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Emission data reported to UNECE/EMEP: Quality Assurance and Trend Analysis & Presentation of WebDab.

By Vigdis Vestreng & Heiko Klein

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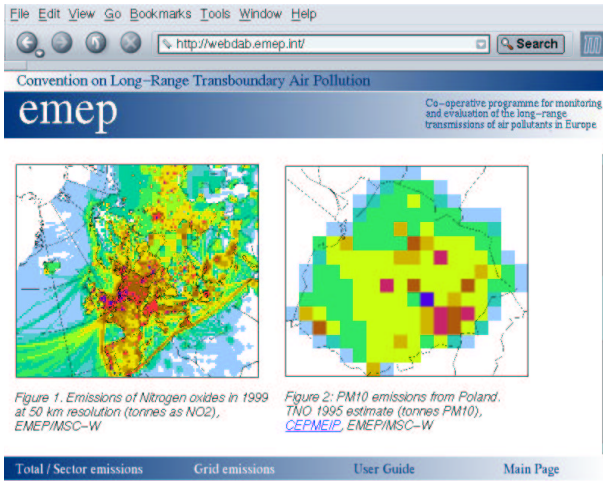

MSC-W Status Report 2002

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Preface & Acknowledgements

This note was prepared to be presented to the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) at its twenty-sixth session in Geneva, 2-4 September 2002. It presents the status of UNECE (United Nations Economic Commission for Europe)/EMEP emission data stored and distributed by the Meteorological Synthesizing Centre-West (MSC-W) of EMEP, and an overview of emission data used for modeling assessments at the MSC-W.

In addition to present an overview of the emission reporting status to the Convention on Long Range Transboundary Air Pollution (CLRTAP), this note was prepared with the aim to improve even further the dialog with and between the Parties in the Convention. Emphasis has been put on highlighting areas were the reporting could have been more timely, complete and accurate. The intention is that this note can help to improve the reporting by identifying topics to be discussed in the Task Force on Emission Inventories and Projections (TFEIP), and by proposing initiatives that Parties might find helpful for their future work on emission estimation, validation and reporting.

Much work has been done this year to fulfill the MSC-W obligation under the EMEP 2002 work plan to develop a web version of the UNECE/EMEP emission database. This database, WebDab is now accessible from *http://webdab.emep.int/.*

The authors would like to thank Leonor Tarrasón for her continuous enthusiasm and support. The WebDab project has been a joint project between EMEP/MSC-W and the IT division at the Norwegian Meteorological Institute, and we want to acknowledge our colleagues Egil Støren, Ingvild Kaale, Ola Kvisle Storås and Terje Reite. We are also grateful for the constructive comments from members of the Webdab Reference Group: Sonja Vidič, Henning Wuester, Stefan Reis and David Simpson.

The work of EMEP is carried out in collaboration with a broad network of scientists at national level that contribute with the systematic collection, analysis and reporting of emission inventories and measurements from the EMEP monitoring networks. The scientists within EMEP appreciate and acknowledge all the good work that national experts perform. Without them, this report would not have been possible.

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Part 1:

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1. Introduction

The first part of this note presents an overview of officially reported emission data to the UNECE under the Convention on LRTAP (Chapter 2 and Annex I, Tables 1-20), followed by an evaluation of national emission trends in the EMEP area (Chapter 3), detection of national emission reductions (Chapter 4 and Annex I, Table 21), and an overview of emission data used in the modeling assessments at the MSC-W (Chapter 5). The second part of the note, presents the web version of the UNECE/EMEP emission database, WebDab.

The overview of the 2002 emission submissions to the Convention on Long Range Transboundary Air Pollution (CLTRAP) was prepared upfront the Task Force on Emission Inventory and Projection (TFEIP) hold 6-8 May 2002, and was meant to form a basis for discussions during the Task Force on how the reporting of emission data can be further improved.

The quality of emission data is essential to EMEP, and efforts have continuously been made to increase the quality of the EMEP emission inventory. The reporting process has benefited from the following initiatives in latest years:

- Documentation on the internet of the EMEP network of national emission experts
- Clarification of reporting requirements
- New updates of the EMEP/CORINAIR Guidebook
- Availability of country specific tables with emission data stored in the EMEP database (prefilled tables) upfront the reporting deadline
- Templates for reporting available on the internet
- Extended reporting deadline
- Stronger feedback to Parties on the consistency and completeness of submissions

The two last years, much work has been done in developing and completing of the Draft Guidelines for Estimating and Reporting Emission Data (EB.AIR/GE.1/2001/6 and Add.1), accepted on a pilot basis by the EMEP Steering Body (SB) in 2001, and the Revised Draft Guidelines for Estimating and Reporting Emission Data (EB.AIR/GE.1/2002/7), for convention by the SB in September 2002. The aim of this work has been to clarify the reporting requirements, and increase the transparency and usefulness of the reported data, without increasing the reporting burden upon the Parties. Much weight has been put on harmonization with other international bodies requiring emission data, notably the UNFCCC. The new Guidelines will hopefully result in a more complete, comparable and accurate EMEP inventory.

In the last three years, MSC-W on its role as responsible for the management and distribution of the emission data has made an extensive effort to increase the transparency and availability of the UNECE/EMEP emission data. The generalized use of internet as distribution channel has translated into increased number of submissions. We expect a further improvement, now that the interactive database, WebDab, has become accessible (*http://webdab.emep.int/*).

Each year, many of the 48 Parties to the Convention (partly) fulfill their obligation to report emissions according to Guidelines set out by the EMEP SB. The submissions are sent to UNECE for registration, and forwarded to MSC-W for checking of consistency and loading

into the UNECE/EMEP database and preparation of emission data input to the different annual assessments performed by EMEP.

Before the EMEP SB in the beginning of September, EMEP reports are produced, among those an emission data note.

The emission data for the whole EMEP area has normally not become available to the Parties and the public before after the SB approval in September. This year, a preliminary overview of emission submissions to UNECE was prepared in due time before the annual TFEIP, and made available on the Task Force web site: *http://www.aeat.co.uk/netcen/airqual/TFEI/unece.htm*. The intention was that by distributing the emission data for all the Parties to the CLRTAP four months earlier than before, the Parties had the opportunity to review and comment on the officially reported EMEP emission data in the Task Force. Further, to stimulate discussions during the Task Force on how the reporting and quality of emission data can be improved. The idea was also that difficulties with the emission data could be identified earlier and be topics for discussion during the next Task Force in October 2003, assisting the Parties to improve the quality of the reporting in the preceding reporting round. Only two Parties took the opportunity to comment on the way the emission data from their country had been presented, and there was little discussion in plenary on how to further improve the EMEP inventory. MSC-W will continue to make efforts to make the discussions in the Task Forces more directed towards quality assurance of the EMEP emission data.

2. Official submissions to the UNECE/EMEP

Some of the Parties made an additional effort to fulfill the extensive reporting requirements in the 2002 submissions. This is highly appreciated, because year 2000 is expected to be a reference year for future negotiations for revision of Protocols. The emission submissions this year included emissions of Particulate Matters (PMs) and activity data for the first time, in addition to SO_2, NO_x, NH_3, NMVOC, CO, PMs, Heavy Metals (HMs) and Persistent Organic Pollutants (POPs) for year 2000, updates for previous years and projections for 2010 and 2020. Both national total emission, sector data, gridded data and Large Point Source (LPS) emissions were required. Emissions of greenhouse gases, CO_2 and CH_4, were no longer required, as these compounds are reported to the UNFCCC (United Nations Framework Convention on Climate Change), and available at: *http://ghg.unfccc*.int/.

An overview of the EMEP Emission Reporting Programme for this year's reporting is given in Table 1. The table was included in the Emission letter sent out from the UNECE Secretariat to all the Parties 19th October 2001, and was together with prefilled tables containing emission data per country already available in the EMEP database, also available from the EMEP web site.

A proposal for a new set of Guidelines for Emission Estimation and Reporting (EB.AIR/GE.1/2001/6 and EB.AIR/GE.1/2001/6 /Add1) was discussed during the TFEIP in Geneva in May 2001, and adopted in principle by the EMEP SB in September 2001. Parties were encouraged to report according to the new proposed Guidelines, but they were allowed to report in the old system as well. To facilitate the reporting, MSC-W made template files in both new and old formats available from the EMEP web site.

The new set of Guidelines allowed for reporting of activity data, and NFR level 2 (Nomenclature For Reporting) sector data, with a more detailed sector split than SNAP 2

(Selected Nomenclature for Air Pollution) previously submitted by a few Parties. Parties were also encouraged to review information used in the EMEP assessments available on the EMEP web site.

The deadline for submission of emission data to the UNECE was this year one month later than before, namely 31st January 2002.

An overview of the most updated anthropogenic[1] emissions of SO_2, NO_x, NH_3, NMVOC, CO, Particulate Matter (TSP, PM_{10}, $PM_{2.5}$), Heavy Metals (HMs) and Persistent Organic Pollutants (POPs), reported under the CLRTAP to the UNECE secretariat, and now available in the UNECE/EMEP database, can be found in Annex I, Tables 1-10. For the first time, Kazakhstan submitted emission data. Overviews of emission data available from the UNECE/EMEP database is given in Tables 11-20. Reported national totals, sector data at level 1 and level 2, and gridded totals stored at MSC-W are outlined with crosses. Present lack of data is marked with bars. The first position indicates data for national totals, second and third position corresponds to sector data and the fourth position corresponds to gridded totals in the 50x50km^2 EMEP grid. An asterisk beneath the country name indicates that the reported data has been submitted in the 150x150km^2 grid. The tables show superior data coverage for SO_2 and NO_x (Tables 11 and 12). For NH_3, NMVOC and CO (Tables 13, 14 and 15), the data gaps are still substantial, especially in the 1980s. PM emissions (Tables 16, 17 and 18) were only required for year 2000, and 20 Parties reported some PM data. POPs and HMs (Tables 19 and 20) with base year 1990 are only available for 50-65% of the Parties, and it has been almost no reporting of gridded data. Parties are kindly requested to complete the time series. Furthermore, if Parties revise the estimation methodologies, they should also update all previous estimates, both national totals, sector and gridded data, that were reported with the old methodology.

[1] Defined as emissions reported in source sectors 1-10

Table 1. The EMEP Emission Reporting Programme for 2001/2002 [1]

Emissions data should be submitted to the UNECE secretariat by 31 January 2002.

This table is based on information in the draft guidelines for estimating and reporting emissions data (EB.AIR/GE.1/2001/6 and Add.1), adopted in principle by the EMEP Steering Body. Parties may continue to report emissions according to the previous guidelines (EB.AIR/GE.1/1997/5) but are encouraged to report at the highest level of detail possible.

Description of contents	Components	Reporting years [2]
YEARLY: MINIMUM **(**and *ADDITIONAL)*		
A. National totals:		
1. Main pollutants	SO_x, NO_x, NH_3, NMVOC, CO	From 1980 to 2000 [3]
2. Particulate matter	$PM_{2.5}$, PM_{10}, TSP	For 2000
3. Heavy metals	Pb, Cd, Hg / (*As, Cr, Cu, Ni, Se, Zn)*	From 1990 to 2000
4. POPs	(See note 4)	From 1990 to 2000
B. Sector emissions:		
1. Main pollutants	SO_x, NO_x, NH_3, NMVOC, CO	From 1980 to 2000 [3]
2. Particulate matter	$PM_{2.5}$, PM_{10}, TSP	For 2000
3. Heavy metals	Pb, Cd, Hg / (*As, Cr, Cu, Ni, Se, Zn)*	From 1990 to 2000
4. POPs	(See note 4)	From 1990 to 2000
5-YEARLY: MINIMUM REPORTING		
C. Gridded data in the EMEP 50x50 km^2 grid		
1. National totals	Main pollutants, PM, Pb, Cd, Hg, PAHs, HCB, dioxins/furans	From 1990 to 2000 (PM for 2000)
2. Sector emissions	Main pollutants, PM, Pb, Cd, Hg, PAHs, HCB, dioxins/furans	From 1990 to 2000 (PM for 2000)
D. Emissions for large point sources	Main pollutants, PM, Pb, Cd, Hg, PAHs, HCB, dioxins/furans	From 1990 to 2000 (PM for 2000)
E. Projection data		
1. Energy consumption	See table 3A in EB.AIR/GE.1/2001/6 Add.1	1990, 1995, 2000, 2010, 2020
2. Energy consumption for transport sector	See table 3B in EB.AIR/GE.1/2001/6 Add.1	1990, 1995, 2000, 2010, 2020
3. Agricultural activity	See table 3C in EB.AIR/GE.1/2001/6 Add.1	1990, 1995, 2000, 2010, 2020
5-YEARLY: ADDITIONAL REPORTING/REVIEW		
VOC speciation	Parties are encouraged to review the information used for modelling at the Meteorological Synthesizing Centres. The information is available for review at *http://www.emep.int/*	
Height distribution		
Temporal distribution		
Land-use data		
Mercury breakdown		
% of toxic congeners of PCDD/F		
Pre-1990 emissions of PAHs, HCB, PCDD/F and PCB		

1) For details, refer to the Draft guidelines for estimating and reporting emissions data (EB.AIR/GE.1/2001/6 and Add.1).
2) As a minimum, data for the base year of the relevant protocol and from the year of entry into force of that protocol to the latest year should be reported.
3) Projected emissions of SO_x, NO_x, NH_3, and NMVOCs should be reported for the years 2010 and 2020.
4) Aldrin, Chlordane, Chlordecone, Dieldrin, Endrin, Heptachlor, Hexaromobiphenyl, Mirex, Toxapene, HCH, DDT, PCBs, Dioxins and Furans, PAHs, HCBs / (PCP, SCCP).

2.1 Timeliness

Figure 1 shows the timeliness of this year's submissions compared to last year's submissions. The number of Parties to the Convention have remained the same and the same number of Parties (33%) managed to submit some data within deadline (31st of January), despite of the somewhat more extensive reporting requirements this year. 37 of the Parties (77%) submitted some data to the CLRTAP before the emission input to this year's MSC-W assessment was to be completed (31st March). This is an increase of eight submissions compared to last year, and the highest number of submissions to be included ever. For the first time, all the submissions were in electronic form.

On the other hand, about one fourth of the Parties did not manage to submit any data in any form in time for inclusion in the assessment work under the Convention this year. New emission data/additions/corrections/comments was received from five Parties after deadline for inclusion in the assessment work The emission data submitted to the UNECE this year but not included in the UNECE/MSC-W emission note (EB.AIR/GE.1/2002/8), the assessment work under the Convention this year and the WebDab, will be checked and loaded to the UNECE/EMEP database in the autumn.

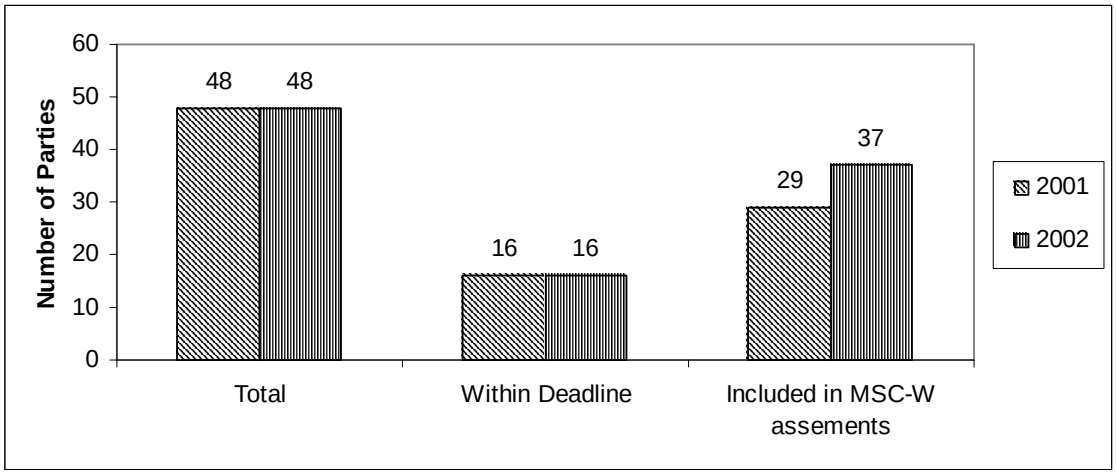

Figure 1: Timeliness of reporting

2.2 Reporting Formats

Figure 2 shows that, as many as 19 of the Parties (nearly 40%) reported in the new reporting format, while 11 Parties preferred the old format. 7 Parties provided data in their own format. The latter requires a lot of restructuring of the data files before loading into the database. This is a rather time consuming work, and the risk of errors increases. In the forthcoming years it is expected that all Parties fully respect the reporting formats in agreement with the Guidelines. If Parties are having difficulties with the formatting/templates provided, they should contact MSC-W in due time before the reporting deadline at emep.mscw@met.no in order to get assistance.

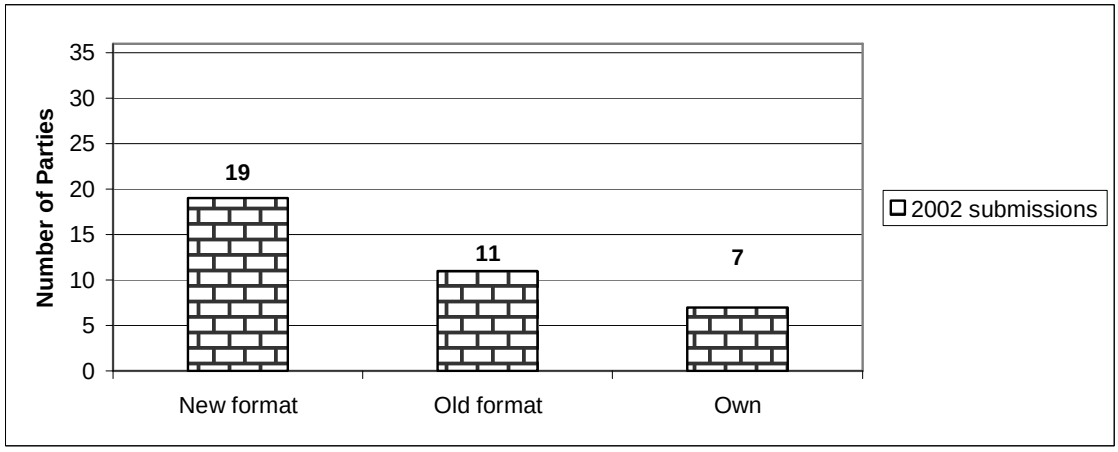

Figure 2: Reporting formats

2.3 Total and Sector Emissions

Figures 3 and 4 show that the number of official submissions of main pollutants national total and sector data (NFR level 1/SNAP level 1) for the latest emission year have remained relatively constant the last three years, but that the reporting of NH_3 and NMVOCs decreased somewhat this year compared to last year, and is as usual lower than the reporting of SO_2, NO_x and CO.

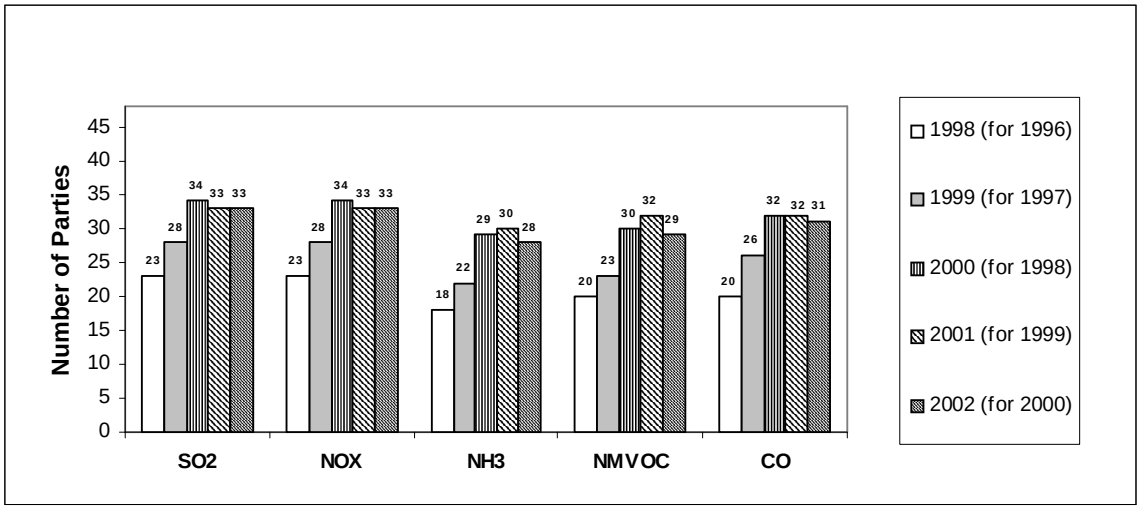

Figure 3: Official submissions of national emission totals

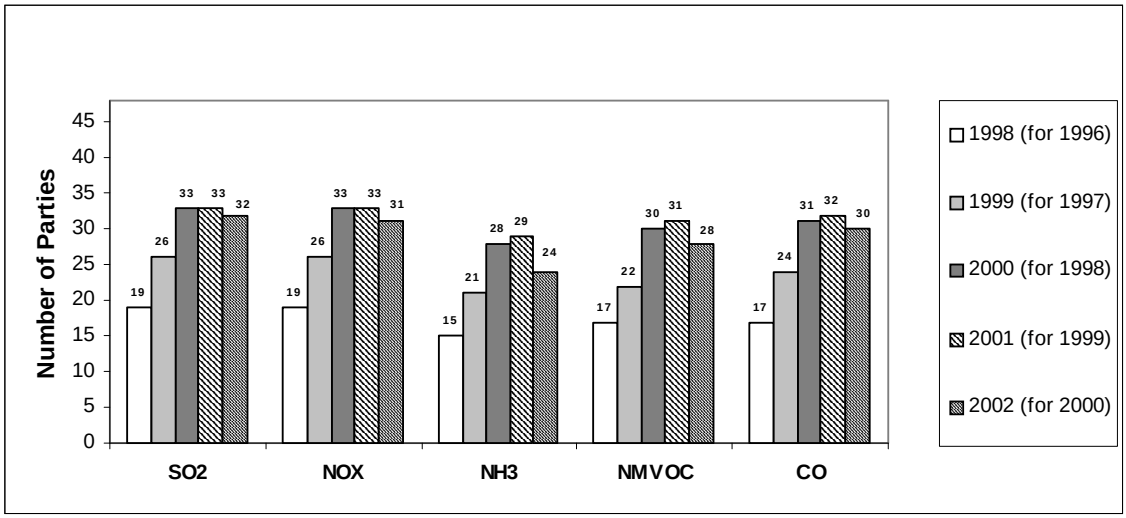

Figure 4: Official submissions of national sector data (NFR level 1 / SNAP level 1)

Figure 5 shows that while the number of Parties providing HMs has remained the same, the number of Parties providing POPs went somewhat back compared to last year. The reporting of HMs and POPs are still lower than for the main pollutants.

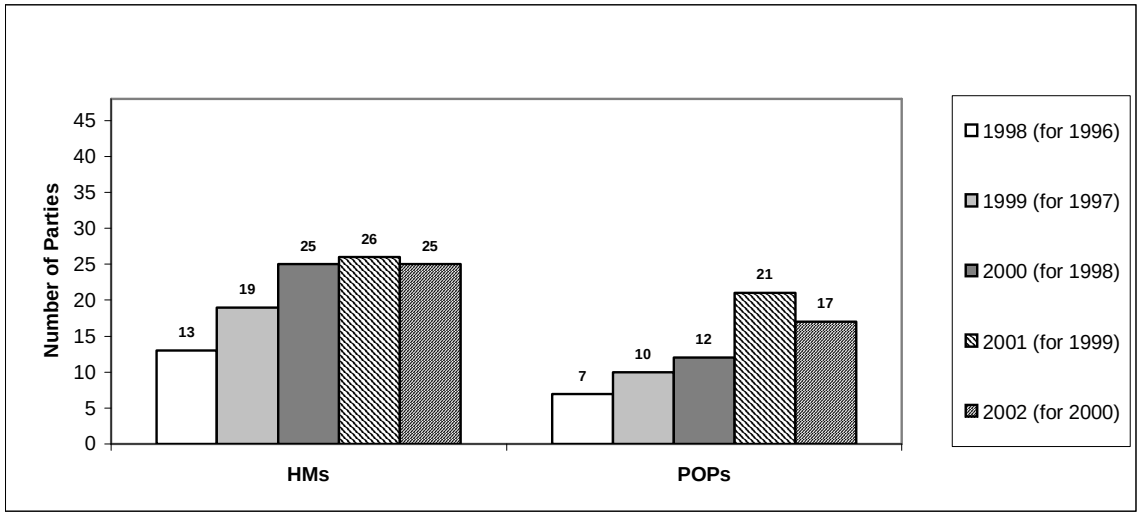

Figure 5: Official submissions of national HMs and POPs emission totals

2.4 Disaggregated Data: NFR level 2

It was very encouraging to see that as many as 14 Parties (29%) submitted data at NFR level 2 (Figure 6). In addition, four Parties submitted data at SNAP 2 level, the same number as last year. The large increase in the more detailed sector emission reporting is a direct result of the new draft Guidelines for estimating and reporting emission data.

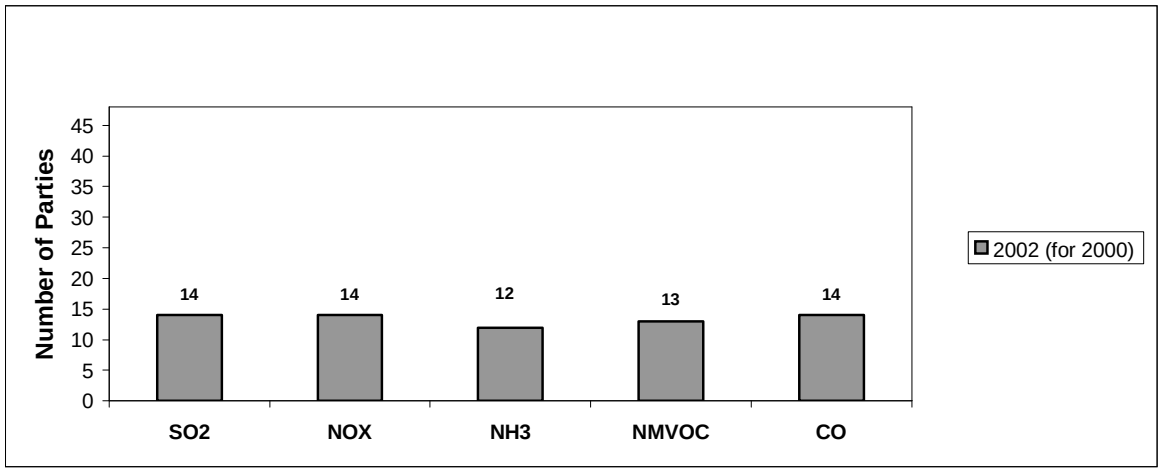

Figure 6: Official submissions of national emission total (NFR level 2)

2.5 Particulate Matter Emissions

Taken into account that this was the first reporting round which included submission of Particulate Matter, it is encouraging that as many as 20 Parties submitted some PM emission data. 11 Parties (23%) submitted national total and level 1 sector PM_{10} year 2000 emissions. The reporting on the finer fraction ($PM_{2.5}$) was somewhat lower (17%). Five Parties even submitted PM data at NFR (Nomenclature For Reporting) level 2. In addition France submitted PM data at SNAP 2 level. Six Parties provided some PM gridded total emissions and three Parties reported gridded sector PM emissions (Figure 7).

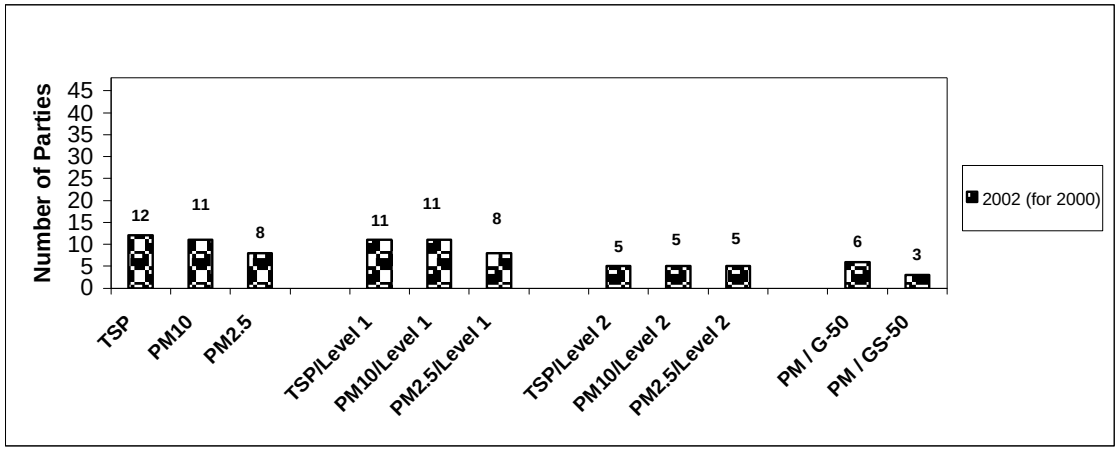

Figure 7: Official submissions of PM national total and sector emissions

2.6 Gridded Data

For the first time Belarus, Denmark and Ukraine reported gridded data in the EMEP 50x50 km^2 grid.

An overview of the gridded data for the main pollutants in the EMEP database for the years 1990, 1995 and 2000 is shown in Figure 8. About half of the Parties reporting national total 2000 emissions, also reported gridded total emissions, while approximately 28% of Parties reporting sector data, also reported gridded sector data.

Figure 9 displays the number of gridded total and sector data of mixed vintages between 1990 and 2000 officially reported and available for inclusion in modeling assessments. The number of Parties within or partly within the EMEP area is 45, since Canada, United States and Kyrgyzstan are situated completely outside the present EMEP area/modeling domain. One third or fifteen of these 45 Parties have never reported any gridded data in the EMEP 50x50 km^2 grid to the Convention. Further, some of the reported gridded data does not include major emission sources, and can therefore not be included in the modeling work.

The results of the modeling work performed under the Convention are dependent upon the quality of the gridded emission data, and the spatial distribution of emissions is shown in some cases to be as important as the emission level for the ozone levels (Vestreng, 2001). Hence, it is of great importance that the reporting of gridded data, both national totals and sector data is strengthened. This message was brought forward to the Task Force on Emission Inventory and Projections (TFEIP), in Córdoba, Spain, in May 2002, and a small working group was formed to update the Atmospheric Emission Inventory Guidebook (*http://reports.eea.eu.int/technical_report_2001_3/en*) with respect to the methodology to distribute the emissions spatially.

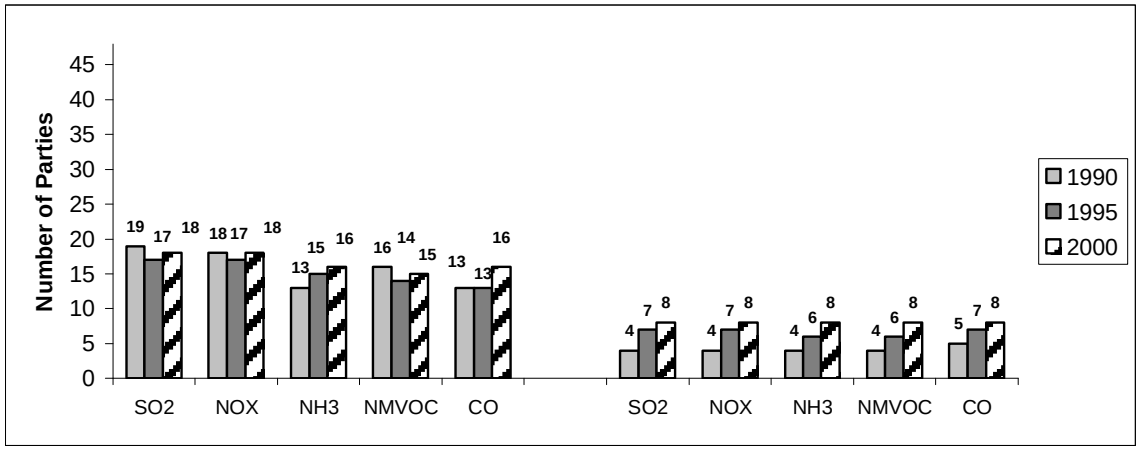

Figure 8: Official submissions of gridded total (left) and sector (right) emissions

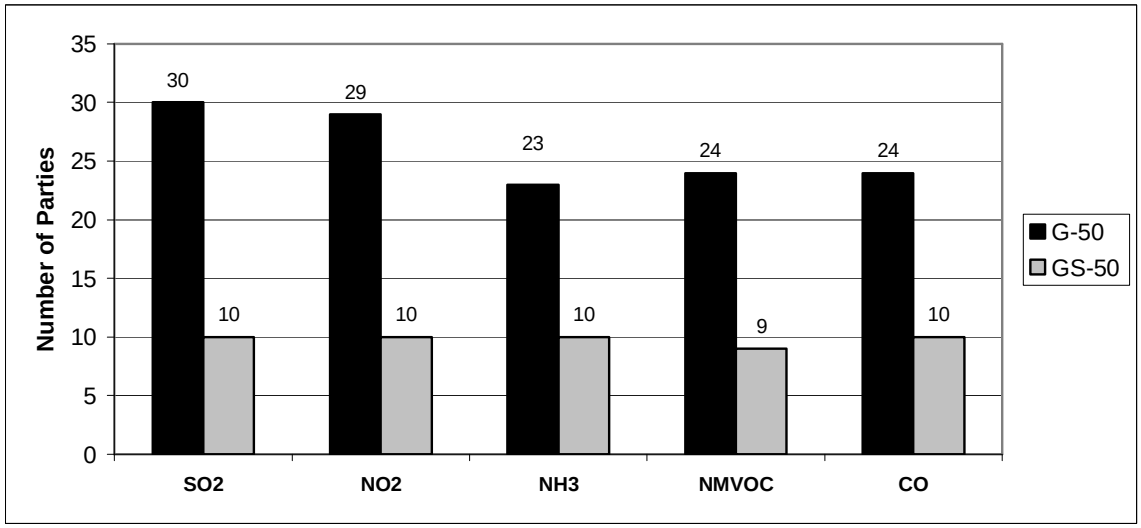

Figure 9: Gridded national total emissions (G-50) and gridded sector emission (GS-50) reported to CLRTAP available to modeling assessments

2.7 Large Point Source and Activity Data

Figure 10 shows the number of Parties that submitted Large Point Source (LPS) and activity data. Only 7 Parties (15%) reported LPS data. The height distribution of the emissions is an important parameter in determining the emission fluxes and in deposition allocation. The description of and formats for reporting LSP data has improved considerably in the revised draft Guidelines. The aim has been to facilitate reporting of LPS data, and hence increase the number of submissions.

It is encouraging that as many as ten of the Parties (21%) reported activity data this year. The level of detail and completeness of the submitted data varied between countries. Together with the more detailed sector emission reporting, reported activity data, will lead to increased transparency and is an important element in improving the possibility to verify and validate the EMEP emission inventory in the future. Activity data as the basis for emission projections discussions is of vital importance. The activity data was sent by MSC-W to CIAM (Centre for Integrated Assessment Modeling) for evaluation and possible inclusion in their assessments. Currently, the CIAM activity database relies on international statistical data (for historical

data) and the results of European and national modeling studies on projections. The regular submission of national information on current and projected level of activities, carried in a consistent format that is also compatible with provided emission data, is a very valuable contribution towards improvement of CIAM's databases and will greatly enhance the transparency of the modeling results. CIAM will use the data to evaluate the current databases and verify the assumptions behind the CLE (Current Legislation) scenario. The complete activity database used in modeling will be freely accessible from the Internet. The evaluation process will start in autumn 2002.

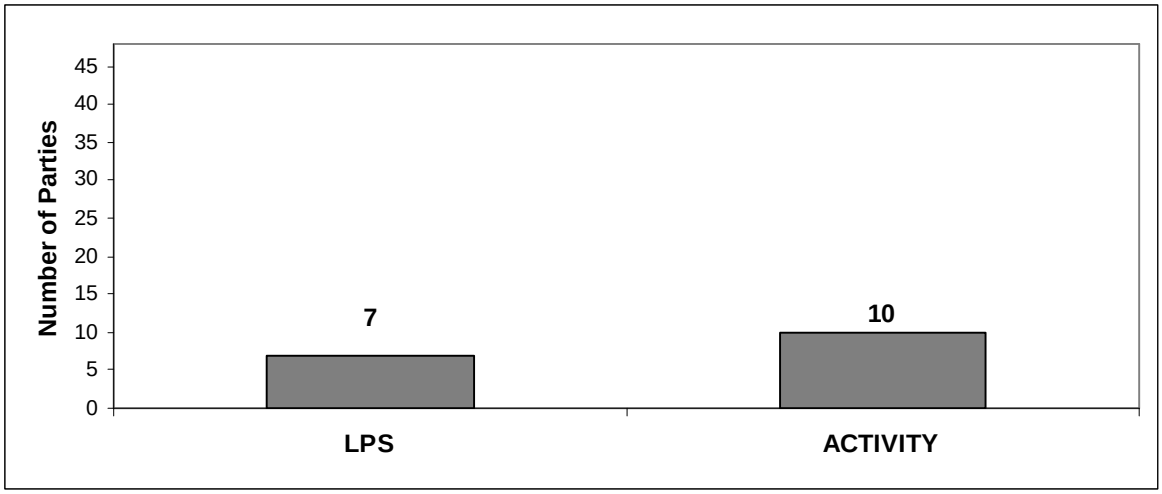

Figure 10: Official submissions in 2002 of Large Point Source (LPS) data and Activity data

2.8 Quality assessment of officially reported emission data

2.8.1 Current procedure

It is the responsibility of the Parties to assure that emission data submitted to the UNECE is submitted within deadline, and is transparent, consistent, comparable, complete and accurate. Once the emission data is received from UNECE at the MSC-W, and before loading the data into the database, the MSC-W assists the Parties in their quality control, by checking the consistency of data reported. Ideally, transparency and comparability of data submitted should be assured by the use of the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook. In praxis, it is sometimes difficult or not desirable for all the Parties to follow the methodology of the Guidebook. Further, Parties often do not recalculate the whole time series nor update both national totals, sector data and gridded data in response to changes in emission estimation methods, all of which leads to inconsistencies that cannot be understood without an accompanying explanation from the Party. The normal procedure is that MSC-W corrects the identified inconsistencies and other irregularities through direct contact with nominated national experts from the reporting Party.

