2% | -4.7% | 1.1% |
| 2002 | 14.2% | -3.1% | -1.3% | 0.2% | 1.0% | -1.1% | -1.8% | -2.3% | 1.0% | 7.6% | 0.2% | -1.3% | -2.7% | 2.2% |
| 2003 | 15.3% | -1.9% | 1.1% | 0.6% | 1.1% | -0.6% | -0.7% | -0.6% | 8.1% | 10.0% | 0.7% | -1.5% | 0.9% | 3.2% |
| 2004 | 16.0% | -1.1% | -0.7% | 3.3% | 1.0% | -0.5% | -0.4% | 0.2% | 5.2% | 12.4% | 0.7% | -1.3% | 2.0% | 3.7% |
| 2005 | 17.0% | -0.1% | -1.0% | 4.4% | 1.3% | -3.2% | -1.3% | -0.5% | 2.8% | 10.5% | 6.2% | -2.0% | 2.1% | 2.8% |
| **Georgia** | no resubmission | | | | | | | | | | | | | |
| **Germany** | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 1990 | 0.0% | 0.0% | 4.3% | 0.1% | 0.0% | -1.0% | 0.0% | 0.0% | 0.0% | -0.3% | 0.0% | 12.1% | 2.7% | 0.0% |
| 1991 | 0.1% | 0.1% | 4.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.5% | 0.0% | 12.7% | 2.6% | 0.0% |
| 1992 | 0.0% | 0.0% | 4.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.9% | 0.0% | 15.2% | 3.0% | 0.0% |
| 1993 | 0.0% | 0.0% | 5.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -1.2% | 0.0% | 15.7% | 2.8% | 0.0% |
| 1994 | 0.0% | 0.0% | 6.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -1.8% | 0.0% | 15.9% | 2.8% | 0.0% |
| 1995 | -1.8% | 2.1% | 6.2% | -0.2% | 0.0% | 2.7% | 2.5% | 3.6% | 0.1% | -2.1% | 3.0% | 13.4% | 2.9% | 0.5% |
| 1996 | -0.4% | 2.2% | 6.5% | -0.4% | 0.0% | 2.4% | 2.7% | 4.1% | -0.1% | -2.4% | -1.4% | 12.6% | 2.7% | 0.0% |
| 1997 | -0.8% | 2.2% | 6.6% | -0.7% | 0.0% | 2.5% | 2.5% | 3.7% | -0.4% | -2.2% | -1.9% | 11.0% | 2.2% | 0.4% |
| 1998 | -0.9% | 2.3% | 6.9% | -0.1% | 0.0% | 2.4% | 2.6% | 3.9% | -0.2% | -2.3% | -1.1% | 11.8% | 2.0% | 0.2% |
| 1999 | -1.4% | 2.5% | 7.2% | 0.4% | 0.0% | 1.9% | 2.3% | 3.9% | -0.5% | -2.1% | -3.5% | 12.1% | 2.0% | -0.6% |
| 2000 | -0.1% | 2.5% | 8.3% | -0.5% | 0.0% | 2.3% | 2.2% | 3.9% | -0.1% | -2.1% | 0.5% | 11.5% | 1.6% | 0.4% |
| 2001 | -2.2% | 2.6% | 8.5% | -0.2% | 0.0% | 1.6% | 2.1% | 3.6% | -0.1% | -2.1% | 0.0% | 11.4% | 1.5% | 0.2% |
| 2002 | -2.5% | 2.6% | 8.8% | -0.7% | 0.0% | 1.3% | 2.0% | 3.5% | 0.1% | -1.9% | 1.7% | 11.9% | 1.5% | 0.5% |
| 2003 | -2.8% | 1.6% | 9.1% | -1.8% | 0.0% | 1.1% | 1.8% | 3.0% | -2.0% | -3.0% | 1.7% | 11.8% | -1.6% | 0.4% |
| 2004 | -2.9% | 0.2% | 9.0% | -1.6% | 0.0% | 1.3% | 2.1% | 3.5% | -2.8% | -2.8% | 0.9% | 12.4% | 0.7% | 2.2% |
| 2005 | 0.2% | 4.1% | 10.5% | 2.4% | 0.0% | 2.4% | 2.1% | 3.6% | 0.4% | -0.8% | 2.4% | 12.7% | 5.1% | 2.1% |
| **Greece** | no resubmission | | | | | | | | | | | | | |
| **Hungary** | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 2005 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| **Iceland** | no reporting | | | | | | | | | | | | | |
| **Ireland** | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 1990 | -0.4% | -1.7% | 1.5% | -0.1% | -0.4% | -0.1% | -2.0% | -0.1% | 9.7% | -0.3% | 0.1% | 0.0% | 0.0% | 0.0% |
| 1991 | -1.2% | -1.3% | 2.0% | -0.1% | -0.3% | -0.5% | -1.0% | -1.3% | 2.7% | -0.5% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1992 | -0.7% | -2.2% | 2.2% | -0.1% | -0.8% | -0.5% | -0.9% | -1.2% | 12.2% | -0.2% | 0.1% | 0.0% | 0.0% | 0.0% |
| 1993 | 0.3% | -1.9% | 2.8% | -0.1% | -1.0% | -0.7% | -0.8% | -1.0% | 7.7% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1994 | 0.3% | -2.9% | 3.2% | -0.1% | -1.1% | -2.0% | -2.1% | -3.0% | 8.1% | -0.6% | -0.1% | 0.0% | 0.0% | 0.0% |
| 1995 | 0.4% | -3.4% | 3.4% | -0.1% | -1.1% | -4.0% | -1.6% | -2.0% | 4.7% | -0.6% | -0.2% | 0.0% | 0.0% | 0.0% |
| 1996 | 0.2% | -4.5% | 3.1% | -0.1% | -1.1% | -1.2% | -1.9% | -2.4% | 1.2% | -0.8% | -0.3% | 0.0% | 0.0% | 0.0% |
| 1997 | 0.4% | -6.4% | 3.5% | -0.2% | -1.4% | -1.2% | -2.0% | -2.4% | 26.6% | -0.8% | -0.4% | 0.0% | 0.0% | 0.0% |
| 1998 | 0.0% | -7.9% | 3.0% | -0.1% | -1.5% | -2.0% | -1.9% | -2.3% | 13.2% | -0.9% | -0.5% | 0.0% | 0.0% | 0.0% |
| 1999 | 1.0% | -10.0% | 1.0% | 0.0% | -1.5% | -1.3% | -2.0% | -2.3% | 72.2% | -1.1% | -0.8% | 0.0% | 0.0% | 0.0% |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | 1.8% | -13.7% | -0.2% | -0.2% | -1.5% | -2.4% | -3.4% | -4.1% | 105.6% | -1.1% | -0.8% | 0.0% | 0.0% | 0.0% |
| 2001 | 2.0% | -15.5% | 0.2% | -0.2% | -1.5% | -2.7% | -4.1% | -4.9% | 61.4% | -1.4% | -0.9% | 0.0% | 0.0% | 0.0% |
| 2002 | 2.0% | -15.6% | -0.3% | -0.2% | -1.7% | -2.3% | -3.4% | -4.0% | 84.2% | -1.8% | -0.9% | 0.0% | 0.0% | 0.0% |
| 2003 | 2.7% | -17.1% | -0.9% | -0.3% | -1.6% | -2.7% | -4.1% | -4.9% | 94.0% | -2.1% | -0.9% | 0.0% | 0.0% | 0.0% |
| 2004 | 3.4% | -18.5% | -1.5% | -0.4% | -2.3% | -3.3% | -4.8% | -5.6% | 94.1% | -2.0% | -0.8% | 0.0% | 0.0% | 0.0% |
| 2005 | 4.1% | -18.8% | -0.9% | 0.3% | -2.1% | -3.7% | -4.8% | -7.0% | 109.2% | 0.6% | 2.5% | 0.0% | 0.0% | 0.0% |
| **Italy** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1980 | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1981 | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1982 | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1983 | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1984 | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1985 | 0.0% | 0.0% | 0.1% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1986 | 0.0% | 0.0% | 0.1% | 0.0% | -0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1987 | 0.0% | 0.0% | 0.1% | 0.0% | -0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1988 | 0.0% | 0.0% | 0.1% | 0.0% | -0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1989 | 0.0% | 0.0% | 0.1% | 0.0% | -0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1990 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.1% | -0.1% | 0.0% | -10.4% | 0.0% | 0.0% |
| 1991 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.4% | 0.2% | 0.1% | -0.1% | 0.0% | -10.1% | 0.0% | 0.0% |
| 1992 | 0.0% | 0.0% | 0.1% | -0.1% | 0.0% | 0.0% | 0.4% | 0.2% | 0.1% | -0.1% | 0.0% | -10.6% | 0.0% | 0.0% |
| 1993 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.5% | 0.4% | 0.1% | -0.1% | 0.0% | -8.1% | 0.0% | 0.0% |
| 1994 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.4% | 0.3% | 0.1% | -0.1% | 0.0% | -7.7% | 0.0% | 0.0% |
| 1995 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.5% | 0.3% | 0.2% | -0.1% | 0.0% | -8.6% | -0.1% | 0.0% |
| 1996 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.2% | -0.1% | 0.0% | -7.7% | -0.1% | 0.0% |
| 1997 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.2% | 0.0% | 0.2% | -0.1% | 0.0% | -8.4% | -0.1% | 0.0% |
| 1998 | 0.0% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.4% | 0.2% | 0.1% | -0.1% | 0.0% | -7.3% | -0.2% | 0.0% |
| 1999 | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.1% | 0.1% | -0.1% | 0.0% | -6.5% | -0.1% | 0.0% |
| 2000 | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.1% | 0.3% | -0.1% | 0.3% | -6.7% | -0.1% | 0.0% |
| 2001 | 0.0% | -0.1% | 0.0% | 0.0% | -0.9% | 0.0% | 0.3% | 0.0% | 0.1% | -0.1% | 0.0% | -4.7% | -0.2% | 0.0% |
| 2002 | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.0% | 0.5% | -0.1% | 0.0% | -3.4% | -0.1% | 0.0% |
| 2003 | 0.0% | -0.2% | -0.2% | 0.0% | 0.0% | 0.0% | 0.4% | 0.2% | 0.7% | 0.1% | 0.4% | -3.2% | -0.1% | 0.0% |
| 2004 | -1.0% | -0.2% | -0.1% | -1.3% | -0.2% | 0.0% | -0.7% | -1.1% | 0.8% | 0.0% | 0.3% | -1.6% | 0.0% | 0.0% |
| 2005 | -0.2% | -0.3% | 0.5% | -2.3% | -0.3% | 0.0% | -1.2% | -1.8% | 0.9% | 0.1% | 0.3% | -1.5% | 0.0% | 0.0% |
| **Kazakhstan** | no reporting | | | | | | | | | | | | | |
| **Kyrgyzstan** | no reporting | | | | | | | | | | | | | |
| **Latvia** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1990 | 0.6% | 0.0% | 0.1% | 1.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 1.5% | 2.4% | 0.1% | -0.3% | 0.8% |
| 1991 | 0.3% | 0.0% | 0.1% | 0.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.8% | 1.3% | 0.0% | 0.0% | 0.6% |
| 1992 | 0.4% | 0.0% | 0.0% | 1.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 2.2% | 3.0% | 0.1% | 0.0% | 0.3% |
| 1993 | 0.2% | 0.0% | 0.0% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.9% | 1.2% | 0.0% | 0.0% | 0.1% |
| 1994 | -0.1% | -0.1% | 0.0% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.8% | 1.0% | -1.0% | -0.2% | -0.7% |
| 1995 | -0.1% | -2.3% | -1.2% | 1.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.7% | 0.9% | -9.2% | -2.6% | -4.8% |
| 1996 | -0.5% | -2.9% | -1.3% | 1.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.8% | -13.4% | -3.4% | -7.1% |
| 1997 | -0.6% | -3.0% | -1.1% | 1.3% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.6% | 0.9% | -14.3% | -3.1% | -8.2% |
| 1998 | -1.2% | -5.3% | -2.4% | 1.1% | -0.2% | 0.0% | 0.0% | 0.0% | -6.2% | -22.5% | 0.8% | -20.4% | -5.4% | -5.9% |
| 1999 | -1.4% | -6.3% | -3.0% | 1.4% | -0.2% | 0.0% | 0.0% | 0.0% | -2.4% | -19.9% | -2.8% | -22.5% | -6.5% | -13.8% |
| 2000 | -1.5% | -5.8% | -2.8% | -0.5% | -0.3% | -6.5% | -7.2% | -7.3% | -5.7% | -36.3% | -8.3% | -24.2% | -6.1% | -14.6% |
| 2001 | -1.6% | -5.7% | -3.0% | 0.7% | -0.2% | -5.8% | -6.3% | -6.4% | -6.1% | -37.9% | -10.7% | -3.4% | -5.8% | -2.8% |
| 2002 | -2.1% | -6.7% | -3.5% | 0.2% | -0.3% | -7.0% | -7.5% | -7.6% | -3.2% | -19.4% | -5.5% | -26.5% | -6.9% | -15.7% |
| 2003 | -1.3% | -2.5% | -0.3% | 0.3% | -0.3% | -2.9% | -2.5% | -2.2% | -6.1% | -11.9% | -5.6% | -23.8% | -1.5% | -11.0% |
| 2004 | -1.7% | -4.7% | -1.6% | 0.9% | 3.7% | -4.9% | -4.9% | -4.8% | -3.5% | -11.8% | -3.1% | -27.8% | -4.4% | -13.6% |
| 2005 | -2.8% | -2.7% | -0.4% | 1.0% | 3.3% | -4.7% | -4.4% | -4.0% | -14.6% | -7.9% | -54.4% | -31.8% | -2.6% | -16.5% |
| **Liechtenstein** | no reporting | | | | | | | | | | | | | |
| **Lithuania** | no resubmission | | | | | | | | | | | | | |
| **Luxembourg** | no reporting | | | | | | | | | | | | | |
| **Macedonia. FYROM** | no resubmission | | | | | | | | | | | | | |
| **Malta** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **NH3** | **TSP** | **PM10** | **PM2.5** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 2004 | -24.0% | 0.0% | -23.1% | -31.9% | -17.8% | 0.0% | 0.0% | 170.3% | -58.1% | -6.1% | -3.2% | 0.0% | 0.0% | 0.0% |
| 2005 | -24.2% | 0.0% | -28.2% | -31.7% | -18.0% | 0.0% | 0.0% | 219.3% | -57.2% | -5.3% | -2.6% | 0.0% | 0.0% | 0.0% |
| **Monaco** | no resubmission | | | | | | | | | | | | | |
| **Montenegro** | no reporting | | | | | | | | | | | | | |
| **Netherlands** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | -4.0% | -6.2% | -3.2% | -0.1% | 0.0% | -4.4% | -3.4% | -1.3% | -0.5% | 0.0% | -24.4% | 0.0% | -3.0% | 0.0% |
| 1991 | -5.0% | -6.7% | -4.2% | -0.2% | 0.0% | -4.5% | -3.9% | -3.4% | -1.5% | -0.1% | 0.2% | 0.0% | -3.4% | 0.0% |
| 1992 | -5.0% | -6.4% | -4.3% | -0.1% | 0.0% | -4.1% | -3.7% | -3.3% | -0.6% | 0.0% | 0.2% | 0.0% | -3.7% | 0.0% |
| 1993 | -4.8% | -5.0% | -3.8% | 0.0% | 0.0% | -3.5% | -3.3% | -1.9% | -0.1% | 0.0% | 0.2% | 0.0% | -3.7% | 0.0% |
| 1994 | -5.6% | -5.9% | -4.7% | -0.1% | -0.1% | -4.2% | -4.8% | -3.1% | -1.0% | -0.1% | 0.1% | -0.1% | -4.4% | 0.0% |
| 1995 | -6.1% | -6.7% | -5.3% | -0.2% | -0.1% | -4.6% | -5.3% | -4.1% | -1.5% | -0.2% | 0.0% | -0.3% | -2.3% | 0.0% |
| 1996 | -4.6% | -7.9% | -5.7% | -3.8% | -0.3% | -7.2% | -0.1% | -2.9% | -7.4% | -42.7% | -18.1% | 5.0% | 5.1% | 0.0% |
| 1997 | -3.5% | -4.8% | -5.3% | -1.6% | -0.6% | 1.7% | -1.1% | -5.9% | -14.1% | -34.5% | -13.0% | -53.1% | 1.0% | 0.0% |
| 1998 | -5.4% | -7.7% | -5.3% | -0.2% | -0.1% | -5.5% | -5.4% | -6.5% | 4.2% | -0.2% | 0.0% | -0.5% | -3.0% | 0.0% |
| 1999 | -5.1% | -9.2% | -5.9% | -1.5% | 0.0% | -1.9% | -2.2% | -5.9% | 5.1% | -0.2% | 0.0% | -0.6% | -4.1% | 0.0% |
| 2000 | -4.3% | -9.5% | -6.2% | -0.1% | 0.0% | -11.1% | -4.2% | -6.5% | 4.7% | -0.2% | 0.0% | -0.7% | -4.3% | 0.0% |
| 2001 | -4.1% | -8.6% | -6.1% | -0.1% | -0.1% | -6.2% | -3.8% | -6.4% | 3.7% | -0.1% | 0.0% | -0.6% | -4.8% | 0.0% |
| 2002 | -4.1% | -7.5% | -5.9% | -0.1% | -0.1% | -3.3% | -4.1% | -8.1% | 3.3% | -0.1% | 0.0% | -0.6% | -5.3% | 0.0% |
| 2003 | -4.1% | -7.8% | -6.3% | -0.2% | -0.1% | -7.3% | -2.9% | -6.1% | 2.6% | -0.1% | 0.0% | -0.7% | -5.7% | 0.0% |
| 2004 | -4.8% | -6.5% | -6.4% | 2.9% | -0.3% | -2.6% | -2.7% | -7.9% | -2.6% | -0.1% | 0.0% | -0.7% | -5.0% | 0.0% |
| 2005 | -5.6% | -9.3% | -4.0% | 5.1% | -1.7% | -12.0% | -4.6% | -8.7% | -11.7% | -2.3% | -19.9% | 28.5% | -1.9% | 0.0% |
| **Norway** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1980 | -2.9% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1987 | -2.1% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1989 | -2.4% | 0.0% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1990 | -2.3% | 0.0% | 0.1% | -0.1% | 0.0% | 0.1% | 0.1% | 0.1% | 0.2% | 2.7% | -0.1% | -0.7% | 1.7% | 0.0% |
| 1991 | -1.3% | 0.0% | 0.1% | -0.2% | 0.0% | 0.1% | 0.1% | 0.1% | 0.3% | 2.9% | -0.1% | -0.9% | 1.6% | 0.0% |
| 1992 | -1.2% | 0.0% | 0.1% | -0.2% | 0.0% | 0.1% | 0.1% | 0.1% | 1.3% | 3.0% | -0.1% | -0.9% | 1.6% | 0.0% |
| 1993 | -1.2% | 0.0% | 0.2% | -0.2% | 0.0% | 0.1% | 0.1% | 0.1% | 2.0% | 2.8% | -0.1% | -0.9% | 1.7% | 0.0% |
| 1994 | -1.2% | 0.0% | 0.1% | -0.2% | 0.0% | 0.1% | 0.1% | 0.1% | 7.3% | 2.6% | -0.1% | -1.0% | 1.9% | 0.0% |
| 1995 | -1.4% | 0.0% | 0.1% | -0.1% | 0.0% | 0.1% | 0.1% | 0.1% | 7.9% | 3.1% | -0.1% | -1.3% | 1.8% | 0.0% |
| 1996 | -1.6% | 0.0% | 0.1% | 0.0% | 0.0% | 0.1% | 0.1% | 0.1% | 17.2% | 2.8% | -0.1% | -1.8% | 1.8% | 0.0% |
| 1997 | -1.3% | 0.0% | 0.2% | -0.1% | 0.0% | 0.1% | 0.1% | 0.1% | 18.1% | 2.9% | -0.1% | -2.2% | 1.9% | 0.0% |
| 1998 | -1.4% | 0.2% | 0.2% | -0.2% | 0.0% | 0.1% | 0.1% | 0.1% | 18.1% | 2.8% | -0.1% | -2.0% | 1.1% | 0.0% |
| 1999 | -2.4% | 0.3% | 0.2% | -0.1% | 0.0% | 0.1% | 0.1% | 0.1% | 19.9% | 2.7% | 0.0% | -2.5% | 0.3% | 0.0% |
| 2000 | -2.4% | 0.3% | 0.2% | 0.0% | 0.0% | 0.1% | 0.1% | 0.1% | 23.5% | 4.5% | 0.0% | 0.0% | -0.3% | 0.0% |
| 2001 | -1.7% | 0.2% | 0.1% | 0.0% | 0.0% | 0.1% | 0.1% | 0.1% | 26.6% | 4.6% | 0.0% | 0.0% | -1.2% | 0.0% |
| 2002 | -1.1% | 0.2% | 0.1% | 0.0% | 0.0% | 0.1% | 0.1% | 0.1% | 22.6% | 4.6% | 0.0% | -0.1% | -2.0% | 0.0% |
| 2003 | -1.3% | 0.2% | 0.2% | 0.0% | 0.0% | 0.1% | 0.1% | 0.1% | 23.6% | 4.8% | 0.0% | -0.1% | -3.6% | 0.0% |
| 2004 | -1.0% | 0.3% | 0.2% | -0.3% | 0.1% | 0.2% | 0.2% | 0.2% | 20.8% | 5.2% | -0.1% | 0.0% | -3.9% | 0.0% |
| 2005 | -2.6% | 0.3% | -0.1% | -1.1% | -0.3% | 0.2% | 0.3% | 0.3% | 29.4% | 5.9% | -0.4% | -0.6% | -4.6% | 0.0% |
| **Poland** | no resubmission | | | | | | | | | | | | | |
| **Portugal** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1990 | 0.2% | 1.6% | 0.8% | 0.0% | 9.8% | 0.1% | 0.2% | 0.3% | -4.5% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1991 | 0.1% | 1.7% | 1.0% | 0.0% | 1.3% | 0.1% | 0.2% | 0.2% | -5.4% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1992 | 0.0% | 1.1% | 0.6% | 0.0% | 0.2% | 0.0% | 0.1% | 0.1% | -5.4% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1993 | 0.0% | 0.8% | 0.8% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | -5.7% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1994 | 0.0% | 1.4% | 0.5% | 0.0% | -0.1% | 0.1% | 0.1% | 0.2% | -6.3% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1995 | 0.0% | 1.4% | 0.4% | 0.0% | -0.7% | 0.1% | 0.1% | 0.2% | -7.1% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1996 | 0.1% | 1.7% | 0.3% | 0.0% | -0.7% | 0.1% | 0.3% | 0.4% | -7.4% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1997 | 0.1% | 1.7% | -1.8% | 0.0% | -0.8% | 0.1% | 0.2% | 0.3% | -8.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1998 | 0.0% | 1.5% | -2.3% | 0.0% | -0.8% | 0.1% | 0.2% | 0.3% | -9.5% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1999 | -0.1% | 1.4% | -1.6% | 0.0% | -0.9% | 0.1% | 0.1% | 0.2% | -14.1% | -0.5% | -4.2% | 0.0% | 0.0% | 0.0% |
| 2000 | 0.0% | 1.2% | -1.5% | 0.0% | -0.6% | 0.1% | 0.2% | 0.3% | -27.3% | -1.4% | -16.5% | 0.0% | 0.0% | 0.0% |
| 2001 | -0.1% | 1.2% | -1.1% | 0.1% | -1.2% | 0.4% | 0.4% | 0.5% | -26.2% | -1.5% | -17.0% | 0.0% | 0.0% | 0.0% |
| 2002 | -0.1% | 1.1% | -1.6% | 0.0% | -1.5% | 0.4% | 0.4% | 0.6% | -27.5% | -1.3% | -16.8% | 0.0% | 0.0% | 0.0% |
| 2003 | -0.4% | 1.1% | -1.9% | -0.5% | -1.3% | -0.2% | -0.1% | 0.0% | -24.9% | -1.5% | -19.3% | 0.0% | 0.0% | 0.0% |
| 2004 | 0.1% | 0.9% | -1.5% | 4.4% | -1.5% | 0.4% | 0.5% | 0.5% | -25.5% | 1.6% | -20.0% | 0.0% | 0.0% | 0.0% |
| 2005 | 1.1% | 0.9% | -1.5% | -0.1% | -6.1% | 0.8% | 0.9% | 1.0% | -27.4% | 3.7% | -21.3% | 0.0% | 0.0% | 0.0% |
| **Republic of Moldova** | no resubmission | | | | | | | | | | | | | |
| **Romania** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 2005 | 3.9% | 6.3% | -27.3% | 14.2% | 5.2% | 22.7% | 823.8% | 0.0% | -25.6% | 240.9% | 165.0% | 200.2% | 2.1% | -99.9% |
| **Russia** | no reporting | | | | | | | | | | | | | |
| **San Marino** | no reporting | | | | | | | | | | | | | |
| **Serbia** | no resubmission | | | | | | | | | | | | | |

