EEA Technical report | No 8/2009

European Community emission inventory report 1990–2007 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)

ISSN 1725–2237

European Environment Agency

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Cover design: EEA
Layout: EEA

Luxembourg: Office for Official Publications of the European Communities, 2009

ISBN 978-92-9213-005-3
ISSN 1830-8139
EEA Technical report series: ISSN 1725-2237
DOI 10.2800/12414

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Acknowledgements

This report was prepared by the European Environment Agency's (EEA) European Topic Centre for Air and Climate Change (ETC/ACC). The lead author was Sabine Göttlicher. Other authors in alphabetical order were Michael Gager, Elisabeth Kampel, Nicole Mandl and Katarína Marečková. The EEA project manager was Martin Adams. The desk officer at European Commission DG Environment was André Zuber. The authors gratefully acknowledge comments received from Paul Ruyssenaars and the technical support received from Robert Wankmüller (both ETC/ACC) in the preparation of this report. National Eionet representatives who provided comments on the draft version of this report are also sincerely thanked.

Title of report	**European Community emission inventory report 1990–2007 under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP)**
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Executive summary

This is the European Community emission inventory report under the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP). The report and its accompanying data are provided by the European Commission on behalf of the European Community as an official submission to the Executive Secretary of the United Nations Economic Commission for Europe via the secretariat for the Executive Body of the LRTAP Convention. The report is updated and produced each year for submission under the reporting requirements of the Convention.

Under the LRTAP Convention, Parties (including the European Community) are obliged to report emissions data for a number of air pollutants, including sulphur oxides (SO_X), nitrogen oxides (NO_X), non-methane volatile organic compounds (NMVOCs), ammonia (NH_3), carbon monoxide (CO), primary particulate matter (PM_{10} and $PM_{2.5}$), heavy metals (HMs) and persistent organic pollutants (POPs).

This report provides information on:

- the institutional arrangements and data sources that underpin the European Community's LRTAP Convention emission inventory (Chapter 1);
- emission trends, by pollutant based on the emission reports received from the EU-27 Member States ([1]) (Chapter 2);
- contributions of key source categories to emissions (Chapter 3); and
- recalculations of emission estimates previously reported (Chapter 4).

Several new elements have been incorporated into this year's European Community emission inventory report compared to last year's publication ([2]). The report now provides an analysis of the main sources of air pollutants within the EU on a combined pollutant basis, a summary of the approaches used by the different Member States to estimate emissions from the transport sector, and an overview of projections data that countries reported to the Convention in 2009.

EU-27 emission trends

The main air pollutant emission trends in the period 1990–2007 for NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$ by country, and aggregated for the EU-27 are described in this report. Due to various gaps in the underlying data reported by Member States, the total EU-27 emissions of these air pollutants cannot be estimated for all years.

Across the EU-27 the largest reduction in emissions in percentage terms has been achieved for the acidifying pollutant SO_X: emissions in 2007 were 72 % less than in 1990. Emissions of other key air pollutants also fell during this period, including emissions of the three air pollutants primarily responsible for the formation of ground-level ozone in the atmosphere: CO (57 % reduction), NMVOCs (47 % reduction) and NO_X (36% reduction).

Trends of particulate matter (PM_{10} and $PM_{2.5}$) levels have been compiled for the years 2000–2007 only. According to the data reported by Member States, emissions of these pollutants decreased by 11 % (PM_{10}) and 12 % ($PM_{2.5}$) in the EU-27 during this period.

([1]) The EU-27 comprises Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

([2]) *Annual European Community LRTAP Convention emission inventory report 1990–2006*, EEA Technical report No 7/2008, www.eea.europa.eu/publications/technical_report_2008_7.

The emission trends of the main pollutants within the EU-27 are illustrated in Figure ES1.