In spite of the extensive communication with the national experts, the UNECE/EMEP database still contains emission figures that need to be explained and/or corrected. This is particularly true for some of the sector data reported, were the trends look rather peculiar. MSC-W, or any user of the officially reported data in the EMEP database, cannot at present check the accuracy of the submitted data.

2.8.2 Proposed revised reporting procedure

At the TFEIP in May 2002, MSC-W proposed a new procedure for the reporting of emissions, aiming at enhancing the quality of the EMEP inventory. A slightly revised version of this proposal is outlined below:

- Emission data is submitted to the UNECE secretariat (within 15. February according to the revised draft Guidelines).
- The secretariat checks that the completeness and the reporting format of the submission is in accordance with the requirements specified in the Guidelines, and acknowledge the receipt. In the acknowledgement, the secretariat specifies if/where there were lack of completeness in the submission. Parties having difficulties with the format of submissions are referred to MSC-W for assistance. The Parties get the opportunity to complete and resubmit the data to the secretariat within the first week of March.
- The secretariat logs the submission data, and forwards it to MSC-W by mid March.
- MSC-W checks consistency of the data, and highlights inconsistencies and other difficulties found in the officially reported EMEP emission data on a password protected part of the EMEP web site by the beginning of April.
- The Parties that have submitted data within deadline are then given two weeks to correct and comment on their own emission data directly on the web.
- By mid April, all corrections must have been received. The corrected data are transferred from MSC-W to the UNECE to constitute official corrections, and the data are loaded permanently into the UNECE/EMEP database.
- The MSC-W then work on completing the inventory in order to provide expert estimates for input to the different assessments performed under the Convention, the European Environmental Agency (EEA) and other bodies requiring emission data, and for the annual June-update of the WebDab.
- In the beginning of May, the regular source-receptor calculations starts at MSC-W.
- Reports to the EMEP SB are written during the month of June, and sent out to the EMEP Steering Body Head of Delegations in August.

The success of this revised reporting routines in terms of enhanced quality of the officially reported emission data, is strongly dependent upon timely feedback from the Parties both on the acknowledgement sent out by the UNECE secretariat, and in correcting/commenting on the difficulties found with the emission data highlighted by MSC-W on the web. The new routines also put demands on MSC-W to develop better and quicker data checking and displaying routines, and last but not least is dependant upon the ability of all parties involved, the Parties, the UNECE secretariat and MSC-W, to keep the time schedule as outlined. If the time schedule is not followed, the reports to the EMEP SB in the beginning of September will not be ready in time for the delegates to have a chance to read them upfront the meeting.

We recommend that the proposed revised reporting routine is implemented before the next reporting round in order to further enhance the quality of the EMEP inventory.

Sometimes there might be desirable to also have the possibility to assist Parties in assuring the accuracy of the reported data, and this is reflected in the revised draft Guidelines for Emission Reporting, where reporting of activity data is included. We envisage that the Task Force on Emission Inventory and Projection (TFEIP) could be the forum where national experts and the EMEP Centers have the opportunity to discuss the quality of emission data also with respect to accuracy. MSC-W is aiming at setting tasks arising from i.e. the discussions in the forthcoming CLRTAP International Workshop on Validation and Evaluation of Air Emission

Inventories 14-16 October 2002 *(http://www.validationworkshop.ivl.se)* even higher up on the Task Force agenda.

3. Emission trends of main pollutants in the EMEP Area

3.1 Trends in the national total emissions

The UNECE/EMEP database and WebDab, contain two complementary sets of emission data. Firstly, the officially reported emission data to the UNECE under the CLRTAP, and secondly, expert estimates which comes from other sources. A combination of these two sets of emission data is used for trend analysis and other modeling assessment work under the Convention.

3.3.1 Gap filling

In order to look at trends for main pollutants 1980-2000, and projections for 2010 and 2020 in the national total emissions in the EMEP area, missing data in the EMEP inventory has to be filled in. Further, officially reported data might have to be replaced. MSC-W can not alter officially submitted emission data. The consequence is that emission data which is likely or even evidently wrong sometimes is included in the UNECE/EMEP database. MSC-W has dealt with this problem by introducing a complementary set of emission data, the expert estimates.

EMEP/MSC-W, together with national experts and the European Environmental Agency (EEA), will meet in the autumn with the aim to discuss, agree and document a procedure to be followed when completing the EMEP inventories of both national and sector data.

3.3.2 Documentation of emission data sources and gap filling for trend analysis

The main source of emission data is the data officially reported to the UNECE under the CLRTAP. MSC-W has so far only completed the time series for SO_2, NO_x, NH_3, NMVOC and CO national total emissions. The procedure followed by MSC-W when filling in gaps in the EMEP inventory 1980-2000 for these pollutants, has been simple linear interpolation between to adjoining officially reported emission values, or if only one emission value exists, carry this emission value forwards or backwards in time. Sometimes a Party has only estimated emissions from all emission sources for one year, and then the emission value for this year has been used for all the years (i.e. NH_3 emissions from Armenia). If sector data exists, the missing sectors in the national totals are replaced by sector emissions for the year when emissions from all sources were estimated (i.e. SO_2 emissions from Turkey). The sum of officially reported gridded data has also been used (i.e. SO_2, NO_x and CO 1998-2000 for Ukraine).

In the absence of any official reliable emission figures, the emission estimates used for all years are drawn from the following documented sources (country name is shaded in Tables 3.1-3.5):

- **Albania:** SO_2, NO_x, NH_3 , NMVOC and CO (CO equals 3.5 times NO_x), IIASA (Amann et al., 2000)
- **Bosnia and Herzegovina:** NO_x, NH_3 , NMVOC and CO (CO equals 3.5 times NO_x), IIASA (Amann et al., 2000)
- **Cyprus:** NH_3, RIVM global inventory (Bouwman et al, 1997). NMVOC equals NO_x, CO, equals 3.5 times NO_x

- **Georgia:** NH_3, RIVM global inventory (Bouwman et al, 1997)
- **Island:** NH_3, based on OECD 1980 emission data
- **The FYR of Macedonia:** NH_3 and NMVOC, IIASA (Amann et al., 2000
- **Turkey:** NH_3, RIVM global inventory (Bouwman et al, 1997)
- **Ukraine:** NH_3, IIASA (Amann et al., 2000)
- **Yugoslavia:** NH_3 and NMVOC, IIASA (Amann et al., 2000), CO equals 3.5 times NO_x
- **Remaining Asian areas** (The whole of Azerbaijan, Syria, Lebanon, Israel, and parts of Uzbekistan, Turkmenistan, Iran, Iraq, and Jordan), several regions in **North Africa** and **Kazakhstan:** SO_2 and NO_x emission totals for these areas are derived from the 1985 GEIA (Global Emission Inventory Activity) emission inventories (Benkovitz et al., 1996). For NH_3 totals are drawn from the 1990 global emission inventories developed at the National Institute of Public Health and the Environment (RIVM), the Netherlands. NMVOC and CO emissions for these regions have been deduced from those of NO_x (NMVOC emissions equals NO_x emissions and CO equals 3.5 times NO_x emissions)

The crude assumption that NMVOC emissions equal the NO_x emissions, and that CO emissions equal 3.5 times the NO_x emissions, has only been used when emission data is missing for all years and are not available in other databases, and is in line with the respective ratios for other countries for which NO_x and CO data are available.

A special note has to be made about emissions from Kazakhstan used in the trend analysis. Kazakhstan submitted emission data for the first time this year. The emission estimates reported are for the whole of Kazakhstan. Since only about half of Kazakhstan's territory is contained in the EMEP area, and MSC-W did not have enough information on the spatial distribution of the emissions to distribute these new emissions, the new emission data from Kazakhstan could not be used in the trend analysis. Instead, the emission estimates from available documented sources has been carried forward from last year. The development of the EMEP Unified model to hemispheric scale, will put demands on CLRTAP Parties and EMEP to include spatially distributed emissions over the northern hemisphere, and reported emission data from Kazakhstan and (potentially) Kyrgyzstan will be certainly be included.

Total releases of SO_2, NO_x, NMVOC and CO from ship traffic in the Atlantic Ocean, the North Sea, the Baltic Sea, the Black Sea and the Mediterranean are used as estimated by Lloyd's Register of Shipping. These emissions refer to 1990 and are disaggregated at 50x 50 km^2 spatial distribution. A new set of gridded emissions from shipping for year 2000, are presently under finalization by ENTEC, under a contract from the European Commission. The new estimates include emissions of particulate matter from ship traffic and ports. The ENTEC emissions estimates for shipping are kindly facilitated to EMEP from the European Commission, DG Environment. It is expected that they will be available in the UNECE/EMEP database next year.

With regard to natural emissions, major contributions are volcanic releases of SO_2 reported by Italy for the period 1980-2000, and estimates of gridded biogenic emissions of sulphur (DMS) over the sea estimated by Tarrasón et al. (1995). These are listed separately in tables 3.1-3.5. Reported natural emissions other than volcanic sulphur are not included in these tables.

The 2010 and 2020 projection estimates have been derived in the following way, listed in priority sequence: **1**. **Reported emissions** (if equal or smaller than the emission ceilings in the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground- level Ozone (The Gothenburg Protocol) , **2. The**

Gothenburg Protocol Emission Ceilings, 3. IIASA, CLE scenarios (as documented in EEA, Riberio et al., 2001) (for non-Signatories to the Protocol), **4. Last reported emission figure.**

3.3.3 National total emissions tables for trend analysis

The updated national totals for SO_2, NO_x, NH_3, NMVOC and CO used for trend analysis for the years 1980-2000, 2010 and 2020 are those received at the MSC-W by April 2002 and are displayed in Tables 3.1-3.5. Official values are displayed with no background. Data drawn from other sources or interpolated are shaded grey. Updates from last year's reporting are printed in bold. In previous years, the corresponding tables did not display emission figures for 1981-1984, and this is the reason why these four years are printed in bold in all the tables. All national figures refer to anthropogenic emissions only. Volcanic sulphur emissions reported by Italy are listed separately.

Tables displaying trends in the EMEP area exclude emissions from Canada, United States, and Kyrgyzstan, as they are outside the present EMEP area. Emissions from the European Community, Liechtenstein and Monaco are also excluded as they are not used in the model calculations. By contrast, emissions from Albania (non-Party to the Convention) along with several Asiatic and North African regions are included in these tables as they are confined to the EMEP area.

In tables 3.1-3.5, the gaps in the officially reported national total emissions in the EMEP area is clearly visualized by the shading. One can immediately see that reporting in the eighties are much poorer than in the nineties for all components tabulated (SO_2, NO_x, NH_3, NMVOC and CO), and that a 1990 reported emission figure sometimes appears for the whole of the eighties. Emission figures in bold indicate that the figure differ from last year's report (Vestreng, 2001), either because a Party has recalculated the whole emission inventory, because one emission figure has been revised, or because new information has otherwise become available to MSC-W. The updates concern both increases and decreases even within the same country. There are markedly fewer recalculations in the eighties than in the nineties. It is only Denmark, France and United Kingdom which has revised the whole national total emission inventory for all compounds tabulated (SO_2, NO_x, NH_3, NMVOC and CO).

Updates (increase or decrease of) of more than 10% of emission figures reported last year are listed below, together with an explanation:

SO_2:

The FYR of Macedonia and Turkey: Increases of more than 100% because of new emission data reported.

NO_2:

Greece, 1996, 1997, 1999: New reporting

Latvia: recalculation of 1990 emissions

Russia, 1987, 1988, 1999: The Russian expert explained the increase to MSC-W by the following e-mail: "Since 1987 the NO_x emissions have been updated according to the instruction of the Ministry of natural resources of Russia for such sources as road transport, other mobile sources etc. NOx emissions data for earlier period (before 1987) have not been corrected."

Spain, 1980-1999: Recalculation has led to an increase of 9-15%.

The FYR of Macedonia: Increases of more than 100% because of new emission data reported.

NH_3:
Belarus: Reported ammonia emissions for the first time including all sources (142 Gg), and the new report replaced the higher IIASA emission estimates previously used (219 Gg) (Amann, 2000).
Switzerland, 1991-1993: New reporting.
NMVOC:
Belgium: 1980-1996: Recalculation led decreases of 12-56%.
Slovakia: Recalculation led to increases of 24-77%. Largest increase in 1990.
Spain, 1980-1999: Emissions of NMVOC of more than 1000 Gg from sector 11, Other sources and sinks, had previously been regarded as anthropogenic. New reporting led to a decrease of about 40%.

Table 3.1: National total emission trends
Emissions of sulphur (1980-1990) used for modeling at the MSC-W (Gg of SO_2 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Albania	72	72	72	72	72	72	72	72	72	72	72
Armenia	141.0	110.7	101.3	110.3	96.9	100.2	111.2	110.6	104.1	62.7	72.00
Austria	384.6	334.2	316.3	237.4	211.7	190.1	171.5	153.0	115.0	101.8	90.74
Belarus	740	730.0	710.0	710.0	690.0	690	690	761	720	668	637
Belgium	828	712	694	560	500	400	377	367	354	325	357
Bosnia and Herzegovina	480	480	480	480	480	480	480	480	480	480	480
Bulgaria	2050	2103	2156	2209	2261	2314	2367	2420	2228	2180	2008
Croatia	150.0	153	156	159	162	165	168	171	174	177	180.0
Cyprus	28	28	33	30	33	35	38	39	42	42	46
Czech Republic	2257	2341	2387	2338	2305	2277	2177	2164	2066	1998	1876
Denmark	452.1	370.4	378.7	322.9	305.5	339.6	287.8	254.9	250.0	196.7	180.6
Estonia	287	280	274	267	261	254	256	255	254	254	252.1
Finland	584	534	484	372	368	382	331	328	302	244	260
France	3249	2554	2442	2009	1791	1493	1364	1349	1241	1401	1341
Georgia	230.2	242.1	250.1	267.3	266.6	273.2	255.3	258.3	255.3	249.1	248.3
Germany	7514	7441	7440	7346	7633	7732	7641	7396	6487	6165	5321
Greece	400	420	440	460	480	500	483	487	492	496	479
Hungary	1633	1580	1545	1480	1440	1404	1362	1285	1218	1102	1010
Iceland	17.8	17.8	17.8	18.2	18.8	18.1	18.4	16.2	17.5	17.3	24.0
Ireland	222	192	158	142	142	140	162	174	152	162	185.7
Italy	3757	3330	2850	2463	2114	1901	1929	2029	1963	1854	1651
Kazakhstan	140	140	140	140	140	140	140	140	140	140	140
Latvia	119	119	119	119	119	119	119	119	119	119	119.2
Lithuania	311	312	304	310	303	304	316	316	300	298	222
Luxembourg	24	21	17	14	15	16	16	16	15	15	15
Netherlands	490	464	404	323	299	258	264	263	250	204	202.4
Norway	136.8	128.0	110.7	103.8	95.8	98.2	91.4	72.61	67.6	57.90	52.55
Poland	4100	4140	4180	4220	4260	4300	4200	4200	4180	3910	3210
Portugal	266	279	293	306.0	252	198	234.0	218.0	204.0	282	359.4
Republic of Moldova	308	305	287	284	270	282	297	317	273	238	265
Romania	1055	1095	1104	1229	1223	1255	1293	1305	1469	1517	1311
Russian Federation	7323	7110	7252	7095	6663	6350	5880	5806	5333	4875	4671
Slovakia	780	747	713	680	646	613	604	614	589	573	542
Slovenia	234	254	256	274	250	241	247	222	210	211	196
Spain	3013	2937	2902	2920	2671	2526	2396	2262	1900	2247	2167
Sweden	491.0	431.0	371.0	305.0	296.0	266.0	272.0	228.0	224.0	160.0	111.1
Switzerland	116	108	100	92	84	76	68	62	56	49	41.96
The FYR of Macedonia	105	105	105	105	105	105	105	105	105	105	105
Turkey	1030	1043	1062	1125	1186	1345	1500	1432	1269	1566	1590
Ukraine	3849	3492	3427	3498	3470	3463	3393	3264	3211	3073	3782
United Kingdom	4859	4401	4190	3851	3702	3720	3880	3875	3812	3698	3721
Yugoslavia	406	408	409	440	456	478	470	484	502	506	508
North Africa	413	413	413	413	413	413	413	413	413	413	413
Remaining Asian areas	869	869	869	869	869	869	869	869	869	869	869
Baltic Sea	228	228	228	228	228	228	228	228	228	228	228
Black Sea	57	57	57	57	57	57	57	57	57	57	57
Mediterranean Sea	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189
North Sea	454	454	454	454	454	454	454	454	454	454	454
Rem. N-E Atlantic Ocean	901	901	901	901	901	901	901	901	901	901	901
Natural marine emissions	742	742	742	742	742	742	742	742	742	742	742
Volcanic emissions	2144	2144	2144	2144	2144	2144	2144	2181	2114	2493	2607
Total EMEP	61630	59163	58129	56485	55136	54311	53524	52926	50183	49439	47564

Table 3.1 Cont.: National total emission trends
Emissions of sulphur (1991-2000, 2010, 2020) used for modeling by the MSC-W (Gg SO_2 per year)

Party/Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Albania	72	72	72	72	72	72	72	72	72	72	55	48
Armenia	59.5	44.1	5.5	4.2	2.5	1.5	.400	3.310	.84	8.403	73	73
Austria	81.83	63.00	60.40	56.32	53.82	52.80	50.67	45.77	41.43	40.75	39	40
Belarus	652	458	382	324	275	246.3	208.5	190	163.7	142.8	480	440
Belgium	329.9	315.3	293.9	252.2	245.4	240.3	219.2	212.5	180.8	180.8	106	152
Bosnia and Herzegovina	480	480	480	480	480	480	480	480	480	480	415	387
Bulgaria	1665	1115	1426	1480	1476	1420	1365	1251	943	982.0	856	702
Croatia	108.0	106.7	113.7	89.3	70.4	66.2	80.4	89.5	90.7	90.7	70	64
Cyprus	33	39	43	42	41	45	47	49	50	50	39	39
Czech Republic	1776	1538	1419	1270	1091	946	701	443	269	264.7	283	295
Denmark	239.0	186.3	152.5	156.6	149.0	179.4	109.7	75.36	54.68	27.50	50	64
Estonia	245.6	187.4	153.8	149.1	118.5	125.2	119.0	110.0	102.5	95.46	57.40	58
Finland	194	141	123	114	96	105	99	90	87	73.5	110	128
France	1450	1275	1110	1054	995	970	824	862	735	659	375	454
Georgia	194.0	135.2	71.4	46.9	20.3	30.1	33.1	20.18	8.61	8.61	8.61	8.61
Germany	3996	3307	2945	2473	1994	1405	1127	899	831	831	550	486
Greece	520	534	533	505	528	518	511	518	531	531	546	439
Hungary	913.0	827.3	757.3	741.0	705.0	673.2	658.5	591.8	590.1	485.3	550	480
Iceland	23.1	23.9	24.5	23.8	23.9	24.1	24.5	26.8	26.8	26.8	29.40	29.4
Ireland	180.2	171.5	160.8	175.0	161.2	147.4	166.0	176.0	157.4	131.5	42	76
Italy	1539	1394	1333	1271	1322	1250	1075	1039	923	923	500	255
Kazakhstan	140	140	140	140	140	140	140	140	140	140	140	140
Latvia	90.37	79.33	73.81	86.30	58.98	59.27	43.85	39.84	30.91	18.06	29	46.22
Lithuania	234	139	125	117	94	93	77	94	70	43.1	145	72
Luxembourg	15	15	15	13	9	8	6	4	3.822	3.092	4	7
Netherlands	173	172	164	146	141.4	135	118	108.0	102.9	91.2	50	81
Norway	44.17	36.37	35.03	34.58	33.57	32.78	30.02	29.57	28.46	26.21	22	32
Poland	2995	2820	2725	2605	2376	2368	2181	1897	1719	1511	1397	739
Portugal	345.6	409.0	360.0	338.9	365.6	323.4	341.3	374.9	374.9	374.9	170	181
Republic of Moldova	259.8	168.2	156.4	108.5	64.06	67.03	36.13	32.08	12.05	12.05	135	102
Romania	1041	951.0	928.0	912.0	912	912	912	912	912	912	918	469
Russian Federation	4603	4033	3637	3131	2969	2774	2524	2275	2062	1997	2400	1864
Slovakia	445	380	325	238	239	227	202	179	171	120	110	96
Slovenia	180	186	183	177	125	112	118	123	104	96	27	18
Spain	2161	2127	1998	1952	1808	1577	1716	1601	1621	1535	774	405
Sweden	101.5	89.15	79.75	80.78	68.56	74.34	65.61	63.41	53.71	57.65	67	61
Switzerland	41	38	34	31	33.55	30	26	27.6	25.5	19.26	26	17.7
The FYR of Macedonia	105	105	105	105	105	105	105	105	105	105.2	81	70
Turkey	1666	1647	1593	1817	1772	1929	1990	2118	2104	2112	1820	1820
Ukraine	2538	2376	2194	1715	1639	1293	1132	1023	1029	1002	1506	1041
United Kingdom	3534	3462	3115	2676	2363	2025	1665	1588	1210	1165	586.0	447
Yugoslavia	446	396	401	424	462	434	522	521	355	387	269	158
North Africa	413	413	413	413	413	413	413	413	413	413	413	413
Remaining Asian areas	869	869	869	869	869	869	869	869	869	869	869	869
Baltic Sea	228	228	228	228	228	228	228	228	228	228	228.0	72
Black Sea	57	57	57	57	57	57	57	57	57	57	57	57
Mediterranean Sea	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189	1189
North Sea	454	454	454	454	454	454	454	454	454	454	454.0	454
Rem. N-E Atlantic Ocean	901	901	901	901	901	901	901	901	901	901	901.0	641
Natural marine emissions	742	742	742	742	742	742	742	742	742	742	742	742
Volcanic emissions	1645	2235	2027	1918	2000	2000	2000	2000	2000	2000	2000	2000
Total EMEP	42409	39272	36928	34399	32552	30571	28776	27354	25427	24686	22765	19024

Table 3.2: National total emission trends
Emissions of nitrogen oxides (1980-1990) used for modeling at the MSC-W (Gg of NO_2 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Albania	24	24	24	24	24	24	24	24	24	24	24
Armenia	15.4	15.4	17.2	16.6	15.7	44.8	53.0	51.5	55.5	51.2	46.20
Austria	227.3	219.6	217.6	214.8	213.8	215.8	211.9	208.3	200.7	192.9	201.8
Belarus	234	235.0	235.0	237.0	240.0	238	258	263	262	263	285
Belgium	442	419.0	395.0	372.0	348.0	325	317	338	345	357	320.6
Bosnia and Herzegovina	80	80	80	80	80	80	80	80	80	80	80
Bulgaria	416	416	416	416	416	416	416	416	415	411	361
Croatia	60	63	66	68	71	74	77	79	82	85	87.6
Cyprus	13	13	14	14	14	14	15	16	17	17	18
Czech Republic	937	819	818	830	844	831	826	816	858	920	742
Denmark	273.2	243.2	264.1	257.0	270.3	295.1	314.8	307.7	299.9	283.3	276.9
Estonia	70	70	70	70	70	70	70	70	70	69	67.7
Finland	295	276	271	261	257	275	277	288	293	301	300
France	2011	1906	1890	1871	1862	1834	1796	1823	1833	1890	1899
Georgia	121.0	125.6	130.0	137.6	137.3	140.4	133.8	134.1	134.6	130.6	129.5
Germany	3334	3259	3219	3258	3305	3276	3286	3327	3208	2989	2706
Greece	306	306	306	306	306	306	313	320.0	304	308	311
Hungary	272.9	270	268	266	264	262.5	264.2	264.9	257.8	246.8	238.0
Iceland	21.2	21.2	21.2	21.8	21.7	20.5	22.3	24.0	24.9	25.3	26.3
Ireland	73	86	86	85	84	91	100	115	122	127	118.1
Italy	1638	1604	1605	1583	1596	1614	1690	1811	1854	1917	1938
Kazakhstan	76	76	76	76	76	76	76	76	76	76	76
Latvia	92.28	92.28	92.28	92.28	92.28	92.28	92.28	92.28	92.28	92.28	92.28
Lithuania	152	154	156	158	162	166	169	171	172	173	158
Luxembourg	23	22	22	21	21	21	20	19.77	21	22	23
Netherlands	583	575	562	555	573	589	587	599	602	584	573.8
Norway	194.0	177.7	182.0	186.7	201.0	212.8	227.9	233.9	224.0	228.9	226.5
Poland	1229	1283	1337	1392	1446	1500	1510	1530	1550	1480	1280
Portugal	166.0	175	183	192.0	144	96	110.0	116.0	122.0	220	317.0
Republic of Moldova	58	57	50	42	44	66	72	71	74	70	100
Romania	523.0	528.0	516.0	542.0	546.0	542.0	559.0	580.0	590.0	579.0	546.0
Russian Federation	1734	1915	2002	1976	1879	1903	1871	3411	3287	3335	3600
Slovakia	197	197	197	197	197	197	197	197	212	227	215
Slovenia	51	52	52	51	52	53	58	57	59	58	63
Spain	1138	1043	1033	1056	1069	1038	1062	1121	1156	1257	1279
Sweden	404.0	417.0	412.0	401.0	411.0	426.0	432.0	437.0	432.0	418.0	348.9
Switzerland	170	172	174	175	177	179	176	174	172	169	153.7
The FYR of Macedonia	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
Turkey	363.9	377.1	407.5	433.0	459.4	483.0	528.3	569.6	570.7	609.2	643.7
Ukraine	1145	1145	1153	1153	1102	1059	1112	1094	1090	1065	1097
United Kingdom	2580	2497	2486	2498	2458	2540	2624	2736	2791	2791	2763
Yugoslavia	47	50	50	53	58	58	58	60	63	62	66
North Africa	96	96	96	96	96	96	96	96	96	96	96
Remaining Asian areas	212	212	212	212	212	212	212	212	212	212	212
Baltic Sea	352	352	352	352	352	352	352	352	352	352	352
Black Sea	86	86	86	86	86	86	86	86	86	86	86
Mediterranean Sea	1639	1639	1639	1639	1639	1639	1639	1639	1639	1639	1639
North Sea	648	648	648	648	648	648	648	648	648	648	648
Rem. N-E Atlantic Ocean	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266
Natural marine emissions	0	0	0	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0	0	0	0
Total EMEP	26120	25805	25885	25968	25937	26074	26416	28451	28426	28534	28128

Table 3.2 Cont.: Emission trends

Emissions of nitrogen oxides (1990-2000, 2010, 2020) used for modeling at the MSC-W (Gg of NO_2 per year)

Party/Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Albania	24	24	24	24	24	24	24	24	24	24	36	42
Armenia	40.0	21.8	12.1	11.9	14.9	11.4	15.10	10.95	10.61	9.97	46	46
Austria	205.4	196.7	190.8	193.8	182.7	180.9	184.7	181.5	181.9	183.6	107	81
Belarus	281	224	207	203	195	172.7	188.5	164	142	134.8	180	346
Belgium	325.5	334.3	330.3	333.2	324.9	314.8	305.8	312.1	288.9	288.9	181	141
Bosnia and Herzegovina	80	80	80	80	80	80	80	80	80	80	60	67
Bulgaria	256	230	242	230	266	259	225	223	202	184.4	266	195
Croatia	65.0	56.2	59.3	65.5	65.7	68.6	73.3	76.0	72.1	72.1	87	100
Cyprus	16	19	20	20	19	21	21	22	22	23	23	23
Czech Republic	725	698	574	435	412	432	423	413	390	397.7	286	336
Denmark	319.5	273.9	273.7	277.9	261.4	305.6	266.0	239.7	220.9	207.2	127	105
Estonia	63.33	39.35	38.05	41.08	42.06	44.36	44.75	46.01	39.62	41.40	52	64
Finland	290	284	282	282	258	268	260	252	247	235.8	170	117
France	1963	1918	1797	1746	1709	1686	1611	1584	1515	1432	810	700
Georgia	112.5	47.8	32.5	20.8	26.6	49.6	54.5	42.35	30.14	30.14	30.14	30.14
Germany	2493	2303	2189	2038	1967	1877	1781	1709	1637	1637	1081	845
Greece	310	304	306	312	309	318	326	351	340	340	344	293
Hungary	203.1	183.3	184.0	187.4	190.1	195.8	199.5	202.6	200.7	187.2	198	198
Iceland	26.7	28.4	29.3	29.2	28.4	29.6	28.6	27.7	27.7	27.7	30	30
Ireland	119.5	130.4	119.1	115.3	115.3	119.9	118.5	121.8	118.5	125.1	65	62
Italy	1984	2010	1990	1789	1768	1744	1662	1594	1485	1485	1000	812
Kazakhstan	76	76	76	76	76	76	76	76	76	76	76	76
Latvia	74.20	62.91	56.54	48.04	41.76	34.57	44.78	42.11	35.65	33.63	39.58	49.29
Lithuania	166	98	78	77	65	65	57	60	54	47.5	110	132
Luxembourg	24	24	25	23	21	22	18	17	16.09	17.03	11	10
Netherlands	568	556	535	510	483.5	501	453	428.5	421.7	421.0	260	218
Norway	215.2	213.9	223.4	221.7	222.7	232.2	235.1	236.5	239.5	223.2	156	164
Poland	1205	1130	1120	1105	1120	1154	1114	991	951	838	879	719
Portugal	332.7	354.4	341.8	344.9	357.8	354.4	360.9	369.3	369.3	369.3	260	191
Republic of Moldova	97	67.3	53	46.2	38.2	38	36.5	21.7	16.91	16.91	90	64
Romania	464.0	357.0	318.0	319.0	319	319	319	319	319	319	437	437
Russian Federation	3435	3123	3054	2667	2570	2467	2379	2488	2494	2357	3300	2927
Slovakia	194	181	174	165	174	132	125	130	118	106	130	139
Slovenia	58	58	63	66	67	70	71	64	58	58	45	62
Spain	1379	1354	1312	1344	1355	1298	1330	1325	1379	1419	847	623
Sweden	340.2	328.3	319.1	334.2	309.2	309.4	291.4	277.2	267.2	246.6	148	154
Switzerland	146	138	129	124	120	113	107	104	99	95.69	79	66
The FYR of Macedonia	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	29	30
Turkey	649.1	667.3	747.7	730.9	800.5	873.0	879.3	862.7	952.1	951.1	2044	2044
Ukraine	989.0	830.0	700.0	568.0	531.0	467.0	455.2	447	438	354	1094	1659
United Kingdom	2637	2558	2361	2263	2088	2014	1844	1732	1604	1512	1084	973
Yugoslavia	57	49	54	52	59	57	66	66	46	50	147	163
North Africa	96	96	96	96	96	96	96	96	96	96	96	96
Remaining Asian areas	212	212	212	212	212	212	212	212	212	212	212	212
Baltic Sea	352	352	352	352	352	352	352	352	352	352	352.0	80
Black Sea	86	86	86	86	86	86	86	86	86	86	86	86
Mediterranean Sea	1639	1639	1639	1639	1639	1639	1639	1639	1639	1639	1639	1639
North Sea	648	648	648	648	648	648	648	648	648	648	648.0	648
Rem. N-E Atlantic Ocean	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	1266	911
Natural marine emissions	0	0	0	0	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0	0	0	0	0
Total EMEP	27338	25962	25050	23849	23407	23128	22484	22048	21559	20987	20744	19205

Table 3.3: National total emission trends
Emissions of ammonia (1980-1990) used for modeling by the MSC-W (Gg NH_3 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Albania	32	32	32	32	32	32	32	32	32	32	32
Armenia	25	25	25	25	25	25	25	25	25	25	25
Austria	78.36	79.34	79.45	81.17	82.01	81.40	81.04	80.18	78.99	79.88	79.86
Belarus	142	142	142	142	142	142	142	142	142	142	142
Belgium	89	89	89	89	89	89	93	96	100	103	107.3
Bosnia and Herzegovina	31	31	31	31	31	31	31	31	31	31	31
Bulgaria	144	144	144	144	144	144	144	144	144	144	144
Croatia	37	37	37	37	37	37	37	37	37	37	37.1
Cyprus	4	4	4	4	4	4	4	4	4	4	4
Czech Republic	156	156	156	156	156	156	156	156	156	156	156
Denmark	125	123	120	119	115	137.3	137.8	134.4	131.3	132.0	132.2
Estonia	24	24	24	24	24	24	24	24	24	24	24.25
Finland	39	40	41	41	42	43	41	45	43	40	38
France	777	786	789	793	780	780	787	784	765	768	763
Georgia	97	97	97	97	97	97	97	97	97	97	97
Germany	835	821	817	841	853	857	846	845	835	823	765
Greece	79	79	79	79	79	79	79	79	79	79	79
Hungary	157	156	154	153	150	150	170	150	160	170	124
Iceland	3	3	3	3	3	3	3	3	3	3	3
Ireland	112	112	112	112	112	112	112	112	112	112	112.4
Italy	479	475	464	504	481	487	495	497	499	481	466
Kazakhstan	18	18	18	18	18	18	18	18	18	18	18
Latvia	44	44	44	44	44	44	44	44	44	44	43.85
Lithuania	85	86	86	87	88	89	89	90	89	86	84
Luxembourg	7	7	7	7	7	7	7	7	7	7	7
Netherlands	234	240	244	244	246	248	258	258	237	232	226.8
Norway	22.57	23.00	23.00	23.00	23.00	23.00	23.00	23.11	21.3	22.90	22.73
Poland	550	550	550	550	550	550	550	550	550	550	512
Portugal	105	105	105	105	105	105	105	105	105	105	104.6
Republic of Moldova	52.7	54	55	56	57	57.9	56	54	53	51	49
Romania	340.0	332.0	327.0	311.0	359.0	343.0	350.0	329.0	339.0	341.0	300.0
Russian Federation	1189	1192	1214	1245	1247	1239	1286	1277	1269	1258	1191
Slovakia	63	63	63	63	63	63	63	63	63	63	63.0
Slovenia	24	24	24	24	24	24	24	24	24	24	24
Spain	396	383	409	411	417	420	435	474	475	487	472
Sweden	54	54	54	54	54	54	54	54	54.00	53	51
Switzerland	77	73	69	64	60	73.7	73	73	72	72	71.5
The FYR of Macedonia	17	17	17	17	17	17	17	17	17	17	17
Turkey	321	321	321	321	321	321	321	321	321	321	321
Ukraine	729	729	729	729	729	729	729	729	729	729	729
United Kingdom	341	341	341	341	341	341	341	341	341	341	341
Yugoslavia	90	90	90	90	90	90	90	90	90	90	90
North Africa	235	235	235	235	235	235	235	235	235	235	235
Remaining Asian areas	303	303	303	303	303	303	303	303	303	303	303
Baltic Sea	0	0	0	0	0	0	0	0	0	0	0
Black Sea	0	0	0	0	0	0	0	0	0	0	0
Mediterranean Sea	0	0	0	0	0	0	0	0	0	0	0
North Sea	0	0	0	0	0	0	0	0	0	0	0
Rem. N-E Atlantic Ocean	0	0	0	0	0	0	0	0	0	0	0
Natural marine emissions	0	0	0	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0	0	0	0
Total EMEP	8763	8740	8768	8849	8877	8906	9008	8997	8955	8933	8639

Table 3.3 Cont.: National total emission trends
Emissions of ammonia (1991-2000, 2010, 2020) used for modeling by the MSC-W (Gg NH_3 per year)

Party/Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Albania	32	32	32	32	32	32	32	32	32	**32**	35	**35**
Armenia	25	25	25	25	25	25	25	25	25	**25**	25	**25**
Austria	79.15	76.40	76.23	75.84	74.13	72.56	72.02	71.76	70.13	**67.68**	66	**66**
Belarus	**142**	**142**	**142**	**142**	**142**	**142**	**142**	**142**	**142**	**142.1**	158	**158**
Belgium	93.12	92.64	97.38	96.31	97.30	98.91	98.83	102.3	**99.74**	**99.74**	74	**74**
Bosnia and Herzegovina	31	31	31	31	31	31	31	31	31	**31**	23	**23**
Bulgaria	124	111	109	101	99	83	77	66	60	**56.23**	108	**100**
Croatia	31.7	26.8	25.5	24.2	24.9	23.4	23.0	23.3	24.4	**24.4**	30	**30**
Cyprus	4	4	4	4	4	4	4	4	4	**4**	4	**4**
Czech Republic	134	115	99	91	86	81	81	80	75	**74.48**	101	**101**
Denmark	**128.4**	**126.4**	**122.8**	**118.7**	**112.2**	**108.3**	**108.0**	**109.2**	**104.1**	**101.1**	69	**69**
Estonia	22.24	18.47	13.36	12.59	10.97	9.55	9.74	9.76	8.47	**8.764**	29	**29**
Finland	40	41	39	37	35.2	35	38	37.8	35.2	**33.1**	31	**31**
France	**764**	**752**	**745**	**750**	**758**	**771**	**778**	**787**	**784**	**788**	780	**780**
Georgia	97	97	97	97	97	97	97	97	97	**97**	97	**97**
Germany	673	649	638	639	635	635	625	632	624	**624**	550	**550**
Greece	78	75	75	73	85	73	71	74	**73**	**73**	73	**73**
Hungary	93.00	84.00	77.00	76.00	77.00	78.00	76.00	73.53	71.09	**70.81**	90	**90**
Iceland	3	3	3	3	3	3	3	3	3	**3**	3	**3**
Ireland	114.5	117.0	116.9	118.6	119.6	121.9	123.4	127.4	127.0	**122.4**	116	**116**
Italy	451	440	449	459	461	430	443	438	448	**448**	419	**419**
Kazakhstan	18	18	18	18	18	18	18	18	18	**18**	18	**18**
Latvia	41.77	32.94	19.72	16.75	16.82	15.54	14.51	13.36	11.95	**11.61**	**11.78**	**13.82**
Lithuania	85	81	80	80	38	36	35	35	29	**25.2**	84	**84**
Luxembourg	7	7	7	7	7	7	7	7	7.288	**7.233**	7	**7**
Netherlands	228	180	191	166	**186.2**	146	188	**165.7**	**159.2**	**152.6**	128	**128**
Norway	23.23	24.98	24.87	24.99	25.99	26.46	25.91	**25.92**	**25.49**	**25.32**	23	**23**
Poland	**443**	**420**	382	384	380	364	350	371	341	**322**	468	**468**
Portugal	100.1	106.6	99.3	92.7	101.7	99.1	100.5	103.0	103	**103**	108	**108**
Republic of Moldova	49	44	37	35	33	31	25	25	24.8	**24.8**	42	**42**
Romania	267.0	255.0	223.0	221.0	221	221	221	221	221	**221**	210	**210**
Russian Federation	1161	1084	903	772	824	749	730	675	657	**650**	**800**	**800**
Slovakia	**56.3**	**47.0**	**41.6**	**38.7**	**39.6**	**38.0**	**36.1**	**32.1**	**30.2**	**29.6**	39	**39**
Slovenia	23	24	23	22	22	22	19	20	20	**19**	20	**20**
Spain	468	468	448	470	467	517	***502***	***488***	***473***	***458***	353	**353**
Sweden	51	61	61	61	61	61	58.5	56.96	55.43	**55.87**	57	**57**
Switzerland	**71**	**71**	**71**	**70**	69.2	69	69	68.3	68.3	**68.29**	63	**63**
The FYR of Macedonia	17	17	17	17	17	17	17	17	17	**17**	16	**16**
Turkey	321	321	321	321	321	321	321	321	321	**321**	321	**321**
Ukraine	729	729	729	729	729	729	729	729	729	**729**	592	**592**
United Kingdom	**343**	**327**	**327**	**328**	**318**	**321**	**325**	**319**	**316**	**297**	297	**297**
Yugoslavia	90	90	90	90	90	90	90	90	90	**90**	82	**82**
North Africa	235	235	235	235	235	235	235	235	235	**235**	235	**235**
Remaining Asian areas	303	303	303	303	303	303	303	303	303	**303**	303	**303**
Baltic Sea	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Black Sea	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Mediterranean Sea	0	0	0	0	0	0	0	0	0	**0**	0	**0**
North Sea	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Rem. N-E Atlantic Ocean	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Natural marine emissions	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Volcanic emissions	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Total EMEP	**8290**	**8005**	**7669**	**7508**	**7533**	**7391**	**7378**	**7305**	**7194**	**7109**	**7159**	**7153**