| Slovakia | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | 0.0% | 0.0% | -1.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% |
| 2001 | 0.0% | 0.0% | 2.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2002 | 0.0% | 0.0% | 6.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2003 | 0.0% | 0.0% | 6.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2004 | 0.0% | 0.0% | 6.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2005 | 0.0% | 0.0% | 4.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | -0.1% |
| **Slovenia** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 2000 | -17.4% | 62.6% | 2.0% | 0.3% | 0.5% | 0.4% | -4.6% | -1.1% | 2.7% | -36.8% | 0.0% | 6.3% | -61.7% | 5965.2% |
| 2001 | -15.9% | 70.8% | 3.0% | 0.4% | 0.1% | -1.8% | -12.1% | -11.1% | 50.7% | -36.8% | 0.0% | 5.4% | -65.0% | 5896.4% |
| 2002 | -15.2% | 66.2% | 2.3% | 0.1% | -0.1% | -0.1% | -7.9% | -6.2% | 23.0% | -34.6% | 0.0% | 6.6% | -60.6% | -36.9% |
| 2003 | -12.9% | 65.8% | 1.6% | 0.0% | -0.2% | -0.4% | -9.2% | -7.5% | 20.7% | -33.7% | 0.0% | 5.6% | -63.4% | 36.9% |
| 2004 | -16.7% | 47.8% | -0.2% | 0.0% | -0.8% | -3.1% | -10.0% | -7.2% | 19.7% | -31.0% | 0.0% | -1.7% | -64.1% | 22.0% |
| 2005 | -19.2% | 41.5% | -2.4% | -1.3% | -0.8% | -1.7% | -15.1% | -15.8% | 19.7% | -30.8% | 0.0% | -20.1% | -64.5% | 12.3% |
| **Spain** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **PM10** | **PM2.5** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1990 | 0.2% | 4.9% | -6.5% | 0.1% | 0.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.9% | 24.3% | 0.0% |
| 1991 | 0.3% | 5.9% | -7.5% | 0.1% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.1% | 31.1% | 0.0% |
| 1992 | 0.3% | 5.9% | -6.9% | 0.1% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.9% | 33.0% | 0.0% |
| 1993 | 0.3% | 6.3% | -8.2% | 0.1% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.1% | 32.9% | 0.0% |
| 1994 | 0.3% | 6.1% | -7.7% | 0.1% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.1% | 31.9% | 0.0% |
| 1995 | 0.3% | 6.6% | -7.1% | 0.2% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 3.7% | 32.7% | 0.0% |
| 1996 | 0.3% | 6.0% | -6.1% | 0.2% | 0.8% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% | 4.2% | 28.9% | 0.0% |
| 1997 | 0.4% | 8.2% | -6.2% | 0.7% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.2% | 6.1% | 38.1% | 0.0% |
| 1998 | 0.2% | 6.0% | -7.8% | 0.7% | 0.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% | 4.8% | 27.3% | 0.0% |
| 1999 | 0.2% | 5.7% | -7.8% | 0.7% | 0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% | 4.0% | 24.3% | 0.0% |
| 2000 | 0.4% | 9.6% | -6.8% | 0.9% | 0.8% | -2.2% | -2.4% | -3.1% | 0.0% | 0.1% | 0.1% | 5.0% | 47.0% | 0.0% |
| 2001 | 0.4% | 12.1% | -7.0% | 0.9% | 1.0% | -2.2% | -2.4% | -3.1% | 0.1% | 0.0% | 0.1% | 6.1% | 76.0% | 0.0% |
| 2002 | 0.3% | 8.6% | -9.1% | 0.8% | 0.7% | -2.1% | -2.4% | -3.2% | 0.1% | 0.0% | 0.0% | 4.4% | 51.1% | 0.0% |
| 2003 | 0.5% | 15.1% | -7.8% | 1.1% | 1.1% | -2.3% | -2.6% | -3.3% | 0.1% | 0.0% | 0.0% | 6.5% | 85.0% | 0.0% |
| 2004 | 0.4% | 12.3% | -8.5% | 1.0% | 2.3% | -1.9% | -2.5% | -3.2% | -0.1% | 0.0% | 0.0% | 3.6% | 66.7% | 0.0% |
| 2005 | 0.5% | 8.3% | -10.2% | 0.8% | 1.3% | -2.4% | -2.7% | -3.4% | 0.4% | 0.5% | 1.1% | 2.2% | 43.8% | 0.0% |
| **Sweden** | **$NO_x$** | **CO** | **NMVOC** | **$SO_x$** | **$NH_3$** | **TSP** | **$PM_{10}$** | **$PM_{2.5}$** | **Pb** | **Cd** | **Hg** | **DIOX** | **PAH** | **HCB** |
| 1980 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1981 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1982 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1983 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1984 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1985 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1986 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1987 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1988 | 0.0% | 0.0% | -0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.3% | 0.0% | 0.0% |
| 1989 | 0.0% | 0.0% | -0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.0% | 0.0% |
| 1990 | -0.1% | 0.7% | -0.2% | -0.3% | 0.0% | -4.4% | -4.3% | 9.3% | 2.6% | -0.7% | -0.2% | 0.0% | 1.3% | 0.0% |
| 1991 | 0.0% | 0.7% | -0.2% | 0.0% | 0.0% | -4.3% | -4.3% | 9.5% | 3.0% | -0.9% | -0.4% | 0.0% | 1.2% | 0.0% |
| 1992 | 0.0% | 0.6% | -0.2% | 0.0% | 0.0% | -4.5% | -4.5% | 9.7% | 3.2% | -1.0% | 0.0% | 0.1% | 1.3% | 0.0% |
| 1993 | 0.0% | 0.6% | -0.1% | 0.0% | 0.0% | -4.6% | -4.4% | 9.5% | 6.8% | -1.1% | 0.5% | -11.1% | 1.1% | 0.0% |
| 1994 | 0.0% | 0.6% | -0.1% | 0.0% | 0.0% | -4.6% | -4.5% | 9.7% | 22.3% | -1.6% | 0.2% | 0.0% | 0.9% | 0.0% |
| 1995 | 0.0% | 0.7% | -0.1% | 0.0% | 0.0% | -4.9% | -4.7% | 10.1% | 34.4% | -1.9% | 0.0% | 0.0% | 0.4% | 0.0% |
| 1996 | 0.0% | 0.8% | -0.1% | 0.0% | 0.0% | -4.9% | -4.8% | 10.3% | 40.3% | -1.9% | 0.1% | 0.0% | 0.2% | 0.0% |
| 1997 | 0.0% | 0.8% | 0.0% | 0.0% | 0.0% | -5.2% | -5.1% | 10.9% | 40.0% | -1.9% | 0.3% | 0.0% | 0.4% | 0.0% |
| 1998 | 0.0% | 0.9% | 0.0% | 0.0% | 0.0% | -5.2% | -5.2% | 11.4% | 41.7% | -2.2% | 0.1% | 0.0% | 0.6% | 0.0% |
| 1999 | 0.0% | 0.9% | 0.0% | 0.0% | 0.0% | -5.6% | -5.6% | 12.5% | 37.9% | -2.7% | 0.0% | 0.0% | 0.6% | 0.0% |
| 2000 | -4.9% | 1.0% | 0.0% | 0.0% | 0.0% | -5.9% | -5.8% | 12.8% | 33.8% | -2.8% | 0.1% | 0.0% | 0.7% | 0.0% |
| 2001 | -6.2% | 1.1% | 0.0% | -0.1% | -1.4% | -5.9% | -5.9% | 12.8% | 26.5% | -2.5% | 0.0% | 0.0% | 0.7% | 0.0% |
| 2002 | -6.8% | 1.1% | 0.0% | 0.1% | -3.3% | -6.2% | -6.2% | 13.2% | 19.8% | -2.9% | 0.0% | 0.0% | 0.7% | 0.0% |
| 2003 | -8.1% | 1.1% | 1.1% | -0.1% | 0.0% | -6.4% | -6.3% | 13.4% | 8.8% | -3.0% | 0.0% | -0.2% | 0.7% | 0.0% |
| 2004 | -10.1% | 1.0% | 0.1% | -0.2% | 0.0% | -6.5% | -6.4% | 13.1% | -1.1% | -3.0% | -1.8% | -0.2% | 0.9% | 0.0% |
| 2005 | -11.8% | 1.1% | 0.4% | -0.3% | 0.3% | -6.5% | -6.6% | 12.9% | -12.0% | -3.0% | -2.2% | -0.6% | 0.6% | 0.0% |