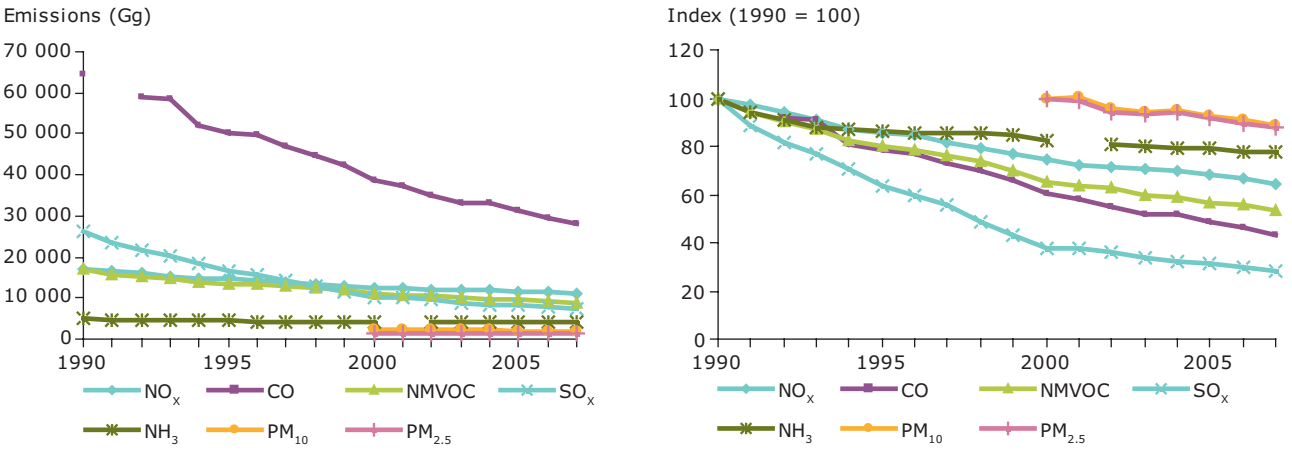
The main sources of EU-27 air pollutant emissions

The top seven key categories of air pollutant emissions are shown in Figure ES2 ([3]). Together, just five energy-related sectors (residential, passenger and heavy duty road vehicles, combustion in manufacturing industries and construction, and power plants) were responsible for more than half of all the EU-27 key category emissions of NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$.

Several individual emission sources were identified as being key categories for more than one of the seven pollutants assessed. The residential sector was identified as a key category for the most pollutants (six), while three sectors (road transport passenger cars, road transport heavy duty vehicles and combustion in manufacturing industries and construction) were each significant sources for five different pollutants.

The growing importance of the residential sector as a source of air pollution across the EU-27 is clear. It is the most important key category for PM_{10}, $PM_{2.5}$ and NMVOC, the second most important key category for CO and also a key source for SO_X and NO_X, and is therefore ranked highest in the combined analysis of emissions sources (as shown in Figure ES2).

Figure ES1 EU-27 emission trends in absolute (Gg) and relative terms for NO_X, CO, NMVOCs, SO_X and NH_3 between 1990 and 2007 (index year 1990 = 100), and for PM_{10} and $PM_{2.5}$ between 2000–2007 (index year 2000 = 100)



Notes: To enable presentation of provisional emission trends, in some instances (due to non-reporting of data) emissions have been aggregated without including data for all the EU-27 Member States. Gaps in the trend curves appear for years where emissions have not been reported by one or more countries and the totals from available data (in the expert judgment of ETC/ACC) would have significantly changed the overall trend shown. Further details are provided in Chapter 2 of this report.

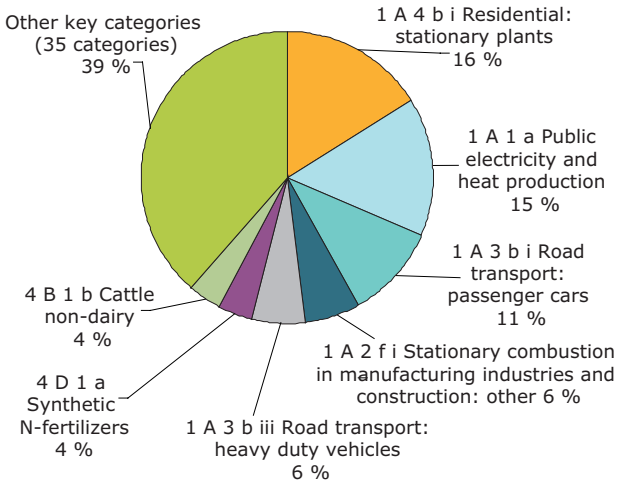
Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onward. Hence emission trends for these years only are shown.