Table 3.4: National total emission trends

Emissions of non-methane volatile organic compounds (1980-1990) used for modeling at the MSC-W (Gg NMVOC per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Albania	31	31	31	31	31	31	31	31	31	31	31
Armenia	25.7	25.7	24.3	23.8	21.7	92.7	98.1	104.3	92.5	90.2	81.00
Austria	353.1	351.9	350.3	354.0	361.2	359.7	373.1	376.0	378.2	367.7	359.7
Belarus	549	546.0	543.0	543.0	540.0	516	506	509	535	511	533
Belgium	688	688	688	688	688	688	611	534	457	3801	303.0
Bosnia and Herzegovina	51	51	51	51	51	51	51	51	51	51	51
Bulgaria	309	309	309	309	309	309	309	309	309.2	263	217
Croatia	105	105	105	105	105	105	105	105	105	105	105.0
Cyprus	13	13	14	14	14	14	15	16	17	17	18
Czech Republic	275	275	275	275	275	275	307	339	371	403	435
Denmark	203	199	199	202	206	196.0	196.2	198.2	197.0	197.5	170.5
Estonia	81	81	81	81	81	81	83	83	84	87	88.4
Finland	210	210	210	210	210	210	210	210	222.1	226.3	224.4
France	2613	2613	2613	2613	2613	2613	2613	2613	2613	2576	2385
Georgia	45.5	46.8	47.8	49.8	49.3	48.5	47.6	48.2	47.8	46.0	46.4
Germany	3224	3152	3134	3152	3191	3190	3218	3273	3255	3202	3221
Greece	317	317	317	317	317	317	317	317	317	317	317
Hungary	215	218	222	225	229	232	263	228	215	205	205.0
Iceland	7.7	7.7	7.7	7.6	7.7	8.0	8.4	11.9	12.6	12.6	12.8
Ireland	111	111	111	111	111	111	111	111	111	111	111.1
Italy	2179	2119	2074	2045	2007	1992	2019	2088	2124	2215	2213
Kazakhstan	76	76	76	76	76	76	76	76	76	76	76
Latvia	152	152	152	152	152	152	152	152	152	152	152.4
Lithuania	100	102	104	105	106	112	108	108	109	109	108
Luxembourg	15	15	15	15	15	15	16	16	17	18	19
Netherlands	579.0	555.0	543.0	526.0	513.0	502	489.0	485.0	538.0	468.0	503.5
Norway	175.4	181.7	188.6	201.3	212.3	231.4	249.4	255.2	249.0	275.0	300.5
Poland	1036	912	889	954	985	1011	1029	1014	1026	1016	831
Portugal	199	199	199	199	199	199	235	271	308	344	379.9
Republic of Moldova	105	105	105	105	105	105	101	102	102	96	157
Romania	829.0	810.0	772.0	796.0	812.0	787.0	830.0	884.0	846.0	812.0	772.0
Russian Federation	2843	2843	2582	2444	2390	2496	2338	3410	3396	3444	3668
Slovakia	262	262	262	262	262	262	262	262	262	262	262
Slovenia	39	39	39	39	39	39	39	39	39	42	44
Spain	1407	1387	1365	1393	1386	1409	1435	1490	1526	1560	1610
Sweden	600	600	600	600	600	600.0	585	570	555.0	536	516.7
Switzerland	323	323	323	324	324	324	318	311	305	298	278.8
The FYR of Macedonia	19	19	19	19	19	19	19	19	19	19	19
Turkey	359.0	361.0	379.3	387.4	383.9	379.0	403.0	430.3	449.8	453.0	462.9
Ukraine	1626	1626	1626	1626	1626	1626	1660	1687	1604	1512	1369
United Kingdom	2232	2208	2243	2264	2321	2335	2391	2454	2521	2552	2508
Yugoslavia	142	142	142	142	142	142	142	142	142	142	142
North Africa	96	96	96	96	96	96	96	96	96	96	96
Remaining Asian areas	212	212	212	212	212	212	212	212	212	212	212
Baltic Sea	8	8	8	8	8	8	8	8	8	8	8
Black Sea	2	2	2	2	2	2	2	2	2	2	2
Mediterranean Sea	34	34	34	34	34	34	34	34	34	34	34
North Sea	15	15	15	15	15	15	15	15	15	15	15
Rem. N-E Atlantic Ocean	25	25	25	25	25	25	25	25	25	25	25
Natural marine emissions	0	0	0	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0	0	0	0
Total EMEP	24732	24095	23739	23745	24094	24269	24455	25895	26026	25916	25700

Table 3.4 Cont.: National total emission trends

Emissions of non-methane volatile organic compounds (1991-2000, 2010, 2020) used for modeling by the MSC-W (Gg NMVOC per year)

Party/Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Albania	31	31	31	31	31	31	31	31	31	**31**	41	**45**
Armenia	69.9	30.9	19.9	17.1	23.4	17.8	35.10	16.94	17.47	**15.96**	81	**81**
Austria	**329.7**	**296.1**	**285.9**	**274.5**	**275.7**	**265.4**	**260.4**	**250.6**	**245.1**	**238.7**	159	**183**
Belarus	546	412	372	366	367	327.7	344.7	294.0	239.9	**239.9**	321	**324**
Belgium	**267.4**	**266.5**	**264.6**	**257.9**	**250.3**	**241.7**	**248.5**	**269.1**	**248.0**	**248**	144	**176**
Bosnia and Herzegovina	51	51	51	51	51	51	51	51	**51**	**51**	48	**55**
Bulgaria	178	179	208	175	173	147	120	132	118	**120.4**	185	**161.9**
Croatia	86.5	63.7	69.3	74.7	74.1	81.5	79.5	78.5	72.9	**72.9**	90	**127**
Cyprus	16	19	20	20	19	21	21	22	22	**23**	23	**23**
Czech Republic	398	359	338	310	286	284	272	269	248	**246.7**	220	**362**
Denmark	**167.4**	**162.9**	**160.7**	**157.6**	**152.8**	**150.6**	**142.7**	**136.4**	**131.5**	**131.9**	73	**67**
Estonia	81.9	45.4	41.6	44.65	47.5	50.2	53.92	53.7	42.33	**33.69**	44.2	**55**
Finland	**210.9**	**203.7**	**196.7**	**194.4**	**189.0**	**182.8**	**177.7**	**173.9**	**169.9**	**159.9**	130	**120**
France	**2366**	**2314**	**2193**	**2059**	**1979**	**1915**	**1830**	**1779**	**1705**	**1659**	1050	**947**
Georgia	8.2	3.9	2.2	1.7	1.5	2.4	2.8	10.84	18.63	**18.63**	18.6	**18.6**
Germany	2796	2539	2326	2158	2024	1896	1805	1723	1653	**1653**	995	**1097**
Greece	**319**	**326**	**329**	**334**	**329**	**344**	**346**	**361**	**350**	**350**	261	**177**
Hungary	149.6	141.8	149.0	142.4	150.3	150.1	145.4	140.6	**169.8**	**172.0**	137	**137**
Iceland	14.3	14.1	13.6	14.2	12.0	12.0	9.8	10.0	10	**10**	6.6	**6.6**
Ireland	111.1	114.3	108.5	107.5	**105.4**	**111.9**	**115.7**	**117.6**	**98.41**	**90.27**	55	**47**
Italy	2293	2338	2344	2349	2368	1934	1861	1764	1671	**1671**	1159	**991**
Kazakhstan	76	76	76	76	76	76	76	76	76	**76**	76	**76**
Latvia	116.1	84.52	113.3	**98.52**	64.04	48.34	74.07	66.67	**113.3**	**95.61**	136	**400.4**
Lithuania	111	66	52	52	77	82	81	79	68	**60.8**	84	**96**
Luxembourg	19	18	18	18	16	16	15	13	14.92	**14.92**	9	**7**
Netherlands	462	438	405	389	369.6	362	317	**301.5**	**289.9**	**280.7**	185	**233**
Norway	**293.7**	**322.3**	**338.3**	**352.9**	**367.8**	**372.0**	**367.3**	**349.2**	**348.7**	**363.0**	**171**	**290**
Poland	833	805	756	819	769	766	774	730	731	**599**	800	**859**
Portugal	408.7	436.3	444.0	442.7	461.6	437.3	498.8	483.7	483.7	**483.7**	202	**183**
Republic of Moldova	151.2	99	74.5	65.6	61.7	64.4	68.8	42.9	22.14	**22.14**	100	**42**
Romania	678.0	627.0	634.0	638.0	638	638	638	638	638	**638**	523	**530**
Russian Federation	**3361**	**3297**	**3062**	**2924**	**2857**	**2622**	**2386**	**2376**	**2451**	**2450**	3500	**3005**
Slovakia	193	124	**151**	108	**159**	**161**	**138**	**132**	**130**	**89**	140	**127**
Slovenia	41	40	42	44	44	49	48	42	40	**40**	40	**66**
Spain	**1644**	**1624**	**1527**	**1584**	**1536**	**1582**	**1577**	**1616**	**1629**	**1584**	669	**543**
Sweden	**512.6**	**490.1**	**480.6**	**476.2**	**471.5**	**471.0**	**447.4**	**438.9**	**430.9**	**417.8**	241	**180**
Switzerland	261	242	226	213	199.4	191	182	173	165	**158.8**	144	**122**
The FYR of Macedonia	19	19	19	19	19	19	19	19	19	**19**	19	**21**
Turkey	457.2	478.6	527.1	515.5	**677.3**	**754.5**	**784.3**	**803.3**	**785.4**	**725.6**	**1925**	**1925**
Ukraine	1302	1171	972.0	1024	811.0	718.0	665.0	665	665	**665**	797	**921**
United Kingdom	**2438**	**2338**	**2233**	**2184**	**2054**	**1992**	**1919**	**1784**	**1600**	**1498**	1095	**1118**
Yugoslavia	142	142	142	142	142	142	142	142	142	**142**	139	**149**
North Africa	96	96	96	96	96	96	96	96	96	**96**	96	**96**
Remaining Asian areas	212	212	212	212	212	212	212	212	212	**212**	212	**212**
Baltic Sea	8	8	8	8	8	8	8	8	8	**8**	8	**8**
Black Sea	2	2	2	2	2	2	2	2	2	**2**	2	**2**
Mediterranean Sea	34	34	34	34	34	34	34	34	34	**34**	34	**34**
North Sea	15	15	15	15	15	15	15	15	15	**15**	15	**15**
Rem. N-E Atlantic Ocean	25	25	25	25	25	25	25	25	25	**25**	25	**25**
Natural marine emissions	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Volcanic emissions	0	0	0	0	0	0	0	0	0	**0**	0	**0**
Total EMEP	**24402**	**23241**	**22209**	**21717**	**21172**	**20173**	**19563**	**19047**	**18548**	**18052**	**16628**	**16487**

Table 3.5: National total emission trends
Emissions of carbon monoxide (1980-1990) used for modeling at the MSC-W (Gg CO per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Albania	84	84	84	84	84	84	84	84	84	84	84
Armenia	404.9	404.9	404.9	404.9	404.9	404.9	405.1	416.5	417.1	398.9	304.3
Austria	1711	1643	1582	1547	1601	1548	1643	1602	1552	1485	1353
Belarus	1654	1654	1654	1654	1654	1654	1605	1601	1590	1615	1722
Belgium	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097	1097
Bosnia and Herzegovina	280	280	280	280	280	280	280	280	280	280	280
Bulgaria	997	997	997	997	997	997	997	997	995	985	891
Croatia	655	655	655	655	655	655	655	655	655	655	655.2
Cyprus	46	46	49	49	49	49	53	56	60	60	63
Czech Republic	894	900	906	901	895	899	740	738	737	884	1055
Denmark	956.3	1075	1123	950.6	1060	1021	1011	1042	965.6	1033	729.2
Estonia	400	400	400	400	400	400	417	423	419	448	434.1
Finland	660	650	640	630	620	610	600	589	579	569	559
France	15638	14870	14408	13953	14018	13840	13454	13215	12800	12247	10781
Georgia	648.3	617.3	632.2	647.8	651.3	636.5	642.9	638.9	647.7	597.3	526.4
Germany	14046	13027	12438	11980	12176	12134	12135	12438	12080	11430	11213
Greece	1356	1356	1356	1356	1356	1356	1356	1356	1356	1356	1356
Hungary	1019	1001	984	996	949	931.1	942	952	963.1	980	997.0
Iceland	44.2	44.2	44.2	43.2	44.1	45.5	48.2	53.6	57.1	57.0	58.2
Ireland	401	401	401	401	401	401	401	401	401	401	400.9
Italy	7588	7478	7527	7432	7590	7692	7607	7674	7581	7735	7824
Kazakhstan	266	266	266	266	266	266	266	266	266	266	266.0
Latvia	388	388	388	388	388	388	388	388	388	388	387.7
Lithuania	541	548	543	550	550	545	554	564	578	568	519
Luxembourg	193	193	193	193	193	193	189	186	182	179	175
Netherlands	1530	1418	1374	1354	1357	1381	1252	1192	1179	1131	1164
Norway	880.5	815.1	823.7	815.8	842.0	844.2	872.3	889.2	868.9	871.7	875.5
Poland	7406	7406	7406	7406	7406	7406	7406	7406	7406	7406	7406
Portugal	1114	1114	1114	1114	1114	1114	1114	1114	1114	1114	1114
Republic of Moldova	55	53	56	49	48	483	478	474	496	476	453.2
Romania	3245	3217	3152	3030	3463	3307	3378	3196	3317	3314	3186
Russian Federation	13520	15005	13617	13696	13672	14122	13142	13270	13144	12210	13329
Slovakia	491	491	491	491	491	491	491	491	491	491	533
Slovenia	68	66	63	61	64	68	78	79	75	75	81
Spain	3776	3649	3616	3636	3596	3549	3605	3705	3898	4096	3986
Sweden	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113	1113
Switzerland	1280	1222	1164	1106	1048	990	933	877	820	764	672.6
The FYR of Macedonia	77	77	77	77	77	77	77	77	77	77	77
Turkey	2934	2961	3110	3141	3141	3121	3305	3477	3610	3505	3585
Ukraine	9832	9832	9832	9832	9832	9832	9722	9269	9085	8794	8141
United Kingdom	7677	7597	7621	7391	7428	7222	7212	7247	7307	7548	7208
Yugoslavia	165	175	175	186	203	203	203	210	221	217	231
North Africa	336	336	336	336	336	336	336	336	336	336	336
Remaining Asian areas	742	742	742	742	742	742	742	742	742	742	742
Baltic Sea	29	29	29	29	29	29	29	29	29	29	29
Black Sea	8	8	8	8	8	8	8	8	8	8	8
Mediterranean Sea	139	139	139	139	139	139	139	139	139	139	139
North Sea	59	59	59	59	59	59	59	59	59	59	59
Rem. N-E Atlantic Ocean	111	111	111	111	111	111	111	111	111	111	111
Natural marine emissions	0	0	0	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0	0	0	0
Total EMEP	108555	107711	105281	103778	104698	104875	103375	103223	102375	100425	98031

Table 3.5 Cont.: National total emission trends
Emissions of carbon monoxide (1991-2010) used for modeling at the MSC-W (Gg CO per year)

Party/Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010
Albania	84	84	84	84	84	84	84	84	84	84	126
Armenia	377.2	195.1	145.1	128.0	173.6	125.5	223.6	124.4	123.7	109.7	109
Austria	1333	1254	1229	1199	1098	1073	1070	1015	969.7	906.5	906
Belarus	1717	1381	1201	1241	1253	1242	1223	1034	786.4	717.5	1404
Belgium	1103	1123	1088	1044	1013	1000	938.3	1114	1017	1017	1017
Bosnia and Herzegovina	280	280	280	280	280	280	280	280	280	280	210
Bulgaria	608	768	820	855	846	613	515	650	617	667.3	750
Croatia	565.3	416.5	375.4	369.4	345.8	388.8	365.6	344.9	334.3	334.3	660
Cyprus	56	67	70	70	67	74	74	77	77	80.5	80.50
Czech Republic	1102	1045	967	1026	874	886	877	767	686	649.3	649
Denmark	742.2	716.2	716.2	690.2	688.3	707.7	663.2	665.0	616.8	632.1	331
Estonia	399.2	207.8	210.2	241.1	242.3	267.7	282.8	280.7	215.3	201.7	201
Finland	552	478	457	444	436	461	474	452	547	526.3	526
France	10681	10241	9684	9016	8880	8315	7850	7641	7140	6626	6626
Georgia	441.4	129.5	142.5	148.5	249.5	390.2	429.2	353.3	222.5	222.5	222.5
Germany	9515	8351	7704	7065	6667	6234	5832	5341	4952	4952	4952
Greece	1368	1382	1345	1327	1316	1404	1414	1546	1440	1440	1440
Hungary	913.4	835.8	796.1	774.3	761.3	726.9	733.4	736.9	721.6	646.9	600
Iceland	59.2	60.7	59.9	60.3	49.4	49.9	38.9	39.8	39.8	39.8	19.41
Ireland	394.4	394.6	350.3	329.2	304.4	306.8	312.1	317.7	285.1	279.6	322
Italy	8003	7961	7755	7549	7755	6971	6681	6318	6051	6051	4213
Kazakhstan	266	266	266	266	266	266	266	266	266	266	266
Latvia	823.0	554.5	612.0	306.8	436.5	175.2	354.0	325.3	293.6	250.1	304
Lithuania	577	350	292	303	286	312	358	358	320	281.5	400
Luxembourg	190	204	219	145	107	103	80	51	49.80	48.94	33
Netherlands	1025	983	960	907	894.0	903	749	739.5	711.8	701	701
Norway	805.8	788.4	789.9	781.6	746.6	718.8	684.0	641.8	605.9	569.5	569.5
Poland	7245	7083	8655	5115	4547	4837	4700	4301	4363	3463	3463
Portugal	1189	1284	1269	1234	1201	1178	1143	1095	1095	1095	1095
Republic of Moldova	468.4	279.2	218.4	170.9	192	170.3	210.2	153.4	100.2	100.2	150
Romania	2695	2506	2434	2325	2325	2325	2325	2325	2325	2325	2325
Russian Federation	13000	11703	11320	10603	9945	9401	10332	10383	10804	10811	16650
Slovakia	478	426	454	413	404	348	352	318	310	290	290
Slovenia	78	78	87	93	91	95	93	77	70	68	53
Spain	4118	4187	3967	3990	3569	3518	3359	3342	3097	3008	3008
Sweden	1069	1065	1025	1006	993.6	966.2	883.2	956.9	910.7	830.3	426
Switzerland	629	581	544	516	490.9	467	443	422	399	393.9	370
The FYF of Macedonia	77	77	77	77	77	77	77	77	77	76.94	76
Turkey	3579	3662	3936	3769	3987	4135	4179	4156	4047	3778	3778
Ukraine	7406	5496	4218	3375	2906	2567	2516	2602	2689	2776	2776
United Kingdom	7002	6707	6210	5877	5522	5487	5201	4934	4718	4167	2838
Yugoslavia	200	172	189	182	207	200	231	231	161	175	515
North Africa	336	336	336	336	336	336	336	336	336	336	336
Remaining Asian areas	742	742	742	742	742	742	742	742	742	742	741
Baltic Sea	29	29	29	29	29	29	29	29	29	29	29
Black Sea	8	8	8	8	8	8	8	8	8	8	8
Mediterranean Sea	139	139	139	139	139	139	139	139	139	139	139
North Sea	59	59	59	59	59	59	59	59	59	59	59
Rem. N-E Atlantic Ocean	111	111	111	111	111	111	111	111	111	111	111
Natural marine emissions	0	0	0	0	0	0	0	0	0	0	0
Volcanic emissions	0	0	0	0	0	0	0	0	0	0	0
Total EMEP	94638	87246	84645	76820	74001	71274	70321	68361	66043	63362	66874

3.3.4 Emission trends in the EMEP area

European sulphur dioxide emissions experience a clear downward trend (Figure 3.1). The total emission reduction of SO_2 between 1980 and 2000 is 60%, while the corresponding reduction between 1990 (base year of the Gothenburg Protocol) and 2000 is 48%. The trend in the emission of NO_x before 1987 is unrealistic, because of too low emissions reported from Russia (see below) (Figure 3.2). The emission level in the late 1980s is relatively constant, and is easing-off in the 1990s. The NO_x emission reduction is 25% between 1990 and 2000. European emissions of ammonia appear to have dropped by approximately 18% between 1990 and 2000. Trends before 1990 are not real, but the result of gap filling assumptions at MSC-W, since data is missing from most countries (Figure 3.3). In the NMVOC emissions there is a downward trend in the 1990s, leading to an average emission reduction of 30% between 1999 and 2000 (Figure 3.4). In the case of CO, the reduction between 1980 and 2000 is 42% while the reduction between 1990 and 2000 is 35% (Figure 3.5). The reductions are caused by changes in the emissions for the CLRTAP Parties, since no updates of emissions for other areas within the EMEP domain have been made by MSC-W this year.

The reductions calculated for other compounds than NO_x have remained relatively constant compared to last year. For SO_2 and NH_3, the reduction is 1% larger than last year. The corresponding figure for NMVOC and CO is 3%. The reduction of NO_x between 1990 and 2000 (25%) is notably larger, than the reduction reported last year between 1990 and 1999 (18%). This is because the 1990 total EMEP emissions have increased slightly (143 Gg), while the total EMEP emissions in 2000 compared to last year's 1999 emissions has decreased by 401 Gg. The 1990 emissions have changed for fourteen of the Parties (Table 3.2). Eight of them increased the emission while six of them decreased the emissions. Reported changes of 10% or more of 1990 value reported in 2001 is seen for Latvia and Spain (-10% and +11%).

The overall level of SO_2 for the whole EMEP area has increased 2-6% relative to last year (Figure 3.1). This is mainly because of changes in the Turkish emissions according to the new reporting, but also French, Spanish and Russian recalculations have resulted in increases relative to emissions reported in last year's reporting round.

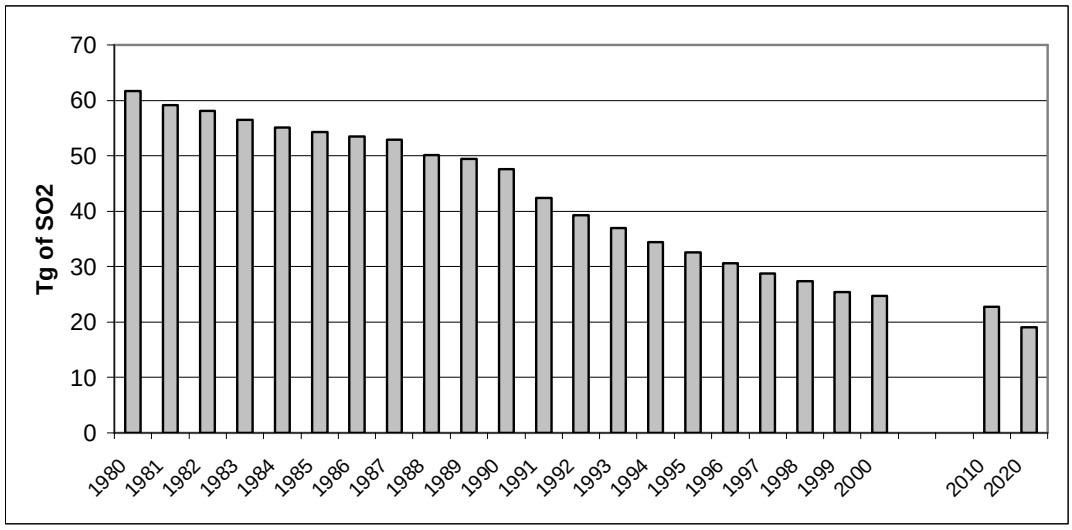

Figure 3.1 Emission trends of sulphur in the EMEP area1980-2000, 2010, 2020

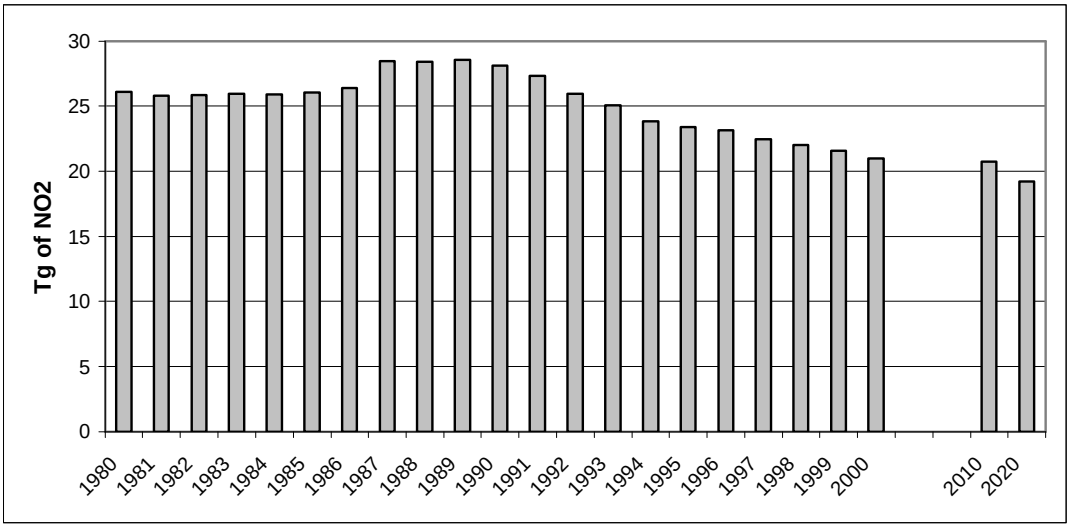

Figure 3.2 Emission trends of nitrogen oxides in the EMEP area1980-2000, 2010, 2020

The level of NO_x has also gone up, approximately 1% (Figure 3.2). The large increase seen in NO_x between 1986 and 1987 is mainly caused by the large increase in Russian emissions. The explanation MSC-W got from the Russian national expert was that important NO_x sources as road transport not had been included for the years 1980-1986. The Russian 1980-1986 national NO_x emissions certainly needs to be recalculated by Russia or replaced by MSC-W estimates in order to give a more correct estimate of the NO_x trend.

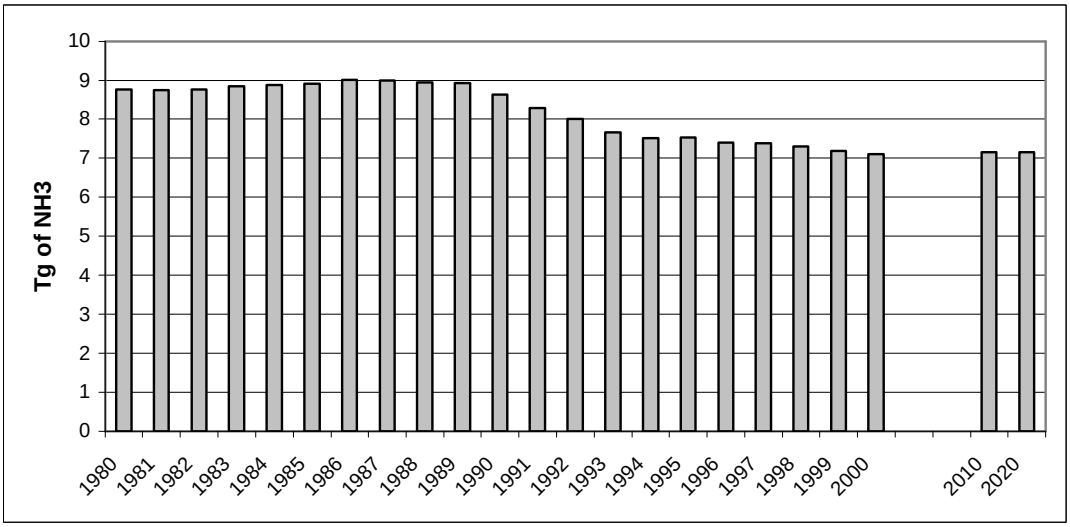

Figure 3.3 Emission trends of ammonia in the EMEP area1980-2000, 2010, 2020

The level of NH_3 and NMVOC emissions for the total EMEP area has decreased compared to last year. The reduction is between 1% and 3% for ammonia, while the corresponding figure for NMVOC is 3-8%.

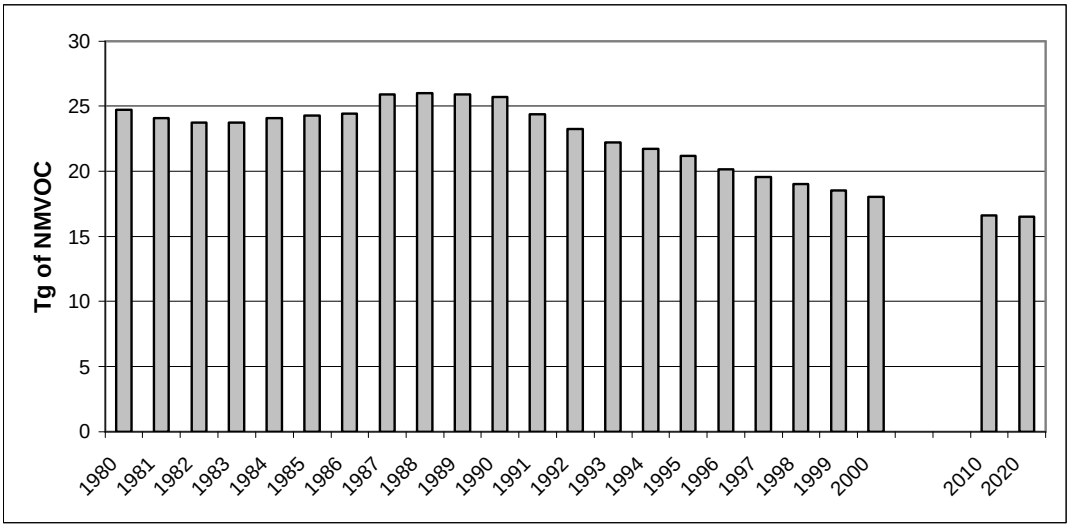

Figure 3.4 Emission trends of volatile organic compounds in the EMEP area 1980-2000, 2010, 2020

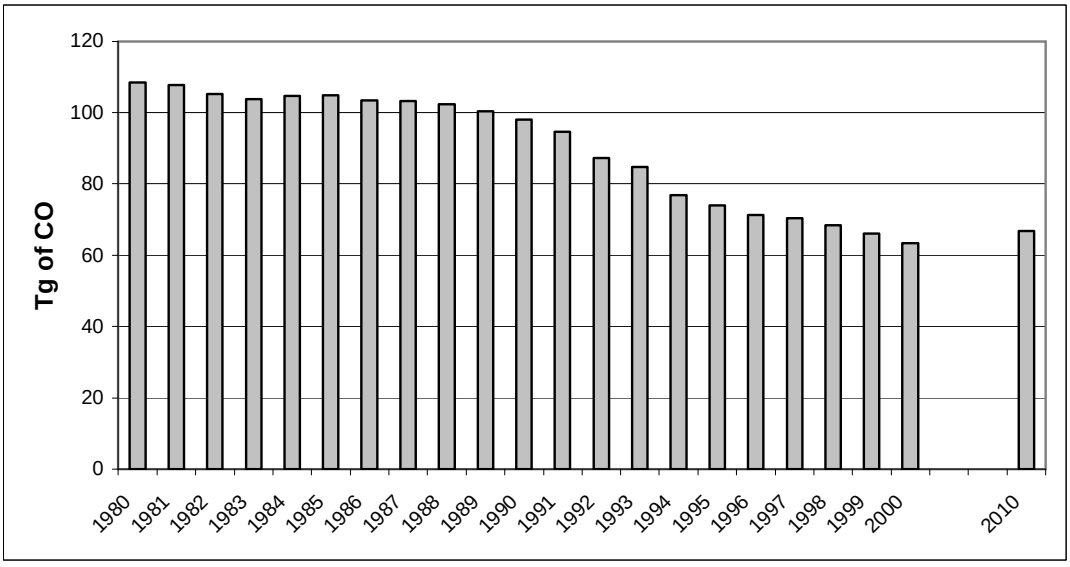

Figure 3.5 Emission trends of carbon monoxide in the EMEP area 1980-2000, 2010

The assumptions made by MSC-W based on the new Turkish reporting regarding the SO_2 2010 projections for Turkey, and the replacement of reported Yugoslavian 2010 projection by the IIASA CLE scenario (Table 3.1), caused large differences in the 2010 projections compared to last year for these countries. The increases and decreases almost cancelled each other out, and are therefore not visible in the diagram for the total EMEP area. The increase seen in the 2010 NO_x and NMVOC projections for the whole EMEP area is mainly cause by this year's reported Russian 2010 projection, which is much higher (3300 Gg) than the IIASA 2010 projection used last year (2494 Gg) (Amann, 2000). For ammonia there is a small (126 Gg) decrease compared to last year.

4. Detection of National Emission reductions

Detection of emission reductions achieved by each Party is naturally a central issue in the work of the CLRTAP. Figures 4.1-4.4 present the percentage emission reduction (100* (E_{year1} – E_{year2})/ E_{year1}) between 1990 (the Gothenburg Protocol base year) and 2000. The calculated reductions are based on the most updated emissions officially reported by each Party (Annex I, Table 21). Non-Signatories to the Gothenburg Protocol are listed to the right in the figures. The Protocol had 31 Signatories as of 20 August 2001.

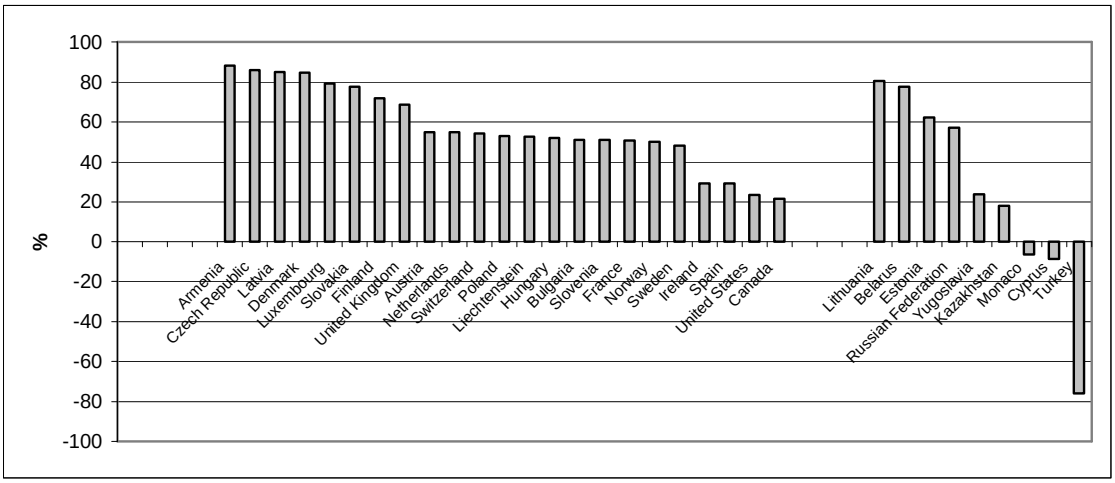

Figure 4.1 Emissions reductions of sulphur in the ECE region 1990-2000 (based on the latest data available, see table 21). Signatories to the 1999 Gothenburg Protocol are on the left. Only countries that have reported national total emission data for both 1990 and 2000 are listed here.

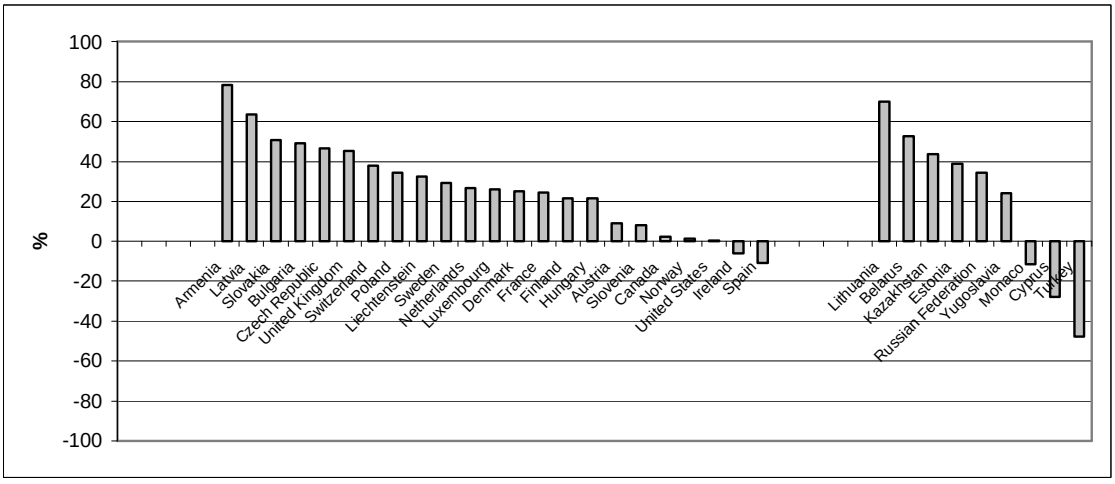

Figure 4.2 Emission reductions of nitrogen oxides in the ECE region 1990-2000 (based on the latest data available, see table 21). Signatories to the 1999 Gothenburg Protocol are on the left. Only countries that have reported national total emission data for both 1990 and 2000 are listed here.