| Switzerland | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | -1.0% | -0.5% | 1.5% | -0.4% | -0.5% | -2.2% | -3.1% | -5.8% | 1.9% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1991 | -1.1% | -0.5% | 1.7% | -0.5% | -0.5% | -2.3% | -3.2% | -6.0% | 2.0% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1992 | -1.2% | -0.5% | 1.8% | -0.6% | -0.5% | -2.5% | -3.3% | -6.3% | 2.3% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1993 | -1.3% | -0.4% | 2.0% | -0.6% | -0.5% | -2.7% | -3.4% | -6.7% | 2.7% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% |
| 1994 | -1.4% | -0.4% | 2.2% | -0.4% | -0.5% | -2.8% | -3.6% | -7.0% | 2.9% | 0.2% | 0.0% | 0.0% | 0.1% | 0.0% |
| 1995 | -1.6% | -0.4% | 2.3% | -1.1% | -0.5% | -3.1% | -3.9% | -7.6% | 3.9% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1996 | -1.9% | -0.3% | 2.4% | -1.5% | -0.6% | -3.3% | -4.0% | -7.8% | 4.5% | -0.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1997 | -2.2% | -0.3% | 2.6% | -1.7% | -0.6% | -3.4% | -4.1% | -8.2% | 4.9% | -0.6% | -0.1% | -0.1% | 0.0% | 0.0% |
| 1998 | -2.4% | -0.2% | 2.9% | -1.7% | -0.6% | -3.4% | -4.1% | -8.2% | 5.5% | -0.6% | -0.1% | -0.1% | 0.0% | 0.0% |
| 1999 | -2.6% | -0.1% | 3.1% | -1.4% | 2.3% | -3.8% | -4.3% | -8.8% | 12.0% | -0.4% | -0.1% | -0.1% | 0.0% | 0.0% |
| 2000 | -2.8% | -0.2% | 3.2% | -1.0% | 2.5% | -3.7% | -4.2% | -8.8% | 19.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2001 | -2.7% | -0.3% | 3.0% | -0.9% | 3.0% | -3.6% | -4.1% | -8.5% | 19.9% | 0.1% | 0.3% | 0.3% | 0.0% | 0.0% |
| 2002 | -2.8% | -0.5% | 2.9% | -1.2% | 3.6% | -3.5% | -3.9% | -8.2% | 19.7% | -0.4% | -0.1% | -0.1% | 0.1% | 0.0% |
| 2003 | -2.7% | -0.7% | 2.7% | -0.7% | 4.2% | -3.4% | -3.7% | -7.8% | 22.1% | -0.1% | 1.5% | -1.6% | 0.1% | 0.0% |
| 2004 | -2.5% | -0.9% | 2.5% | -0.2% | 4.6% | -3.0% | -3.3% | -7.1% | 23.3% | -0.1% | 2.8% | -3.2% | 0.1% | 0.0% |
| 2005 | -1.9% | -0.4% | 2.4% | 4.1% | 6.6% | -2.2% | -2.3% | -5.3% | 21.4% | 0.6% | 4.6% | -4.2% | 0.3% | 0.0% |
| **Turkey** | no reporting | | | | | | | | | | | | | |
| **Ukraine** | no resubmission | | | | | | | | | | | | | |
| **United Kingdom** | $NO_x$ | CO | NMVOC | $SO_x$ | $NH_3$ | TSP | $PM_{10}$ | $PM_{2.5}$ | Pb | Cd | Hg | DIOX | PAH | HCB |
| 1980 | -0.3% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.6% | -0.5% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1981 | -0.3% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.6% | -0.4% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1982 | -0.3% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.6% | -0.5% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1983 | -0.3% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.6% | -0.4% | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1984 | -0.3% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.6% | -0.4% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1985 | -0.3% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.5% | -0.4% | 0.0% | -0.1% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1986 | -0.2% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | -0.5% | -0.4% | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1987 | -0.1% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | -0.4% | -0.3% | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1988 | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | -0.2% | -0.2% | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1989 | 0.0% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | -0.1% | -0.1% | 0.0% | -0.2% | 0.0% | 0.0% | 0.0% | 0.0% |
| 1990 | 0.1% | 0.1% | 0.1% | 0.8% | -0.1% | 0.0% | -0.1% | -0.1% | 0.0% | -0.2% | 0.9% | 3.0% | 0.0% | -69.3% |
| 1991 | 0.0% | 0.1% | 0.1% | 0.9% | -0.1% | 0.0% | -0.1% | -0.1% | 0.0% | -0.2% | 0.9% | 3.0% | 0.0% | -71.5% |
| 1992 | 0.2% | 0.1% | 0.0% | 0.9% | -0.9% | 0.0% | 0.0% | 0.0% | 0.0% | -0.2% | 0.9% | 3.0% | -0.1% | -70.8% |
| 1993 | 0.2% | 0.1% | 0.0% | 1.0% | -1.5% | 0.0% | 0.1% | 0.1% | 0.0% | -0.3% | 1.5% | 3.5% | -0.1% | -78.3% |
| 1994 | 0.2% | 0.0% | 0.0% | 1.1% | -1.9% | 0.0% | 0.1% | 0.1% | 0.0% | -0.8% | 1.5% | 2.7% | -0.1% | -85.0% |
| 1995 | 0.2% | 0.1% | 0.1% | 1.3% | -2.2% | 0.0% | 0.2% | 0.1% | 0.0% | -0.4% | 1.7% | 3.6% | -0.1% | -85.3% |
| 1996 | 0.3% | 0.1% | 0.0% | 1.5% | -1.9% | 0.0% | 0.2% | 0.0% | 0.1% | -0.8% | 2.5% | 5.2% | -0.2% | -84.9% |
| 1997 | 0.3% | 0.1% | -0.1% | 1.3% | -1.7% | 0.0% | 4.5% | 7.3% | 0.1% | -0.4% | 2.3% | 1.4% | -0.4% | -87.2% |
| 1998 | 0.3% | 0.1% | 0.0% | 0.8% | -1.4% | 0.0% | 0.2% | 0.0% | 0.0% | -0.3% | 0.1% | 1.9% | -0.5% | -88.4% |
| 1999 | 0.3% | -0.3% | 0.0% | -1.5% | -0.4% | 0.0% | -0.1% | -0.3% | -0.3% | -1.2% | -5.1% | 0.5% | -0.5% | 0.0% |
| 2000 | 0.1% | -0.2% | 0.0% | -1.4% | -2.1% | 0.0% | 0.0% | -0.2% | -1.2% | -1.0% | -5.5% | -0.2% | -0.6% | 0.0% |
| 2001 | 0.0% | -0.3% | 0.0% | -2.2% | -1.7% | 0.0% | -0.3% | -0.6% | -1.0% | -1.3% | -6.2% | -0.4% | -0.7% | 0.0% |
| 2002 | -0.4% | -0.6% | -0.1% | -2.3% | 0.2% | 0.0% | -0.5% | -0.8% | -1.0% | -1.9% | -7.0% | -0.7% | -0.9% | 0.0% |
| 2003 | -0.4% | -0.5% | 0.0% | -2.4% | 0.9% | 0.0% | -0.3% | -1.0% | -1.1% | -2.2% | -6.4% | -1.7% | -0.7% | 0.0% |
| 2004 | -0.3% | -0.8% | -0.7% | -2.8% | 1.2% | 0.0% | -0.5% | -0.8% | -0.4% | -2.6% | -6.9% | -1.3% | -0.6% | 0.0% |
| 2005 | -0.4% | -1.2% | -1.7% | -2.6% | -0.9% | 0.0% | -0.2% | -0.6% | -0.5% | -2.0% | -5.3% | -2.6% | -1.1% | -1.5% |
| **USA** | no resubmission | | | | | | | | | | | | | |