([3]) For each of the main air pollutants and particulate matter (PM_{10} and $PM_{2.5}$), a key category analysis (KCA) was performed to identify the most important sectors that contribute to emissions of a given pollutant in 2007. These individual analyses were subsequently combined according to the methodology of the European Monitoring and Evaluation Programme (EMEP)/EEA Air Pollutant Emission Inventory Guidebook (EMEP/EEA, 2009) to identify those sources which overall contribute most to the emissions of pollutants. A key category is defined as an emission source that has significant influence on the total inventory in terms of the absolute level of emissions, the trend in emissions, or both. In this report, the categories that are together responsible for 80 % of the total emissions for a given pollutant are classified as key categories (EMEP/EEA, 2009).

Similarly, the importance of the road transport sector in terms of its overall contribution to total EU-27 emissions is also evident. Passenger cars are among the top six polluting sources for CO, NO_X, PM_{10}, $PM_{2.5}$ and NMVOC, while heavy duty vehicles are the most important source of NO_X emissions and are a key category for CO, and $PM_{2.5}$, PM_{10} and NMVOC.

Despite significantly reducing emissions since 1990, the public electricity and heat production sector (i.e. power and heat-generating plants) still remains an important source of the acidifying pollutants NO_X and SO_X. It is the most important category for SO_X emissions in the EU-27 and the second most important for NO_X.

Figure ES2 Air pollutant emission sources that contributed most to EU-27 emissions of NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$ in 2007



Note: The codes and descriptions shown correspond to the UNECE emissions reporting nomenclature.

Recommendations

At a technical level, this report makes several recommendations to assist in improving the quality of the European Community inventory. First, Member States should use the new reporting format specified in the recently updated 2009 United Nations Economic Commission for Europe (UNECE) LRTAP Convention emission reporting guidelines. This allows a comparable aggregation and analysis of the underlying data received from countries, which is necessary for the Community's own inventory.

Similarly, despite clear progress in recent years concerning the completeness of reporting, to compile a comprehensive inventory at the European Community level the completeness of Member States' submissions must improve further. That is particularly so for reporting of 1990–2001 data to allow for reliable trend analysis. In order to generate a complete EU-27 inventory, an additional option is to establish a formal procedure for filling data gaps. Such a procedure could be similar to that employed in the compilation of the EU greenhouse gas inventory and inventory report submitted each year to the United National Framework Convention on Climate Change. With this objective in mind, discussions have already been held with country representatives concerning a potential technical basis of a gap-filling procedure that could be implemented in the future.

Finally, national emission inventory experts are encouraged to participate as expert reviewers in the joint annual EMEP/EEA inventory review process. Such activities (aimed specifically at supporting and improving the quality of national inventories) are key to ensuring that high quality data are available for the European Community's own inventory.

1 Introduction

The present report and its accompanying data are provided by the European Commission (on behalf of the European Community) as an official submission to the Secretariat for the Executive Body of the LRTAP Convention.

The report provides information on the institutional arrangements that underpin the European Community's emission inventory (Chapter 1); emission trends, by pollutant (Chapter 2); contributions of key categories to emissions (Chapter 3); and recalculations of emission estimates previously reported by the EU-27 Member States (Chapter 4).

EU-27 totals are estimated for nitrogen oxides (NO_X), carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs), sulphur oxides (SO_X) and ammonia (NH_3). Emission estimates are not always available for these pollutants in each year due to gaps in the data reported by Member States. Similarly, a limited time series of data are provided for particulate matter emissions (PM_{10} and $PM_{2.5}$).

A number of annexes accompany this inventory report:

- Annex A provides a copy of the formal LRTAP Convention data submission of the European Community for the years 1990–2007 for the EU-27 in the required UNECE reporting format;
- Annex B provides the updated European Community NO_X emissions data for 1987–1989, provided in accordance with the requirements of the 1988 NO_X protocol of the LRTAP Convention;
- Annex C provides results of the key category analysis for the EU-27;
- Annex D provides emissions data for heavy metals (HMs) and persistent organic pollutants (POPs) submitted by the EU-27 Member States.