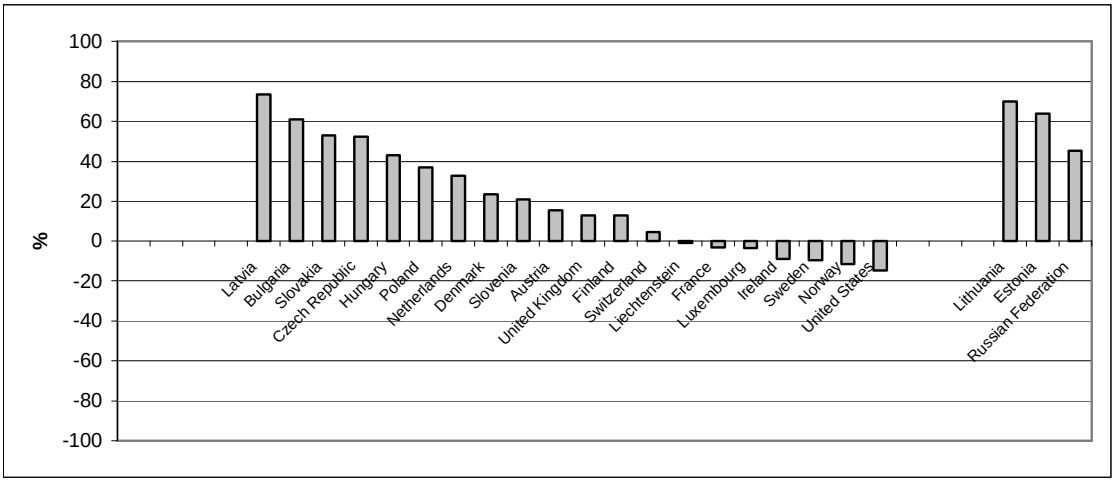

Figure 4.3 Emission reduction of ammonia in the ECE region 1990-2000 (based on the latest data available, see table 21). Signatories to the 1999 Gothenburg Protocol are on the left. Only countries that have reported national total emission data for both 1990 and 2000 are listed here.

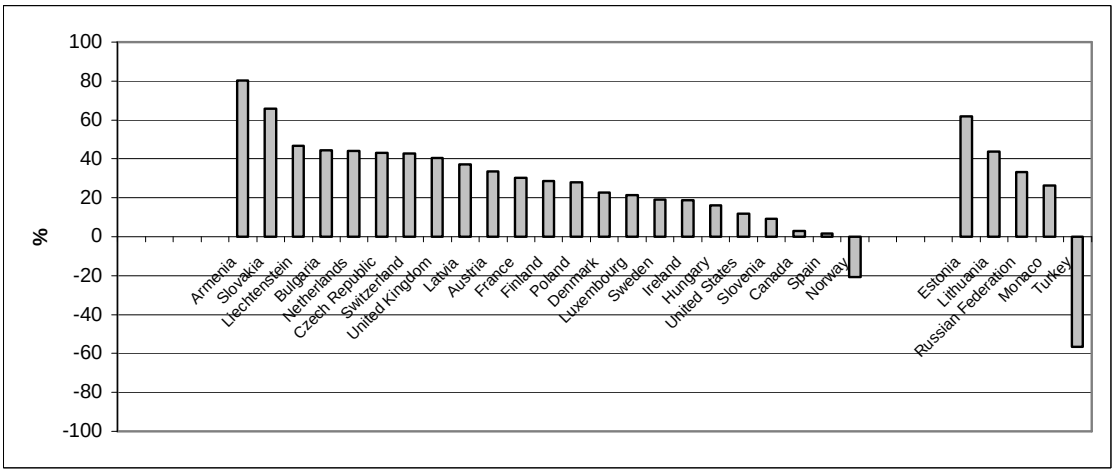

Figure 4.4 Emission reductions of non-methane volatile organic compounds in the ECE region 1990-2000 (based on the latest data available, see table 21). Signatories to the 1999 Gothenburg Protocol are on the left. Only countries that have reported national total emission data for both 1990 and 2000 are listed here.

Overall, the greatest reductions are detected in sulphur emissions (Figure 4.1).Turkey, Cyprus and Monaco are the only Parties to the Convention that report an increase in emissions of sulphur, but the order of the Parties reducing emissions most differ from year to year. Figure 4.2 shows that for nitrogen oxides, also Spain, Ireland and United States have reported increased emissions, while Norway has after recalculation of their emission inventory, turned last years increase to a small decrease. Increases in emissions of ammonia (Figure 4.3) are reported by United States, Norway, Sweden, Ireland, Luxembourg, France and Liechtenstein. while all other Signatories to the Gothenburg Protocol and the non-Signatories: Lithuania. Estonia and the Russian Federation have reported reduced ammonia emissions. In the case of NMVOC (Figure 4.4), all the Parties except Norway and Turkey have reported reduced emissions.

5. Emission data used for modeling assessments at the MSC-W

5.1 Main updates

The main updates in the emission data input to the modeling activity at MSC-W this year compared to last year are:

1. The inclusion of the reported gridded data in the EMEP 50x50km^2 grid for the first time from Belarus, Denmark and Ukraine. Updates in the spatial distribution made according to the reporting of year 2000 gridded data, are displayed in table 4.1 for the main pollutants. In addition, Germany and United Kingdom corrected the 1999 gridded emissions previously reported, and new reported 1999 gridded data from Hungary have been included.
2. The reported gridded data in the EMEP 150x150 grid from Greece reported and included last year, has been replaced by gridded data in the EMEP 50x50km^2 grid from CORINAIR (The Core Inventory of Air Emissions in Europe), in order test if a better allocation of emission sources could improve the model results relative to the measurements.
3. The national total emissions have been updated as displayed in Tables 3.1-3.5, and the sector data have been scaled accordingly. The 2010 and 2020 scenarios used in the modeling assessments, might differ somehow from what is reported in tables 3.1-3.4, as the updated 2010 and 2020 emission projection from IIASA were not available within deadline for this report.
4. Inclusion of officially reported PM emissions: The model runs for PMs for year 2000 concerned $PM_{2.5}$ and PM_{coarse} (PM_{10} minus $PM_{2.5}$). The gridded 1995 emission distributions from the CEPMEIP project/TNO (EMEP/MSC-W Note 2/2002) were scaled with reported emission data from Austria, Denmark, Finland, France, Hungary and United Kingdom, otherwise the emission data input represents the 1995 emission level as documented at: *http://www.air.sk/tno/cepmeip/emissions.php*, and displayed in table 5.2

Table 5.1 Updates of the spatial distribution for year 2000 model runs[1]

Party/Component	CO	NH_3	NMVOC	NO_x	SO_2
Belarus	G-50	G-50		G-50	G-50
Bulgaria	G-50	G-50	G-50	G-50	G-50
Czech Republic	G-50 GLH-50	G-50	G-50 GLH-50	G-50 GLH-50	G-50 GLH-50
Denmark	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Estonia	G-50	G-50	G-50	G-50	G-50
Finland	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Ireland	G-50	G-50	G-50	G-50	G-50
Netherlands	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Norway	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Poland	G-50	G-50	G-50	G-50	G-50
Russian Federation	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Slovakia	GLH-50	GLH-50	GLH-50	GLH-50	GLH-50
Slovenia				G-50	G-50
Spain	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Sweden	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Switzerland	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50	G-50 GS-50
Ukraine	G-50	G-50	G-50	G-50	G-50
Yugoslavia				G-50	G-50

1) Code: G-50: Gridded national total emissions in the EMEP 50x50km^2 grid
GS-50: Gridded sector level 1 emissions in the EMEP 50x50km^2 grid
GLH-50: Gridded national total emissions distributed as low (<100m) and high (>100m) emissions

Table 5.2 $PM_{2.5}$ and PM_{10} National totals (in Mg) included in year 2000 model runs[2]

Party/Year	$PM_{2.5}$ (Mg)	PM_{10} (Mg)
Albania 1995	6134.86	8207.62
Armenia 1995	4728.36	6555.43
Austria 2000	**26099.13**	**46117.10**
Belarus 1995	38473.1	62361.9
Belgium 1995	57057.04	84124.62
Bosnia and Herzegovina 1995	5672.6	9850.51
Bulgaria 1995	37644.98	93059.23
Croatia 1995	13736.35	21025.01
Cyprus 1995	1763.97	2964.49
Czech Republic 1995	57384.28	125423.18
Denmark 2000	**12104.2**	**27069.7**
Estonia 1995	13692.58	33267.55
Finland 2000	**37663.**	**48240.**
France 2000	**304000.**	**566000.**
Georgia 1995	6994.47	10032.04
Germany 1995	217096.46	335282.93
Greece 1995	41868.97	62438.76
Hungary 2000	**20150.**	**45810.**
Iceland 1995	1619.05	2034.96
Ireland 1995	12846.48	22659.36
Italy 1995	232267.79	319308.45
Latvia 1995	8568.23	13205.8
Lithuania 1995	12677.81	19830.17
Luxembourg 1995	2793.55	5187.99
Netherlands 1995	41415.25	64424.83
Norway 1995	43090.07	48981.87
Poland 1995	126926.37	313824.79
Portugal 1995	36975.38	50991.41
Republic of Moldova 1995	9831.91	16356.91
Romania 1995	92839.3	185587.4
Russian Federation 1995	895707.06	1709102.27
Slovakia 1995	22979.36	40566.4
Slovenia 1995	6678.64	13218.18
Spain 1995	158456.44	225576.28
Sweden 1995	29741.3	42052.41
Switzerland 1995	15478.54	20462.27
The FYR of Macedonia 1995	9580.82	27391.5
Turkey 1995	204432.03	390669.03
Ukraine 1995	281448.6	608110.34
United Kingdom 2000	**93562.**	**171606.**
Yugoslavia 1995	48879.17	144330.61

5.2 Temporal and spatial distribution of year 2000 emissions

Temporal variation of emissions has been provided to MSC-W by the GENEMIS project (Generation of European Emission Data for Episodes), and concerns 1994 daily estimates of NO_x per country and SNAP source sectors. MSC-W has processed these data into monthly and hourly variation. The same temporal variation is used for SO_2, NO_x, NH_3, NMVOC and CO. The monthly and daily factors vary depending on country and source sector, while the hourly data only varies with country. In the model runs for PMs, monthly factors, varying by country only, that differs from the one used for the other pollutants is included. Daily and hourly variation is not used for PMs.

Two different height distributions were used in the model runs, one for the main pollutants

[2] Emission figures in bold indicate that the emissions are officially reported emissions

and another for PMs. The height distributions are shown in tables 5.3 and 5.4.

Table 5.3 Height distribution of emissions used in the EMEP Unified model

Snap sector		Effective height			
		ground	~150 m	~250m	high
1	Combustion in energy and transformation industries	10%	20%	30%	40%
2	Non-industrial combustion plants	50%	50%		
3	Combustion in manufacturing industry	50%	50%		
4	Production processes	90%	10%		
5	Extraction and distribution of fossil fuels and geothermal energy	90%	10%		
6	Solvent and other product use	100%			
7	Road transport	100%			
8	Other mobile sources and machinery	100%			
9	Waste treatment and disposal	80%	20%		
10	Agriculture	100%			
11	Other sources and sinks	100%			

Table 5.4 Height distribution of PMs

Snap sector		Effective height			
		ground	~150m	~250m	high
1	Combustion in energy and transformation industries	20%	20%	40%	20%
2	Non-industrial combustion plants	100%			
3	Combustion in manufacturing industry	70%	7.5%	15%	7.5%
4	Production processes	100%			
5	Extraction and distribution of fossil fuels and geothermal energy	20%	20%	40%	20%
6	Solvent and other product use	100%			
7	Road transport	100%			
8	Other mobile sources and machinery	100%			
9	Waste treatment and disposal	100%			
10	Agriculture	100%			
11	Other sources and sinks	100%			

MSC-W is involved in many projects requiring emission trend data for several years. The EMEP Assessment Report requires emission data in 5-yearly intervals from 1980-2000, while the TROTREP project (Tropospheric Ozone and Precursors - TRends, Budgets and Policy) so far has required EMEP emission data for 1995-2000.

Special efforts have been made this year, to carefully select and scrutinize the sets of gridded data (both national totals and sector), national totals and sector data for each Party and area included in the EMEP domain, to be included in the scaling procedure at MSC-W. It is a challenge to select consistent datasets among the reported emission data available in the EMEP database. When the spatial distribution is selected from the UNECE/EMEP database, the gridded data is scaled according to the most recent totals and sector data reported/estimated (Tables 3.1-3.5).

The spatial distribution of emissions used in model calculations for 2000 is shown in figures 5.1-5.7. The colour maps shown for SO_2, NO_2, NH_3, NMVOC, CO, $PM_{2.5}$ and PM_{10} (figure 5.1-5.7) are in 50 km resolution. Grid elements appearing in groups of nine indicate that the 50x 50 km^2 distribution was not available for the corresponding country and that a 150x150 km^2 grid has been used instead. The emissions of NH_3 in the sea areas (Figure 5.3) are emissions from sector 8, Other mobile sources and machinery, reported by Norway and Sweden. For the particulate matter emissions, emission data from shipping, volcanoes and natural sources, together with emissions from North Africa and Remaining Asian Areas (Azerbaijan, Syria, Lebanon, Israel and parts of Uzbekistan, Turkmenistan, Iran, Iraq and Jordan) were not available.

The year 2000 base grid will be made available for scaling to emission years 1980-2000, 2010 and 2020 by the database user at: *http://webdab.emep.int/.*

The differences between the emission data input to the MSC-W modeling assessments for year 2000 and year 1999 for SO_2, NO_x, NH_3 and NMVOC is shown in figures 5.8-5.11, the colour scale is +-5 Gg (kilotons) in all cases. Warm/reddish colours indicate an increase, while cold/blue colours indicate a decrease of 2000 emissions relative to 1999 emissions. The most striking feature in figure 5.8, difference in SO_2, is the increase in SO_2 emissions in Turkey. The Spanish increase of SO_2 emissions can also be detected. Otherwise, the replacement of gridded data of older vintages used in 1999, by gridded data for year 2000 shows clearly up for most of the countries listed in Table 5.1; Spain, Ireland, United Kingdom, Denmark, Netherlands, Poland, Czech Republic, Slovakia, Slovenia, Hungary , Yugoslavia, Bulgaria and Russia. The replacement of the grids in 150x150km^2 by gridded 50x50km^2 data for Belarus, Ukraine and Greece, results in a better allocation of emission sources, and this shows up on the map as large blue squares with smaller red squares inside. This enhance of the source allocation is also evident on the NO_x (Figure 5.9) and NH_3 difference maps (Figure 5.10). The general increase of NO_x emissions from Spain, and Norwegian offshore activity can be clearly seen in Figure 5.9. In Figure 5.10 the revision by Germany of the 1999 NH_3 gridded distribution, together with the new gridded data from Netherlands and Denmark also shows up clearly. The most outstanding feature on the NMVOC difference map (figure 5.11), is the decrease in the emissions from Spain used for modeling. The difference is mainly due to the exclusion of emissions in sector 11, Other sources and sinks, for year 2000 compared to 1999.The replacement of the CORINAIR gridded data used for 1999 emissions with the year 2000 Swedish spatial distribution, the replacement of old 1999 gridded emissions from United Kingdom with new 1999 estimates, and the increase and reallocation of NMVOC emissions from the Norwegian off-shore industry is easy to spot.

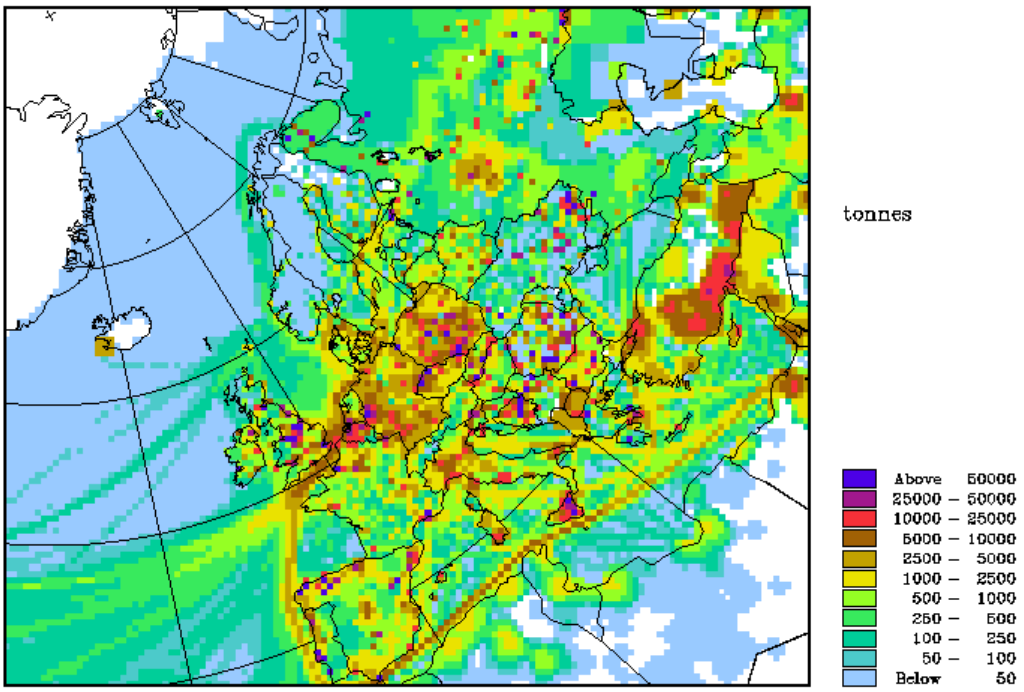

Figure 4.1 Emissions of sulphur in 2000 at 50km resolution (Mg as SO_2)

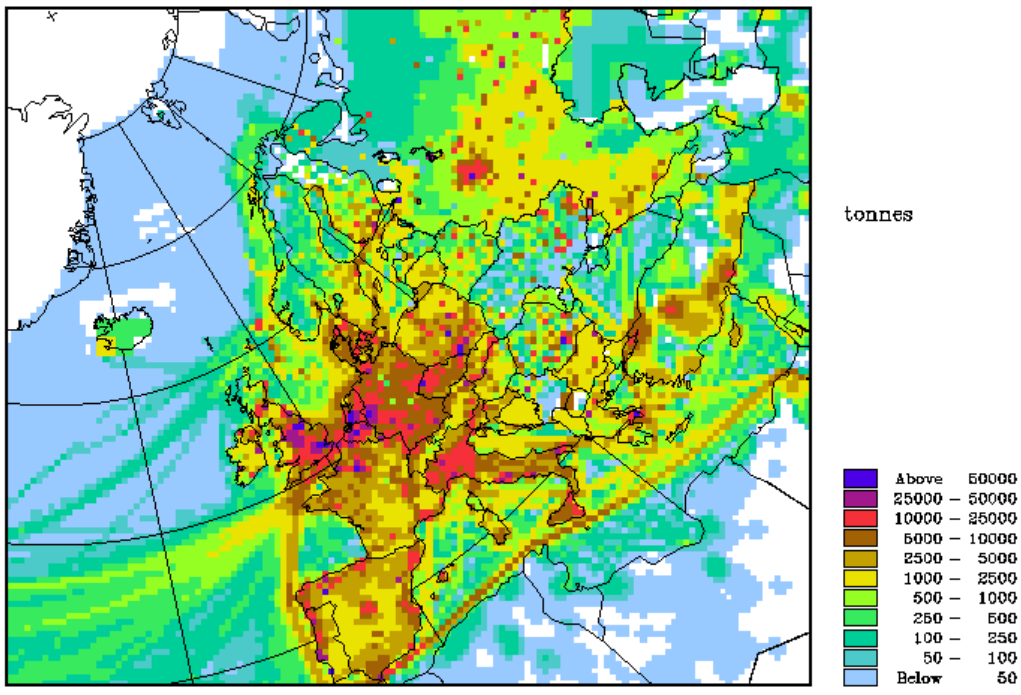

Figure 4.2 Emissions of nitrogen oxides in 2000 at 50km resolution (Mg as NO_2)

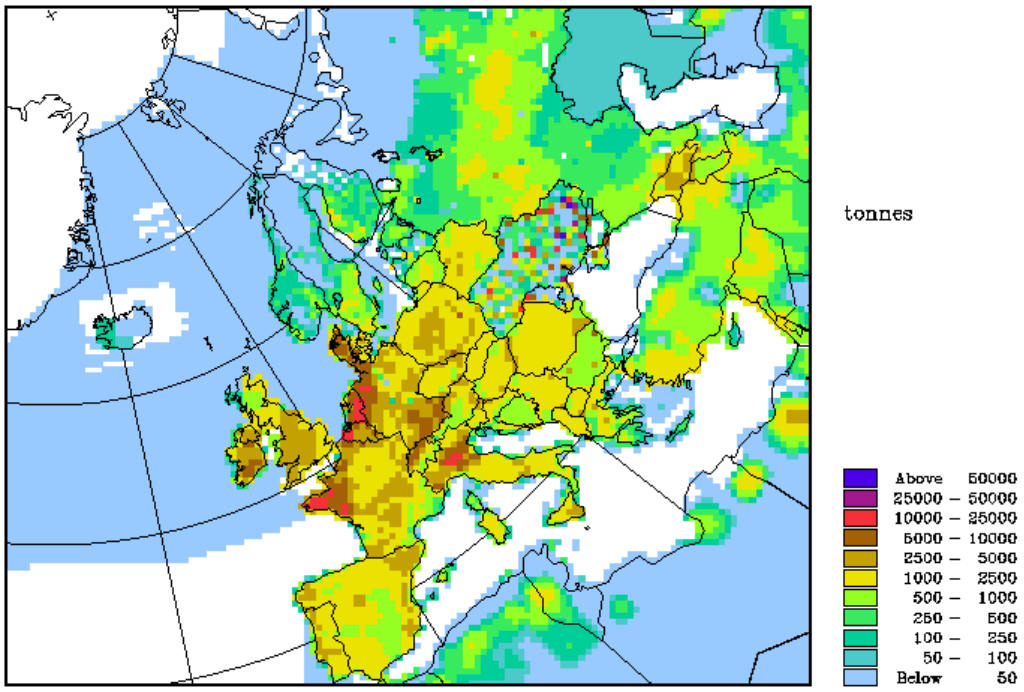

Figure 4.3 Emissions of ammonia in 2000 at 50km resolution (Mg as NH_3)

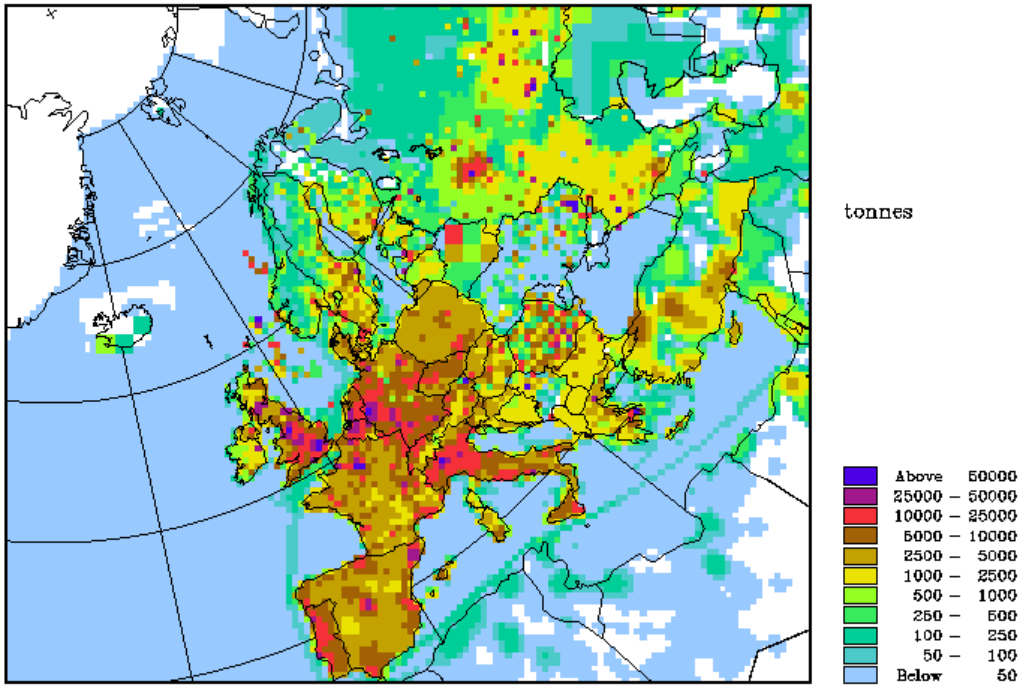

Figure 4.4 Emissions of non-methane volatile organic compounds in 2000 at 50km resolution (Mg as NMVOC)

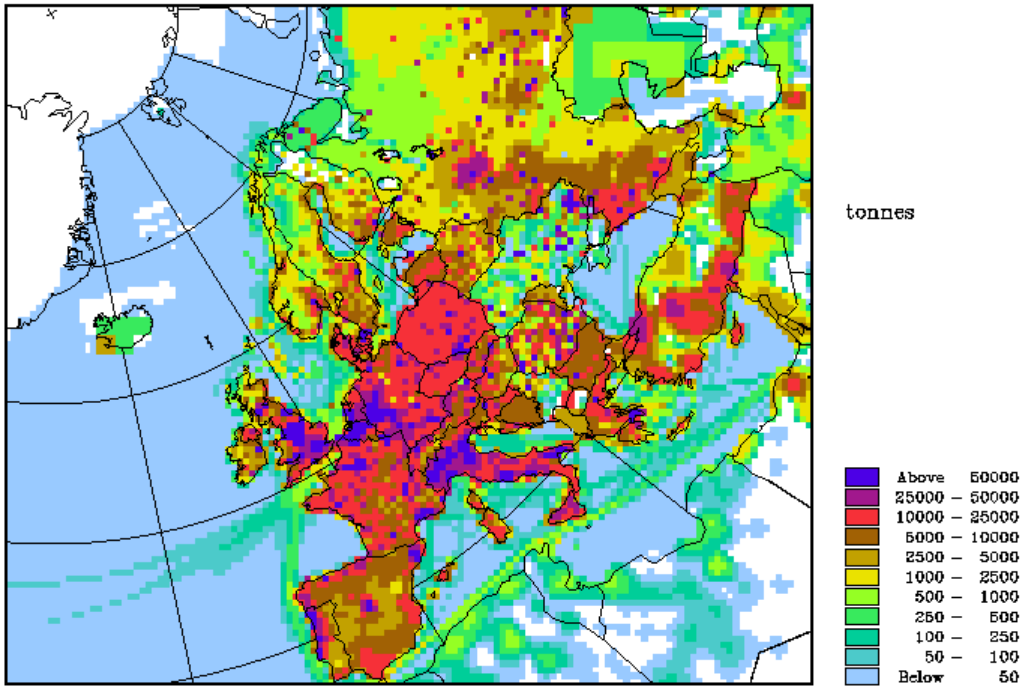

Figure 4. 5 Emissions of carbon monoxide in 2000 at 50km resolution (Mg as CO)

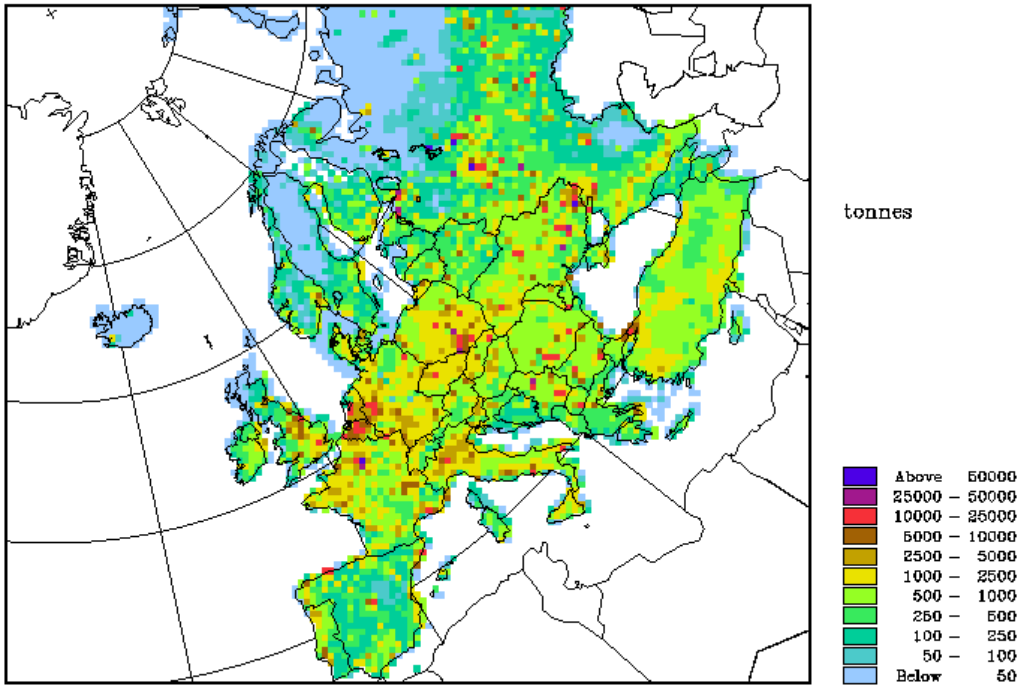

Figure 4.6 Emissions of PM_{10} in 2000 at 50km resolution (Mg as PM_{10})

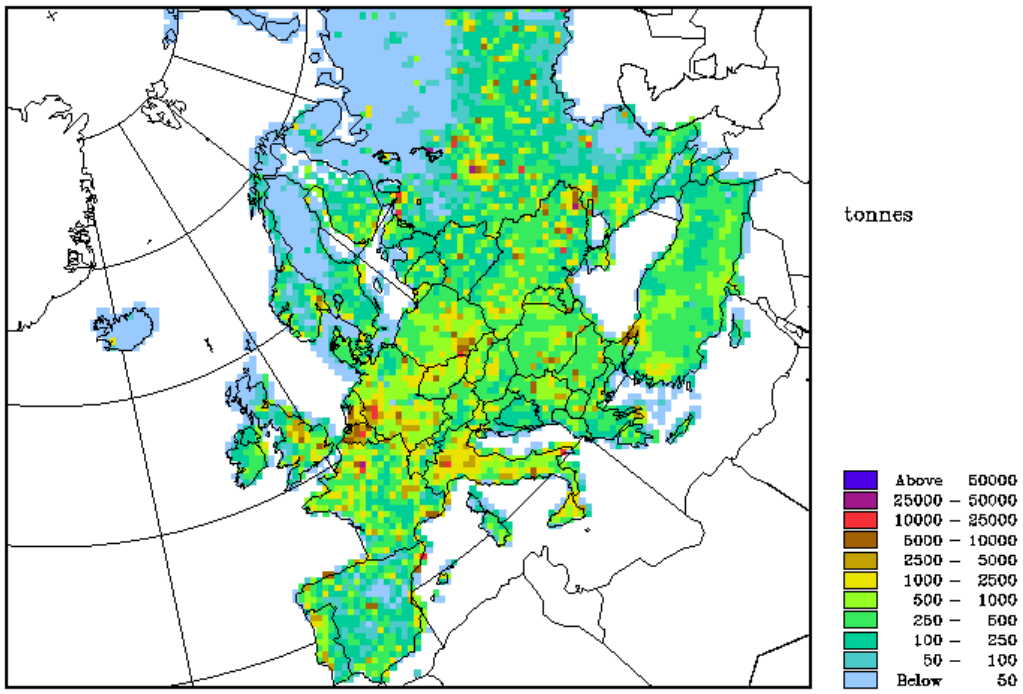

Figure 4.7 Emissions of $PM_{2.5}$ in 2000 at 50km resolution (Mg as $PM_{2.5}$)

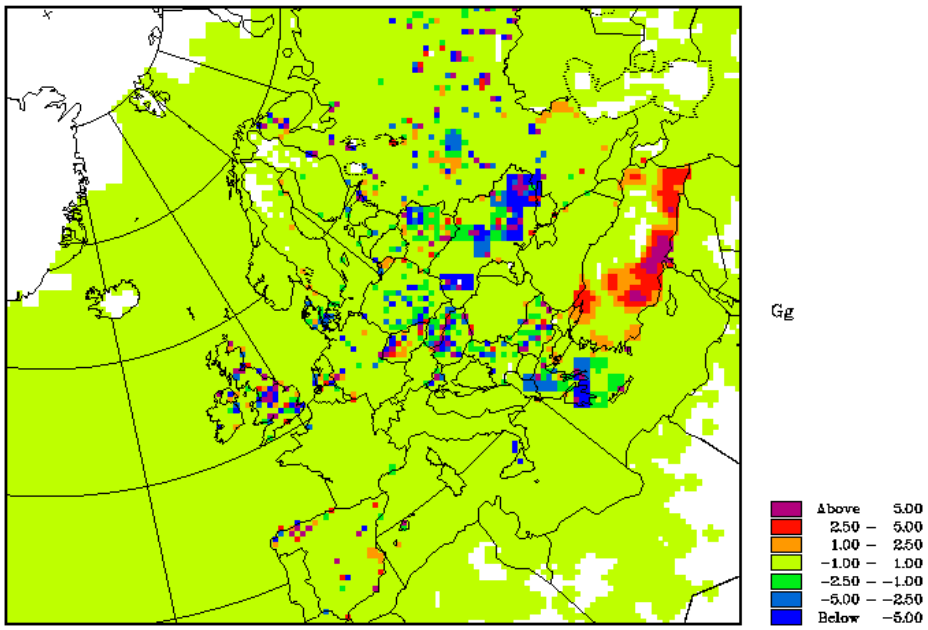

Figure 5.8 Difference between SO_2 emission input to modeling assessment for emission year 2000 and emission year 1999 (Gg SO_2)

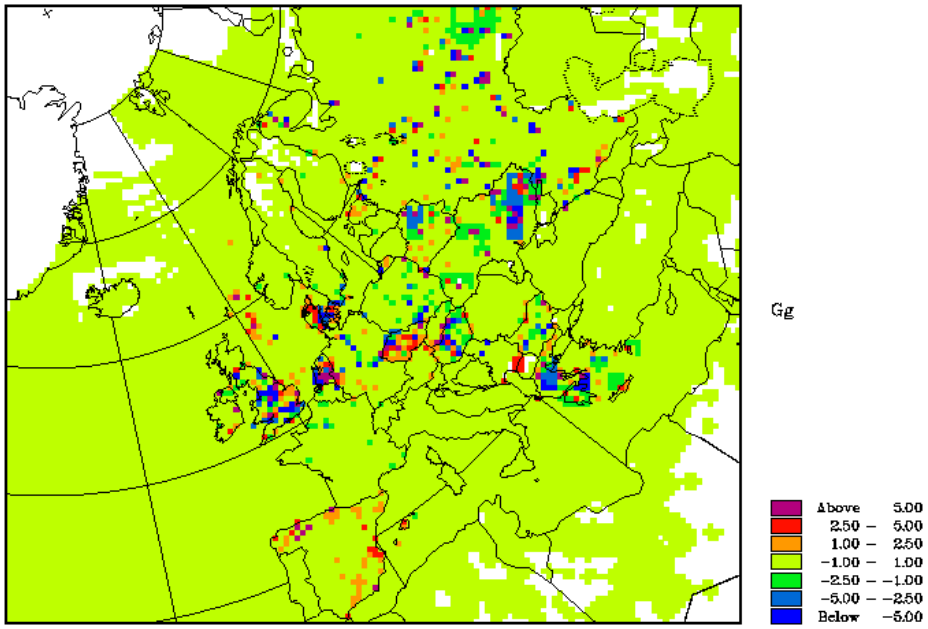

Figure 5.9 Difference between NO_2 emission input to modeling assessment for emission year 2000 and emission year 1999 (Gg NO_2)

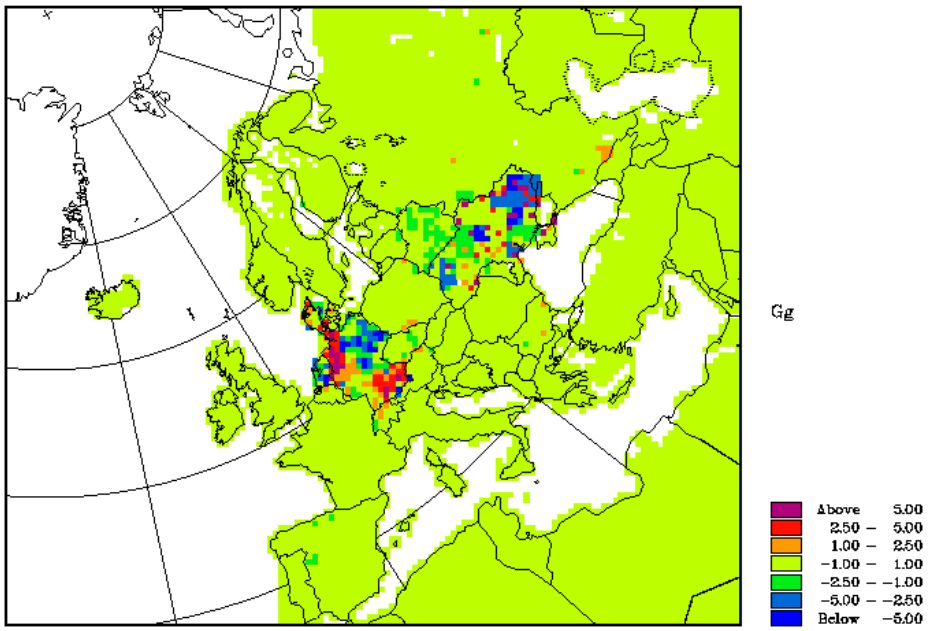

Figure 5.10 Difference between NH_3 emission input to modeling assessment for emission year 2000 and emission year 1999 (Gg NH_3)

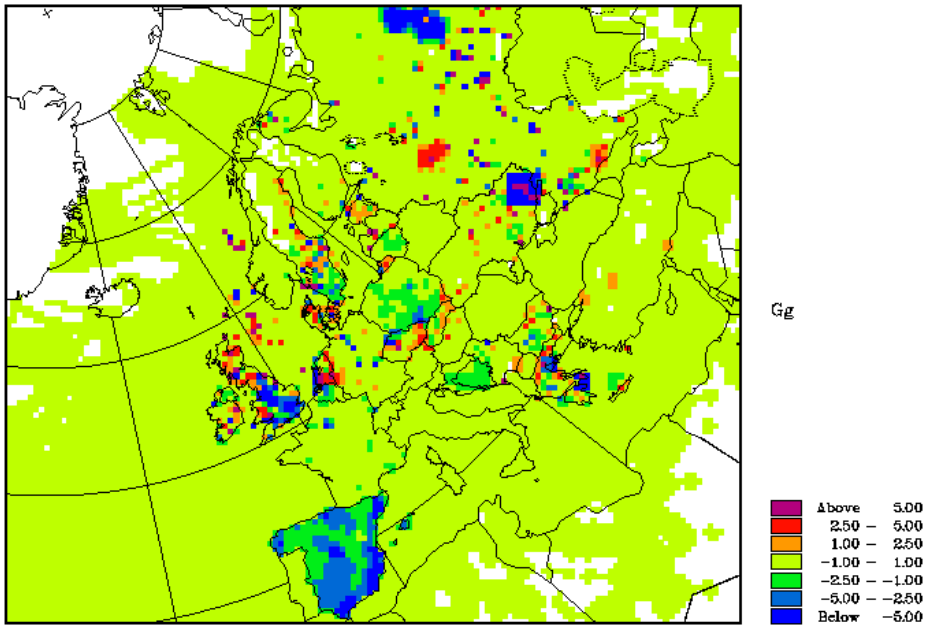

Figure 5.11 Difference between NMVOC emission input to modeling assessment for emission year 2000 and emission year 1999 (Gg NMVOC)

6. Conclusions

6.1 Quality Assurance

Much work has already been done within EMEP to increase the quality of the emission reporting to the Convention on LRTAP. The main achievement the last two years has been the development of the revised draft Guidelines for estimating and reporting emission data (EB.AIR/GE.1/2002/7). The EMEP/CORINAIR Guidebook has been further developed, and the Parties to the Convention make continuous efforts to enhance emission data quality.