# APPENDIX 4: Overview of recalculations – NECD Inventory

The following tables represent the difference between data reported by MS in 2008 and the data reported in 2007. A dash indicates that one of the two submissions did not contain any data and '0' indicates that recalculations were smaller than 0.5 Gg.

Table ***10: Member States' $NO_x$ recalculations (Gg) for 1990–2005.***

| $NO_x$ [Gg] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | -21 | -17 | -16 | -15 | -12 | -9 | -6 | -3 | 0 | 3 | 6 | 7 | 10 | 12 | 15 | 16 |
| Belgium | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | 0 | -8 |
| Bulgaria | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Cyprus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Czech Republic | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 8 | 16 |
| Denmark | 5 | 4 | 3 | 6 | 9 | 7 | 6 | 6 | 5 | 6 | 6 | 8 | 7 | 9 | 9 | 10 |
| Estonia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Finland | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 | -2 |
| France | 18 | 16 | 27 | 26 | 30 | 44 | 59 | 83 | 112 | 138 | 146 | 164 | 174 | 192 | 198 | 209 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Greece | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hungary | 0 | – | – | – | – | – | – | – | – | – | 0 | – | – | 0 | 0 | -2 |
| Ireland | – | – | – | – | – | – | – | – | – | – | – | 5 | 4 | 5 | 6 | 7 |
| Italy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -13 |
| Latvia | 1 | 1 | 1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lithuania | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 |
| Luxembourg | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Malta | 0 | – | – | – | – | 0 | – | – | – | – | -3 | – | – | -2 | -3 | -3 |
| Netherlands | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | -18 |
| Poland | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Portugal | 5 | 5 | 4 | 3 | 2 | 1 | -1 | -3 | -8 | -9 | -14 | -14 | -16 | -16 | -15 | -16 |
| Romania | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Slovakia | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Slovenia | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | -11 |
| Spain | 1 | 3 | 3 | 2 | -1 | -1 | -2 | 0 | -1 | -3 | -2 | -1 | -4 | -1 | -2 | 3 |
| Sweden | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -11 | -14 | -15 | -18 | -21 | -24 |
| United Kingdom | – | – | – | – | – | – | – | – | – | – | 0 | 0 | -6 | -7 | -5 | -7 |

Table ***11***: Member States' NMVOC recalculations (Gg) for 1990–2005.

| NMVOC [Gg] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | -2 | 3 | 8 | 11 | 12 | 13 | 12 | 11 | 10 | 9 | 9 | 17 | 22 | 20 | 19 | 9 |
| Belgium | 0 | 0 | 0 | 0 | 0 | 0 | – | – | – | – | 0 | 0 | 0 | 0 | 0 | -49 |
| Bulgaria | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Cyprus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Czech Republic | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 8 | -4 |
| Denmark | 3 | 2 | 2 | 4 | 5 | 3 | 3 | 1 | 1 | 0 | -2 | -3 | -2 | -4 | -4 | -5 |
| Estonia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Finland | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 | 2 |
| France | -18 | -21 | -7 | -9 | -1 | 3 | -18 | 1 | -3 | 13 | -2 | -38 | -22 | 17 | -11 | -11 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 132 |
| Greece | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hungary | 0 | – | – | – | – | – | – | – | – | – | 0 | – | – | 0 | 0 | – |
| Ireland | – | – | – | – | – | – | – | – | – | – | – | 1 | 1 | 0 | -1 | 0 |
| Italy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -27 |
| Latvia | -1 | -2 | -2 | -2 | -2 | -2 | -2 | -2 | -3 | -3 | -3 | -3 | -3 | -1 | -2 | -1 |
| Lithuania | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 |
| Luxembourg | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Malta | 0 | – | – | – | – | 0 | – | – | – | – | -6 | – | – | -4 | -1 | -2 |
| Netherlands | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | -7 |
| Poland | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Portugal | 6 | 8 | 6 | 6 | 5 | 4 | 3 | -4 | -7 | -6 | -7 | -10 | -10 | -16 | -16 | -18 |
| Romania | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Slovakia | – | – | – | – | – | – | – | – | – | – | – | – | – | 5 | 6 | 4 |
| Slovenia | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | -1 |
| Spain | -74 | -86 | -80 | -90 | -86 | -76 | -66 | -68 | -91 | -91 | -76 | -77 | -99 | -85 | -92 | -104 |
| Sweden | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| United Kingdom | – | – | – | – | – | – | – | – | – | – | 0 | 0 | -2 | -1 | -8 | -17 |

Table ***12:*** Member States' $SO_x$ recalculations (Gg) for 1990–2005.

| $SO_x$ [Gg] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Belgium | 0 | 0 | 0 | 0 | 0 | 0 | – | – | – | – | 0 | 0 | 0 | 0 | 0 | -3 |
| Bulgaria | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Cyprus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Czech Republic | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 | -2 |
| Denmark | -1 | -2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 |
| Estonia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Finland | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 | 1 |
| France | 0 | 0 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | -3 | 8 | -4 | 4 | 16 | 21 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 |
| Greece | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hungary | 0 | – | – | – | – | – | – | – | – | – | 0 | – | – | 0 | 0 | -28 |
| Ireland | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 |
| Italy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -33 |
| Latvia | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lithuania | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 |
| Luxembourg | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Malta | 0 | – | – | – | – | 0 | – | – | – | – | -10 | – | – | -6 | -6 | -6 |
| Netherlands | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 3 |
| Poland | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Portugal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 9 | -3 |
| Romania | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Slovakia | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Slovenia | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | -1 |
| Spain | 1 | 2 | 2 | 1 | -2 | -1 | -2 | 7 | 6 | 6 | 7 | 7 | 6 | 7 | 5 | 3 |
| Sweden | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United Kingdom | – | – | – | – | – | – | – | – | – | – | 0 | 0 | -23 | -23 | -23 | -18 |

Table ***13***: Member States' $NH_3$ recalculations (Gg) for 1990–2005.

| $NH_3$ [Gg] | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Austria | 2 | 3 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 |
| Belgium | 0 | 0 | 0 | 0 | 0 | 0 | – | – | – | – | 0 | 0 | 0 | 0 | 0 | -1 |
| Bulgaria | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Cyprus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Czech Republic | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 | 1 |
| Denmark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Estonia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Finland | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | 0 | 3 |
| France | 4 | 4 | 4 | 4 | 3 | 1 | 0 | 0 | -1 | 8 | 8 | 8 | 7 | 8 | 8 | 10 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Greece | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | – | – | – |
| Hungary | 0 | – | – | – | – | – | – | – | – | – | 0 | – | – | 0 | 0 | – |
| Ireland | – | – | – | – | – | – | – | – | – | – | – | -2 | -2 | -2 | -3 | -2 |
| Italy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -3 |
| Latvia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lithuania | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 |
| Luxembourg | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Malta | – | – | – | – | – | – | – | – | – | – | -1 | – | – | 0 | 0 | 0 |
| Netherlands | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 | -2 |
| Poland | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Portugal | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -4 |
| Romania | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Slovakia | – | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 |
| Slovenia | – | – | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 0 |
| Spain | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 4 | 3 | 5 | 10 | 5 |
| Sweden | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -2 | 0 | 0 | 0 |
| United Kingdom | – | – | – | – | – | – | – | – | – | – | 0 | 0 | 0 | 2 | 4 | -3 |

# APPENDIX 5: Overview of inventory comparisons

Note: Comparisons could be performed only for countries which submitted inventories under more than one reporting obligation. 0 indicates that there was no difference between emissions; an empty cell indicates that one (or both) of the inventories were not submitted; $NH_3$ is not reported under the EU-MM.