Compared to the *European Community LRTAP Convention emission inventory report 1990–2006* (EEA, 2008), this inventory report also includes two new elements:

- an overview of the approach used by Member States to estimate emissions from the transport sector, i.e. whether based on a 'fuel used' or 'fuel consumed' approach (or both);
- a summary of the emission projections reported by the Member States under the LRTAP Convention ([4]).

The 27 Member States referred to in this report are: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

1.1 Background

1.1.1 Reporting obligations under the Convention on Long-range Transboundary Air Pollution

The United Nations Economic Commission for Europe's Convention on Long-range Transboundary Air Pollution was ratified by the European Community in 1982. Article 2 of the Convention states that 'the Contracting Parties, taking due account of the facts and problems involved, are determined to protect man and his environment against air pollution and shall endeavour to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution'.

The Convention has set up a process for negotiating concrete measures to control specific pollutants through legally binding protocols. Since 1984,

([4]) A separate report, the *NEC Directive status report 2008* (EEA Technical report 2009, in preparation) will provide a more detailed assessment of the air emission projections for 2010 recently reported by Member States directly to the European Commission and the EEA under the requirements of the EU National Emission Ceilings Directive.

eight protocols have come into force. The 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone came into force on 17 May 2005. Table 1.1 presents the status of ratification of each protocol by the European Community. The status differs in the individual Member States.

At its most recent session (15–18 December 2008), the UNECE Executive Body approved revised 'Guidelines For Reporting Emission Data under the Convention on Long-range Transboundary Air Pollution'. These revised Reporting Guidelines (UNECE, 2009) describe the data that Parties should report under the LRTAP Convention and its protocols. A summary of the reporting requirements is provided in Appendix 1I.

In 2009, Parties were requested to report emissions data for SO_X, NO_X, NMVOCs, NH_3, CO, HMs, POPs and PM, and also associated activity data. The deadline for Parties to submit data is 15 February each year, with a separate deadline of 15 March for submitting the accompanying inventory reports. The European Community has separate reporting dates specified in the Reporting Guidelines, which allow time for the compilation of the Community's inventory from the individual submissions from Member States; EU-27 inventory data should be submitted by 30 April and the accompanying inventory report by 30 May each year.

The Reporting Guidelines also request Parties to report emissions inventory data using an updated format — the nomenclature for reporting (NFR08) format .

1.1.2 Reporting obligations under the NEC Directive and the EU Monitoring Mechanism

EU Member States also report their emissions of SO_2, NO_X, NMVOCs and NH_3 under the National Emission Ceilings Directive (NECD) ([5]) and emissions of NO_X, CO, NMVOCs and SO_2 under the EU Greenhouse Gas Monitoring Mechanism (EU-MM) ([6]) for the United Nations Framework Convention on Climate Change (UNFCCC). This information should also be copied by Member States to the EEA's Eionet Reportnet Central Data Repository (CDR) ([7]). Table 1.2 provides an overview of the different air emission reporting obligations for EU Member States.

Table 1.1 The European Community's status of ratification of the LRTAP Convention and related protocols

LRTAP Convention and its protocols	Status of ratification
Convention on Long-range Transboundary Air Pollution (1979)	Signed and ratified (approval)
Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (1984)	Signed and ratified (approval)
Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent (1985)	Not signed
Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes (1988)	Ratified (accession)
Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes (1991)	Signed
Protocol on Further Reduction of Sulphur Emissions (1994)	Signed and ratified (approval)
Protocol on Persistent Organic Pollutants (1998)	Signed and ratified (approval)
Protocol on Heavy Metals (1998)	Signed and ratified (approval)
Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (1999)	Ratified (accession)

([5]) Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, *Official journal of the European Communities* 309, 27.11.2001, p. 22.
([6]) Decision 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, *Official journal of the European Communities* 49, 19.02.2004, p. 1.
([7]) http://cdr.eionet.europa.eu.

The three reporting obligations differ somewhat in the air pollutants covered, the geographical coverage of countries (for example, regarding inclusion of overseas territories and areas of France, Portugal, Spain and the United Kingdom), and the inclusion of domestic and international aviation and navigation in the reported 'national total'. For most countries, however, such differences are not significant. The reporting obligations under the LRTAP Convention and NECD have now largely been harmonised since the adoption of the updated Reporting Guidelines. They differ only with respect to the geographical coverage for France, Portugal and Spain, and the technical basis on which transport emissions may be estimated. The main differences between the different reporting instruments are summarised in Table 1.3.