The transparency and accessibility of the EMEP emission data is further increased by the development and release of the interactive database, WebDab, (The web version of the UNECE/EMEP database).

In order to further enhance the quality of the EMEP inventory, MSC-W has proposed a new reporting procedure, which we recommend to be implemented before the next reporting round. The proposal from MSC-W is to give the Parties access to a password protected part of the EMEP web site in the beginning of April, which highlight inconsistencies and other difficulties found after the consistency checking of the emission data. Within two weeks, Parties are then welcomed to correct and/or give additional comments directly on the web, to the data they officially submitted over the years. After this feedback from the Parties, the WebDab will annually be updated in June. Possible additional problems with the emission data might then be identified by WebDab users and reported back to EMEP upfront the TFEIP in the autumn and be discussed there.

The development of the EMEP web pages to include prefilled tables and templates for reporting lead to an increase in reporting of national total and sector emissions of 27 % between 1999 and 2000. The last three years, the number of submissions has remained relatively constant, and MSC-W concludes that prefilled tables in the future should only be available upon requests from the Parties.

The reporting of gridded data needs to be strengthened in order to further improve the results of the dispersion modeling. Ongoing work on updating the EMEP/CORINAIR Guidebook to include methodology on how to distribute the emissions spatially in the EMEP grid, together with development of software to assist the Parties in this work will most likely improve the completeness, comparability and quality of the gridded data in the EMEP inventory.

Reporting of HMs and POPs also needs to be improved. Identification of topics for update of the EMEP/CORINAIR Guidebook and/or scientific presentations during the Task Forces designed to highlight areas were the quality of the emission inventories needs enhancement, can assist Parties in the preparation and validation of their inventories, and should come even higher on the agenda in the TFEIP annual autumn meetings.

Year 2002 was the first year ever where all Parties submitted data in electronic form, and this decreases the risk of errors when loading data to the UNECE/EMEP database. However, some Parties did not respect the specified formats for reporting available. If Parties have difficulties in submitting emission data in the format specified by the Guidelines, they are welcomed to contact MSC-W for assistance.

The large increase in the reporting of disaggregated sector emission data is a result of the new draft Guidelines.

This was the first year reporting of particulate matter and activity data was requires to the Convention on LRTAP, and the reporting is regarded as satisfactory. Feedback from the Parties on difficulties discovered when preparing these types of emission data is appreciated. The identification of such problems should help EMEP to take measures to facilitate reporting by the Parties in the future.

The work under the Convention is dependent not only upon the number and quality of submissions, but also on the timeliness. The extension of the reporting deadline by one month did not have a significant effect on the number of submissions received strictly within deadline. However, year 2002 has the largest number of submissions included in the EMEP assessments. Parties that not respect the deadline for emission data submission set out in the Guidelines won't be included in the assessment work under the Convention of LRTAP in the future. It is essential that submissions are received within deadline, to allow for earlier distribution of the emission data, and facilitate the quality analysis of the submissions.

6.2 Trend analysis

There is still a lack of completeness, comparability and accuracy in the EMEP inventory of national total emissions for 1980-2000. The lack of officially reported data and the amount of inconsistencies are far more pronounced in the eighties than in the nineties.

The results of the efforts made to prepare a consistent set of emission data for input to trend analysis of ozone levels, acidification and eutrophication should be evaluated when the modeling results are available.

The emission reduction between 1990 and 2000 for the main components for the whole of the EMEP area is relatively constant compared to last year (1990-999), except for NO_x. The NO_x emissions have been reduced 25% between 1990 and 2000, while the reduction between 1990 and 1999 was 18%. A minor increase of the 1990 emissions, combined with a minor but three times lager decrease of 2000 emissions compared to 1999 emission caused this relatively large reduction increase.

The overall emission level of SO_2 and NO_x 1980-2000 has increased by 2-6% and 1% respectively, while the level of NH_3 and NMVOC has decreased by 1-3% and 3-8%.

The Russian Federation national total NO_x emissions for 1980-1986 will need to be revised to include all NO_x source sectors in order to give a more reliable estimate of the NO_x trends for the EMEP area.

The NH_3 emission trends before 1990 is not real but a result of gap filling assumptions at MSC-W, since emission data is missing for most countries.

New reported 2010 projections from the Russian Federation resulted in an increase in the 2010 projections for the whole of the EMEP area compared to last year.

Part 2:

Emission data reported to UNECE/EMEP:

PRESENTATION OF WEBDAB

1. Introduction

The purpose of the interactive Web database (WebDab) is to facilitate the access and use of the emission data reported to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) through the EMEP programme (Co-operative programme for monitoring and evaluation of long range transmission of air pollutants in Europe). Following the recommendations from the Steering Body to EMEP on its 25th session, emission data of Main Pollutants, Heavy Metals, Persistent Organic Pollutants and Particulate Matters is now available from WebDab, *http://webdab.emep.int/.*

The first release of WebDaB contains the most recent emission data officially submitted to the UNECE by the Parties to the CLRTAP for the years 1980 to 1999. These official submissions correspond to those documented in EB.AIR/GE.1/2001/7. Official emission data for year 2000 that MSC-W received from the UNECE secretariat before 31. March 2002, and documented in EB.AIR/GE.1/2002/8, is also included.

In addition to the officially reported emission data, WebDab also includes expert estimates provided by CEPMEIP/TNO and MSC-W. Expert estimates from CEPMEIP (Co-ordinated European Programme on Particulate Matter Emission Inventories, Projections and Guidance), included in WebDab are 1995 Particulate Matter emissions as documented on *http://www.air.sk/tno/cepmeip/*. Expert estimates provided by MSC-W concerns national total emissions for Main Pollutants (SO_2, NO_x, NH_3, NMVOC and CO) as documented in EMEP/MSC-W Status Report 2001, Emission data reported to UNECE/EMEP: Evaluation of the spatial distribution of emissions. Further, all the gridded data is regarded as MSC-W expert estimates.

Download of graphics are very slow and cumbersome. A change of the graphical package is planned for future releases of WebDab. Furthermore is the flat file format of ASCI downloads only preliminary. It is likely to be changed to a more standardized format.

2. Starting WebDab

When starting WebDab by using a Web-Browser, i.e. Internet Explore or Netscape, the Startup Page will appear (Figure 1). At the bottom of this page, there is a browser through the main pages of WebDab. The main pages of WebDab are:

- *Total / Sector Emissions* for download of national total and sector emission figures and barcharts
- *Grid Emissions* for the download of spatially distributed emission data and maps
- *User Guide*
- *Main Page* going back to the Startup Page

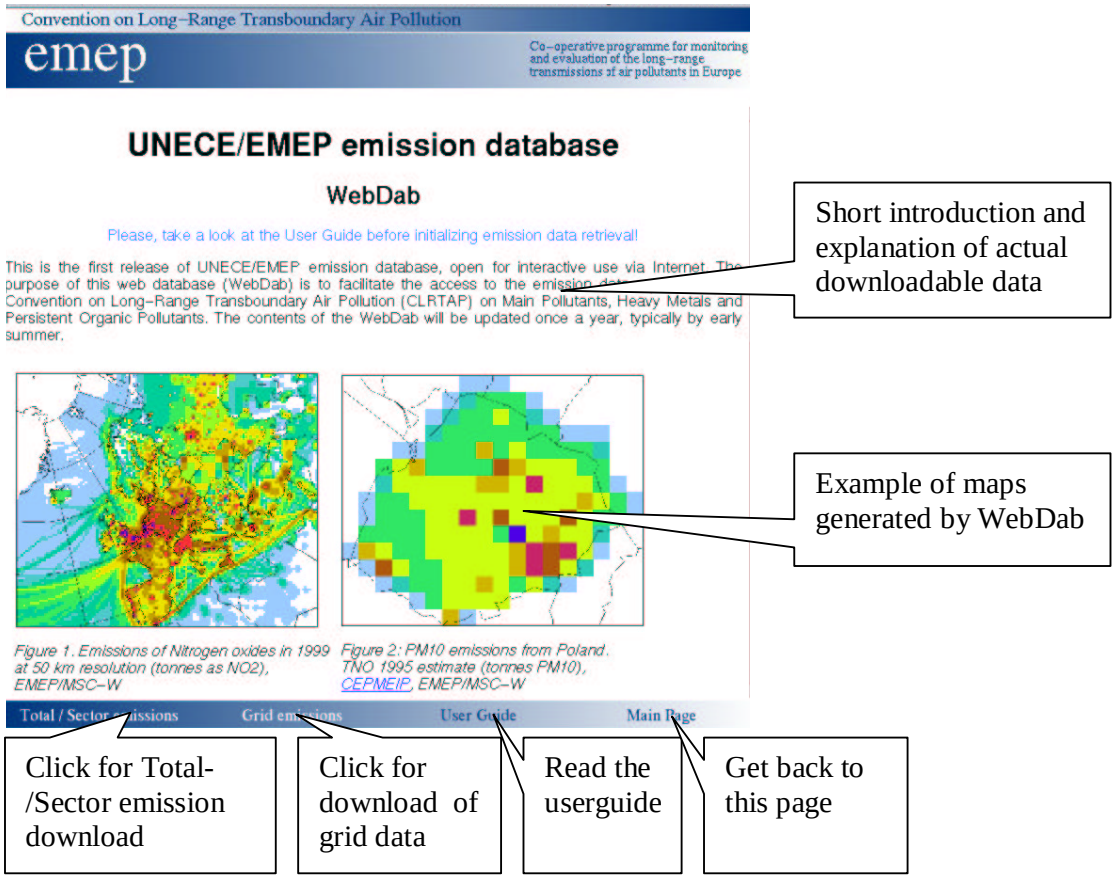

Figure 1: Startup Page of WebDab

3. Download of Total and Sector Emission Data

The window for downloading national or sector emissions is shown in Figure 2.Data can be distinguished by:

- Area
- Year
- Pollutant
- Emission Category, *National Total* or *Sector data*
- Origin, *Official Reported* and/or *Expert Estimates*

In addition, three different types of data download are possible:

- HTML table
- ASCII (flat file format)
- Barcharts

The default axes of the HTML table and the groups of the barcharts can be changed according to the user's choise.

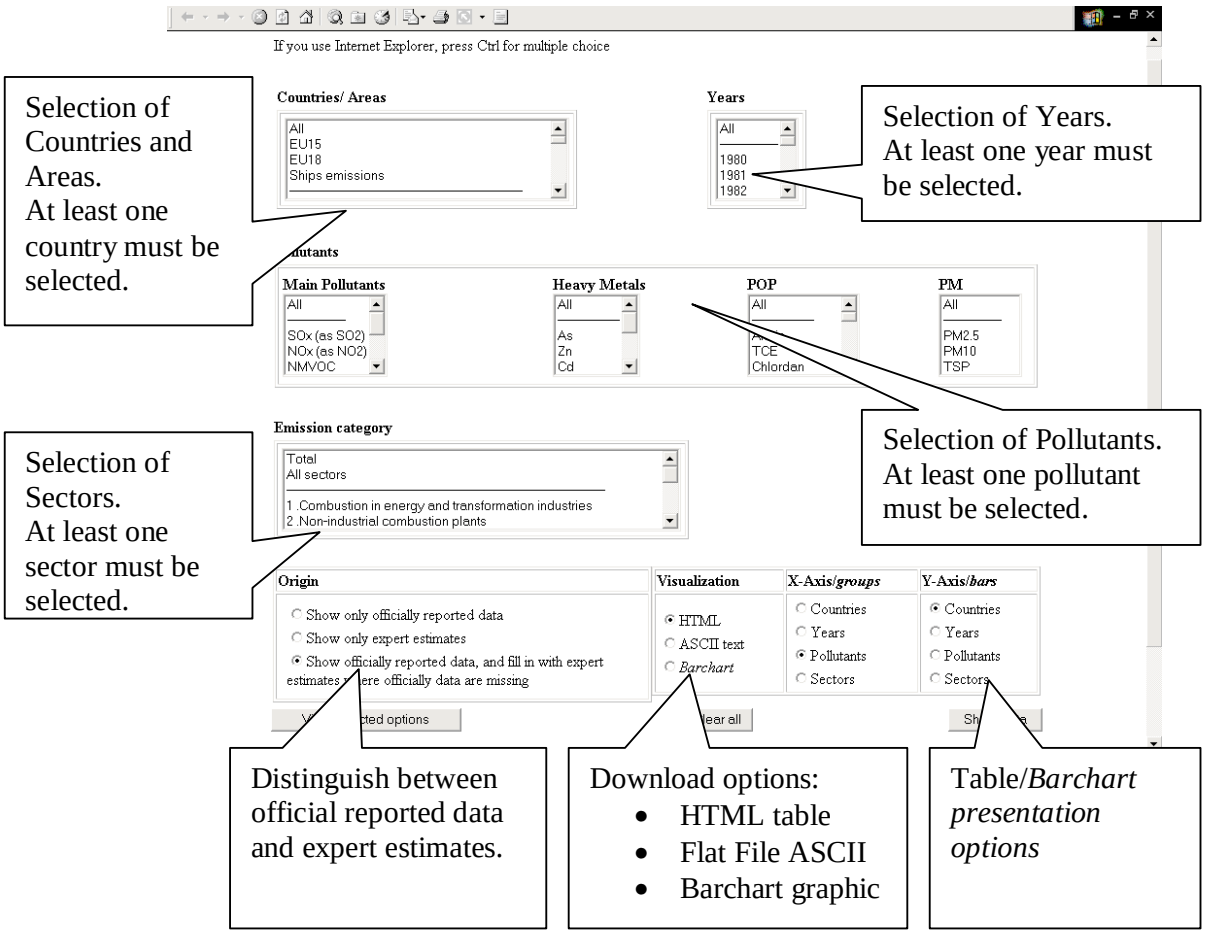

Figure 2: National / Sector Selection

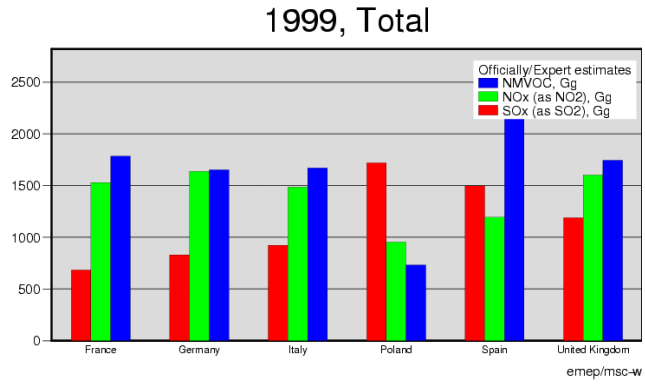

Figure 3: Example of a barchart with Pollutants as "groups" and "countries" as bars

4. Download of Grid Emission Data

The window for downloading of grid emissions is shown in Figure 4. All grid emission data are regarded as MSC-W expert estimates. Data can be distinguished by:

- Area
- Year
- Pollutant
- Emission Category
- Grid Resolution, EMEP 50x50km^2, EMEP 150x150km^2, 1˚x1˚
- Scale of the map
- Area of coverage for the map

Data download is possible as:

- ASCII flat file format
- Map of Emissions

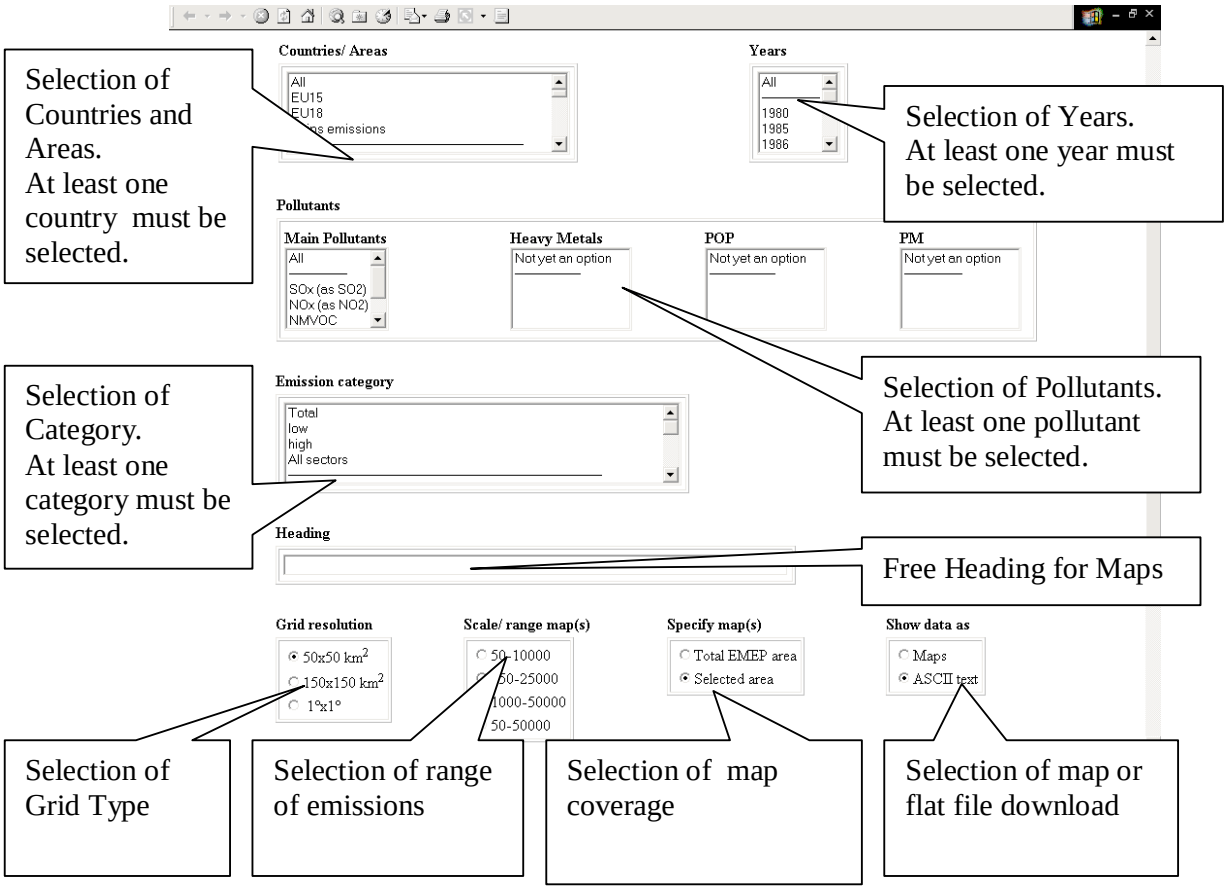

Figure 4: Grid Selection

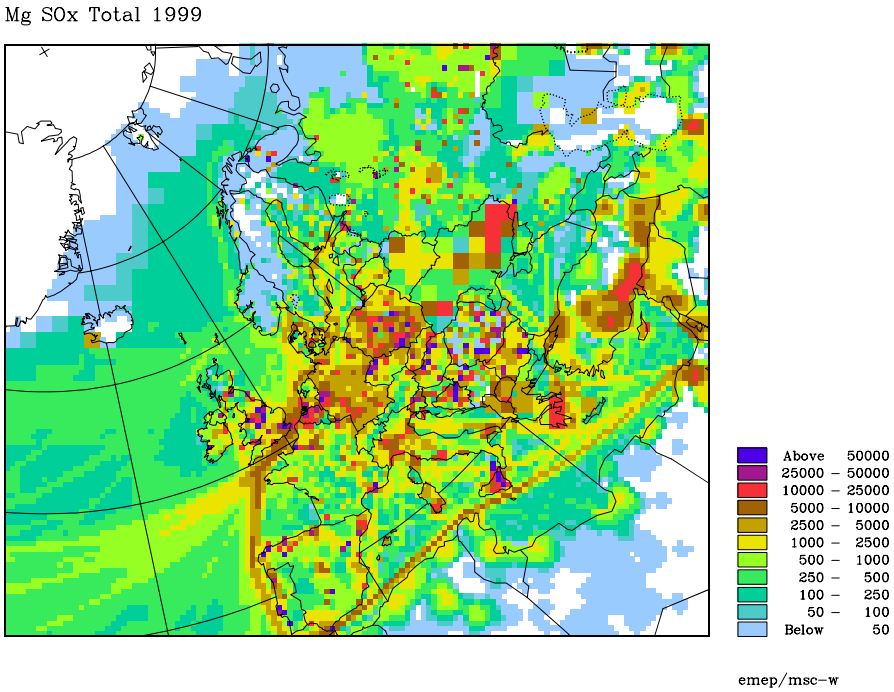

Figure 5: Example of an EMEP50 Map

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Annex I:

Overview of officially reported anthropogenic national total emissions

All emission figures included in this Annex refer to Parties to the LRTAP Convention only. They are drawn from official reports to the UNECE/EMEP Secretariat, that MSC-W received by 31. March 2002.

The emissions figures listed in Tables 1-10 is the emissions reported in accordance with the EB.AIR/GE.1/2001/6 and Add.1 Guidelines as PROTOCOL TOTALS; that is national total emissions not including emissions in Sector 11, Other Sources and Sinks, and overseas areas. Tables 11-20 give overviews of emission data (national totals, sector level 1, sector level 2, and gridded emission data) available from the EMEP/UNECE database. Table 21 list the percentage emission reductions (1990-2000) for Parties to the Convention on LRTAP, both Signatories and non Signatories to the Gothenburg Protocol.

EMEP emission data is available at: *http://webdab.emep.int*.

Table 1: Anthropogenic emissions of sulphur (1980-1992) in the ECE region (Gg SO_2 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia	141.0	110.7	101.3	110.3	96.9	100.2	111.2	110.6	104.1	62.7	72.00	59.5	44.1
Austria	384.6	334.2	316.3	237.4	211.7	190.1	171.5	153.0	115.0	101.8	90.74	81.83	63.00
Belarus	740	730.0	710.0	710.0	690.0	690	690	761	720	668	637	652	458
Belgium	828	712	694	560	500	400	377	367	354	325	357.0	329.9	315.3
Bosnia and Herzegovina											480.0		
Bulgaria	2050							2420	2228	2180	2008	1665	1115
Canada	4643	4291	3612	3625	3955	3692	3627	3762	3838	3695	3236	3245	3117
Croatia[abc]	150.0										180.0	108.0	106.7
Cyprus	28	28	33	30	33	35	38	39	42	42	46	33	39
Czech Republic	2257	2341	2387	2338	2305	2277	2177	2164	2066	1998	1876	1776	1538
Denmark[d]	452.1	370.4	378.7	322.9	305.5	339.6	287.8	254.9	250.0	196.7	180.6	239.0	186.3
Estonia	287					254	256	255	254	254	252.1	245.6	187.4
Finland	584	534	484	372	368	382	331	328	302	244	260	194	141
France[df]	3249	2554	2442	2009	1791	1493	1364	1349	1241	1401	1341	1450	1275
Georgia[g]	230.2	242.1	250.1	267.3	266.6	273.2	255.3	258.3	255.3	249.1	248.3	194.0	135.2
Germany[hi]	7514	7441	7440	7346	7633	7732	7641	7396	6487	6165	5321	3996	3307
Greece	400					500					479	520	534
Hungary	1633	1580	1545	1480	1440	1404	1362	1285	1218	1102	1010	913.0	827.3
Iceland[jk]	17.8	17.8	17.8	18.2	18.8	18.1	18.4	16.2	17.5	17.3	24.0	23.1	23.9
Ireland	222	192	158	142	142	140	162	174	152	162	185.7	180.2	171.5
Italy	3757	3330	2850	2463	2114	1901	1929	2029	1963	1854	1651	1539	1394
Kazakhstan											1156	1296	1296
Kyrgyzstan												52.1	40.8
Latvia											119.2	90.37	79.33
Liechtenstein	.31	.29	.27	.25	.23	.2	.18	.17	.15	.13	.113	.1075	.101
Lithuania	311	312	304	310	303	304	316	316	300	298	222	234	139
Luxembourg	24			14		16					15		
Malta													
Monaco											.063	.091	.094
Netherlands	490	464	404	323	299	258	264	263	250	204	202.4	173	172
Norway	136.8	128.0	110.7	103.8	95.8	98.2	91.4	72.61	67.6	57.90	52.55	44.17	36.37
Poland	4100					4300	4200	4200	4180	3910	3210	2995	2820
Portugal[l]	266			306.0		198	234.0	218.0	204.0		359.4	345.6	409.0
Republic of Moldova [mno]	308	305	287	284	270	282	297	317	273	238	265	259.8	168.2
Romania	1055	1095	1104	1229	1223	1255	1293	1305	1469	1517	1311	1041	951.0
Russian Federation[pq]	7323	7110	7252	7095	6663	6350	5880	5806	5333	4875	4671	4603	4033
Slovakia	780					613	604	614	589	573	542	445	380
Slovenia	234	254	256	274	250	241	247	222	210	211	196	180	186
Spain[d]	3013	2937	2902	2920	2671	2526	2396	2262	1900	2247	2167	2161	2127
Sweden	491.0	431.0	371.0	305.0	296.0	266.0	272.0	228.0	224.0	160.0	111.1	101.5	89.15
Switzerland	116	108	100	92	84	76	68	62	56	49	41.96	41	38
The former Yugoslav Republic of Macedonia													
Turkey[r]	204.5	218.0	236.7	299.1	360.8	519.8	674.4	606.4	443.1	740.7	764.6	840.6	821.3
Ukraine	3849	3492	3427	3498	3470	3463	3393	3264	3211	3073	3782	2538	2376
United Kingdom	4859	4401	4190	3851	3702	3720	3880	3875	3812	3698	3721	3534	3462
United States	23501	22251	20993	20449	21292	21463	20795	20580	21005	21132	21478	20901	20687
Yugoslavia	406	408	409	440	456	478	470	484	502	506	508	446	396
European Community[s]											16325	14801	13590

[a] 1990-1998: Distributed according to SNAP90

[b] 1999: Distributed according to SNAP97

[c] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period

[d] Data include those located within the EMEP area only

[f] National totlas do not include the international air traffic and the international sea traffic

[g] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable

[h] Emissions from 1980-1986 are not updated

[i] Emissions from international air traffic, marine bunkers and managed forests are not included

[j] 2/3 of the SO2 emissions are emitted as H2S

[k] Emissions in 1980 and 1981 are assumed to be similar to 1982 due to lack of data

[l] Emissions from 1990 onwards are calculated using the categories of SNAP97

[m] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[n] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[o] SOx emissions 1980-1989 and NOx emissions 1980-1984 do not include mobile sources

[p] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[q] Since 1980 the SO2 emission data were updated taking into account emissions from mobile sources (agricultural engineering, road-building machinery and railway transportation).

[r] SO_2 emissions from all sectors in the fuel combustion were calculated for 1999 only.

[s] The EC inventory relies on the availability and submission of Member States data. However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under the UNFCCC (SO_X, NO_X, CO and NMVOC) have been used (see the latest EC submission to the UNFCCC as compiled by EEA and ETC/ACC '*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001'*)

Table 1 Continued: Anthropogenic emissions of sulphur (1993-2000, 2010, 2020) in the ECE region (Gg SO_2 per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	5.5	4.2	2.5	1.5	.400	3.310	.84[a]	8.403		
Austria	60.40	56.32	53.82	52.80	50.67	45.77	41.43	40.75	39.0	
Belarus	382	324	275	246.3	208.5	190	163.7	142.8	480	
Belgium	293.9	252.2	245.4	240.3	219.2	212.5	180.8		106	
Bosnia and Herzegovina										
Bulgaria	1426	1480	1476	1420	1365	1251	943	982.0[b]	856	702
Canada	3008	2651	2681	2722	2749	2766	2499	2534	2914	3086
Croatia[cde]	113.7	89.3	70.4	66.2	80.4	89.5	90.7		70	
Cyprus	43	42	41	45	47	49	50	50	39	
Czech Republic	1419	1270	1091	946	701	443	269	264.7	283	
Denmark[f]	152.5	156.6	149.0	179.4	109.7	75.36	54.68	27.50	50	
Estonia	153.8	149.1	118.5	125.2	119.0	110.0	102.5	95.46	57.4	
Finland	123	114	96	105	99	90	87	73.5	110	
France[fh]	1110	1054	995	970	824	862	735	659	375[i]	
Georgia[j]	71.4	46.9	20.3	30.1	33.1	20.18	8.61			
Germany[kl]	2945	2473	1994	1405	1127	899	831		550	
Greece	533	505	528	518	511	518	531		546	
Hungary	757.3	741.0	705.0	673.2	658.5	591.8	590.1	485.3[m]	550	480
Iceland[no]	24.5	23.8	23.9	24.1	24.5	26.8			29.4	
Ireland	160.8	175.0	161.2	147.4	166.0	176.0	157.4	131.5	42	
Italy	1333	1271	1322	1250[p]	1075[p]	1039[p]	923[p]		842	
Kazakhstan	1285	1093	1083	804.5	937.9	961.2	881.0	948.0		
Kyrgyzstan	31.6	21.0	15.7	14.0	9.9	10.8	8.72			
Latvia	73.81	86.30	58.98	59.27	43.85	39.84	30.91	18.06	29.03	46.22
Liechtenstein	.0938	.0844	.0789	.0743	.0689	.0642	.06	.0534	.05	.05
Lithuania	125	117	94	93	77	94	70	43.1	145	
Luxembourg	15.00	13	9	8	6	4	3.822	3.092	4	
Malta										
Monaco	.100	.089	.085	.076	.073	.071	.075	.067		
Netherlands	164	146	141.4	135	118	108.0	102.9	91.2[m]	50	
Norway	35.03	34.58	33.57	32.78	30.02	29.57	28.46	26.21	29.50	
Poland	2725	2605	2376	2368	2181	1897	1719	1511	1397	
Portugal[q]	360.0	338.9	365.6	323.4	341.3	374.9				
Republic of Moldova [rst]	156.4	108.5	64.06	67.03	36.13	32.08	12.05		135	
Romania	928.0	912.0								
Russian Federation[uv]	3637	3131	2969	2774	2524	2275	2062	1997	2400	
Slovakia	325	238	239	227	202	179	171	120[m]	210	
Slovenia	183	177	125	112	118	123	104	96	27	
Spain[f]	1998	1952	1808	1577	1716	1601	1621	1535		
Sweden	79.75	80.78	68.56	74.34	65.61	63.41	53.71	57.65	67[wx]	
Switzerland	34	31	33.55	30	26	27.6	25.5	19.26	26	17.7
The former Yugoslav Republic of Macedonia					17.00	105.0[y]		105.2		
Turkey[Z]	767.8	991.5	1007	1165	1225	1354	2104	1347	995.0	
Ukraine	2194	1715	1639	1293	1132				2310	
United Kingdom	3115	2676	2363	2025	1665	1588	1210	1165	586	447
United States	20387	19840	17406	17621	18068	18182	17533	16483	15167	14351
Yugoslavia	401	424	462	434	522	521	355	387	1135	
European Community[A]	12351	11198	10138	8840	7969	7549	6803			

[a] Reduction of emissions from 1993 onwards is explained by the blocade of communications in Armenia followed by a drop in energy production. The reduction of the SO2 in 1999 can be explained by the fact that in 1999 all heating enterprises used natural gas as fuel
[b] Emissions are calculated on the base of the total quality of the used fuels by sectors
[c] 1990-1998: Distributed according to SNAP90
[d] 1999: Distributed according to SNAP97
[e] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period
[f] Data include those located within the EMEP area only
[h] National totals do not include the international air traffic and the international sea traffic
[i] Emissions corresponds to the National Emission Ceilings (NEC)
[j] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable
[k] Emissions from 1980-1986 are not updated
[l] Emissions from international air traffic, marine bunkers and managed forests are not included
[m] Preliminary data
[n] 2/3 of the SO2 emissions are emitted as H2S
[o] Emissions in 1980 and 1981 are assumed to be similar to 1982 due to lack of data
[p] Emissions for 1996-1999 estimated according to SNAP97
[q] Emissions from 1990 onwards are calculated using the categories of SNAP97
[r] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy
[s] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions
[t] SOx emissions 1980-1989 and NOx emissions 1980-1984 do not include mobile sources
[u] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.
[v] Since 1980 the SO2 emission data were updated taking into account emissions from mobile sources (agricultural engineering, road-building machinery and railway transportation).
[w] International transport (ie aviation and navigation) is not included in national totals except for the CO2 figure for 1980
[x] Emissions ot SO2 and NOx from domestic navigation/coatal shipping, for the years 1980-1993, are assumed to account for 30% of the total emissions from shipping in Sweden
[y] Data are for sectors 1-6 only. Data for sectors 7-11 are not yet ready.
[z] SO_2 emissions from all sectors in the fuel combustion were calculated for 1999 only.
[A] The EC inventory relies on the availability and submission of Member States data. However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under the UNFCCC (SO_X, NO_X, CO and NMVOC) have been used (see the latest EC submission to the UNFCCC as compiled by EEA and ETC/ACC '*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001*')

Table 2: Anthropogenic emissions of nitrogen oxides (1980-1992) in the ECE region (Gg NO_2 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia		15.4	17.2	16.6	15.7	44.8	53.0	51.5	55.5	51.2	46.20	40.0	21.8
Austria	227.3	219.6	217.6	214.8	213.8	215.8	211.9	208.3	200.7	192.9	201.8	205.4	196.7
Belarus	234	235.0	235.0	237.0	240.0	238	258	263	262	263	285	281	224
Belgium	442					325	317	338	345	357	320.6	325.5	334.3
Bosnia and Herzegovina													
Bulgaria								416	415	411	361	256	230
Canada	1959	1907	1897	1884	1871	2038	2043	2131	2204	2188	2104	2003	1997
Croatia[abc]	60.00										87.6	65.0	56.2
Cyprus	13	13	14	14	14	14	15	16	17	17	18	16	19
Czech Republic	937	819	818	830	844	831	826	816	858	920	742	725	698
Denmark[d]	273.2	243.2	264.1	257.0	270.3	295.1	314.8	307.7	299.9	283.3	276.9	319.5	273.9
Estonia								70	70	69	67.7	63.33	39.35
Finland	295	276	271	261	257	275	277	288	293	301	300	290	284
France[df]	2011	1906	1890	1871	1862	1834	1796	1823	1833	1890	1899	1963	1918
Georgia[g]	121.0	125.6	130.0	137.6	137.3	140.4	133.8	134.1	134.6	130.6	129.5	112.5	47.8
Germany[hi]	3334	3259	3219	3258	3305	3276	3286	3327	3208	2989	2706	2493	2303
Greece						306		320.0[j]	304		311	310	304
Hungary	272.9	270	268	266	264	262.5	264.2	264.9	257.8	246.8	238.0	203.1	183.3
Iceland	21.2	21.2	21.2	21.8	21.7	20.5	22.3	24.0	24.9	25.3	26.3	26.7	28.4
Ireland	73	86	86	85	84	91	100	115	122	127	118.1	119.5	130.4
Italy	1638	1604	1605	1583	1596	1614	1690	1811	1854	1917	1938	1984	2010
Kazakhstan											355.7	400.5	377.9
Kyrgyzstan												20.0	8.9
Latvia											92.28	74.20	62.91
Liechtenstein	.58	.59	.59	.6	.6	.6	.6	.59	.59	.58	.525	.5029	.4788
Lithuania	152	154	156	158	162	166	169	171	172	173	158	166	98
Luxembourg	23			21		21		19.77			23		
Malta													
Monaco											.530	.636	.684
Netherlands	583	575	562	555	573	589	587	599	602	584	573.8	568	556
Norway	194.0	177.7	182.0	186.7	201.0	212.8	227.9	233.9	224.0	228.9	226.5	215.2	213.9
Poland	1229					1500	1510	1530	1550	1480	1280	1205	1130
Portugal[k]	166.0			192.0		96	110.0	116.0	122.0		317.0	332.7	354.4
Republic of Moldova [lmn]	58	57	50	42	44	66	72	71	74	70	100	97	67.3
Romania	523.0	528.0	516.0	542.0	546.0	542.0	559.0	580.0	590.0	579.0	546.0	464.0	357.0
Russian Federation[opq]	1734	1915	2002	1976	1879	1903	1871	3411	3287	3335	3600	3435	3123
Slovakia								197		227	215	194	181
Slovenia	51	52	52	51	52	53	58	57	59	58	63	58	58
Spain[d]	1138	1043	1033	1056	1069	1038	1062	1121	1156	1257	1279	1379	1354
Sweden	404.0	417.0	412.0	401.0	411.0	426.0	432.0	437.0	432.0	418.0	348.9	340.2	328.3
Switzerland	170	172	174	175	177	179	176	174	172	169	153.7	146	138
The former Yugoslav Republic of Macedonia													
Turkey	363.9	377.1	407.5	433.0	459.4	483.0	528.3	569.6	570.7	609.2	643.7	649.1	667.3
Ukraine	1145	1145	1153	1153	1102	1059	1112	1094	1090	1065	1097	989.0	830.0
United Kingdom	2580	2497	2486	2498	2458	2540	2624	2736	2791	2791	2763	2637	2558
United States[r]	22121	22397	21819	21704	22581	21045	20480	20654	21517	21676	21747	21979	22367
Yugoslavia	47	50	50	53	58	58	58	60	63	62	66	57	49
European Community[s]								13446	13464	13563	13292	13195	12882

[a] 1990-1998: Distributed according to SNAP90

[b] 1999: Distributed according to SNAP97

[c] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period

[d] Data include those located within the EMEP area only

[f] National totlas do not include the international air traffic and the international sea traffic

[g] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable

[h] Emissions from 1980-1986 are not updated

[i] Emissions from international air traffic, marine bunkers and managed forests are not included

[j] Emissions reported for 1980-1985 are to be regarded as indicators only, and are not comparable to the emissions reported after 1985

[k] Emissions from 1990 onwards are calculated using the categories of SNAP97

[l] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[m] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[n] SOx emissions 1980-1989 and NOx emissions 1980-1984 do not include mobile sources

[o] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[p] NO2 figures for 1980-1987 refer to stationary and road vehicles only. NO2 emission data from 1987 to 1989 were updated taking into account emissions from railway transportation, agricultural engineering and road-building machinery.