Table ***14: Comparison of NECD, CLRTAP and UNFCCC inventories from 2006 for $NO_x$.***

| | 1990 | | | | | 2006 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CLRTAP | NECD | | UNFCCC | | CLRTAP | NECD | | UNFCCC | |
| $NO_x$ | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP |
| Austria | 192 | 200 | 3,8% | 192 | 0.0% | 225 | 173 | -30.1% | 225 | 0.0% |
| Belgium | 368 | 382 | 3,8% | 444 | 17.3% | 278 | 278 | 0.0% | 230 | -20.6% |
| Bulgaria | 361 | | | 242 | -49.0% | 246 | 246 | 0.0% | 159 | -54.6% |
| Cyprus | 15 | 14 | -0,1% | 19 | 25.3% | 18 | 18 | 0.0% | 15 | -16.8% |
| Czech Republic | 544 | | | 741 | 26.6% | 282 | 285 | 0.9% | 278 | -1.5% |
| Denmark | 274 | 274 | 0,0% | 274 | 0.0% | 185 | 185 | 0.0% | 185 | 0.0% |
| Estonia | 74 | 74 | 0,0% | 100 | 26.5% | 30 | 31 | 1.1% | 52 | 40.9% |
| European Community | 17101 | | | 16863 | -1.4% | 11199 | 11050 | -1.3% | 11071 | -1.2% |
| Finland | 300 | | | 295 | -1.7% | 193 | 193 | 0.1% | 193 | 0.1% |
| France | 1856 | 1856 | 0,0% | 1841 | -0.8% | 1351 | 1358 | 0.5% | 1364 | 1.0% |
| Germany | 2862 | 2862 | 0,0% | 2862 | 0.0% | 1394 | 1394 | 0.0% | 1394 | 0.0% |
| Greece | 299 | 300 | 0,3% | 280 | -6.7% | 316 | 316 | 0.0% | 316 | 0.0% |
| Hungary | 238 | 238 | 0,0% | 8 | -2729.5% | 208 | 208 | 0.1% | 202 | -2.7% |
| Ireland | 124 | 130 | 5,0% | 124 | 0.6% | 119 | 113 | -5.0% | 119 | 0.0% |
| Italy | 1941 | 1947 | 0,3% | 1943 | 0.1% | 1061 | 1087 | 2.4% | 1062 | 0.0% |
| Latvia | 67 | 67 | 0,8% | 67 | 0.0% | 44 | 44 | 1.0% | 44 | 0.0% |
| Lithuania | 158 | | | 136 | -16.0% | 61 | 61 | 0.0% | 61 | -0.1% |
| Luxembourg | 23 | | | 14 | -63.6% | | | | | |
| Malta | | 11 | | 10 | | 9 | 9 | 0.4% | 9 | 0.4% |
| Netherlands | 536 | | | 545 | 1.7% | 311 | 337 | 7.8% | 317 | 1.8% |
| Norway | 208 | | | 208 | 0.0% | 191 | | | 191 | 0.0% |
| Poland | 1280 | | | 1280 | 0.0% | 890 | 879 | -1.2% | 879 | -1.2% |
| Portugal | 244 | 244 | 0,0% | 246 | 1.1% | 267 | 267 | 0.0% | 250 | -6.7% |
| Romania | 546 | | | 462 | -18.2% | 326 | 301 | -8.6% | 348 | 6.1% |
| Slovakia | 222 | | | 222 | 0.0% | 87 | 87 | 0.0% | 87 | 0.0% |
| Slovenia | 63 | | | | | 47 | 47 | -0.2% | 47 | 0.0% |
| Spain | 1246 | 1179 | -5,8% | 1231 | -1.2% | 1481 | 1365 | -8.5% | 1466 | -1.0% |
| Sweden | 314 | 314 | 0,0% | 314 | 0.0% | 175 | 175 | 0.0% | 175 | 0.0% |
| Switzerland | 157 | | | 162 | 3.4% | 82 | | | 84 | 2.1% |
| United Kingdom | 2968 | | | 2967 | 0.0% | 1595 | 1595 | 0.0% | 1595 | 0.0% |
| USA | 23161 | | | 21698 | -6.7% | 16015 | | | 15160 | -5.6% |

Table *15: Comparison of NECD, CLRTAP and UNFCCC inventories from 2006 for NMVOC.*

| NMVOC | 1990 | | | | | 2006 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CLRTAP | NECD | | UNFCCC | | CLRTAP | NECD | | UNFCCC | |
| | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP |
| Austria | 283 | 284 | 0,1% | 283 | 0,0% | 172 | 168 | -2,2% | 172 | 0,0% |
| Belgium | 399 | 359 | -11,0% | 394 | -1,2% | 150 | 150 | 0,0% | 126 | -19,0% |
| Bulgaria | 217 | | | 117 | -84,7% | 159 | 159 | 0,0% | 109 | -46,2% |
| Cyprus | 14 | 14 | -1,6% | 14 | 1,0% | 11 | 11 | 0,4% | 11 | -0,3% |
| Czech Republic | 441 | | | 311 | -41,7% | 179 | 172 | -3,9% | 182 | 1,7% |
| Denmark | 172 | 170 | -1,1% | 172 | 0,0% | 110 | 108 | -1,7% | 110 | 0,0% |
| Estonia | 70 | 70 | 0,0% | 36 | -95,1% | 34 | 35 | 2,1% | 23 | -44,8% |
| European Community | 16868 | | | 18266 | 7,7% | 9391 | 9303 | -0,9% | 11109 | 15,5% |
| Finland | 226 | | | 229 | 1,6% | 133 | 132 | -0,2% | 132 | -0,2% |
| France | 2744 | 2744 | 0,0% | 3934 | 30,2% | 1336 | 1345 | 0,6% | 2735 | 51,1% |
| Germany | 3768 | 3768 | 0,0% | 3768 | 0,0% | 1349 | 1349 | 0,0% | 1349 | 0,0% |
| Greece | 280 | 280 | 0,1% | 308 | 9,0% | 291 | 291 | 0,0% | 291 | 0,0% |
| Hungary | 205 | 205 | 0,0% | 62 | -229,5% | 177 | 179 | 1,1% | 187 | 5,4% |
| Ireland | 108 | 114 | 4,7% | 105 | -3,2% | 60 | 59 | -2,4% | 57 | -6,3% |
| Italy | 1979 | 2032 | 2,6% | 1988 | 0,4% | 1174 | 1159 | -1,3% | 1176 | 0,1% |
| Latvia | 94 | 94 | 0,1% | 94 | 0,0% | 65 | 65 | 0,1% | 65 | 0,0% |
| Lithuania | 108 | | | 110 | 2,1% | 78 | 78 | 0,0% | 84 | 7,0% |
| Luxembourg | 19 | | | 8 | -131,1% | | | | 3 | |
| Malta | | 4 | | 6 | | 4 | 4 | 0,0% | 3 | -26,7% |
| Netherlands | 450 | | | 456 | 1,1% | 164 | 166 | 1,0% | 163 | -0,6% |
| Norway | 295 | | | 295 | 0,0% | 196 | | | 196 | 0,0% |
| Poland | 831 | | | 831 | 0,0% | 916 | 911 | -0,6% | 911 | -0,6% |
| Portugal | 307 | 307 | 0,0% | 709 | 56,7% | 312 | 312 | 0,0% | 738 | 57,7% |
| Romania | 616 | | | 335 | -83,7% | 353 | 299 | -18,2% | 296 | -19,5% |
| Slovakia | 137 | | | 141 | 3,1% | 78 | 78 | 0,0% | 78 | 0,0% |
| Slovenia | 44 | | | | | 41 | 41 | 0,0% | 41 | 0,0% |
| Spain | 1094 | 1059 | -3,3% | 1094 | 0,0% | 965 | 928 | -4,0% | 965 | 0,0% |
| Sweden | 373 | 373 | 0,0% | 373 | 0,0% | 195 | 195 | 0,0% | 195 | 0,0% |
| Switzerland | 286 | | | 391 | 26,9% | 101 | | | 198 | 49,0% |
| United Kingdom | 2388 | | | 2386 | -0,1% | 910 | 910 | 0,0% | 909 | -0,2% |
| USA | 21871 | | | 20930 | -4,5% | 15220 | | | 14082 | -8,1% |

Table ***16: Comparison of NECD, CLRTAP and UNFCCC inventories from 2006 for $SO_x$.***

| | 1990 | | | | | 2006 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CLRTAP | NECD | | UNFCCC | | CLRTAP | NECD | | UNFCCC | |
| $SO_2$ | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP |
| Austria | 74 | 75 | 0,5% | 74 | 0,0% | 28 | 28 | -0,1% | 28 | 0,0% |
| Belgium | 354 | 363 | 2,3% | 319 | -11,0% | 139 | 139 | 0,0% | 112 | -23,9% |
| Bulgaria | 2008 | | | 1517 | -32,3% | 877 | 877 | 0,0% | 1030 | 14,8% |
| Cyprus | 37 | 37 | -0,1% | 45 | 18,6% | 36 | 36 | 0,0% | 34 | -3,6% |
| Czech Republic | 1881 | | | 1876 | -0,3% | 211 | 211 | -0,2% | 219 | 3,4% |
| Denmark | 178 | 178 | 0,0% | 178 | 0,0% | 25 | 25 | 0,0% | 25 | 0,0% |
| Estonia | 273 | 273 | 0,0% | 257 | -6,2% | 71 | 71 | 0,0% | 124 | 42,6% |
| European Community | 26217 | | | 24976 | -5,0% | 7946 | 7904 | -0,5% | 7802 | -1,8% |
| Finland | 259 | | | 249 | -4,0% | 85 | 84 | -1,2% | 84 | -1,2% |
| France | 1332 | 1332 | 0,0% | 1357 | 1,8% | 452 | 452 | 0,0% | 478 | 5,5% |
| Germany | 5353 | 5353 | 0,0% | 5353 | 0,0% | 558 | 558 | 0,0% | 558 | 0,0% |
| Greece | 487 | 487 | 0,0% | 472 | -3,3% | 536 | 536 | 0,0% | 536 | 0,0% |
| Hungary | 1010 | 1010 | 0,0% | 10 | -10381,5% | 118 | 119 | 0,5% | 124 | 4,4% |
| Ireland | 183 | 183 | 0,3% | 183 | 0,0% | 60 | 60 | 0,3% | 60 | 0,0% |
| Italy | 1794 | 1795 | 0,1% | 1795 | 0,0% | 389 | 406 | 4,3% | 389 | 0,0% |
| Latvia | 101 | 101 | 0,1% | 101 | 0,0% | 3 | 3 | 1,4% | 3 | 0,0% |
| Lithuania | 222 | | | 214 | -3,7% | 43 | 43 | 0,0% | 42 | -3,0% |
| Luxembourg | 15 | | | 14 | -6,1% | | | | | |
| Malta | | 19 | | 16 | | 12 | 12 | 0,1% | 12 | 0,0% |
| Netherlands | 190 | | | 190 | 0,1% | 64 | 65 | 2,4% | 64 | 0,8% |
| Norway | 52 | | | 52 | 0,0% | 21 | | | 21 | 0,0% |
| Poland | 3210 | | | 3210 | 0,0% | 1195 | 1203 | 0,7% | 1203 | 0,7% |
| Portugal | 317 | 317 | 0,0% | 320 | 0,9% | 190 | 190 | 0,0% | 191 | 0,5% |
| Romania | 1311 | | | 707 | -85,3% | 863 | 832 | -3,7% | 497 | -73,5% |
| Slovakia | 526 | | | 526 | 0,0% | 88 | 88 | 0,0% | 88 | 0,0% |
| Slovenia | 196 | | | | | 18 | 18 | 0,0% | 17 | -3,9% |
| Spain | 2169 | 2092 | -3,7% | 2169 | 0,0% | 1170 | 1134 | -3,2% | 1170 | 0,0% |
| Sweden | 108 | 108 | 0,0% | 108 | 0,0% | 39 | 39 | 0,0% | 39 | 0,0% |
| Switzerland | 42 | | | 42 | 0,0% | 18 | | | 18 | 0,0% |
| United Kingdom | 3717 | | | 3717 | 0,0% | 676 | 676 | 0,0% | 676 | 0,0% |
| USA | 20935 | | | 20935 | 0,0% | 12258 | | | 12258 | 0,0% |