Table 1.2 Overview of air emission reporting obligations in the European Community, 2008–2009

Legal obligation	Emission reporting requirements	Annual reporting deadline for EU Member States	Annual reporting deadline for the European Community
LRTAP Convention	Emissions ([a]) of SO_x (as SO_2), NO_x (as NO_2), NH_3, NMVOCs, CO, HMs, POPs and PM	15 February	30 April
NEC Directive	Emissions of SO_2, NO_x, NMVOCs and NH_3	31 December	–
EU Monitoring Mechanism/ UNFCCC	Emissions ([b]) of CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NO_x, CO, NMVOCs and SO_2	15 January (to the European Commission) 15 April (to the UNFCCC)	15 April

Note: ([a]) Parties are formally required to report only on the substances and for the years set forth in protocols that they have ratified and that have entered into force.
([b]) Greenhouse gases: CH_4 — methane; N_2O — nitrous oxide; HFCs — hydrofluorocarbons; PFCs —polyfluorocarbons; SF_6 — sulphur hexafluoride.

Table 1.3 Major differences between the reporting obligations of air pollutants under the LRTAP Convention, NEC Directive and EU Monitoring Mechanism/UNFCCC

	EU NECD	LRTAP Convention — NFR ([a])	EU-MM/UNFCCC — CRF ([b])
Air pollutants	NO_x, SO_x, NMVOCs, NH_3	NO_x, SO_x, CO, NMVOCs, NH_3, HMs, POPs, PM	NO_x, SO_x, NMVOCs, CO
Domestic aviation (landing and take-off)	Included in national total	Included in national total	Included in national total
Domestic aviation (cruise)	Not included in national total ([c])	Not included in national total ([c])	Included in national total
International aviation (landing and take-off)	Included in national total	Included in national total	Not included in national total ([c])
International aviation (cruise)	Not included in national total ([c])	Not included in national total ([c])	Not included in national total ([c])
National navigation (domestic shipping)	Included in national total	Included in national total	Included in national total
International inland shipping	Included in national total	Included in national total	Not included in national total ([c])
International maritime navigation	Not included in national total ([c])	Not included in national total ([c])	Not included in national total ([c])
Road transport	Emissions calculated based on fuel sold ([d])	Emissions calculated based on fuel sold ([d])	Emissions calculated based on fuel sold

Note: ([a]) 'NFR' denotes 'nomenclature for reporting', a sectoral classification system developed by UNECE/EMEP for reporting air emissions.

([b]) 'CRF' is the sectoral classification system developed by UNFCCC for reporting of greenhouse gases.

([c]) Categories not included in national totals should still be reported by Parties as so-called 'memo items'.

([d]) In addition, Parties may report emission estimates based on fuel consumed, as an additional 'memo item'.

1.2 Institutional arrangements

1.2.1 Member States

Member States are responsible for choosing activity data, emission factors and other parameters used for their national inventories. Member States should also follow the Reporting Guidelines (UNECE, 2009) and use the methodologies contained in the latest version of the EMEP/CORINAIR emission inventory guidebook (EMEP/EEA, 2007). An updated emission inventory guidebook is presently under preparation and is expected to be adopted by the Convention during the course of 2009.

Member States are also responsible for establishing quality assurance and quality control programmes for their inventories. Where Member States compile an inventory report, a description of the quality assurance and quality control activities and recalculations should be included.

In addition to submitting their national LRTAP inventories and inventory reports, Member States through their participation in the Eionet network (see Section 1.2.2) also take part in the annual review and commenting phase of the draft European Community inventory report. The purpose of circulating the draft inventory report is to improve the quality of the European Community emission inventory. The Member States check their national data and information used in the inventory report and if necessary send updates. In addition, they provide general comments on the inventory report.

1.2.2 The European Environment Agency, Eionet and the European Topic Centre on Air and Climate Change

European Environment Agency

The European Environment Agency assists the European Commission (DG Environment) in compiling the annual European Community LRTAP inventory. The activities of the EEA include:

- overall coordination and management of the inventory compilation process;
- coordinating the activities of the EEA's European Topic Centre on Air and Climate Change (ETC/ACC), which undertakes the data checking, compilation and draft report writing tasks;
- communication with the European Commission;
- communication with Member States;
- circulation of the draft European Community emission inventory and inventory report;
- hosting the official inventory database and web dissemination of data and the inventory report.