[q] Since 1987 the NOx emissions have been updated according to the instruction of the Ministry of natural resources of Russia for a such sources as road transport, other mobile sources etc. NOx emissions data for earlier period (before 1987) have not been corrected.

[r] The NO_2 emissions for the base year, 1978, is 21830 Gg

[s] For the time series 1987-1989, data as submitted under the Environmental Information and Observation Network (EIONET) have been used. As no officially agreed data gap filling procedure exists, data gaps were filled by EMEP data and EEA interpolations. For the time series 1990-1999, data as compiled for the EC UNFCCC submission was used (‘*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001’*).

Table 2 Continued: Anthropogenic emissions of nitrogen oxides (1993-2000, 2010, 2020) in the ECE region (Gg NO_2 per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	12.1	11.9	14.9	11.4	15.10	10.95	10.61	9.97		
Austria	190.8	193.8	182.7	180.9	184.7	181.5	181.9	183.6	107.0	
Belarus	207	203	195	172.7	188.5	164	142	134.8	180	
Belgium	330.3	333.2	324.9	314.8	305.8	312.1	288.9		181	
Bosnia and Herzegovina										
Bulgaria	242	230	266	259	225	223	202	184.4[a]	266	195
Canada	2006	2026	2032	2011	2068	2051	2056	2058	2085	1589
Croatia[bcd]	59.3	65.5	65.7	68.6	73.3	76.0	72.1		87	
Cyprus	20	20	19	21	21	22	22	23	23	
Czech Republic	574	435	412	432	423	413	390	397.7	286	
Denmark[e]	273.7	277.9	261.4	305.6	266.0	239.7	220.9	207.2	133	
Estonia	38.05	41.08	42.06	44.36	44.75	46.01	39.62	41.40		
Finland	282	282	258	268	260	252	247	235.8	170	
France[eg]	1797	1746	1709	1686	1611	1584	1515	1432	810[h]	
Georgia[i]	32.5	20.8	26.6	49.6	54.5	42.35	30.14			
Germany[jk]	2189	2038	1967	1877	1781	1709	1637		1081	
Greece	306	312	309	318	326	351	340		344	
Hungary	184.0	187.4	190.1	195.8	199.5	202.6	200.7	187.2[l]	198	198
Iceland	29.3	29.2	28.4	29.6	28.6	27.7			30.0	
Ireland	119.1	115.3	115.3	119.9	118.5	121.8	118.5	125.1	65	
Italy	1990	1789	1768	1744[m]	1662[m]	1594[m]	1485[m]		1436	
Kazakhstan	372.2	296.6	282.7	252.0	213.2	228.0	205.2	200.9		
Kyrgyzstan	6.5	3.3	3.4	3.5	3.5	3.6	2.38			
Latvia	56.54	48.04	41.76	34.57	44.78	42.11	35.65	33.63	39.58	49.29
Liechtenstein	.4549	.4398	.4188	.404	.3912	.3763	.3618	.3549	.3	.25
Lithuania	78	77	65	65	57	60	54	47.5	110	
Luxembourg	25.00	23	21	22	18	17	16.09	17.03	11	
Malta										
Monaco	.634	.623	.579	.557	.553	.518	.551	.590		
Netherlands	535	510	483.5	501	453	428.5	421.7	421.0[l]	260	
Norway	223.4	221.7	222.7	232.2	235.1	236.5	239.5	223.2	193.9	
Poland	1120	1105	1120	1154	1114	991	951	838	879	
Portugal[n]	341.8	344.9	357.8	354.4	360.9	369.3				
Republic of Moldova [opq]	53	46.2	38.2	38	36.5	21.7	16.91		90	
Romania	318.0	319.0								
Russian Federation[rst]	3054	2667	2570	2467	2379	2488	2494	2357	3300	
Slovakia	174	165	174	132	125	130	118	106[l]		
Slovenia	63	66	67	70	71	64	58	58	45	
Spain[e]	1312	1344	1355	1298	1330	1325	1379	1419		
Sweden	319.1	334.2	309.2	309.4	291.4	277.2	267.2	246.6	148[uv]	
Switzerland	129	124	120	113	107	104	99	95.69	79	66
The former Yugoslav Republic of Macedonia					6.000	15.22[w]		30.4		
Turkey	747.7	730.9	800.5	873.0	879.3	862.7	952.1	951.1	2044[x]	
Ukraine	700.0	568.0	531.0	467.0	455.2				1094	
United Kingdom	2361	2263	2088	2014	1844	1732	1604	1512	1084	973
United States	22741	22925	22675	23071	23332	23114	22437	21713	17498	14362
Yugoslavia	54	52	59	57	66	66	46	50	147	
European Community[y]	12246	11872	11509	11326	10872	10499	10136			

[a] Emissions are calculated on the base of the total quality of the used fuels by sectors
[b] 1990-1998: Distributed according to SNAP90
[c] 1999: Distributed according to SNAP97
[d] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period
[e] Data include those located within the EMEP area only
[g] National totals do not include the international air traffic and the international sea traffic
[h] Emissions corresponds to the National Emission Ceilings (NEC)
[i] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable
[j] Emissions from 1980-1986 are not updated
[k] Emissions from international air traffic, marine bunkers and managed forests are not included
[l] Preliminary data
[m] Emissions for 1996-1999 estimated according to SNAP97
[n] Emissions from 1990 onwards are calculated using the categories of SNAP97
[o] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy
[p] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions
[q] SOx emissions 1980-1989 and NOx emissions 1980-1984 do not include mobile sources
[r] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.
[s] NO2 figures for 1980-1987 refer to stationary and road vehicles only. NO2 emission data from 1987 to 1989 were updated taking into account emissions from railway transportation, agricultural engineering and road-building machinery.
[t] Since 1987 the NOx emissions have been updated according to the instruction of the Ministry of natural resources of Russia for a such sources as road transport, other mobile sources etc. NOx emissions data for earlier period (before 1987) have not been corrected.
[u] International transport (ie aviation and navigation) is not included in national totals except for the CO2 figure for 1980
[v] Emissions ot SO2 and NOx from domestic navigation/coatal shipping, for the years 1980-1993, are assumed to account for 30% of the total emissions from shipping in Sweden
[w] Data are for sectors 1-6 only. Data for sectors 7-11 are not yet ready.
[x] Sum of reported sector data
[y] For the time series 1987-1989, data as submitted under the Environmental Information and Observation Network (EIONET) have been used. As no officially agreed data gap filling procedure exists, data gaps were filled by EMEP data and EEA interpolations.
For the time series 1990-1999, data as compiled for the EC UNFCCC submission was used (*'Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001'*).

Table 3: Anthropogenic emissions of ammonia (1980-1992) in the ECE region (Gg NH_3 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia[a]		3.1	3.1	3.0	2.8	2.0	1.7	1.7	2.0	.2	25.00	.11	.05
Austria	78.36	79.34	79.45	81.17	82.01	81.40	81.04	80.18	78.99	79.88	79.86	79.15	76.40
Belarus[b]											4		
Belgium						89					107.3	93.12	92.64
Bosnia and Herzegovina													
Bulgaria											144	124	111
Canada													
Croatia[cde]											37.1	31.7	26.8
Cyprus													
Czech Republic											156	134	115
Denmark[f]	125	123	120	119	115	137.3	137.8	134.4	131.3	132.0	132.2	128.4	126.4
Estonia											24.25	22.24	18.47
Finland	39					43	41	45			38		41
France[fh]	777	786	789	793	780	780	787	784	765	768	763	764	752
Georgia													
Germany[ij]	835	821	817	841	853	857	846	845	835	823	765	673	649
Greece											79	78	75
Hungary	157.0					150.0	170.0	150.0		170.0	124.0	93.00	84.00
Iceland													
Ireland											112.4	114.5	117.0
Italy	479	475	464	504	481	487	495	497	499	481	466	451	440
Kazakhstan											.49	.42	.69
Kyrgyzstan													
Latvia											43.85	41.77	32.94
Liechtenstein	.22				.17						.2047	.205	.2049
Lithuania	85	86	86	87	88	89	89	90	89	86	84	85	81
Luxembourg											7		
Malta													
Monaco											.001	.001	.001
Netherlands	234	240	244	244	246	248	258	258	237	232	226.8[k]	228	180
Norway	22.57	23.00	23.00	23.00	23.00	23.00	23.00	23.11	21.3	22.90	22.73	23.23	24.98
Poland	550					550	550	550	550	550	512	443	420
Portugal [l]											104.6	100.1	106.6
Republic of Moldova [mn]	52.7					57.9					49	49	44
Romania	340.0	332.0	327.0	311.0	359.0	343.0	350.0	329.0	339.0	341.0	300.0	267.0	255.0
Russian Federation[op]	1189	1192	1214	1245	1247	1239	1286	1277	1269	1258	1191	1161	1084
Slovakia											63.0	56.3	47.0
Slovenia											24	23	24
Spain[f]	396	383	409	411	417	420	435	474	475	487	472	468	468
Sweden									54.00		51	51	61
Switzerland	77				60	73.7					71.5	71	71
The former Yugoslav Republic of Macedonia													
Turkey													
Ukraine											23.00		
United Kingdom											341	343	327
United States											3925	3977	4028
Yugoslavia													
European Community											3795		

[a] Without emissions from agriculture, except NH3 emission figure for 1990

[b] Without emissions from agriculture

[c] 1990-1998: Distributed according to SNAP90

[d] 1999: Distributed according to SNAP97

[e] Values for the period 1980-1989 are missing because air emission inventories were not prepared for that period

[f] Data include those located within the EMEP area only

[h] National totals do not include the international air traffic and the international sea traffic

[i] Emissions from 1980-1986 are not updated

[j] Emissions from international air traffic, marine bunkers and managed forests are not included

[k] NFR 11 emissions are from human (p)respiration

[l] Emissions from 1990 onwards are calculated using the categories of SNAP97

[m] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[n] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[o] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[p] NH3 figures for 1980-1986 refer to agricultural sector only. Since 1987 NH3 figures include emissions from industrial sources.

Table 3 Continued: Anthropogenic emissions of ammonia (1993-2000, 2010, 2020) in the ECE region (Gg NH_3 per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia[a]	.01	.006	.006	.004	.004	.002	.003	.002		
Austria	76.23	75.84	74.13	72.56	72.02	71.76	70.13	67.68	66.0	
Belarus[b]		4	4.6	4.4	4.05	4.4	4.16	142.1	4.0	
Belgium	97.38	96.31	97.30	98.91	98.83	102.3	99.74		74	
Bosnia and Herzegovina										
Bulgaria	109	101	99	83	77	66	60	56.23[c]	108	100.5
Canada			554							
Croatia[def]	25.5	24.2	24.9	23.4	23.0	23.3	24.4		30	
Cyprus										
Czech Republic	99	91	86	81	81	80	75	74.48	101	
Denmark[g]	122.8	118.7	112.2	108.3	108.0	109.2	104.1	101.1		
Estonia	13.36	12.59	10.97	9.55	9.74	9.76	8.47	8.764		
Finland			35.2	35	38	37.8	35.2	33.1	31	
France[gi]	745	750	758	771	778	787	784	788	780[j]	
Georgia										
Germany[kl]	638	639	635	635	625	632	624		550	
Greece	75	73	85	73	71	74	73		73	
Hungary	77.00	76.00	77.00	78.00	76.00	73.53	71.09	70.81[m]	90	90
Iceland										
Ireland	116.9	118.6	119.6	121.9	123.4	127.4	127.0	122.4	116	
Italy	449	459	461	430[n]	443[n]	438[n]	448[n]		449	
Kazakhstan	.61	.39	.32	.07	.07	.26	.27	.27		
Kyrgyzstan[b]							59.11			
Latvia	19.72	16.75	16.82	15.54	14.51	13.36	11.95	11.61	11.78	13.82
Liechtenstein	.2048	.2057	.3864	.2058	.2061	.3884	.2066	.2066	.19	
Lithuania	80	80	38	36	35	35	29	25.2	84	
Luxembourg	7.000	7	7	7	7	7	7.288	7.233	7	
Malta										
Monaco	.002	.003	.003	.004	.005	.005	.006	.006		
Netherlands	191	166	186.2[o]	146	188	165.7[o]	159.2[o]	152.6[mo]	128	
Norway	24.87	24.99	25.99	26.46	25.91	25.92	25.49	25.32	25.30	
Poland	382	384	380	364	350	371	341	322	468.0	
Portugal[p]	99.3	92.7	101.7	99.1	100.5	103.0				
Republic of Moldova [qr]	37	35	33	31	25	25	24.8		42	
Romania	223.0	221.0								
Russian Federation[st]	903	772	824	749	730	675	657	650	800	
Slovakia	41.6	38.7	39.6	38.0	36.1	32.1	30.2	29.6[m]		
Slovenia	23	22	22	22	19	20	20	19	20	
Spain[g]	448	470	467	517						
Sweden	61	61	61	61	58.5	56.96	55.43	55.87	57	
Switzerland	71	70	69.2	69	69	68.3	68.3	68.29	63	
The former Yugoslav Republic of Macedonia										
Turkey[b]			.009	.008	.006	.007	.007	.007		
Ukraine[b]			9.100	7.7	7.000				23.00	
United Kingdom	327	328	318	321	325	319	316	297	311	312
United States	4093	4157	4225	4258	4342	4433	4458	4503	4506	4704
Yugoslavia										
European Community			3517		3598					

[a] Agriculture not included. Only sector 4, Production Processes, is included in year 2000

[b] Agriculture not included except for Belarus in year 2000

[c] Emissions are calculated on the base of the total quality of the used fuels by sectors

[d] 1990-1998: Distributed according to SNAP90

[e] 1999: Distributed according to SNAP97

[f] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period

[g] Data include those located within the EMEP area only

[i] National totlas do not include the international air traffic and the international sea traffic

[j] Emissions corresponds to the National Emission Ceilings (NEC)

[k] Emissions from 1980-1986 are not updated

[l] Emissions from international air traffic, marine bunkers and managed forests are not included

[m] Preliminary data

[n] Emissions for 1996-1999 estimated according to SNAP97

[o] NFR 11 emissions are from human (p)respiration

[p] Emissions from 1990 onwards are calculated using the categories of SNAP97

[q] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[r] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[s] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[t] NH3 figures for 1980-1986 refer to agricultural sector only. Since 1987 NH3 figures include emissions from industrial sources.

Table 4: Anthropogenic emissions of non-methane volatile organic compounds (1980-1992) in the ECE region (Gg NMVOC per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia		25.7	24.3	23.8	21.7	92.7	98.1	104.3	92.5	90.2	81.00	69.9	30.9
Austria	353.1	351.9	350.3	354.0	361.2	359.7	373.1	376.0	378.2	367.7	359.7	329.7	296.1
Belarus	549	546.0	543.0	543.0	540.0	516	506	509	535	511	533	546	412
Belgium						688[a]					303.0	267.4	266.5
Bosnia and Herzegovina													
Bulgaria									309.2		217	178	179
Canada	2099					2851	2859	2897	2964	2906	2880	2792	2730
Croatia[bcd]											105.0	86.5	63.7
Cyprus													
Czech Republic						275					435	398	359
Denmark[e]	203	199	199	202	206	196.0	196.2	198.2	197.0	197.5	170.5	167.4	162.9
Estonia						81	83	83	84	87	88.4	81.9	45.4
Finland								210[g]	222.1	226.3	224.4	210.9	203.7
France[eh]									2613	2576	2385	2366	2314
Georgia[i]	45.5	46.8	47.8	49.8	49.3	48.5	47.6	48.2	47.8	46.0	46.4	8.2	3.9
Germany[jk]	3224	3152	3134	3152	3191	3190	3218	3273	3255	3202	3221	2796	2539
Greece						614[a]					317	319	326
Hungary	215					232	263	228	215.0	205	205.0	149.6	141.8
Iceland	7.7	7.7	7.7	7.6	7.7	8.0	8.4	11.9	12.6	12.6	12.8	14.3	14.1
Ireland											111.1	111.1	114.3
Italy	2179	2119	2074	2045	2007	1992	2019	2088	2124	2215	2213	2293	2338
Kazakhstan[l]											.394	.465	.558
Kyrgyzstan												8.0	6.9
Latvia											152.4	116.1	84.52
Liechtenstein	1.14	1.15	1.15	1.15	1.15	1.15	1.13	1.1	1.08	1.06	.9879	.9322	.868
Lithuania	100	102	104	105	106	112	108	108	109	109	108	111	66
Luxembourg						15					19		
Malta													
Monaco											.702	.806	.928
Netherlands	579.0	555.0	543.0	526.0	513.0	502	489.0	485.0	538.0	468.0	503.5	462	438
Norway	175.4	181.7	188.6	201.3	212.3	231.4	249.4	255.2	249.0	275.0	300.5	293.7	322.3
Poland	1036	912	889	954	985	1011	1029	1014	1026	1016	831	833	805
Portugal[m]						199					379.9	408.7	436.3
Republic of Moldova [no]						105	101	102	102	96	157	151.2	99
Romania	829.0	810.0	772.0	796.0	812.0	787.0	830.0	884.0	846.0	812.0	772.0	678.0	627.0
Russian Federation[pq]	2843	2843	2582	2444	2390	2496	2338	3410	3396	3444	3668	3361	3297
Slovakia											262		124.0
Slovenia									39		44	41	40
Spain[e]	1407	1387	1365	1393	1386	1409	1435	1490	1526	1560	1610	1644	1624
Sweden						600.0[r]			555.0		516.7	512.6	490.1
Switzerland	323				324	324	318	311	305	298	278.8	261	242
The former Yugoslav Republic of Macedonia													
Turkey	359.0	361.0	379.3	387.4	383.9	379.0	403.0	430.3	449.8	453.0	462.9	457.2	478.6
Ukraine						1626	1660	1687	1604	1512	1369	1302	1171
United Kingdom	2232	2208	2243	2264	2321	2335	2391	2454	2521	2552	2508	2438	2338
United States	23221	21786	20943	21865	22957	21904	20953	20726	20965	20120	18421	18878	18777
Yugoslavia													
European Community[s]											16633	16071	15549

[a] The NMVOC figure for 1985 includes CH4 emissions

[b] 1990-1998: Distributed according to SNAP90

[c] 1999: Distributed according to SNAP97

[d] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period

[e] Data include those located within the EMEP area only

[g] Time series will be updated.

[h] National totlas do not include the international air traffic and the international sea traffic

[i] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable

[j] Emissions from 1980-1986 are not updated

[k] Emissions from international air traffic, marine bunkers and managed forests are not included

[l] CH4 included

[m] Emissions from 1990 onwards are calculated using the categories of SNAP97

[n] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[o] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[p] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[q] Natural sources not included. Since 1987 NMVOCs emission data were updated taking into account emissions from railway transportation, agricultural engineering and road-building machinery. CO: Since 1987 CO emission data were updated taking into account emissions from railway transportation, agricultural engineering and road-building machinery.

[r] International transport (ie aviation and navigation) is not included in national totals except for the CO2 figure for 1980.

[s] The EC inventory relies on the availability and submission of Member States data. However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under the UNFCCC (SO_X, NO_X, CO and NMVOC) have been used (see the latest EC submission to the UNFCCC as compiled by EEA and ETC/ACC '*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001'*)

Table 4 Continued: Anthropogenic emissions of non-methane volatile organic compounds (1993-2000, 2010, 2020) in the ECE region (Gg NMVOC per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	19.9	17.1	23.4	17.8	35.10	16.94	17.47	15.96		
Austria	285.9	274.5	275.7	265.4	260.4	250.6	245.1	238.7	159.0	
Belarus	372	366	367	327.7	344.7	294.0	239.9		321	
Belgium	264.6	257.9	250.3	241.7	248.5	269.1	248.0		144	
Bosnia and Herzegovina										
Bulgaria	208	175	173	147	120	132	118	120.4[a]	185	161.9
Canada	2763	2752	2742	2760	2768	2736	2777	2790	2927	3130
Croatia[bcd]	69.3	74.7	74.1	81.5	79.5	78.5	72.9		90	
Cyprus										
Czech Republic	338	310	286	284	272	269	248	246.7	220	
Denmark[e]	160.7	157.6	152.8	150.6	142.7	136.4	131.5	131.9	73	
Estonia	41.6	44.65	47.5	50.2	53.92	53.7	42.33	33.69	44.2	
Finland	196.7	194.4	189.0	182.8	177.7	173.9	169.9	159.9	130	
France[eg]	2193	2059	1979	1915	1830	1779	1705	1659	1050[h]	
Georgia[i]	2.2	1.7	1.5	2.4	2.8	10.84	18.63			
Germany[jk]	2326	2158	2024	1896	1805	1723	1653		995	
Greece	329	334	329	344	346	361	350		261	
Hungary	149.0	142.4	150.3	150.1	145.4	140.6	169.8	172.0[l]	137	137
Iceland	13.6	14.2	12.0	12.0	9.8	10.0			6.6	
Ireland	108.5	107.5	105.4	111.9	115.7	117.6	98.41	90.27	55	
Italy	2344	2349	2368	1934[m]	1861[m]	1764[m]	1671[m]		1440	
Kazakhstan[n]	.565	.7	1.222	.132	.083	.026	.041	.22		
Kyrgyzstan	4.0	2.5	2.8	2.4	2.4	2.4	2.32			
Latvia	113.3	98.52	64.04	48.34	74.07	66.67	113.3	95.61	336.8	400.4
Liechtenstein	.8108	.7606	.7103	.672	.6346	.5963	.5568	.5274	.48	.41
Lithuania	52	52	77	82	81	79	68	60.8	84	
Luxembourg	18.00	18	16	16	15	13	14.92	14.92	9	
Malta										
Monaco	.829	.823	.751	.696	.636	.578	.562	.518		
Netherlands	405	389	369.6	362	317	301.5	289.9	280.7[l]	185	
Norway	338.3	352.9	367.8	372.0	367.3	349.2	348.7	363.0	171.8	
Poland	756	819	769	766	774	730	731	599	804.0	
Portugal[o]	444.0	442.7	461.6	437.3	498.8	483.7				
Republic of Moldova [pq]	74.5	65.6	61.7	64.4	68.8	42.9	22.14		100	
Romania	634.0	638.0								
Russian Federation[rs]	3062	2924	2857	2622	2386	2376	2451	2450	3500	
Slovakia	151	108.0	159	161	138	132	130	89[l]		
Slovenia	42	44	44	49	48	42	40	40	40	
Spain[e]	1527	1584	1536	1582	1577	1616	1629	1584		
Sweden	480.6	476.2	471.5	471.0	447.4	438.9	430.9	417.8	245[t]	
Switzerland	226	213	199.4	191	182	173	165	158.8	144	122
The former Yugoslav Republic of Macedonia										
Turkey	527.1	515.5	677.3	754.5	784.3	803.3	785.4	725.6	1925[u]	
Ukraine	972.0	1024	811.0	718.0	665.0				1369	
United Kingdom	2233	2184	2054	1992	1919	1784	1600	1498	1095	1118
United States	18948	19327	18824	17700	17680	17180	16572	16252	12606	12486
Yugoslavia										
European Community[v]	14865	14745	14313	13831	13232	12398	12004			

[a] Emissions are calculated on the base of the total quality of the used fuels by sectors
[b] 1990-1998: Distributed according to SNAP90
[c] 1999: Distributed according to SNAP97
[d] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period
[e] Data include those located within the EMEP area only
[g] National totlas do not include the international air traffic and the international sea traffic
[h] Emissions corresponds to the National Emission Ceilings (NEC)
[i] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable
[j] Emissions from 1980-1986 are not updated
[k] Emissions from international air traffic, marine bunkers and managed forests are not included
[l] Preliminary data
[m] Emissions for 1996-1999 estimated according to SNAP97
[n] CH4 included
[o] Emissions from 1990 onwards are calculated using the categories of SNAP97
[p] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy
[q] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions
[r] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.
[s] Natural sources not included. Since 1987 NMVOCs emission data were updated taking into account emissions from railway transportation, agricultural engineering and road-building machinery. CO: Since 1987 CO emission data were updated taking into account emissions from railway transportation, agricultural engineering and road-building machinery.
[t] International transport (ie aviation and navigation) is not included in national totals except for the CO2 figure for 1980
[u] Sum of reported sector data
[v] The EC inventory relies on the availability and submission of Member States data. However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under the UNFCCC (SO_x, NO_x, CO and NMVOC) have been used (see the latest EC submission to the UNFCCC as compiled by EEA and ETC/ACC '*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001*')

Table 5: Anthropogenic emissions of carbon monoxide (1980-1992) in the ECE region (Gg CO per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia		26.6	30.0	30.4	30.9	404.9	405.1	416.5	417.1	398.9	304.3	377.2	195.1
Austria	1711	1643	1582	1547	1601	1548	1643	1602	1552	1485	1353	1333	1254
Belarus						1654	1605	1601	1590	1615	1722	1717	1381
Belgium											1097	1103	1123
Bosnia and Herzegovina													
Bulgaria								997	995	985	891	608	768
Canada	10273					9685					10596	10153	9855
Croatia[abc]											655.2	565.3	416.5
Cyprus													
Czech Republic	894		906		895	899	740	738	737	884	1055	1102	1045
Denmark[d]	956.3	1075	1123	950.6	1060	1021	1011	1042	965.6	1033	729.2	742.2	716.2
Estonia						400	417	423	419	448	434.1	399.2	207.8
Finland	660										559	552	478
France[df]	15638	14870	14408	13953	14018	13840	13454	13215	12800	12247	10781	10681	10241
Georgia[g]	648.3	617.3	632.2	647.8	651.3	636.5	642.9	638.9	647.7	597.3	526.4	441.4	129.5
Germany[hi]	14046	13027	12438	11980	12176	12134	12135	12438	12080	11430	11213	9515	8351
Greece											1356	1368	1382
Hungary	1019					931.1			963.1		997.0	913.4	835.8
Iceland	44.2	44.2	44.2	43.2	44.1	45.5	48.2	53.6	57.1	57.0	58.2	59.2	60.7
Ireland											400.9	394.4	394.6
Italy	7588	7478	7527	7432	7590	7692	7607	7674	7581	7735	7824	8003	7961
Kazakhstan											1640	1975	1959
Kyrgyzstan												26.2	21.3
Latvia											387.7	823.0	554.5
Liechtenstein	5.02	4.79	4.56	4.34	4.11	3.88	3.66	3.44	3.21	3	2.637	2.498	2.325
Lithuania	541	548	543	550	550	545	554	564	578	568	519	577	350
Luxembourg						193					175		
Malta													
Monaco											3.025	3.477	3.942
Netherlands	1530	1418	1374	1354	1357	1381	1252	1192	1179	1131	1164	1025	983
Norway	880.5	815.1	823.7	815.8	842.0	844.2	872.3	889.2	868.9	871.7	875.5	805.8	788.4
Poland											7406		7083
Portugal[j]											1114	1189	1284
Republic of Moldova [kl]	55	53	56	49	48	483	478	474	496	476	453.2	468.4	279.2
Romania	3245	3217	3152	3030	3463	3307	3378	3196	3317	3314	3186	2695	2506
Russian Federation[m]	13520	15005	13617	13696	13672	14122	13142	13270	13144	12210	13329	13000	11703
Slovakia										491	533	478	426
Slovenia	68	66	63	61	64	68	78	79	75	75	81	78	78
Spain[d]	3776	3649	3616	3636	3596	3549	3605	3705	3898	4096	3986	4118	4187
Sweden											1113	1069	1065
Switzerland	1280	1222	1164	1106	1048	990	933	877	820	764	672.6	629	581
The former Yugoslav Republic of Macedonia													
Turkey	2934	2961	3110	3141	3141	3121	3305	3477	3610	3505	3585	3579	3662
Ukraine						9832	9722	9269	9085	8794	8141	7406	5496
United Kingdom	7677	7597	7621	7391	7428	7222	7212	7247	7307	7548	7208	7002	6707
United States	101641	97724	96799	100470	100999	103472	97183	94855	95593	93832	84544	89239	88301
Yugoslavia													
European Community[n]											49817	47964	46046

[a] 1990-1998: Distributed according to SNAP90

[b] 1999: Distributed according to SNAP97

[c] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period

[d] Data include those located within the EMEP area only

[f] National totlas do not include the international air traffic and the international sea traffic

[g] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable

[h] Emissions from 1980-1986 are not updated

[i] Emissions from international air traffic, marine bunkers and managed forests are not included

[j] Emissions from 1990 onwards are calculated using the categories of SNAP97

[k] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[l] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[m] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[n] The EC inventory relies on the availability and submission of Member States data. However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under the UNFCCC (SO_X, NO_X, CO and NMVOC) have been used (see the latest EC submission to the UNFCCC as compiled by EEA and ETC/ACC '*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001*')

Table 5 Continued: Anthropogenic emissions of carbon monoxide (1993-2000, 2010, 2020) in the ECE region (Gg CO per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	145.1	128.0	173.6	125.5	223.6	124.4	123.7	109.7		
Austria	1229	1199	1098	1073	1070	1015	969.7	906.5		
Belarus	1201	1241	1253	1242	1223	1034	786.4	717.5	1404	
Belgium	1088	1044	1013	1000	938.3	1114	1017			
Bosnia and Herzegovina										
Bulgaria	820	855	846	613	515	650	617	667.3[a]	750	666
Canada	9851	9747	9653	9595	9476	9302	9425	9522	10550	10360
Croatia[bcd]	375.4	369.4	345.8	388.8	365.6	344.9	334.3		660	
Cyprus										
Czech Republic	967	1026	874	886	877	767	686	649.3		
Denmark[e]	716.2	690.2	688.3	707.7	663.2	665.0	616.8	632.1	331	
Estonia	210.2	241.1	242.3	267.7	282.8	280.7	215.3	201.7		
Finland	457	444	436	461	474	452	547	526.3		
France[eg]	9684	9016	8880	8315	7850	7641	7140	6626		
Georgia[h]	142.5	148.5	249.5	390.2	429.2	353.3	222.5			
Germany[ij]	7704	7065	6667	6234	5832	5341	4952			
Greece	1345	1327	1316	1404	1414	1546	1440			
Hungary	796.1	774.3	761.3	726.9	733.4	736.9	721.6	646.9[k]	600	700
Iceland	59.9	60.3	49.4	49.9	38.9	39.8			19.41	
Ireland	350.3	329.2	304.4	306.8	312.1	317.7	285.1	279.6	322.0	
Italy	7755	7549	7755	6971[l]	6681[l]	6318[l]	6051[l]		4213	
Kazakhstan	1801	1426	1422	1451	1379	1345	1187	1114		
Kyrgyzstan	13.2	9.5	7.5	5.5	4.6	5.0	3.68			
Latvia	612.0	306.8	436.5	175.2	354.0	325.3	293.6	250.1	304.7	335.7
Liechtenstein	2.182	2.081	1.986	1.896	1.818	1.731	1.652	1.636	1.5	1.21
Lithuania	292	303	286	312	358	358	320	281.5	400	
Luxembourg	219.0	145	107	103	80	51	49.80	48.94	33	
Malta										
Monaco	3.469	3.407	3.072	2.751	2.661	2.264	2.214	2.108		
Netherlands	960	907	894.0	903	749	739.5	711.8	701[k]		
Norway	789.9	781.6	746.6	718.8	684.0	641.8	605.9	569.5		
Poland	8655	5115	4547	4837	4700	4301	4363	3463		
Portugal[m]	1269	1234	1201	1178	1143	1095				
Republic of Moldova [no]	218.4	170.9	192	170.3	210.2	153.4	100.2		150	
Romania	2434	2325								
Russian Federation[p]	11320	10603	9945	9401	10332	10383	10804	10811	16650	
Slovakia	454	413	404	348	352	318	310	290[k]		
Slovenia	87	93	91	95	93	77	70	68	53	
Spain[e]	3967	3990	3569	3518	3359	3342	3097	3008		
Sweden	1025	1006	993.6	966.2	883.2	956.9	910.7	830.3	426[q]	
Switzerland	544	516	490.9	467	443	422	399	393.9	370	292
The former Yugoslav Republic of Macedonia					23.00	25.80[r]		76.94		
Turkey	3936	3769	3987	4135	4179	4156	4047	3778	10986[s]	
Ukraine	4218	3375	2906	2567	2516				8141	
United Kingdom	6210	5877	5522	5487	5201	4934	4718	4167	2838	
United States	89091	90353	83993	90741	90054	89456	85240	82939	83482	92593
Yugoslavia										
European Community[t]	43746	41862	40513	39231	37470	35497	33602			

[a] Emissions are calculated on the base of the total quality of the used fuels by sectors

[b] 1990-1998: Distributed according to SNAP90

[c] 1999: Distributed according to SNAP97

[d] Values for the periode 1980-1989 are missing because air emission inventories were not prepared for that period

[e] Data include those located within the EMEP area only

[g] National totlas do not include the international air traffic and the international sea traffic

[h] Calculations are based on Official Statistical data. Due to economical and social difficulties the collection of statistical data within the country is inadequate. Therefore it is assumable that data provided here are not reliable

[i] Emissions from 1980-1986 are not updated

[j] Emissions from international air traffic, marine bunkers and managed forests are not included

[k] Preliminary data

[l] Emissions for 1996-1999 estimated according to SNAP97

[m] Emissions from 1990 onwards are calculated using the categories of SNAP97

[n] Since 1993 emissions located on the left side of Diester River are not included, except for emissions from Moldavian electric station. The drop in emissions between 1991 and 1992 are due to a decrease in national economy

[o] For 1990-1999 emissions have been calculated according to EMEP/CORINAIR Emission Inventory Guidebook and the Greenhouse Gas inventory Reporting Instructions

[p] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[q] International transport (ie aviation and navigation) is not included in national totals except for the CO2 figure for 1980

[r] Data are for sectors 1-6 only. Data for sectors 7-11 are not yet ready

[s] Sum of reported sector data

[t] The EC inventory relies on the availability and submission of Member States data. However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under the UNFCCC (SO_x, NO_x, CO and NMVOC) have been used (see the latest EC submission to the UNFCCC as compiled by EEA and ETC/ACC '*Annual European Community Greenhouse Gas Inventory 1990-1999, EEA Technical Report 60, April 2001*')

Table 6: Anthropogenic emissions of Total Suspended Matter (1980-1992) in the ECE region (Mg TSP per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia													
Austria											75587.12		
Belarus													
Belgium													
Bosnia and Herzegovina													
Bulgaria													
Canada													
Croatia													
Cyprus													
Czech Republic													
Denmark													
Estonia [b]						334000	294100	300500	278500	262000	268500	277800	240728
Finland													
France[cd]											1698000	1737000	1648000
Georgia													
Germany													
Greece													
Hungary											197000	191750	154200
Iceland													
Ireland													
Italy													
Kazakhstan											1268121	1218987	1163744
Kyrgyzstan													
Latvia													
Liechtenstein													
Lithuania													
Luxembourg													
Malta													
Monaco											10.046	11.121	12.714
Netherlands											102822		
Norway													
Poland													
Portugal													
Republic of Moldova													
Romania													
Russian Federation													
Slovakia													
Slovenia													
Spain													
Sweden													
Switzerland													
The FYR Macedonia													
Turkey													
Ukraine													
United Kingdom													
United States													
Yugoslavia													
European Community													

[b] The TSP emissions are dust only

[c] Data include those located within the EMEP area only

[d] National totlas do not include the international air traffic and the international sea traffic

Table 6 Continued: Anthropogenic emissions of Total Suspended Matter (1993-2000, 2010, 2020) in the ECE region (Mg TSP per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia										
Austria			75805.1				77905.2	77097.09		
Belarus										
Belgium										
Bosnia and Herzegovina										
Bulgaria										
Canada										
Croatia										
Cyprus										
Czech Republic			201031	179362	128363	86178	67018	57973		
Denmark[ab]								28139.7		
Estonia [c]	189022	161492	113144[g]	98930	78277	69851	70463	78538.70		
Finland			50043[g]					73587		
France[be]	1561000	1531000	1525000	1610000	1611000	1637000	1639000	1604000		
Georgia										
Germany										
Greece										
Hungary	150300	149570	154500	140650	136530	127410	127610	126070[f]	108000	106000
Iceland										
Ireland										
Italy										
Kazakhstan	1070343	8864037	9123768	7828796	6662028	617602	5860106	5859673		
Kyrgyzstan										
Latvia								9500		
Liechtenstein										
Lithuania								12719		
Luxembourg										
Malta										
Monaco	11.583	10.548	9.473	8.921	8.345	7.422	6.737	6.181		
Netherlands			75015			63190				
Norway										
Poland								463923		
Portugal										
Republic of Moldova										
Romania										
Russian Federation										
Slovakia										
Slovenia										
Spain										
Sweden										
Switzerland			41976							
The FYR Macedonia										
Turkey										
Ukraine										
United Kingdom										
United States										
Yugoslavia										
European Community										

[a] For road traffic the emissions of particulate matter include both exhaust, brake and tyre wear and road abrasion. The road abrasion source is of a significant size and contributes with around half of the total emissions of TSP and PM10.