Table *17: Comparison of NECD, CLRTAP and UNFCCC inventories from 2006 for $NH_3$.*

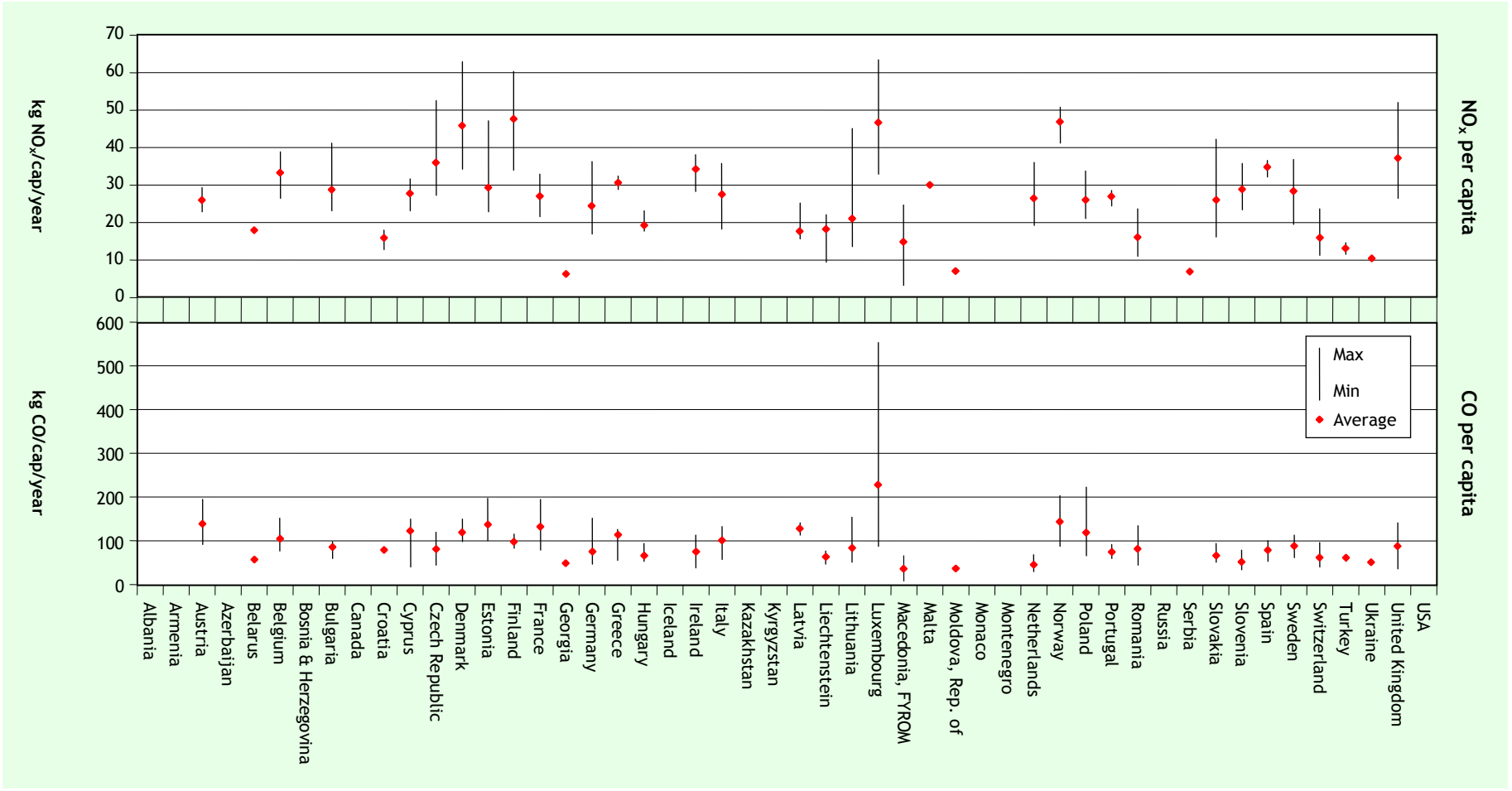
| | 1990 | | | | | 2006 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CLRTAP | NECD | | UNFCCC | | CLRTAP | NECD | | UNFCCC | |
| $NH_3$ | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP |
| Austria | 71 | 71 | 0,0% | | | 66 | 65 | -0,7% | | |
| Belgium | 109 | 112 | 2,7% | | | 73 | 73 | 0,0% | | |
| Bulgaria | 144 | | | | | 55 | 55 | 0,0% | | |
| Cyprus | 5 | 5 | -0,2% | | | 5 | 5 | 0,0% | | |
| Czech Republic | 156 | | | | | 63 | 63 | 0,1% | | |
| Denmark | 134 | 108 | -24,1% | | | 90 | 75 | -19,0% | | |
| Estonia | 26 | 26 | 0,0% | | | 9 | 9 | 0,4% | | |
| European Community | 5118 | | | | | 4001 | | | | |
| Finland | 42 | | | | | 36 | 36 | -0,4% | | |
| France | 791 | 791 | 0,0% | | | 740 | 740 | 0,0% | | |
| Germany | 738 | 738 | 0,0% | | | 621 | 621 | 0,0% | | |
| Greece | 79 | 79 | 0,0% | | | | | | | |
| Hungary | 124 | 124 | 0,0% | | | 81 | 72 | -11,7% | | |
| Ireland | 110 | 110 | 0,0% | | | 110 | 110 | -0,2% | | |
| Italy | 464 | 405 | -14,6% | | | 408 | 413 | 1,0% | | |
| Latvia | 47 | 47 | 0,0% | | | 15 | 15 | 0,0% | | |
| Lithuania | 84 | | | | | 35 | 35 | 0,0% | | |
| Luxembourg | 7 | | | | | | | | | |
| Malta | | | | | | 1 | 1 | 1,6% | | |
| Netherlands | 250 | | | | | 133 | 133 | 0,0% | | |
| Norway | 20 | | | | | 23 | | | | |
| Poland | 508 | | | | | 287 | 287 | 0,0% | | |
| Portugal | 71 | 71 | 0,0% | | | 70 | 70 | 0,0% | | |
| Romania | 300 | | | | | 199 | 187 | -6,4% | | |
| Slovakia | 65 | | | | | 27 | 27 | 0,0% | | |
| Slovenia | 24 | | | | | 19 | 19 | 0,0% | | |
| Spain | 342 | 339 | -0,8% | | | 424 | 421 | -0,8% | | |
| Sweden | 54 | 54 | 0,0% | | | 52 | 52 | 0,0% | | |
| Switzerland | 67 | | | | | 59 | | | | |
| United Kingdom | 383 | | | | | 315 | 314 | -0,2% | | |
| USA | 3918 | | | | | 3622 | | | | |

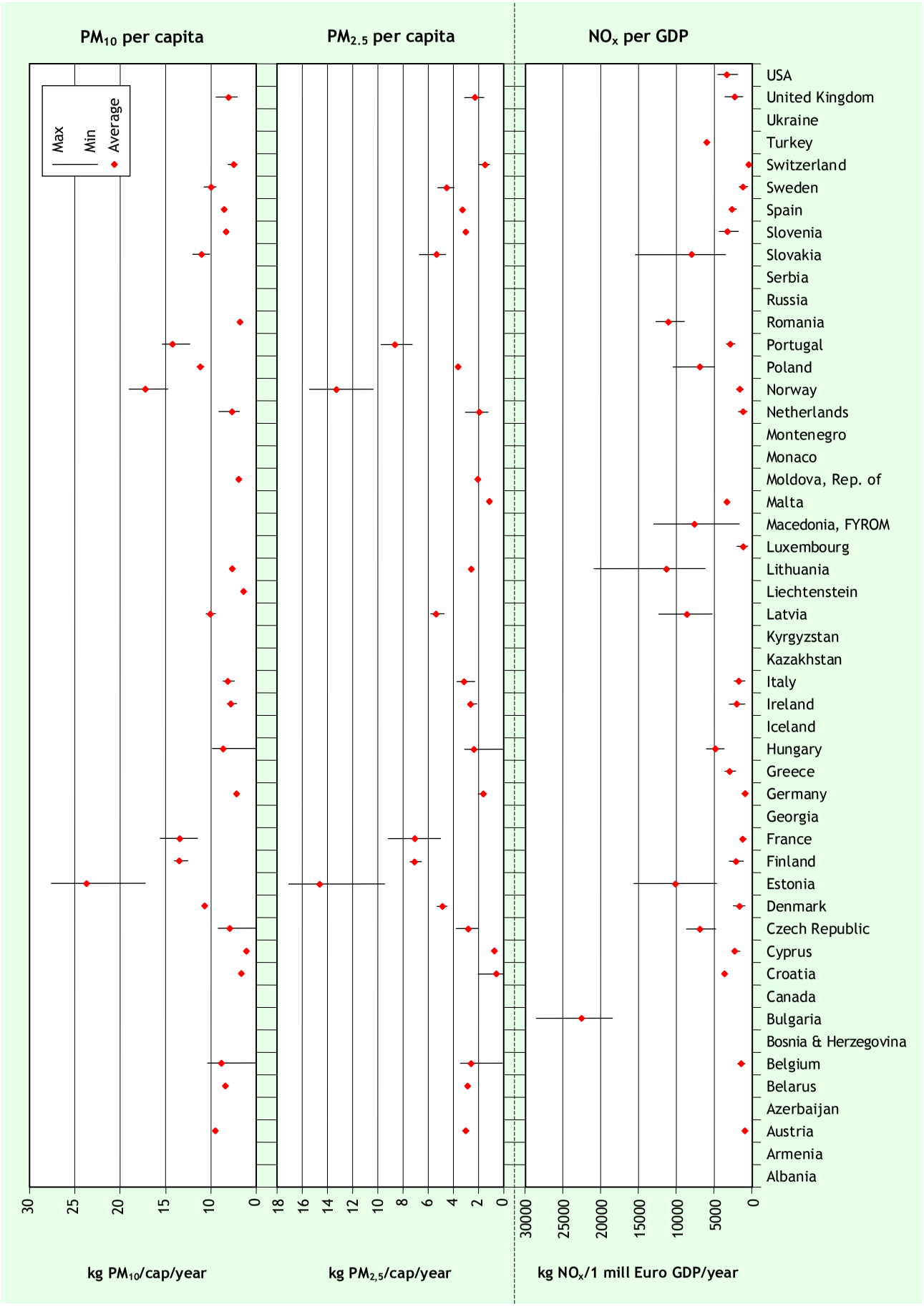
Table ***18: Comparison of NECD, CLRTAP and UNFCCC inventories from 2006 for CO.***