European Topic Centre on Air and Climate Change

With regard to the European Community's emission inventory, the main ETC/ACC ([8]) activities include:

- initial checks and testing of Member State submissions in cooperation with EMEP, and compiling results from those initial checks (status reports, country synthesis and assesment reports);
- consulting with Member States (via the EEA) in order to clarify data and other information provided;
- preparing the European Community emission inventory and inventory report by 30 April, based on Member State submissions (subsequently submitted by the Commission to the UNECE);
- preparing the updated European Community emission inventory and inventory report.

The work of the EEA and the ETC/ACC is facilitated by the European environmental information and observation network (Eionet) ([9]), which consists of the EEA (supported by its European Topic Centres), a supporting network of experts from national environment agencies and other bodies that deal with environmental information (see http://eionet.europa.eu). Member States are requested to use the CDR of the Eionet Reportnet tools to make their LRTAP Convention submissions available to the European Commission and the EEA.

([8]) The current ETC/ACC was established by a contract between the lead organisation Milieu-en Natuurplanbureau (MNP) and the EEA in 2006. Now based at the Netherlands Environmental Assessment Agency (PBL), it involves 11 organisations and institutions in eight European countries.

([9]) Council Regulation (EC) No 933/1999 of 29 April 1999 amending Regulation (EEC) No 1210/90 on the establishment of the European Environment Agency and Eionet. A brochure describing the structure, working methods, outputs and activities of Eionet is available at http://reports.eea.europa.eu/brochure_2004_3/en.

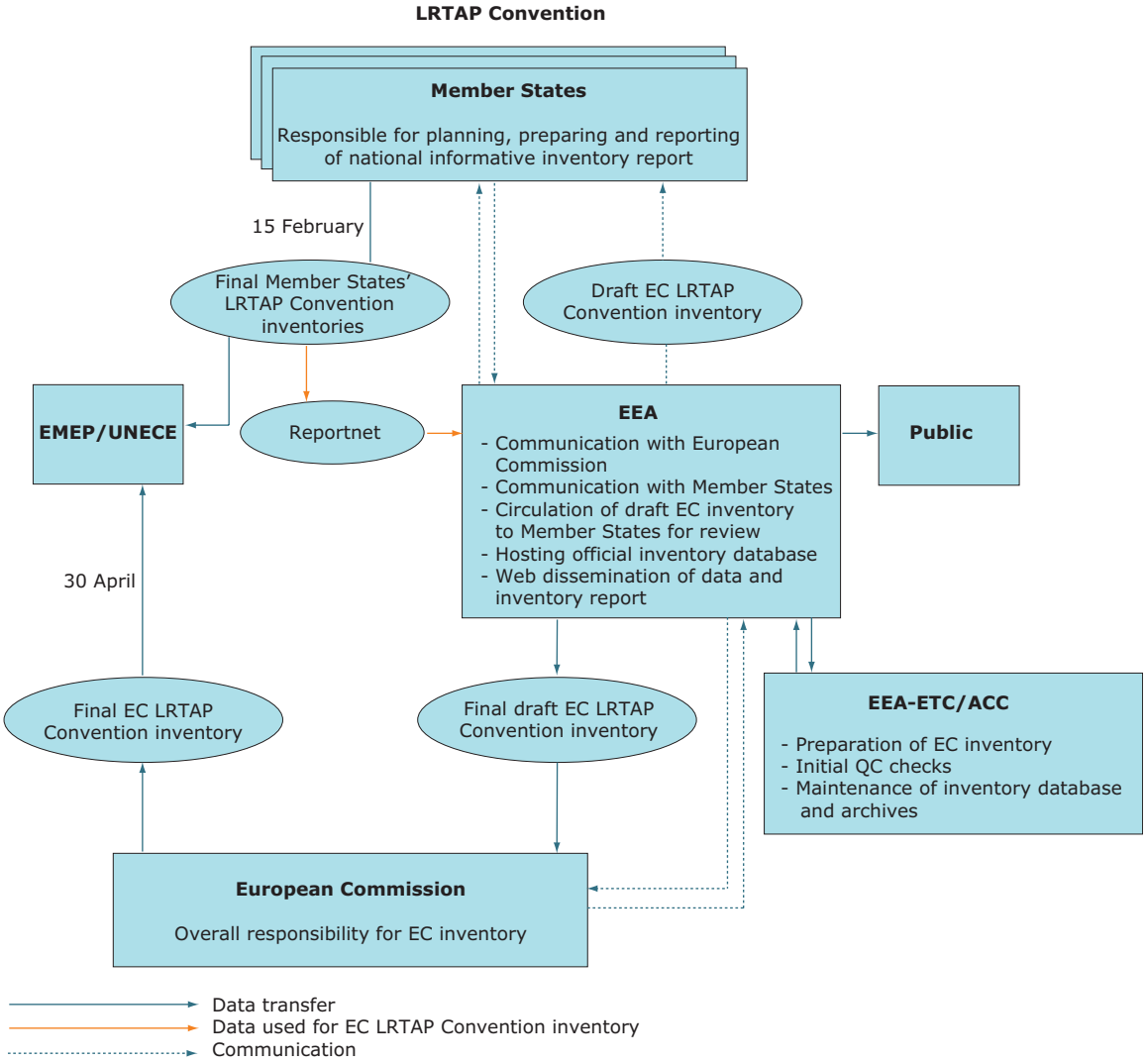
The European Commission formally submits the European Community's emission inventory data and inventory report to EMEP through the Executive Secretary of the UNECE.