[b] Data include those located within the EMEP area only

[c] The TSP emissions are dust only

[e] National totals do not include the international air traffic and the international sea traffic

[f] Preliminary data

[g] Emissions reported for 1995 are identical to the emissions estimated by TNO in the CEPMEIP project

Table 7: Anthropogenic emissions of Particulate Matter (1980-1992) in the ECE region (Mg PM10 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia													
Austria											48290		
Belarus													
Belgium													
Bosnia and Herzegovina													
Bulgaria													
Canada													
Croatia													
Cyprus													
Czech Republic													
Denmark													
Estonia													
Finland													
France[ab]											640000	676000	646000
Georgia													
Germany													
Greece													
Hungary													
Iceland													
Ireland													
Italy													
Kazakhstan													
Kyrgyzstan													
Latvia													
Liechtenstein											89.2		
Lithuania													
Luxembourg													
Malta													
Monaco													
Netherlands[c]											81562		
Norway													
Poland													
Portugal													
Republic of Moldova													
Romania													
Russian Federation													
Slovakia													
Slovenia													
Spain													
Sweden													
Switzerland											32130		
The FYR Macedonia													
Turkey													
Ukraine													
United Kingdom	364763	348477	340977	337155	297149	335391	349414	346527	341893	326559	313360	310618	299179
United States													
Yugoslavia													
European Community													

[a] Data include those located within the EMEP area only

[b] National totlas do not include the international air traffic and the international sea traffic

[c] The Dutch Pollutant Emission Register does not include PM10 emission totals for industrial building venting and for agricultural sources. Emissions for these categories have been added based on the results of the National Aerosol Programme.

Table 7 Continued: Anthropogenic emissions of Particulate Matter (1993-2000, 2010, 2020) in the ECE region (Mg PM10 per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia										
Austria			46806				46738	46117		
Belarus										
Belgium										
Bosnia and Herzegovina										
Bulgaria										
Canada										
Croatia										
Cyprus										
Czech Republic										
Denmark[ab]								27069.7		
Estonia			33268[g]							
Finland			30028[g]					48240		
France[bd]	617000	589000	588000	609000	592000	598000	587000	566000		
Georgia										
Germany										
Greece										
Hungary			60240	53000	50830	48140	46410	45810[e]		
Iceland										
Ireland								13573		
Italy										
Kazakhstan										
Kyrgyzstan										
Latvia										
Liechtenstein			80					73.7	69	
Lithuania										
Luxembourg										
Malta										
Monaco										
Netherlands[f]			60903			53352				
Norway										
Poland								281885		
Portugal										
Republic of Moldova										
Romania										
Russian Federation										
Slovakia										
Slovenia										
Spain										
Sweden										
Switzerland			28222					26402	24686	
The FYR Macedonia										
Turkey										
Ukraine										
United Kingdom	285463	270015	237860	230130	209403	200779	188111	171606		
United States								21050669		
Yugoslavia										
European Community										

[a] For road traffic the emissions of particulate matter include both exhaust, brake and tyre wear and road abrasion. The road abrasion source is of a significant size and contributes with around half of the total emissions of TSP and PM10.

[b] Data include those located within the EMEP area only

[d] National totlas do not include the international air traffic and the international sea traffic

[e] Preliminary data

[f] The Dutch Pollutant Emission Register does not include PM10 emission totals for industrial building venting and for agricultural sources. Emissions for these categories have been added based on the results of the National Aerosol Programma.

[g] Emissions reported for 1995 are identical to the emissions estimated by TNO in the CEPMEIP project

Table 8: Anthropogenic emissions of Particulate Matter (1980-1992) in the ECE region (Mg PM2.5 per year)

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Armenia													
Austria											29337		
Belarus													
Belgium													
Bosnia and Herzegovina													
Bulgaria													
Canada													
Croatia													
Cyprus													
Czech Republic													
Denmark													
Estonia													
Finland													
France[ab]											369000	401000	380000
Georgia													
Germany													
Greece													
Hungary													
Iceland													
Ireland													
Italy													
Kazakhstan													
Kyrgyzstan													
Latvia													
Liechtenstein													
Lithuania													
Luxembourg													
Malta													
Monaco													
Netherlands													
Norway													
Poland													
Portugal													
Republic of Moldova													
Romania													
Russian Federation													
Slovakia													
Slovenia													
Spain													
Sweden													
Switzerland													
The FYR Macedonia													
Turkey													
Ukraine													
United Kingdom	186286	179119	176034	174390	159430	174358	181762	181757	182483	174275	167682	167327	162421
United States													
Yugoslavia													
European Community													

[a] Data include those located within the EMEP area only

[b] National totlas do not include the international air traffic and the international sea traffic

Table 8 Continued: Anthropogenic emissions of Particulate Matter (1993-2000, 2010, 2020) in the ECE region (Mg PM2.5 per year)

Party/Year	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia										
Austria			27642.3				26475.2	26099.1		
Belarus										
Belgium										
Bosnia and Herzegovina										
Bulgaria										
Canada										
Croatia										
Cyprus										
Czech Republic										
Denmark[ab]								12104.2		
Estonia			13693[f]							
Finland			22016[f]					37663		
France[bd]	366000	338000	336000	348000	330000	332000	321000	304000		
Georgia										
Germany										
Greece										
Hungary			27780	27940	26790	25170	20210	20150[e]		
Iceland										
Ireland										
Italy										
Kazakhstan										
Kyrgyzstan										
Latvia										
Liechtenstein										
Lithuania										
Luxembourg										
Malta										
Monaco										
Netherlands										
Norway										
Poland								135317		
Portugal										
Republic of Moldova										
Romania										
Russian Federation										
Slovakia										
Slovenia										
Spain										
Sweden										
Switzerland			15479							
The FYR Macedonia										
Turkey										
Ukraine										
United Kingdom	154081	147332	132298	128813	116297	110268	103557	93562		
United States								5663650		
Yugoslavia										
European Community										

[a] For road traffic the emissions of particulate matter include both exhaust, brake and tyre wear and road abrasion. The road abrasion source is of a significant size and contributes with around half of the total emissions of TSP and PM10.

[b] Data include those located within the EMEP area only

[d] National totals do not include the international air traffic and the international sea traffic

[e] Preliminary data

[f] Emissions reported for 1995 are identical to the emissions estimated by TNO in the CEPMEIP project

Table 9: Anthropogenic emissions of persistent organic pollutants in the ECE region
(Kg per year, except for dioxins and furans which are g I-Teq per year; PAHs are Mg per year)

		ANNEX I								ANNEX II			ANNEX III			OTHER			
Party	**Year**	**Aldrin**	**Chlor-dane**	**Chlor-decone**	**Dieldrin**	**Endrin**	**Hepta-chlor**	**Hexa-bromo-biphenyl**	**Mirex**	**Toxa-phene**	**HCH**	**DDT**	**PCBs**	**Dioxins and furans**	**PAHs**	**HCB**	**PCP**	**SCCP**	**PER**	**TRI**
Austria	1980													.00	.00	.00				
	1981													.00	.00	.00				
	1982													.00	.00	.00				
	1983													.00	.00	.00				
	1984													.00	.00	.00				
	1985													177.7	25.98	44.07				
	1986													185.5	27.11	45.62				
	1987													188.2	27.01	48.57				
	1988													180.8	27.11	47.10				
	1989													171.5	26.71	46.01				
	1990													166.1	18.50	42.88				
	1991													128.8	17.46	29.72				
	1992													74.35	12.90	19.52				
	1993													68.97	10.49	16.89				
	1994	0	0	0	0	0	0	0	0		12000	0		60.51	10.19	10.12	0			
	1995	0	0	0	0	0	0	0	0		8056	0		62.41	10.77	9.18	0			
	1996	0	0	0	0	0	0	0	0		8640	0		59.81	10.86	8.80	0			
	1997	0	0	0	0	0	0	0	0		2324	0		60.32	9.65	10.51	0			
	1998	0	0	0	0	0	0	0	0		0	0		55.99	9.22	9.96	0			
	1999	0	0	0	0	0	0	0	0		0	0		51.51	8.74	7.97	0			
	2000													49.21	8.18	7.88				
Belarus	1997													16.4						
	1998													15.68						
	1999													15.19						
Belgium	1990													448.0[a]	354.3[a]	487.6	5768			
	1993[a]														294.1					
	1994													147.6[b]	235.2	30.00[c]				
	1995										9[c]			437.5	274.5	236.8	16.00[d]			
	1996										9[c]			108.1	185.0	21.00[c]	6.000[c]			
	1997										9600[c]			122.8	187.4	25.00[c]	7.000[c]			
	1998										9600[ec]			122.9	187.2	25.00[ec]	7.000[ec]			
	1999													129.2	104.7					
Bulgaria	1990												258.4	554.2	677.3	544	49.30			
	1995												382.2	456.0	443.4	79	10.72			
	1996												261.7	340.9	409.5	87	10.61			
	1997												227.0	309.6	364.3	47	7.54			
	1998												252.8	288.4	384.0	75.6	9.07			
	1999												247.4	245.3	286.0	46	6.36			
	2000[f]												228.5	232.5	118.1	54	2.633			
	2010												453.9	425.3	621.4	109	9.8			
	2020												483.3	394.3	678.9	101	6.8			
Croatia	1990										9400[gh]			178.6[gh]	15.11[gh]	0[gh]	8500	1458967		
	1996										12800[gh]			97.35[gh]	9.30[gh]	0[gh]	0	1636000		
	1997										3100[gh]			95.04[gh]	9.17[gh]	0[gh]			142700	1242000
	1998[gh]										5000			110.8	8.59	0				
	1999[gh]										5000			97.96	7.93	0				
Cyprus	1990													772			.7			

		ANNEX I									ANNEX II			ANNEX III			OTHER			
Party	**Year**	**Aldrin**	**Chlor-dane**	**Chlor-decone**	**Dieldrin**	**Endrin**	**Hepta-chlor**	**Hexa-bromo-biphenyl**	**Mirex**	**Toxa-phene**	**HCH**	**DDT**	**PCBs**	**Dioxins and furans**	**PAHs**	**HCB**	**PCP**	**SCCP**	**PER**	**TRI**
Czech Republic	1990												772.9	1252	751.6					
	1991												772.0	1220	747.0					
	1992												741.3	1220	1131					
	1993												643.6	1140	1115					
	1994												629.8	1135	951.4					
	1995												622.9	1135	1357					
	1996												554.5	921.5	971.4					
	1997												447.8	830.2	657.4					
	1998												457.7	766.7	656.7					
	1999												485.4	643.2	556.6					
	2000												474.1	743.8	487.6					
Denmark[i]	1990														8.192					
	1991														9.188					
	1992														9.084					
	1993														9.552					
	1994										61.00			15	9.491			842555		
	1995	.000	.000	.000	.000	.000	.000		.000	.000		.000		14	9.471					
	1996													21	9.930					
	1997	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000		20	9.934					
	1998	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		20	9.093					
	1999													95	9.211					
	2000													1808	11.06					
Estonia	1990														.308					
	1991														.290					
	1992														.172					
	1993														.182					
	1994														.183					
	1995														.188					
	1996														.191					
	1997														.197					
	1998														.213					
	2000														2.963					
Finland	1990													30	15.76					
	1991													33.2	15.33					
	1992													31.2	15.45					
	1993												5300	31.9	15.72					
	1994												1100	32.7	15.64					
	1995												15800	33.8	16.92					
	1996													31.7	15.84					
	1997													32	16.05					
	1998													32.12	16.25					
	1999													32.2	15.9					
	2000													30.69	15.16					
France[i]	1990												61[k]	1871[k]	319[k]	1654[k]		78200000[m]	18.8[k]	28.4[k]
	1991												68[k]	1942[k]	384[k]	1674[k]		69100000[m]	16.9[k]	25.6[k]
	1992												67[k]	1968[k]	360[k]	1699[k]		59900000[m]	13.4[k]	23.3[k]
	1993												67[k]	2034[k]	358[k]	1633[k]		50900000[m]	12.0[k]	20.1[k]
	1994												64[k]	2025[k]	331[k]	1791[k]		48700000[m]	12.6[k]	18.8[k]
	1995												60[k]	1623[k]	329[k]	1788[k]		42900000[m]	11.3[k]	20.5[k]
	1996												60[k]	1617[k]	343[k]	1701[k]		40000000[m]	10.2[k]	19.7[k]

		ANNEX I								ANNEX II			ANNEX III			OTHER			
Party	**Year**	**Aldrin**	**Chlor-dane**	**Chlor-decone**	**Dieldrin**	**Endrin**	**Hepta-chlor**	**Hexa-bromo-biphenyl**	**Mirex**	**Toxa-phene**	**HCH**	**DDT**	**PCBs**	**Dioxins and furans**	**PAHs**	**HCB**	**PCP**	**SCCP**	**PER**	**TRI**
	1997												50[k]	1153[k]	329[k]	1719[k]		35700000[m]	9.1[k]	19.0[k]
	1998												50[k]	1023[k]	336[k]	1701[k]		34200000[m]	9.4[k]	19.9[k]
	1999												46[k]	707[k]	329[k]	1699[k]		31900000[4m]	10.1[k]	18.6[k]
	2000[k]												42	570	321	1801			9.7	18.2
Germany	1990												43579[n]	1196	420[no]	86[n]				
	1994										15000		30894[n]		396[no]		752	2100300		
	1995													309						
Hungary	1980[p]												180.6	199.4	135.2					
	1985												169.3[p]	207.3[p]	155.9[p]	.486	.0365			
	1990										9281		134.9[p]	156.8[p]	132.0[p]	.304	.0228			
	1991										60		119.6[p]	150.9[p]	121.6[p]	.506	.038			
	1992										12		107.8[p]	126.1[p]	86.88[p]	.678	.0509			
	1993										462		106.4[p]	121.8[p]	80.70[p]	.632	.0474			
	1994										798		104.5[p]	104.1[p]	72.34[p]	.476	.0357			
	1995										1650		101.1[p]	116.5[p]	67.62[p]	.660	.0495			
	1996										2400		98.79[p]	108.2[p]	63.25[p]	.660	.0495			
	1997										31		95.60[p]	103.3[p]	60.48[p]	.678	.0509			
	1998										22		92.18[p]	93.64[p]	53.50[p]	.712	.0534			
	1999[p]												93.02	92.85	54.59					
	2000[ep]												88.29	90.83	54.75					
	2010												79	70	47					
	2020												79	57	38					
Iceland	1990	.000																		
Kyrgyzstan	1992										.04				1.824					
	1993										.038				4.363					
	1994										4.898				.27					
	1995														.129					
	1996														.544					
	1997										.003				.20					
	1998										.003				.202					
	1999														.089					
Lithuania	1997												12.45	5.620	71.21					
	1998												14.20	5.970	53.14					
	1999												12.69	5.030	44.49					
	2000												10.75	4.277	34.02					
Luxembourg	1990													40						
	1994													23	1.1					
	1995													24	.6					
	1996													16	.7					
	1997													16	.4					
	1998													8	.3					
	1999														.000					
Monaco	1990												.277	2.385	.008					
	1991												.282	2.428	.008					
	1992												.310	2.675	.009					
	1993												.338	2.912	.009					
	1994												.367	3.165	.010					
	1995												.366	3.155	.010					
	1996												.392	3.376	.011					
	1997												.441	3.804	.012					
	1998												.415	3.577	.011					

		ANNEX I									ANNEX II			ANNEX III			OTHER			
Party	**Year**	**Aldrin**	**Chlor-dane**	**Chlor-decone**	**Dieldrin**	**Endrin**	**Hepta-chlor**	**Hexa-bromo-biphenyl**	**Mirex**	**Toxa-phene**	**HCH**	**DDT**	**PCBs**	**Dioxins and furans**	**PAHs**	**HCB**	**PCP**	**SCCP**	**PER**	**TRI**
	1999												.419	3.614	.012					
	2000												.433	3.736	.012					
Netherlands	1990	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	611.0	1759	.000	34000	11070137[q]		
	1992	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.251	505.0	142.0		30000			
	1994	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.283	143.0	139.0	.0	.0	5631000		
	1995	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.015	66.57	929.4	.0	29000	4154627[q]		
	1996										.000			60.7	109.0	.0	.0	4036600		
	1997										.000			55.3	107.0	2.1	.0	3533200		
	1998													43.99	713.3	.0	26000	1335830[q]		
	1999													34.8	73.2	.0	25000	2850000		
Norway	1990	0	0	0	0	0	0	0	0	0		0		129.8	14.63					
	1991	0	0	0	0	0	0	0	0	0		0		98.57	14.01					
	1992	0	0	0	0	0	0	0	0	0	0	0		96.18	13.37	120[r]				
	1993	0	0	0	0	0	0	0	0	0	0	0		95.61	14.05	135[r]				
	1994	0	0	0	0	0	0	0	0	0	0	0		94.33	13.99	125[r]				
	1995	0	0	0	0	0	0	0	0	0	0	0		70.92	14.03	80[r]	63		379335	
	1996	0	0	0	0	0	0	0	0	0	0	0		50.15	14.51	50[r]	100	766800	304000	
	1997	0	0	0	0	0	0	0	0	0	0	0		42.51	14.57	60[r]	100			
	1998	0	0	0	0	0	0	0	0	0	0	0		35.23	14.21	50[r]				
	1999	0	0	0	0	0	0	0	0	0	0	0		39.67	13.10	40[r]				
	2000													34.12	13.56					
Poland	1990	.000	.000	.000	.000	.000	.000		.000	.000		.000	2425	529.1	159.2	62.1				
	1991												2367	535.4	174.3	38.6				
	1992												2322	517.1	171.7	39.1				
	1993												2348	591.8	253.2	42.5				
	1994												2330	519.5	231.4	38.1				
	1995	.000	.000	.000	.000	.000	.000		.000	.000		.000	2323	514.5	237.3	50.7				
	1996	.000	.000	.000	.000	.000	.000		.000	.000		.000	2348	484.2	224.9	48.0				
	1997	.000	.000	.000	.000	.000	.000		.000	.000		.000	2342	439.5	195.2	51.1				
	1998	.000	.000	.000	.000	.000	.000		.000	.000		.000	2353	381.3	176.2	43.2				
	1999	.000	.000	.000	.000	.000	.000		.000	.000		.000	2331	381.1	175.9	39.5				
	2000												2265	333.4	167.3	46.3				
Republic of Moldova	1990														6.171					
	1991														4.879					
	1992														3.993					
	1993														3.282					
	1994														3.120					
	1995														4.261					
	1996														3.595					
	1997														5.058					
	1998														4.760					
	1999														4.350					
Russian Federation	1990										923.0[i]			991[s]	18.26[st]	1.637[s]				
	1991[s]													947	17.3[t]	1.637				
	1992[s]													901	15.6[t]	1.637				
	1993[s]													878	15.29[t]	1.687				
	1994[s]													825	15.45[t]	1.6				
	1995[s]													769	15.28[t]	1.3				
	1996[s]													637	15.02[t]	1.1				

		ANNEX I									ANNEX II			ANNEX III			OTHER			
Party	**Year**	**Aldrin**	**Chlor-dane**	**Chlor-decone**	**Dieldrin**	**Endrin**	**Hepta-chlor**	**Hexa-bromo-biphenyl**	**Mirex**	**Toxa-phene**	**HCH**	**DDT**	**PCBs**	**Dioxins and furans**	**PAHs**	**HCB**	**PCP**	**SCCP**	**PER**	**TRI**
	1997[s]													614	14.95[t]	.979				
	1998[s]													606	14.71[t]	.95				
	1999[s]													625	15.32[t]	.98				
	2000[s]													631	15.43[t]	1.1				
	2010[s]													900	20[t]	1.7				
Slovakia	1990												163.5	189.4	42.0					
	1995												138.1	156.9	19.4					
	1997												137.4	124.6	18.5					
	1998												138.6	138.1	16.0					
	1999												136.2	126.8	16.7					
	2000												132.9	145.5	17.5					
Slovenia	1990												357	8.6	23.53	0	0			
	1994												265	5.67	17.99	0	0			
	1995												235	4.94	16.98	0	0			
	1996												214	4.91	17.28	0	0			
	1997												194	3.82	18.87	0	0			
	1998												184	3.53	18.18	0	0			
	1999												105	3.51	18.3	0	0			
	2000												143	2.9	22.66	0	0			
Spain[i]	1990										9204			181	300	6647	70			
	1991										9204			189	305	6204	70			
	1992										6705			200	289	5369	74			
	1993										5917			195	287	5108	75			
	1994										10650			187	284	5563	75			
	1995										9598			158	241	4894	76			
	1996										9730			156	245	5417	73			
	1997										9992			151	260	6070	89			
	1998										9992			153	249	6119	95			
	1999										9992			162	268	6072	96			
	2000										9992			146	295	6100	103			
Sweden	1990													127[u]	182					
	1992														153					
	1993[v]													46						
	1995														153					
	1997													2.8	1.12					
	1998													2.7	35.02	.8				
	1999													2.7	35.02	.8				
Switzerland	1990	0	0	0	0	0	0	0		0		0				0	0			
	1991	0	0	0	0	0	0	0		0		0				0	0			
	1992	0	0	0	0	0	0	0		0		0				0	0			
	1993	0	0	0	0	0	0	0		0		0				0	0			
	1994	0	0	0	0	0	0	0		0		0				0	0			
	1995	0	0	0	0	0	0	0	0	0		0				0	0			
	1996	0	0	0	0	0	0	0	0	0		0				0	0			
	1997	0	0	0	0	0	0	0	0	0		0				0	0			
	1998	0	0	0	0	0	0	0	0	0		0				0	0			
	1999	0	0	0	0	0	0	0	0	0		0				0	0			
Ukraine	1997														2.948					
	1998														.770					
United Kingdom	1990	0	0	0	0	0	0	0	0	0	100013	0	7123	1172	224.8	1267	538010	1.5		

		ANNEX I									ANNEX II			ANNEX III			OTHER			
Party	**Year**	**Aldrin**	**Chlor-dane**	**Chlor-decone**	**Dieldrin**	**Endrin**	**Hepta-chlor**	**Hexa-bromo-biphenyl**	**Mirex**	**Toxa-phene**	**HCH**	**DDT**	**PCBs**	**Dioxins and furans**	**PAHs**	**HCB**	**PCP**	**SCCP**	**PER**	**TRI**
	1991	0	0	0	0	0	0	0	0	0	86189	0	6544	1152	209.0	1259	537991	1.5		
	1992	0	0	0	0	0	0	0	0	0	74756	0	6048	1126	186.7	1255	537989	1.5		
	1993	0	0	0	0	0	0	0	0	0	65250	0	5554	1077	138.1	1242	529774	1.5		
	1994	0	0	0	0	0	0	0	0	0	57301	0	4993	986.9	128.4	1230	518780	1.5		
	1995	0	0	0	0	0	0	0	0	0	50616	0	4439	856.4	102.9	1227	511035	1.5		
	1996	0	0	0	0	0	0	0	0	0	44963	0	3898	623.9	49.01	1232	503463	1.5		
	1997	0	0	0	0	0	0	0	0	0	40158	0	3395	453.0	37.73	874.2	496162	1.5		
	1998	0	0	0	0	0	0	0	0	0	36052	0	2894	393.1	34.37	885.2	489221	1.5		
	1999	0	0	0	0	0	0	0	0	0	33586	0	2217	377.4	30.05	786.0	482503	1.5		
	2000	0	0	0	0	0	0	0	0	0	32526	0	1706	347.2	27.02	786.1	476014	1.5		
United States	1990												102	2366[w]	15642[x]	1450				
	1996		300				83			1	235		195[y]	[z]	18834[x]	281				

[a] Referring to Flanders only

[b] Referring to Brussels and Wallonia only

[c] Referring to Wallonia only

[d] Referring to Flanders and Wallonia only

[e] Preliminary data

[f] Emissions are calculated on the base of the total quality of the used fuels by sectors

[g] 1990-1998: Emission of POPs is distributed according to SNAP94. 1999: According to SNAP97

[h] Values for the periode 1991-1995 are missing because air emission inventories were not prepared for that period

[i] Data include those located within the EMEP area only

[k] National totlas do not include the international air traffic and the international sea traffic

[l] Emission figures do not include air traffic above 1000 m and international sea traffic

[m] Sum of TRI, PER AND TCE

[n] Figures for 1990 and 1994 are not comparable because they are based on different reports

[o] Figures include only Benzo(ghi)perylene and Flouranthene (Borneff 6)

[p] Borneff 6

[q] Include chloro-methane dichloro-methane trichloro-methane tetrachloro-methane chloro-ethane 1,1-dichloro-ethane 1,2-dichloro-ethane 1,1,1-trichloro-ethane 1,1,2-trichloro-ethane tetrachloro-ethanes 1,1,1,2-tetrachloro-ethane 1,1,2,2-tetrachloro-ethane pentachloro-ethanes hexachloro-ethanes 1-chloro-propane 2-chloro-propane 1,2-dichloro-propane 1,3-dichloro-propane 1,2,3-trichloro-propane trichloro-propanes

[r] Only data for sector 4:Production processes, no data for other sectors

[s] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

[t] Including only benzo(a)pyrene

[u] The range reported is 58-127 gI-Teq

[v] The range reported is 19-46 gI-Teq

[w] The 1990 dioxins and furan inventory was developed using methodologies applied on a national level basis. Data development for subsequent years includes application of facility-specific information and is expected to include additional sources.

[x] PAHs are defined as the sum of 16-PAH, which includes: Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluouranthene, Benzo(k)fluouranthene, Chrysene, Dibenz(a, h)anthracene, Indeno(1,2,3-cd)pyrene, Acenaphthene, Acenaphtylene, Antracene, Benzo(ghi)perylene, Fluoranthene, Fluorene, Naphthalene, Phenanthrene, Pyrene

[y] The PCB national value reflects that reported to the US EPA Toxic Release Inventory (TRI) and is suspected to contain an error in industry reporting.

[z] A reassessment of the dioxins & furans inventory data and estimation methodologies is being conducted. Data developed since the 1990 inventory includes facility-specific information and is expected to include more sources.

Table 10: Anthropogenic emissions of heavy metals in the ECE region (Mg per year)

		PRIORITY METALS			OTHER METALS					
Party	**Year**	**Lead**	**Cadmium**	**Mercury**	**Arsenic**	**Chromium**	**Copper**	**Nickel**	**Selenium**	**Zinc**
Armenia	1983	91.00		.01	30.00					
	1984	61.00		.01	95.00					
	1985	44.00		.01	62.00		5.00			
	1986	87.00					5.00			
	1987	46.00			62.00	.20	5.00	.30		
	1988	57.00			66.00		5.00	.003		.10
	1989	22.00		.03	22.00	5.00	2.00	.10		
	1990	11.00		.01		4.00	2.50	.10		
	1991	.82		.01		5.97	1.60	.24		
	1992	.61		.008		1.8	.068	.239		
	1993	.79		.009		1.04	.036	.074		
	1994	.34		.001		.34	.002	.003		
	1995	.334		.001		.101	.001	.009		
	1996	.009		.0008	.0003	.466	.009	.02		.016
	1997	.009				.019	.650	.003		
	1998	.010				.008	.005	.007		.001
	1999	.0053[a]				.073	.008	.004		.021
	2000	.0[b]				.006	.00043	.0		.0
Austria	1980	.00	.00	.00						
	1981	.00	.00	.00						
	1982	.00	.00	.00						
	1983	.00	.00	.00						
	1984	.00	.00	.00						
	1985	331.7	4.66	4.22						
	1986	320.1	4.65	3.93						
	1987	311.5	4.15	3.44						
	1988	281.0	3.77	2.94						
	1989	245.2	3.44	2.68						
	1990	204.9	2.98	2.59						
	1991	172.9	2.68	2.51						
	1992	118.0	2.21	1.98						
	1993	84.06	2.08	1.75						
	1994	58.91	1.82	1.54	3.300	6.600	9.200	35.50	4.700	208.4
	1995	18.49	1.61	1.50						
	1996	17.28	1.52	1.41						
	1997	16.39	1.55	1.44						
	1998	15.12	1.47	1.25						
	1999	14.09	1.44	1.23						
	2000	13.18	1.30	1.10						
Belarus	1990	797.6	7.59	.480	13.15	29.24	34.98	601.9		210.5
	1995	148.4	3.48	.265	4.48	14.10	19.11	246.4		121.7
	1996	46.34	1.20	.297	3.66	8.68	13.89	202.7		122.3
	1997	42.20	1.25	.310	3.07	8.27	15.10	167.1		159.3
	1998	41.24	1.45	.392	2.96	7.91	13.64	154.3		177.9
	1999	37.52	1.42	.38	2.64	7.19	13.19	128.9		180.1
	2000	46.12	1.378	.358	3.33	6.295	11.78	94.43		196.5
Belgium	1990	601.3	9.52	8.79	10.45	53.98	52.26	106.5	21.35	370.5
	1991	218.0	3.00	2.00	1.00	12.00	6.00	10.00	.00	135.0
	1992	230.0	4.00	3.00	3.00	11.00	20.00	9.00	.10	97.00
	1993	230.0	1.00	1.00	2.00	22.00	22.00	11.00	3.00	86.00
	1994	325.4	4.40	5.82	4.63	26.82	45.69	52.64	23.46	241.6
	1995	336.1	6.38	4.54	6.39	48.32	55.70	46.73	18.80	286.5
	1996	302.6	4.62	5.55	5.22	32.15	33.19	57.68	7.66	219.9
	1997	287.2	4.60	3.32	4.67	25.48	28.08	46.36	10.19	177.5
	1998	203.0	3.26	3.50	4.86	22.47	29.52	67.72	9.99	186.4
	1999	173.7	2.90	2.06	4.43	4.33	30.54	66.36	5.56	170.8
Bulgaria	1990	435.9	28.25	13.20						
	1995	297.5	12.82	6.88						
	1996	278.8	14.33	4.70						
	1997	231.2	14.23	4.31						
	1998	250.8	14.87	4.69						
	1999	223.5	13.57	4.06						
	2000[c]	213.4	10.99	4.186						
	2010	176.7	11.9	5.8						
	2020	202.8	13.3	6.9						
Croatia[def]	1990	466	1.61	1.15	2.28	13.00	14.64	45.76	.91	84.21
	1995	264	.95	.29						
	1996	268	1.04	.30						
	1997	190	1.03	.32	1.25	5.19	10.21	30.39	.41	64.67
	1998	183	1.06	.32	1.33	5.63	10.31	31.42	.42	68.29
	1999	178	1.05	.31	1.32	5.65	10.72	31.83	.38	68.40
Cyprus	1990	81.00	.20	.30	.60	1.60	1.20	1.70		1.80
	1991	63.00								
	1992	66.00								
	1993	69.00								

		PRIORITY METALS			OTHER METALS					
Party	**Year**	**Lead**	**Cadmium**	**Mercury**	**Arsenic**	**Chromium**	**Copper**	**Nickel**	**Selenium**	**Zinc**
	1994	68.00								
	1995	67.00								
	1996	67.00								
	1997	72.00								
	1998	69.00								
	1999	75.00								
	2000	74.00								
Czech Republic	1990	269.4	4.34	7.52						
	1991	240.0	3.92	7.42						
	1992	247.0	3.61	7.28						
	1993	232.0	3.48	7.46						
	1994	202.5	3.52	7.17						
	1995	179.7	3.55	7.40						
	1996	165.4	2.94	5.86						
	1997	179.7	3.00	5.54						
	1998	169.2	2.65	5.16						
	1999	157.0	2.72	3.66						
	2000	107.7	2.85	3.84						
Denmark	1990[g]	134.3	1.167	3.352	1.442	6.450	10.34	26.43	4.199	35.77
	1991[g]	99.03	1.229	3.234	1.921	5.256	10.50	31.96		24.53
	1992[g]	87.09	1.203	3.073	1.716	4.888	10.13	31.15		23.52
	1993[g]	45.02	1.124	3.055	1.692	4.551	10.07	27.35		23.70
	1994	31.85[g]	1.359[g]	3.098[g]	2.008[g]	4.950[g]	10.43[g]	38.46[g]	2.928	26.42[g]
	1995[g]	28.71	.957	2.550	1.445	3.649	9.698	25.68	1.915	27.48
	1996[g]	15.82	.915	2.752	1.104	3.807	9.781	24.88	3.413	30.75
	1997[g]	8.731	.845	2.162	.916	3.236	9.638	22.76	3.209	25.99
	1998[g]	7.636	.775	1.948	.846	2.697	9.410	18.86	2.815	22.97
	1999[g]	7.418	.713	1.976	.846	2.648	9.546	15.16	2.629	22.85
	2000[g]	7.515	.7286	2.052	.8453	2.409	9.072	13.73	2.017	22.18
Estonia	1990	232.5	1.612	1.292	8.1	8.2	1.7	4.4	.2	29.3
	1991	208.4	1.493	1.183	7.7	7.9	1.7	4.2	.2	27.5
	1992	120.9	1.118	.980	7.2	7.795	1.648	3.9	.2	26.77
	1993	100.4	.885	.750	5.6	6.195	1.241	3.1	.1	21.47
	1994	106.7	.937	.798	4.8	5.078	1.033	2.651	.1	17.64
	1995	87.56	.899	.751	4.0	3.982	.841	2.167	.1	16.76
	1996	80.16	.941	.778	4.3	4.236	2.344	2.352	.1	16.34
	1997	73.08	.978	.773	3.8	3.874	2.255	2.068	.1	14.33
	1998	54.66	.829	.664	3.5	3.368	2.158	1.929	.1	13.23
	1999	45.04	.776	.611						
	2000	40.73	.68	.553	9.668	9.686	3.482	7.865	.006	52.96
Finland	1990	326.1	6.3	1.1	33.2	31.6	94.4	67		570.5
	1991	247.4	3.4	.9	22.1	41.4	90.7	45.1		381.4
	1992	174.7	2.9	.8	17.5	31.2	65.5	37.1		283.7
	1993	99.7	2.9	.6	14.3	20.5	54.1	25.9		259.6
	1994	60.1	2.4	.7	10.7	19.6	48.9	33.6		315.7
	1995	56.6	1.7	.7	3.5	21.7	26.7	33.8		321.7
	1996	35	1.5	.8	7.2	21.2	54.5	25.1		191.4
	1997	18.5	1.1	.6	12.3	20.5	72.3	27.8		70.3
	1998	20.3	1.3	.5	12.4	18.2	27.4	20.8		71.2
	1999	14	.6	.4	3.6	18.5	4.1	16.9		57.7
	2000	37.5	1.4	.6	4.6	28	18.7	33.3		70.7
France[gi]	1990	4192	17	27	25	378	97	301	11	1951
	1991	2795	17	28	24	320	98	347	11	1791
	1992	2020	17	27	24	270	98	294	11	1631
	1993	1766	16	24	20	210	95	248	10	1430
	1994	1570	15	24	22	185	95	239	11	1354
	1995	1395	14	22	22	195	94	248	11	1303
	1996	1221	14	22	20	199	93	250	11	1322
	1997	1073	13	17	21	228	91	242	12	1415
	1998	961	13	17	22	235	91	265	12	1412
	1999	724	12	16	22	225	88	236	12	1311
	2000	196	12	15	22	244	89	215	12	1373
Germany	1985	5028	45.00	154.0	221.0	344.0	459.0	440.0		1900
	1990	2323	31	113	122	253	361	278	27	1323
	1995	632	11	31	32	115	79	158	25	451
	2010	294.0	11.00	24.00						
Greece[j]	1996	470.0	3.00	13.00	4.00	10.00	14.00	101.0	.20	52.00
Hungary	1980	574.4	7.49	8.71	21.68	22.25	38.72	66.94	4.93	97.64
	1985	528.9	6.78	8.34	22.45	22.41	36.71	74.13	4.78	99.96
	1990	680.5	5.52	6.28	15.94	16.42	28.07	42.48	3.39	96.59
	1991	487.6	4.70	5.83	14.52	14.83	23.80	48.96	3.19	70.83
	1992	207.7	4.03	4.99	10.22	11.79	18.34	48.72	2.81	62.02
	1993	187.1	4.14	5.00	10.10	12.21	18.18	57.24	2.89	67.64
	1994	155.5	4.077	4.724	9.656	11.83	16.70	54.08	2.777	46.14
	1995	126.6	3.782	4.828	8.791	10.88	15.76	50.07	2.466	48.26
	1996	99.82	3.41	4.667	8.341	10.04	14.50	42.87	2.254	45.69
	1997	89.73	3.26	4.474	7.252	9.185	14.69	46.60	2.107	44.95
	1998	82.20	3.082	4.278	6.118	7.404	14.61	45.92	1.902	39.37