| CO | 1990 | | | | | 2006 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CLRTAP | NECD | | UNFCCC | | CLRTAP | NECD | | UNFCCC | |
| | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP | emissions [Gg] | emissions [Gg] | difference to CLRTAP | emissions [Gg] | difference to CLRTAP |
| Austria | 1444 | | | 1444 | 0,0% | 785 | | | 785 | 0,0% |
| Belgium | 1529 | | | 1585 | 3,6% | 838 | | | 515 | -62,6% |
| Bulgaria | 891 | | | 790 | -12,8% | 785 | | | 665 | -17,9% |
| Cyprus | 88 | | | 71 | -23,2% | 34 | | | 33 | -3,2% |
| Czech Republic | 1257 | | | 1063 | -18,3% | 484 | | | 559 | 13,4% |
| Denmark | 761 | | | 761 | 0,0% | 591 | | | 591 | 0,0% |
| Estonia | 313 | | | 273 | -14,7% | 148 | | | 212 | 30,0% |
| European Community | 64660 | | | 64480 | -0,3% | 30200 | | | 30484 | 0,9% |
| Finland | 561 | | | 709 | 20,9% | 511 | | | 499 | -2,3% |
| France | 11054 | | | 11734 | 5,8% | 5179 | | | 5680 | 8,8% |
| Germany | 12145 | | | 12118 | -0,2% | 4006 | | | 4006 | 0,0% |
| Greece | 1281 | | | 1295 | 1,1% | 956 | | | 956 | 0,0% |
| Hungary | 997 | | | 167 | -497,5% | 569 | | | 596 | 4,5% |
| Ireland | 404 | | | 404 | 0,0% | 175 | | | 175 | 0,0% |
| Italy | 7123 | | | 7183 | 0,8% | 3576 | | | 3588 | 0,3% |
| Latvia | 382 | | | 382 | 0,0% | 330 | | | 330 | 0,0% |
| Lithuania | 519 | | | 499 | -3,9% | 200 | | | 201 | 0,7% |
| Luxembourg | 175 | | | 132 | -32,4% | | | | | |
| Malta | | | | 24 | | 0 | | | 31 | 98,5% |
| Netherlands | 1066 | | | 1067 | 0,1% | 519 | | | 544 | 4,5% |
| Norway | 868 | | | 868 | 0,0% | 421 | | | 421 | 0,0% |
| Poland | 7406 | | | 7406 | 0,0% | 2800 | | | 2766 | -1,3% |
| Portugal | 894 | | | 956 | 6,5% | 682 | | | 662 | -3,0% |
| Romania | 3186 | | | 824 | -286,5% | 1417 | | | 1419 | 0,2% |
| Slovakia | 512 | | | 512 | -0,1% | 290 | | | 290 | 0,0% |
| Slovenia | 81 | | | | | 109 | | | 108 | -1,0% |
| Spain | 3883 | | | 3883 | 0,0% | 2433 | | | 2433 | 0,0% |
| Sweden | 974 | | | 974 | 0,0% | 578 | | | 578 | 0,0% |
| Switzerland | 661 | | | 717 | 7,9% | 319 | | | 335 | 4,8% |
| United Kingdom | 8235 | | | 8225 | -0,1% | 2268 | | | 2263 | -0,2% |
| USA | 139878 | | | 132324 | -5,7% | 77042 | | | 78603 | 2,0% |

# APPENDIX 6: Overview of annual emissions per GDP and emissions per capita

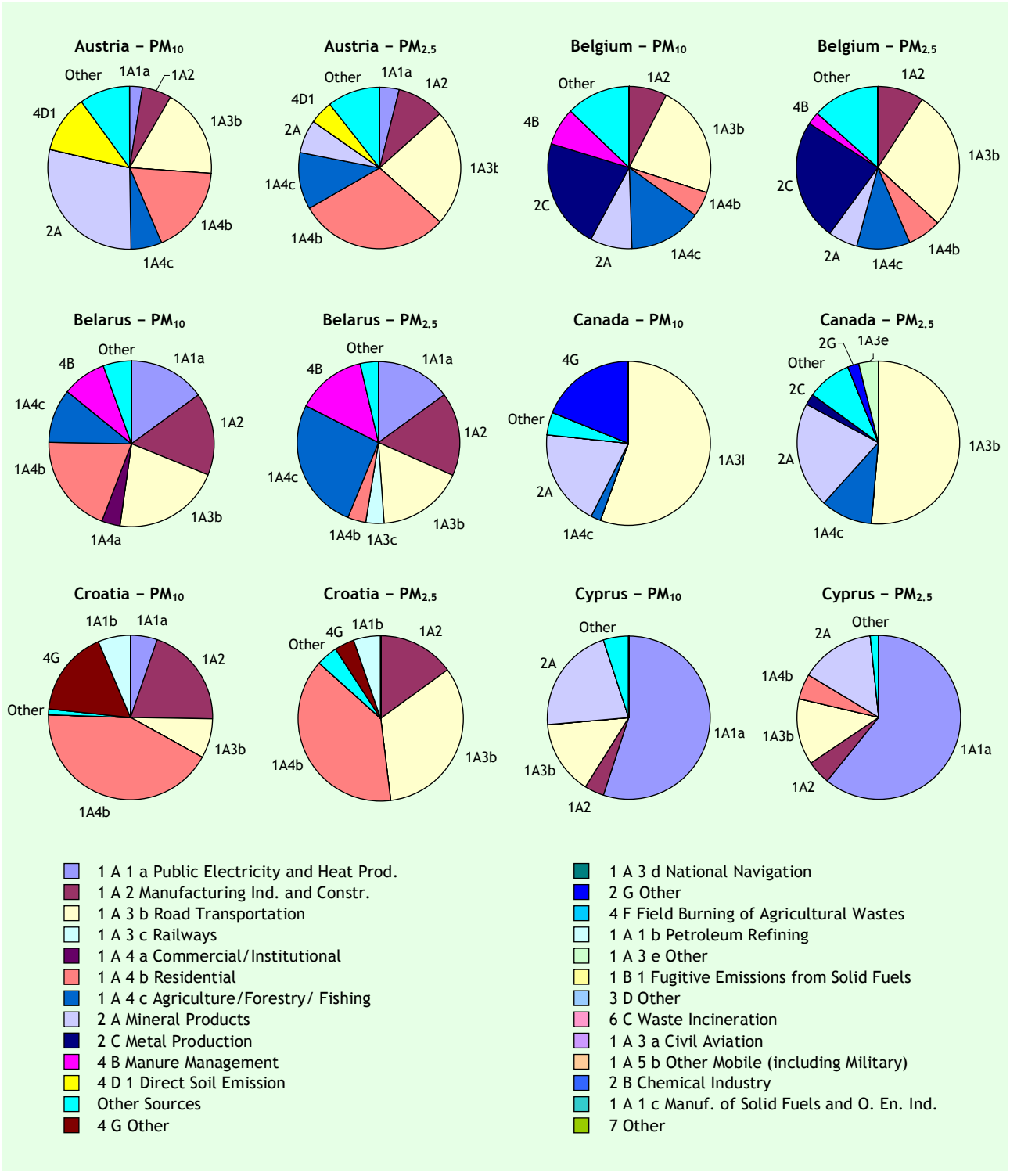
Emissions of main pollutants and PM per capita and emissions per GDP indicators were calculated for all Parties which submitted national total emissions of main pollutants and PM to CEIP, using information on population and GDP available at Eurostat database, for period from 1990 to 2006.



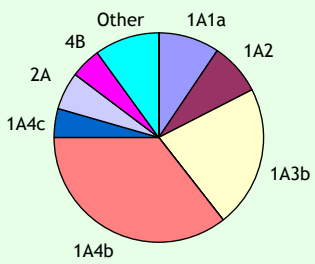


# APPENDIX 7: KCA results 2008 ($PM_{10}$ and $PM_{2.5}$)

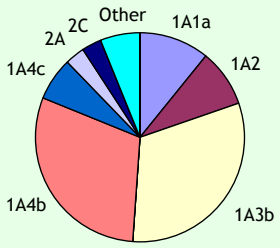
Figures represent results of stage 2 review KCA – "aggregated". Twenty six different categories together were identified as top ten in all countries. "Other sources" include all sources out of the top ten key sources as identified for particular country.



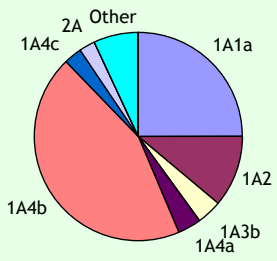
**Czech Republic – $PM_{10}$**



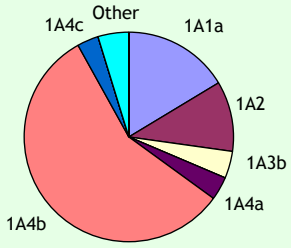

**Czech Republic – $PM_{2.5}$**



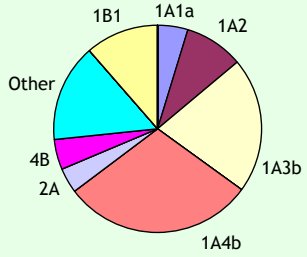

**Estonia – $PM_{10}$**



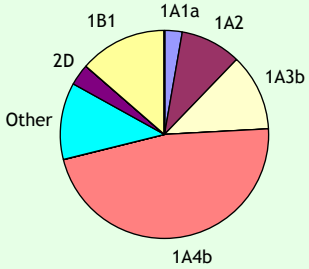

**Estonia – $PM_{2.5}$**



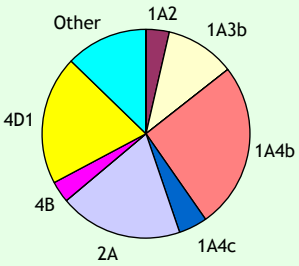

**Finland – $PM_{10}$**



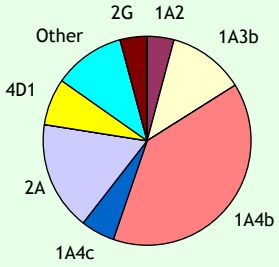

**Finland – $PM_{2.5}$**



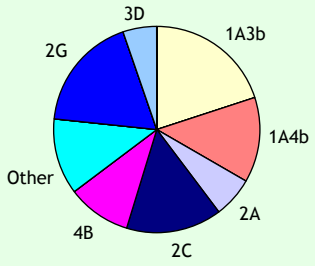

**France – $PM_{10}$**



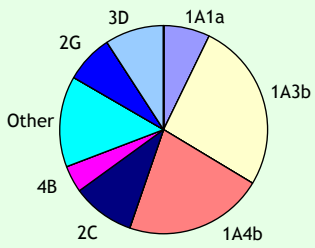

**France – $PM_{2.5}$**



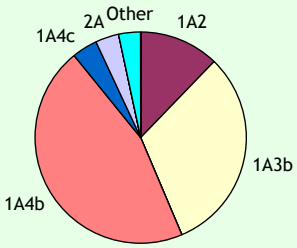

**Germany – $PM_{10}$**



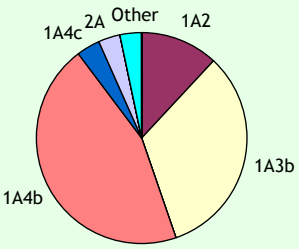

**Germany – $PM_{2.5}$**



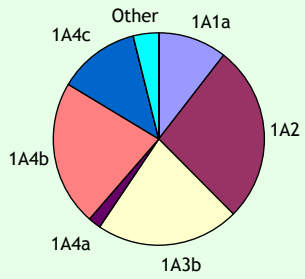

**Hungary – $PM_{10}$**



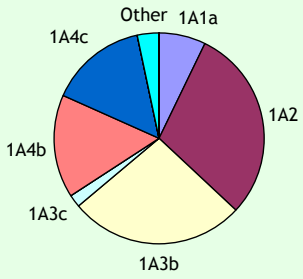

**Hungary – $PM_{2.5}$**



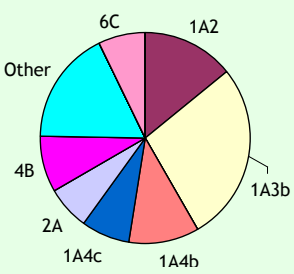

**Ireland – $PM_{10}$**



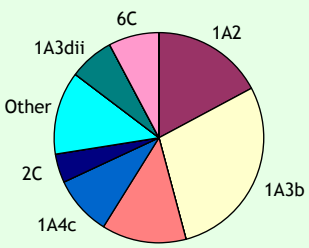

**Ireland – $PM_{2.5}$**



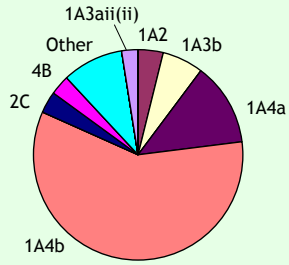

**Italy – $PM_{10}$**



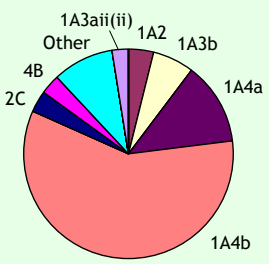

**Italy – $PM_{2.5}$**



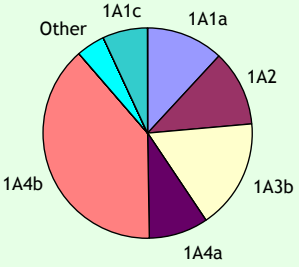

**Latvia – $PM_{10}$**



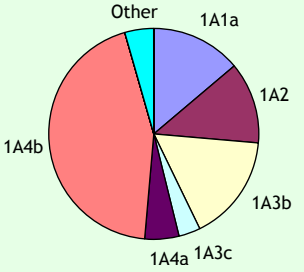

**Latvia – $PM_{2.5}$**



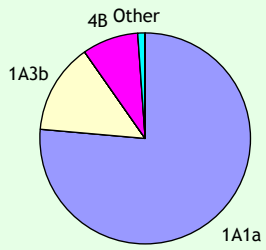

**Lithuania – $PM_{10}$**



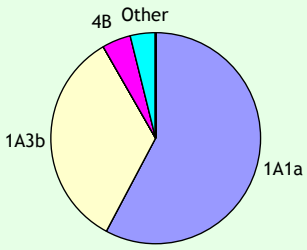

**Lithuania – $PM_{2.5}$**



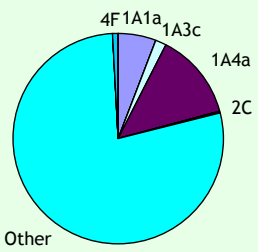
**Malta – $PM_{10}$**



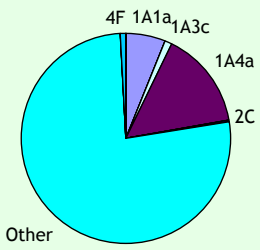

**Malta – $PM_{2.5}$**



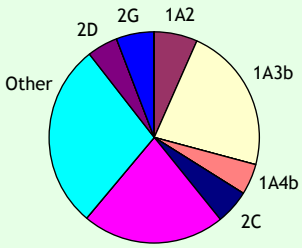

**Moldavia – $PM_{10}$**



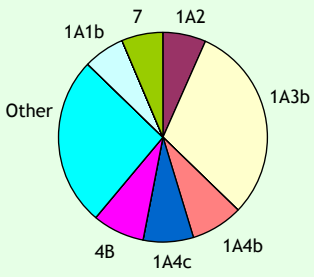

**Moldavia – $PM_{2.5}$**



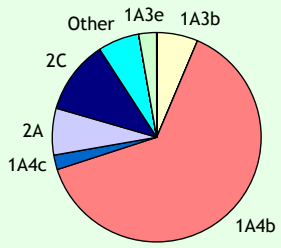

**Netherlands – $PM_{10}$**




**Netherlands – $PM_{2.5}$**




**Norway – $PM_{10}$**

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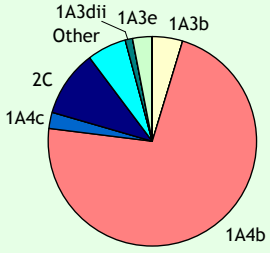
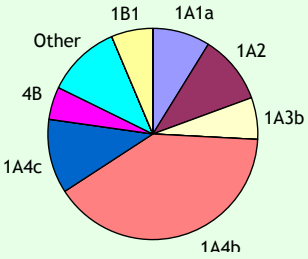



**Poland – $PM_{10}$**

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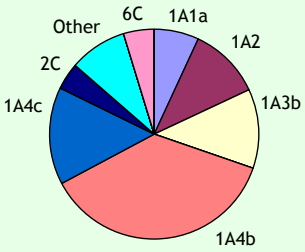
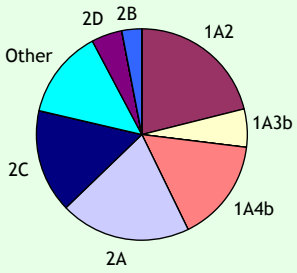



**Portugal – $PM_{10}$**

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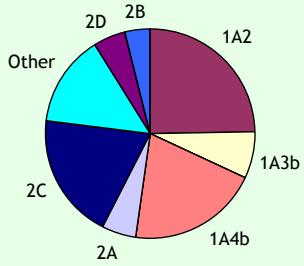
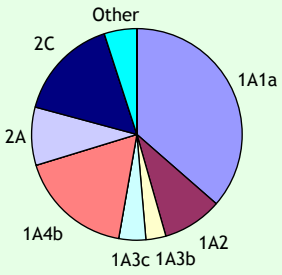


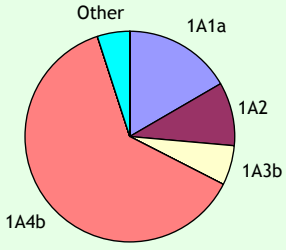

**Romania – $PM_{10}$**



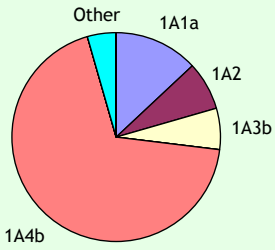

**Romania – $PM_{2.5}$**

no data available

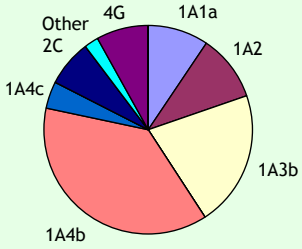
**Slovakia – $PM_{10}$**




**Slovakia – $PM_{2.5}$**




**Slovenia – $PM_{10}$**

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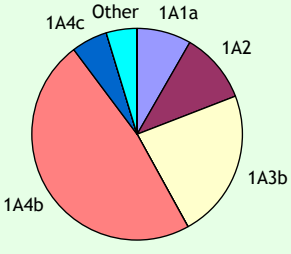
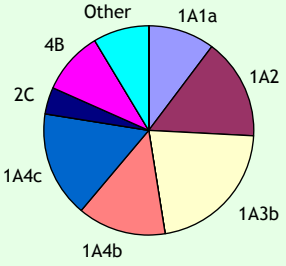
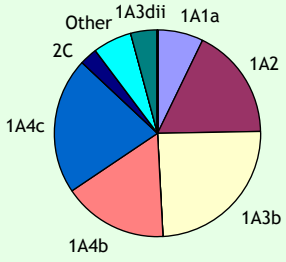


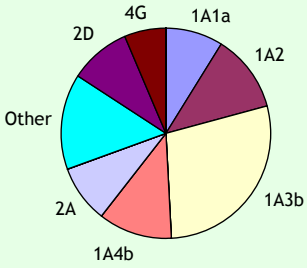

**Spain – $PM_{10}$**



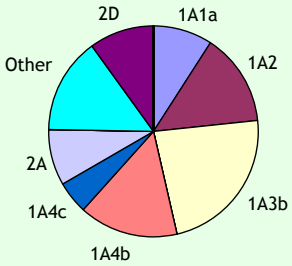

**Spain – $PM_{2.5}$**



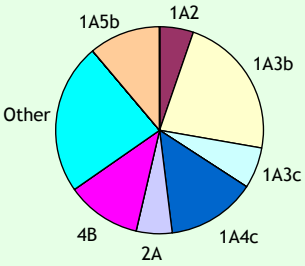
**Sweden – $PM_{10}$**



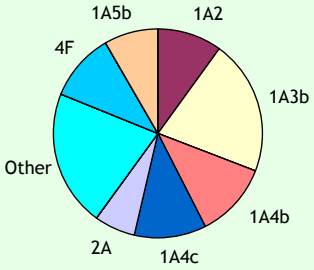

**Sweden – $PM_{2.5}$**



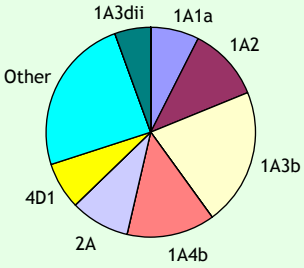

**Switzerland – $PM_{10}$**



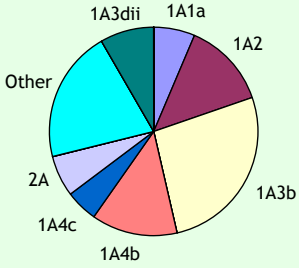

**Switzerland – $PM_{2.5}$**




**United Kingdom – $PM_{10}$**




**United Kingdom – $PM_{2.5}$**




- 1 A 1 a Public Electricity and Heat Prod.
- 1 A 2 Manufacturing Ind. and Constr.
- 1 A 3 b Road Transportation
- 1 A 3 c Railways
- 1 A 4 a Commercial/Institutional
- 1 A 4 b Residential
- 1 A 4 c Agriculture/Forestry/ Fishing
- 2 A Mineral Products
- 2 C Metal Production
- 4 B Manure Management
- 4 D 1 Direct Soil Emission
- Other Sources
- 4 G Other
- 1 A 3 d National Navigation
- 2 G Other
- 4 F Field Burning of Agricultural Wastes
- 1 A 1 b Petroleum Refining
- 1 A 3 e Other
- 1 B 1 Fugitive Emissions from Solid Fuels
- 3 D Other
- 6 C Waste Incineration
- 1 A 3 a Civil Aviation
- 1 A 5 b Other Mobile (including Military)
- 2 B Chemical Industry
- 1 A 1 c Manuf. of Solid Fuels and O. En. Ind.
- 7 Other

# ANNEX A – Completeness of LRTAP Convention inventory data

Overview table – See separate file at
http://www.emep-emissions.at/review-process/review-2008/.

# ANNEX B – Atmospheric Emission Inventory Guidebook Development: *View from the NIS*

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For full version see separate file at www.ceip.at.

## PREFACE

The EMEP/CORINAIR Atmospheric Emission Inventory Guidebook – a joint production of a multinational team – is a main methodological instrument for emission inventory in the CLRTAP region. It provides a common basis for emission inventory across the Europe; in the last years its application became more broad due to the increase in number of members of the CLRTAP (Central Asia). Since 1996 when the first edition was issued, the Guidebook has been partially updated in the framework of TFEIP. But due to the variety of emission sources, the, necessity of provision of inventory of new pollutants (HM, POPs, PM) included in the CLRTAP, and limited resources, the current maintenance level of the Guidebook chapters is different. Last year a process of the Guidebook restructuring and updating was launched.

Taking into account time constraints, the restructuring and updating plans are very ambitious. It is very important to provide a regular testing of the process of its updating and restructuring to balance (harmonize) Guidebook from the view of:

a) applicability for emission inventory processes (taking into account real-life experience in view of current emission inventory practices in different countries);

b) level of accuracy of emission estimates which can be obtained using the Guidebook on the whole and different methodologies described in the Guidebook in particularly.

Such testing may allow to make the process of the Guidebook updating more flexible.

In accordance with the work-plan of contribution to EMEP in-kind for 2007, an analysis of applicability of current Guidebook for emission inventory in the NIS, analysis of plans of the Guidebook restructure and a model chapter have been conducted. For these purposes experience of national emission inventory, preparation of expert estimates, emission sources testing was utilized. The outline of this contribution was presented at the TFEIP meeting (22-24.10.2007, Dublin, Ireland).

# emep

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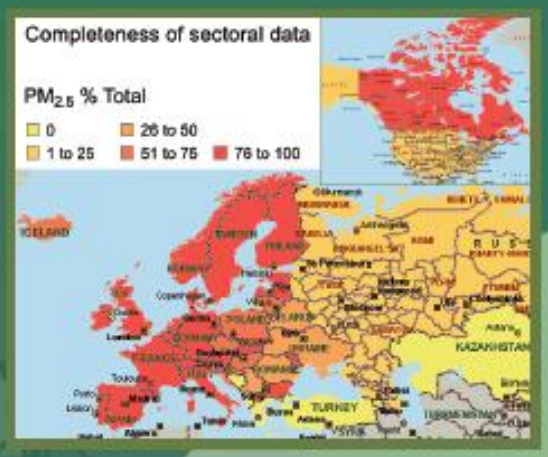


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