		PRIORITY METALS			OTHER METALS					
Party	**Year**	**Lead**	**Cadmium**	**Mercury**	**Arsenic**	**Chromium**	**Copper**	**Nickel**	**Selenium**	**Zinc**
	1999	38.55	2.993	4.247	6.126	7.257	15.56	43.05	1.842	39.86
	2000[j]	36.90	2.746	4.204	5.709	6.657	15.23	37.24	1.620	40.15
	2010	30	2.7	3.1						
	2020	30	2.7	3.1						
Iceland	1990	12.2								
	1991	8.9								
	1992	6.8								
	1993	5.3								
	1994	4.6								
	1995	3.9								
	1996	1.7								
	1997	.4								
	1998	.4								
Italy	1990	4300	53.79	19.98						
	1994	2174	29.90	13.23						
Kazakhstan	1990				1600		1800			
	1991				1700		1500			
	1992				1800		1100			
	1993				2100		1400			
	1994				1700		620			
	1995				3100		2670			
Kyrgyzstan	1999	.005				.169				
Latvia	1990	20.3	2.46	.37	18.8	11.5	9.9	58.8		22.7
	1991	10.1	1.79	.32	7.57	4.81	6.14	46		21.7
	1992	7.94	1.71	.27	5.47	3.93	5.57	41.7		11
	1993	6.18	1.68	.22	2.34	3.69	3.43	40.6		9.55
	1994	10.3	2.2	.37	2.68	4.71	4.86	56.8		13.3
	1995	4.69	1.44	.17	4.45	3.49	2.76	36.7		6.54
	1996	4.57	.3	.51						
	1997	3.4	.4	.07						
	1998	4.64	.7	.12						
	1999	.2	.32	.18						
	2000	.2								
Lithuania	1990	46.70	3.800	.018	3.400	7.400	11.70	95.60		59.10
	1991	48.80	2.800	.016	2.100	4.600	10.50	57.40		55.20
	1992	32.40	2.500	.011	2.100	4.600	6.800	59.90		30.00
	1993	28.20	2.300	.014	2.000	4.400	5.700	57.00		13.20
	1994	33.00	2.100	.013	1.900	4.300	3.700	57.80		8.900
	1995	30.20	2.10	.153	1.70	4.20	6.80	51.60		50.10
	1996	17.80	2.20	.159	1.70	4.50	7.50	54.40		56.90
	1997	19.50	2.20	.232	1.50	4.10	8.30	49.40		71.00
	1998	21.78	2.59	.245	1.85	5.07	9.18	62.40		78.71
	1999	19.25	2.008	.253	1.366	3.813	7.872	46.10		72.84
	2000	15.92	1.351	.252	.782	2.310	6.398	26.56		61.81
Luxembourg	1990	77.4	.6	.3						
	1994	52.5	.5	.2						
	1995	29.8	.4	.1						
	1996	26.1	.4	.1						
	1997	17.7	.3	.1						
	1998	6.8	.2	.1						
	1999	2.340	.054	.286	.082	.373	1.205	.790	.015	35.47
	2000	1.615	.05079	.2749	.07902	.3420	1.250	.6796	.02365	36.70
Monaco	1990	2.181	.005	.052		.001	.018	.001	.000	.010
	1991	2.256	.005	.053		.001	.019	.001	.000	.011
	1992	2.285	.005	.059		.001	.020	.001	.000	.012
	1993	1.917	.006	.064		.001	.025	.001	.000	.014
	1994	1.653	.006	.070		.001	.025	.001	.000	.015
	1995	.624	.006	.069		.001	.024	.001	.000	.014
	1996	.537	.007	.074		.001	.024	.001	.000	.014
	1997	.481	.008	.084		.001	.024	.001	.000	.014
	1998	.403	.007	.079		.001	.023	.001	.000	.014
	1999	.364	.007	.080		.001	.025	.001	.000	.014
	2000	.060	.008	.082		.001	.025	.001	.000	.015
Netherlands	1990	332.7	1.95	3.03	1.47	11.22	19.4	84.41	.42	220.9
	1991	251.0	2.33	2.74		11.50	46.90	85.70		325.0
	1992	233.0	2.33	2.75	1.50	11.30	48.70	96.50	.40	317.0
	1993	213.0	1.84	2.57		13.80	49.90	90.30		270.0
	1994	164.0	1.68	1.54	1.81	10.40	50.70	95.60	.30	277.0
	1995	158.9	1.01	1.07	1.2	8.23	20.46	96.3	.37	143.9
	1996	106.0	1.83	1.04	1.29	7.51	43.40	95.60	.541	267.0
	1997	72.1	1.88	.759	1.37	6.32	47	85.1	.332	251
	1998	43.92	1.15	.56	1.24	5.4	21.36	52.58	.12	100.3
	1999	35.4	1.01	.529	1.18	5.32	44.6	51.5	.109	91.4
Norway	1980	482.3								
	1981	577								
	1982	651								
	1983	559								
	1984	401								

		PRIORITY METALS			OTHER METALS					
Party	**Year**	**Lead**	**Cadmium**	**Mercury**	**Arsenic**	**Chromium**	**Copper**	**Nickel**	**Selenium**	**Zinc**
	1985	406	1.1							
	1986	341	.0							
	1987	227.8	.0							
	1988	293	.0							
	1989	212.3	1.2							
	1990	186.4	1.690	1.671						
	1991	143.3	1.625	1.563						
	1992	126.2	1.615	1.412						
	1993	86.23	1.682	1.103						
	1994	22.84	1.225	1.165						108.1
	1995	21.06	1.053	1.076						109.2
	1996	9.222	1.093	1.104						103.7
	1997	8.631	1.120	1.121			9.100			
	1998	8.632	1.176	1.086						
	1999	7.817	1.014	1.144						
	2000	6.468	.7457	.9601						
Poland	1990	1372	91.6	33.3	82.1	154.6	599.4	370.0		3092
	1991	1336	85.0	32.7	79.8	133.5	530.4	354.8		2781
	1992	986.0	84.1	31.9	78.9	121.6	497.3	349.8		2678
	1993	996.9	91.9	32.5	82.4	127.8	511.0	352.9		2830
	1994	966.1	85.8	32.4	76.2	120.0	478.3	322.5		2624
	1995	936.6	82.6	32.3	73.4	118.3	464.9	312.3		2580
	1996	959.7	91.2	33.6	75.6	117.0	494.8	328.3		2749
	1997	895.8	85.8	33.0	71.0	116.0	475.1	364.9		2580
	1998	736	55.4	29.5	54.3	89.8	388.7	251.3		2191
	1999	745	61.7	27.1	58.8	89.8	420.9	259.8		2377
	2000	647.5	50.4	25.6	50.4	84.3	374.5	251.4		2173
Republic of Moldova	1990	253.2	3.078	4.253	5.136	9.088	10.01	100.7	.518	12.51
	1991	220.3	3.493	3.810	3.199	7.300	7.467	83.49	.239	8.381
	1992	102.6	1.693	3.290	2.869	4.911	4.465	59.63	.072	5.384
	1993	71.20	1.415	1.849	1.671	4.189	3.633	48.33	.113	4.589
	1994	23.16	.819	1.287	1.487	2.681	2.848	27.33	.072	3.781
	1995	33.90	.594	.894	1.536	2.015	2.785	17.00	.162	3.100
	1996	27.90	0	.954	1.551	1.631	2.748	19.58	.057	3.007
	1997	22.36	.364	.571	.908	1.397	2.033	12.02	.038	2.052
	1998	7.898	.328	.406	.596	1.037	1.389	9.667	.065	1.371
	1999	11.21	.148	.180	.210	.479	.796	4.374	.007	.628
Russian Federation[k]	1990	3591	79.4	15.6						
	1991	3553	68.2	13.4						
	1992	3095	68.8	11.4						
	1993	3276	59	11.8						
	1994	2643	56.6	10.4						
	1995	2426	57.4	10.4						
	1996	2304	51	10.1						
	1997	2247	50.4	9.6						
	1998	2262	49	9.4						
	1999	2339	50.9	9.9						
	2000	2352	50.5	10						
	2010	550	55	14						
Slovakia	1990	151.7	9.97	12.53	154.4	79.27	103.5	80.19	7.17	112.1
	1992	148.6	11.31	6.15	85.58	70.98	79.64	67.02	9.70	92.10
	1994	84.03	7.19	3.86	46.16	12.13	52.49	36.00	7.38	75.59
	1995	81.14	10.57	3.95	39.48	12.62	50.88	37.81	7.78	75.39
	1996	78.39	9.62	3.41	47.44	10.51	62.98	38.64	10.36	72.68
	1997	78.67	10.82	3.74	46.97	9.85	64.63	35.68	8.67	74.81
	1998	67.17	8.47	4.10	40.44	9.68	53.98	35.17	7.41	68.09
	1999	55.38	7.34	3.72	13.31	9.80	24.89	30.70	4.60	58.75
	2000	75.00	7.90	4.45	13.32	9.67	28.01	34.41	5.59	72.82
Slovenia	1990	460.2	1.68	.76						
	1991	386								
	1992	390								
	1993	398								
	1994	405.6	1.66	.61						
	1995	195.5	1.71	.65						
	1996	99	1.77	.59						
	1997	80.38	1.75	.61						
	1998	60.47	1.67	.63						
	1999	50.2	1.62	.6						
	2000	37.15	1.54	.58						
Spain[g]	1990	2834	14	21	34	36	99	262	44	1066
	1991	2081	15	22	37	38	112	279	46	1086
	1992	1301	16	23	43	40	110	312	47	1092
	1993	1194	15	21	41	37	107	279	45	1109
	1994	1180	15	21	43	39	108	296	50	1145
	1995	974	16	21	43	40	101	321	53	1162
	1996	1007	15	19	47	37	123	270	52	1168
	1997	943	15	20	49	37	128	261	56	1178
	1998	884	16	22	52	40	135	285	59	1288

		PRIORITY METALS			OTHER METALS					
Party	**Year**	**Lead**	**Cadmium**	**Mercury**	**Arsenic**	**Chromium**	**Copper**	**Nickel**	**Selenium**	**Zinc**
	1999	826	18	24	49	44	140	314	60	1319
	2000	692	19	23	55	45	145	322	63	1458
Sweden	1990	540	2	1.5	6	23	27	26		230
	1992	365	1.3	1.2	4	20	30	25		195
	1994	37	.7	.9	1.1	13	9	34		94
	1995	37.8	.8	.9	1.3	13.8	9.8	32.2		138
	1997	10.8	.3	.55	.6	5.37	6.5	4.28	.09	34.9
	1998	10.5	.26	.54	.56	4.79	5.4	4.15	.08	32.2
	1999	10.5	.26	.54	.56	4.79	5.4	4.15	.08	32.2
Switzerland	1980	1760	6.35	7.93						1280
	1985	768	4.74	7.84						925
	1990	520	4.2	6.8						841
	1991	461	3.9	6.1						814
	1992	401	3.6	5.4						767
	1993	341	3.1	4.7						719
	1994	287	2.7	4						674
	1995	226	2.5	3.3						607
	1996	199.7	2.3	3.1						609.2
	1997	173.9	2.2	2.9						589.6
	1998	148.6	2.18	2.63						547.3
	1999	131.2	2.18	2.63						553.4
	2000	113.6	2.176	2.63						558.3
	2010	90	2.03	2.39						597
The former Yugoslav Republic of Macedonia	1998	3.020	.167	.048						162.7
	2000	3.02	.0167	.048						
United Kingdom	1980	8189	20.43	35.3	98.41	173.4	144.6	703.4	150.8	964.0
	1981	7393	19.89	34.12	93.49	170.3	138.2	614.5	141.8	985.9
	1982	7494	19.87	33.73	92.32	163.9	133.5	592.3	136.7	951.2
	1983	7611	19.71	32.7	90.52	162.8	134.0	529.7	135.5	956.6
	1984	7810	21.87	30.53	77.58	142.4	116.1	630.7	115.4	932.2
	1985	7210	20.32	33.39	92.12	159.3	127.7	514.5	131.7	953.4
	1986	3545	19.99	32.62	93.03	167.1	132.7	502.2	158.6	948.9
	1987	3635	19.74	31.57	89.37	164.8	132.0	431.4	148.9	959.8
	1988	3775	19.96	32.35	90.38	165.3	132.1	472.1	151.3	1006
	1989	3272	19.87	31.69	84.74	162.3	126.9	430.7	151.5	994.2
	1990	2828	20.33	31.78	81.56	152.8	125.9	422.2	145.7	961.2
	1991	2574	19.93	32.56	83.81	146.8	119.3	441.3	138.4	904.7
	1992	2355	19.58	30.5	83.75	147.5	113.9	445.1	141.1	918.6
	1993	2133	13.75	20.12	80.26	140.2	107.3	432.1	133.9	913.4
	1994	1888	13.29	19.63	74.6	132.5	102.0	396.9	123.3	912.1
	1995	1577	11.82	19.17	65.31	113.3	86.18	330.0	102.6	835.1
	1996	1335	9.35	14.56	60.5	97.72	88.06	296.0	95.1	733.6
	1997	1182	7.81	12.22	52.59	86.14	66.22	223.1	78.55	655.0
	1998	898	6.33	11.12	46.88	79.34	62.87	193.5	73.9	577.6
	1999	548	5.93	8.88	42.56	66.74	56.65	153.6	55.35	434
	2000	496	5.22	8.54	34.56	62.8	45.7	115.1	49.91	336.2
	2010	340.0	12.30	12.30						
United States	1990	2996	180	187	394	1003		1205	504	
	1995			146						
	1996	2383	142	170	323	953		1086	782	

[a] Road transport not included

[b] Road Transport not included.

[c] Emissions are calculated on the base of the total quality of the used fuels by sectors

[d] 1990-1998: Distributed according to SNAP90

[e] 1999: Distributed according to SNAP97

[f] Values for the periode 1991-1994 are missing because air emission inventories were not prepared for that period

[g] Data include those located within the EMEP area only

[i] National totlas do not include the international air traffic and the international sea traffic

[j] Preliminary data

[k] Figures apply to the European part within EMEP except of CO2. CO2 emissions are presented for all territory of Russia.

Table 11. Sulphur: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

(*) Gridded 150km x150km except for year 2000

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----
Austria	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	X---	----
Belarus *	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X--X	X---	X---	X--X	X---	X--X	X---	X---	X---	X---	XX-X	X---	----
Belgium	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	X--X	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	XX--	----	----	----	----	----	----	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Croatia	X---	----	----	----	----	----	----	----	----	----	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX--	----	X---	----
Cyprus	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Czech Republic	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XXXX	X---	----
Denmark	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Estonia	X---	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XXXX	X---	----
Finland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XXXX	X---	----
France	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Georgia	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----
Germany	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	----	X---	----
Greece *	X---	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	X---	----	X---	----
Hungary	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX--	X---	X---
Iceland	X---	X---	X---	X---	X---	X---	X---	XX--	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	X---	XX--	XX--	----	----	X---	----
Ireland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Italy	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	-X--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-
Liechtenstein	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---
Lithuania	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Luxembourg	X---	----	----	X---	----	XX--	----	----	----	----	XX--	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XXXX	XX--	XX--	XX--	XX--	XXXX	XX--	XX--	XXX-	XXX-	XXXX	X---	----
Norway	XX--	X---	X---	X---	X---	XX--	X---	XX--	X---	XX--	XXXX	XXXX	XXXX	XX-X	XXXX	XXXX	XXXX	XXX-	XXX-	XXX-	XXXX	X---	----
Poland	X---	----	----	----	----	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	X---	----
Portugal	X---	----	----	X---	----	X---	X---	X---	X---	----	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----
Republic of Moldova	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	X---	----
Romania	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----	----	----	----	----
Russian Federation	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX--	XX--	XX-X	X---	----
Slovakia	X---	----	----	----	----	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX-X	XX-X	X---	----
Slovenia	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	----
Spain	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	----	----
Sweden	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XXX-	XXX-	XXXX	XXX-	XXXX	XXXX	XXX-	XXX-	XXX-	XXX-	XXXX	X---	----
Switzerland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	X---
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	XX--	----	XXX-	----	----
Turkey	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Ukraine *	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	---X	---X	---X	X---	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXXX	XXX-	XX--	XX--
United States	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Yugoslavia	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX--	----
European Community	----	----	----	----	----	----	----	----	----	----	XX--	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----

Table 12. Nitrogen oxides: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

(*) Gridded 150km x150km except for year 2000

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----
Austria	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	X---	----
Belarus *	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X--X	X---	X---	X--X	X---	X--X	X---	X---	X---	X---	XX-X	X---	----
Belgium	X---	----	----	----	----	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	XX--	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Croatia	X---	----	----	----	----	----	----	----	----	----	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX--	----	X---	----
Cyprus	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Czech Republic	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XXXX	X---	----
Denmark	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Estonia	----	----	----	----	----	----	----	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XXXX	----	----
Finland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XXXX	X---	----
France	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Georgia	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----
Germany	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	----	X---	----
Greece *	----	----	----	----	----	XX--	----	XX--	XX--	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	X---	----	X---	----
Hungary	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX--	X---	X---
Iceland	X---	X---	X---	X---	X---	X---	X---	XX--	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	X---	XX--	XX--	----	----	X---	----
Ireland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Italy	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	-X--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-
Liechtenstein	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---
Lithuania	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Luxembourg	X---	----	----	X---	----	XX--	----	X---	----	----	XX--	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XXXX	XX--	XX--	XX--	XX--	XXXX	XX--	XX--	XXX-	XXX-	XXXX	X---	----
Norway	XX--	X---	X---	X---	X---	XX--	X---	XX--	X---	XX--	XXXX	XXXX	XXXX	XX-X	XXXX	XXXX	XXXX	XXX-	XXX-	XXX-	XXXX	X---	----
Poland	X---	----	----	----	----	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	X---	----
Portugal	X---	----	----	X---	----	X---	X---	X---	X---	----	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----
Republic of Moldova	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	X---	----
Romania	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----	----	----	----	----
Russian Federation	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX--	XX--	XX-X	X---	----
Slovakia	----	----	----	----	----	----	----	X---	----	X---	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX-X	XX-X	----	----
Slovenia	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	----
Spain	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	----	----
Sweden	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XXX-	XXX-	XXXX	XXX-	XXXX	XXXX	XXX-	XXX-	XXX-	XXX-	XXXX	X---	----
Switzerland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	X---
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	XX--	----	XXX-	----	----
Turkey	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Ukraine *	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	---X	---X	---X	X---	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXXX	XXX-	XX--	XX--
United States	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Yugoslavia	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	X---	----
European Community	----	----	----	----	----	----	----	X---	X---	X---	XX--	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----

Table 13. Ammonia: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

(*) Gridded 150km x150km except for year 2000

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----
Austria	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	X---	----
Belarus *	----	----	----	----	----	----	----	----	----	----	X--X	----	----	---X	X---	X--X	X---	X---	X---	X---	XX-X	X---	----
Belgium	----	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	----	----	----
Croatia	----	----	----	----	----	----	----	----	----	----	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX--	----	X---	----
Cyprus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Czech Republic	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XXXX	X---	----
Denmark	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	----	----
Estonia	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	----	----
Finland	X---	----	----	----	----	X---	X---	X---	----	----	XX--	-X--	XX--	-X--	-X--	XX-X	XX--	XX-X	XX-X	XX-X	XXXX	X---	----
France	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Georgia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Germany	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	----	X---	----
Greece	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----	X---	----
Hungary	XX--	----	----	----	----	XX--	X---	X---	----	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	X---
Iceland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ireland	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Italy	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	-X--	-X--	-X--	-X--	-X--	-X--	-X--	-X--	----	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-
Liechtenstein	X---	----	----	----	X---	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Lithuania	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Luxembourg	----	----	----	----	----	----	----	----	----	----	XX--	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XXXX	XX--	XX--	XX--	XX--	XXXX	XX--	XX--	XXX-	XXX-	XXXX	X---	----
Norway	XX--	X---	X---	X---	X---	X---	X---	XX--	X---	XX--	XXXX	XXXX	XXXX	XX--	XXXX	XXXX	XXXX	XXX-	XXX-	XXX-	XXXX	X---	----
Poland	X---	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	X---	----
Portugal	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----
Republic of Moldova	XX--	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	X---	----
Romania	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----	----	----	----	----
Russian Federation	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX--	XX--	XX-X	X---	----
Slovakia	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	----	----
Slovenia	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Spain	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	---X	---X	---X	---X	----	----
Sweden	----	----	----	----	----	----	----	----	X---	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Switzerland	X---	----	----	----	X---	X---	----	----	----	----	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	----
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Turkey	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Ukraine *	----	----	----	----	----	----	----	----	----	----	XX-X	-X--	-X--	-X--	-X--	XX--	XX--	XX--	---X	---X	---X	X---	----
United Kingdom	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XX--	XX--
United States	----	----	----	----	----	X---	----	----	----	-X--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	X---	----	X---	----	----	----	----	----

Table 14. Non-methane volatile organic compounds: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

(*) Gridded 150km x150km except for year 2000

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----
Austria	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	X---	----
Belarus *	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X--X	X---	X---	X--X	X---	X--X	X---	X---	X---	X---	----	X---	----
Belgium	----	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	XX--	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	X---	----	----	----	----	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Croatia	----	----	----	----	----	----	----	----	----	----	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX--	----	X---	----
Cyprus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Czech Republic	----	----	----	----	----	X---	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XXXX	X---	----
Denmark	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Estonia	----	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	X---	----
Finland	----	----	----	----	----	----	----	X---	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XXXX	X---	----
France	----	----	----	----	----	----	----	----	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Georgia	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----
Germany	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	----	X---	----
Greece *	----	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	X---	----	X---	----
Hungary	X---	----	----	----	----	X---	X---	X---	XX--	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	X---
Iceland	X---	X---	X---	X---	X---	X---	X---	XX--	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	X---	XX--	XX--	----	----	X---	----
Ireland	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Italy	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	X---	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	-X--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-
Liechtenstein	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---
Lithuania	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Luxembourg	----	----	----	----	----	XX--	----	----	----	----	XX--	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	X---	X---	X---	X---	X---	XX--	X---	X---	XX--	X---	XXXX	XX--	XX--	XX--	XX--	XXXX	XX--	XX--	XXX-	XXX-	XXXX	X---	----
Norway	XX--	X---	X---	X---	X---	XX--	X---	XX--	X---	XX--	XXXX	XXXX	XXXX	XX-X	XXXX	XXXX	XXXX	XXX-	XXX-	XXX-	XXXX	X---	----
Poland	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	X---	----
Portugal	----	----	----	----	----	X---	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----
Republic of Moldova	----	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	X---	----
Romania	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----	----	----	----	----
Russian Federation	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX--	XX--	XX--	XX-X	X---	----
Slovakia	----	----	----	----	----	----	----	----	----	----	XX--	-X--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	----	----
Slovenia	----	----	----	----	----	----	----	----	X---	----	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Spain	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	----	----
Sweden	----	----	----	----	----	X---	----	----	X---	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	X---	----
Switzerland	X---	----	----	----	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	X---
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Turkey	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Ukraine *	----	----	----	----	----	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	---X	---X	---X	X---	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXXX	XXX-	XX--	XX--
United States	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	XX--	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----

Table 15. Carbon Monoxide: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

(*) Gridded 150km x150km except for year 2000

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----
Austria	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
Belarus *	----	----	----	----	----	X---	X---	X---	X---	X---	X--X	X---	X---	X--X	X---	X--X	X---	X---	X---	X---	XX-X	X---	----
Belgium	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	X---	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Croatia	----	----	----	----	----	----	----	----	----	----	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX--	----	X---	----
Cyprus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-X--	----	----	----
Czech Republic	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XXXX	----	----
Denmark	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Estonia	----	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	----	----
Finland	X---	----	----	----	----	----	----	----	----	----	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XXXX	----	----
France	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	----	----
Georgia	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----
Germany	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	----	----	----
Greece	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----	----	----
Hungary	XX--	----	----	----	----	XX--	----	----	XX--	----	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX-X	XX--	X---	X---
Iceland	X---	X---	X---	X---	X---	X---	X---	XX--	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	X---	XX--	XX--	----	----	X---	----
Ireland	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	X---	----
Italy	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	XX--	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	-X--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-
Liechtenstein	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---
Lithuania	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Luxembourg	----	----	----	----	----	XX--	----	----	----	----	XX--	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XXXX	XX--	XX--	XX--	XX--	XXXX	XX--	XX--	XXX-	XXX-	XXXX	----	----
Norway	XX--	X---	X---	X---	X---	XX--	X---	XX--	X---	XX--	XXXX	XXXX	XXXX	XX-X	XXXX	XXXX	XXXX	XXX-	XXX-	XXX-	XXXX	----	----
Poland	----	----	----	----	----	----	----	----	----	----	X---	----	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	----	----
Portugal	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----
Republic of Moldova	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	X---	----
Romania	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----	----	----	----	----	----
Russian Federation	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX-X	XX-X	XX-X	XX--	XX--	XX-X	X---	----
Slovakia	----	----	----	----	----	----	----	----	----	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX-X	XX-X	----	----
Slovenia	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Spain	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	----	----
Sweden	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	X---	----
Switzerland	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX-X	XX--	XX--	XX--	XX-X	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	X---
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	XX--	----	XXX-	----	----
Turkey	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----
Ukraine *	----	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	---X	X---	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	XXX-	XXX-	XXXX	XXX-	XX--	----
United States	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	XX--	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----

Table 16. TSP: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Austria	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XXX-	X---	X---	X---	X---	XXX-	X---	X---	X---	XXX-	XXX-	----	----
Belarus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Belgium	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Canada	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Croatia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cyprus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Czech Republic	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	XXXX	----	----
Denmark	----	----	----	----	----	----	----	----	----	----	---X	----	----	----	----	---X	----	----	----	----	XXXX	----	----
Estonia	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	X---	X---	X---	X---	XXXX	----	----
Finland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XXXX	----	----
France	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
Georgia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Germany	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Greece	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hungary	X---	----	----	----	----	X---	----	----	X---	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	X---	X---
Iceland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ireland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Italy	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	----	----
Liechtenstein	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lithuania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----
Luxembourg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	----	----	----	----	----	----	----	----	----	----	XXXX	----	----	----	----	XXXX	----	----	XXX-	----	----	----	----
Norway	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Poland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----
Portugal	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Republic of Moldova	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Romania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Russian Federation	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Slovakia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Slovenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Spain	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sweden	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Switzerland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	----	----	----	----	----	----	----
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Turkey	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-X--	-X--	-X--	-X--	-X--	-X--	----	----
Ukraine	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
United Kingdom	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
United States	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table 17. PM10: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Austria	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XXX-	X---	X---	X---	X---	XXX-	X---	X---	X---	XXX-	XXX-	----	----
Belarus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Belgium	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Canada	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Croatia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cyprus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Czech Republic	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Denmark	----	----	----	----	----	----	----	----	----	----	---X	----	----	----	----	---X	----	----	----	----	XXXX	----	----
Estonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	----	----	----
Finland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XXXX	----	----
France	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
Georgia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Germany	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Greece	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hungary	X---	----	----	----	----	X---	----	----	X---	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Iceland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ireland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XXXX	----	----
Italy	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Liechtenstein	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XX--	----	----	----	----	XX--	XX--	----
Lithuania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Luxembourg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Netherlands	----	----	----	----	----	----	----	----	----	----	XXXX	----	----	----	----	XXXX	----	----	XXX-	----	----	----	----
Norway	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Poland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----
Portugal	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Republic of Moldova	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Romania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Russian Federation	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Slovakia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Slovenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Spain	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sweden	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Switzerland	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XX--	----	----	----	----	XX-X	X---	----
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Turkey	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ukraine	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	----	----
United States	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table 18. PM2.5: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Austria	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XXX-	X---	X---	X---	X---	XXX-	X---	X---	X---	XXX-	XXX-	----	----
Belarus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Belgium	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Canada	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Croatia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cyprus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Czech Republic	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Denmark	----	----	----	----	----	----	----	----	----	----	---X	----	----	----	----	---X	----	----	----	----	XXXX	----	----
Estonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	----	----	----
Finland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XXXX	----	----
France	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
Georgia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Germany	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Greece	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hungary	X---	----	----	----	----	X---	----	----	X---	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Iceland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ireland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Italy	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Liechtenstein	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lithuania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Luxembourg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Netherlands	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Norway	----	----	----	----	----	----	----	----	----	----	--X-	--X-	--X-	----	--X-	--X-	--X-	--X-	--X-	--X-	--X-	----	----
Poland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----
Portugal	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Republic of Moldova	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Romania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Russian Federation	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Slovakia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Slovenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Spain	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sweden	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Switzerland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	----	----	----	----	----	----	----
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Turkey	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ukraine	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
United States	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table 19. Persistent organic pollutants: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

* Gridded PAH includes BaP only

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Austria	X---	X---	X---	X---	X---	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
Belarus	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	---X	----	----
Belgium	----	----	----	----	----	----	----	----	----	----	X---	----	----	X---	X---	X---	X---	X---	X---	X---	----	----	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	----	----	XX-X	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Croatia	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	----	XX--	XX--	XX-X	XX--	----	----	----
Cyprus	----	----	----	----	----	----	----	----	----	----	X---	----	----	----	----	----	----	----	----	----	----	----	----
Czech Republic	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	----	----
Denmark	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	----	----
Estonia	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	XXX-	----	----
Finland	----	----	----	----	----	----	----	----	----	----	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XX-X	XXXX	----	----
France	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	----	----
Georgia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Germany	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	XX--	XX--	----	----	----	----	----	----	----
Greece	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hungary	X---	----	----	----	----	X---	----	----	----	----	X---	X---	X---	X---	XX--	XX--	XX--	XX--	X---	X---	X---	X---	X---
Iceland	----	----	----	----	----	----	----	----	----	----	X---	----	----	----	----	----	----	----	----	----	----	----	----
Ireland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Italy	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Liechtenstein	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lithuania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	XX--	XX--	XX--	----	----
Luxembourg	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	----	----	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	----	----	----	----	----	----	----	----	----	----	XXXX	----	X---	----	X---	XXXX	XX--	XX--	XXX-	XX--	----	----	----
Norway	----	----	----	----	----	----	----	----	----	----	XXXX	XXX-	XXX-	XX--	XXX-	XXXX	XXX-	XXX-	XXX-	XXX-	XXXX	----	----
Poland	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	----	----
Portugal	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Republic of Moldova	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----	----
Romania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Russian Federation	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	----
Slovakia	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XX--	----	XX--	XX--	XX--	XX--	----	----
Slovenia	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Spain	----	----	----	----	----	----	----	----	----	----	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	----	----
Sweden	----	----	----	----	----	----	----	----	----	----	X---	----	X---	X---	----	X---	----	XX--	XX--	XX--	----	----	----
Switzerland	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Turkey	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-X--	-X--	-X--	-X--	-X--	----	----	----
Ukraine	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	X---	----	----	----	----
United Kingdom *	----	----	----	----	----	----	----	----	----	----	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	----	----
United States	----	----	----	----	----	----	----	----	----	----	X---	----	----	----	----	----	XX--	----	----	----	----	----	----
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table 20. Heavy Metals: Overview of national emission totals, sector data and gridded data reported and stored at the UNECE/EMEP emission database at MSC-W

Totals	NFR level 1	NFR level 2	Gridded 50km x 50km
X	X	X	X

(*) Gridded 150km x150km except for year 2000

Party/Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	2020
Armenia	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X--X	X---	X---	X---	----	----
Austria	X---	X---	X---	X---	X---	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	----	----
Belarus	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX-X	----	----
Belgium	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	----	----	----
Bosnia and Herzegovina	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bulgaria	----	----	----	----	----	----	----	----	----	----	XX-X	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XXXX	XX--	XX--
Canada	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Croatia	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	XX--	XX-X	XX-X	XX-X	XX--	----	----	----
Cyprus	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	XX--	----	----
Czech Republic	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	XX--	----	----
Denmark	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XXXX	----	----
Estonia	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XXXX	----	----
Finland	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX-X	XX-X	XXXX	----	----
France	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	----	----
Georgia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Germany	----	----	----	----	----	X---	----	----	----	----	XX--	----	----	----	----	XX--	----	----	----	----	----	X---	----
Greece	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	----	----	----
Hungary	X---	----	----	----	----	X---	----	----	----	----	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	X---	X---
Iceland	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----	----	----
Ireland	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	--X-	----	----
Italy	----	----	----	----	----	----	----	----	----	----	X---	----	----	----	X---	----	----	----	----	----	----	----	----
Kazakhstan	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	----	----	----	----	----	----	----
Kyrgyzstan	----	----	----	----	----	----	----	----	----	----	----	----	-X--	-X--	-X--	-X--	-X--	-X--	-X--	XX--	----	----	----
Latvia	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	X---	----	----
Liechtenstein	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lithuania	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Luxembourg	----	----	----	----	----	----	----	----	----	----	XX--	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Malta	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Monaco	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Netherlands	----	----	----	----	----	----	----	----	----	----	XXXX	X---	X---	X---	X---	XXXX	XX--	XX--	XXX-	XX--	----	----	----
Norway	XX--	X---	X---	X---	X---	X---	X---	XX--	X---	XX--	XXXX	XXX-	XXX-	XX--	XXX-	XXXX	XXXX	XXX-	XXX-	XXX-	XXXX	----	----
Poland	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	----	----
Portugal	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Republic of Moldova	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	----	----	----
Romania	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Russian Federation	----	----	----	----	----	----	----	----	----	----	XX-X	XX--	XX--	XX--	XX--	XX-X	XX--	XX--	XX--	XX--	XX--	X---	----
Slovakia	----	----	----	----	----	----	----	----	----	----	XX--	----	X---	----	X---	XX--	X---	X---	X---	X---	XX--	----	----
Slovenia	----	----	----	----	----	----	----	----	----	----	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	XX--	----	----
Spain	----	----	----	----	----	----	----	----	----	----	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	----	----
Sweden	----	----	----	----	----	----	----	----	----	----	X---	----	X---	----	X---	X---	----	XX--	XX--	XX--	----	----	----
Switzerland	X---	----	----	----	----	X---	----	----	----	----	XX-X	X---	X---	X---	X---	XX-X	X---	X---	XX--	XX--	XX-X	X---	----
The FYR of Macedonia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	X---	----	XX--	----	----
Turkey	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-X--	-X--	-X--	-X--	-X--	----	----	----
Ukraine *	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---X	---X	----	----
United Kingdom	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXX-	XXXX	XXX-	X---	----
United States	----	----	----	----	----	----	----	----	----	----	X---	X---	X---	X---	X---	X---	XX--	----	----	----	----	----	----
Yugoslavia	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
European Community	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table 21. Percentage reduction (1990-2000) of 1990 level (A negative number indicates an increase)

PARTY to CLRTAP	SO_2			NO_x			NH_3			NMVOC		
	1990	2000	Reduction	1990	2000	Reduction	1990	2000	Reduction	1990	2000	Reduction
Units	Gg So_2		%	Gg NO_2		%	Gg NH_3		%	Gg NMVOC		%
Signatories to the Gothenburg Protocol (as of August 2001)												
Armenia [1]	72	8.403	88.33	46.2	9.97	78.42	25	0.002		81	15.96	80.3
Austria	90.74	40.75	55.09	201.8	183.6	9.034	79.86	67.68	15.25	359.7	238.7	33.64
Belgium	357			320.6			107.3			303		
Bulgaria	2008	982	51.1	361	184.4	48.91	144	56.23	60.95	217	120.4	44.51
Canada [2]	3236	2534	21.69	2104	2058	2.186				2880	2790	3.125
Croatia	180			87.6			37.1			105		
Czech Republic	1876	264.7	85.89	742	397.7	46.4	156	74.48	52.26	435	246.7	43.28
Denmark	180.6	27.5	84.78	276.9	207.2	25.17	132.2	101.1	23.48	170.5	131.9	22.64
Finland	260	73.5	71.73	300	235.8	21.4	38	33.1	12.89	224.4	159.9	28.74
France	1341	659	50.86	1899	1432	24.59	763	788	-3.28	2385	1659	30.44
Germany	5321			2706			765			3221		
Greece	479			311			79			317		
Hungary	1010	485.3	51.95	238	187.2	21.36	124	70.81	42.9	205	172	16.1
Ireland	185.7	131.5	29.19	118.1	125.1	-5.95	112.4	122.4	-8.93	111.1	90.27	18.76
Italy	1651			1938			466			2213		
Latvia	119.2	18.06	84.85	92.28	33.63	63.56	43.85	11.61	73.52	152.4	95.61	37.25
Liechtenstein	0.113	0.053	52.74	0.525	0.355	32.4	0.205	0.207	-0.93	0.988	0.527	46.61
Luxembourg	15	3.092	79.39	23	17.03	25.96	7	7.233	-3.33	19	14.92	21.45
Netherlands	202.4	91.2	54.93	573.8	421	26.63	226.8	152.6	32.71	503.5	280.7	44.25
Norway	52.55	26.21	50.11	226.5	223.2	1.443	22.73	25.32	-11.4	300.5	363	-20.8
Poland	3210	1511	52.93	1280	838	34.53	512	322	37.11	831	599	27.92
Portugal	359.4			317			104.6			379.9		
Republic of Moldova	265			100			49			157		
Romania	1311			546			300			772		
Slovakia	542	120	77.86	215	106	50.7	63	29.6	53.02	262	89	66.03
Slovenia	196	96	51.02	63	58	7.937	24	19	20.83	44	40	9.091
Spain	2167	1535	29.16	1279	1419	-10.9	472			1610	1584	1.615
Sweden	111.1	57.65	48.12	348.9	246.6	29.3	51	55.87	-9.55	516.7	417.8	19.13
Switzerland	41.96	19.26	54.11	153.7	95.69	37.74	71.5	68.29	4.49	278.8	158.8	43.03
United Kingdom	3721	1165	68.69	2763	1512	45.28	341	297	12.9	2508	1498	40.27
United States [2]	21478	16483	23.26	21747	21713	0.156	3925	4503	-14.7	18421	16252	11.77
Non Signatories to the Gothenburg Protocol (as of August 2001)												
Belarus [3]	637	142.8	77.59	285	134.8	52.69	4	142.1		533		
Bosnia and Herzegovina	480											
Cyprus	46	50	-8.7	18	23	-27.8						
Estonia	252.1	95.46	62.13	67.7	41.4	38.84	24.25	8.764	63.86	88.4	33.69	61.89
Georgia	248.3			129.5						46.4		
Iceland	24			26.3						12.8		
Kazakhstan [4]	1156	948	18.02	355.7	200.9	43.52	0.49	0.27		0.394	0.22	44.16
Kyrgyzstan												
Lithuania	222	43.1	80.59	158	47.5	69.94	84	25.2	70	108	60.8	43.7
Malta												
Monaco [5]	0.063	0.067	-6.35	0.53	0.59	-11.3	0.001	0.006	-500	0.702	0.518	26.21
Russian Federation	4671	1997	57.25	3600	2357	34.53	1191	650	45.42	3668	2450	33.21
The FYR of Macedonia		105.2			30.4							
Turkey [4]	764.6	1347	-76.2	643.7	951.1	-47.8		0.007		462.9	725.6	-56.8
Ukraine [4]	3782			1097			23			1369		
Yugoslavia	508	387	23.82	66	50	24.24						
European Community	16325			13292			3795			16633		

1. Emissions of NH_3 from agriculture are not included in the 2000 emission value
2. Special notes for NH_3 and NMVOC are stated in the Gothenburg Protocol
3. Emissions of NH_3 from agriculture are not included in the 1990 emission value
4. Emissions of NH_3 from agriculture are not or do not seem to be included
5. The NH_3 emission reduction (increase) is not included in the NH_3 reduction figure