1.3 Inventory preparation process

No specific European Community directive implements the LRTAP Convention's requirements to estimate air emissions and prepare air emission inventories. The basis of reporting for the individual Member States and for the European Community remains the LRTAP Convention, its protocols (Table 1.1) and subsequent decisions taken by the Executive Body. As noted earlier, the Reporting Guidelines describe the data that Parties should report under the LRTAP Convention and its protocols. Within the European Community, Member States are requested each year (under the agreement between Eionet countries and EEA concerning priority data flows) to post a copy of their official submission to the LRTAP Convention in the CDR by 15 February each year. The ETC/ACC subsequently collects the data from the CDR and compiles the European Community LRTAP Convention emission inventory database, producing a European Community LRTAP Convention emission inventory and inventory report.

Within this legal and procedural framework, preparation of the annual LRTAP Convention emission inventory involves the Member States providing their data, the European Commission and EEA receiving the data, and finally the EEA and its ETC/ACC compiling the data and preparing the actual inventory. The inventory and accompanying documentation are subsequently

Figure 1.1 Data flow for compiling the European Community LRTAP Convention emission inventory



made publicly available through the EEA website. Figure 1.1 presents a flowchart diagram illustrating the dataflow that is used to compile the European Community's LRTAP Convention emission inventory.

1.4 Methods and data sources

The European Community LRTAP Convention emission inventory is the sum of the Member States' inventories. An overview, by pollutant, of emission data received from Member States' LRTAP Convention submissions in 2009 via the CDR is provided in Table 1.4.

Due to data gaps and the lack of an agreed data gap filling procedure, total European Community emissions in the period 1990–2007 are estimated only for NO_X, CO, NMVOCs, SO_X and NH_3. For the years 2000–2007 they are only estimated for PM_{10} and $PM_{2.5}$. For HMs and POPs, due to significant gaps in data available from Member States, neither time-series trends nor an analysis of the main emission sources can yet be compiled for the EU-27.

This report includes all data and submissions received from EU-27 Member States by 26 May 2009.

As noted above, the updated Reporting Guidelines request that emissions data be provided in the NFR08 format. While several Member States used the new NFR08 reporting templates, many did not and instead continued to provide data in older formats (mainly the previous version of NFR, the so-called NFR02). Table 1.7 lists the formats used by Member States. In order to compile the EU-27 inventory it was necessary to transfer all submissions into a uniform format.

1.4.1 Data gaps and gap filling

As Tables 1.4 and 1.5 indicate, Member States' submissions can contain various data gaps for particular pollutants or years in the time series. There is currently no agreed procedure enabling the missing data in Member States' inventories to be provided. In order to generate a complete EU-27 inventory, a formal procedure for filling data gaps should be elaborated and adopted. One option for the future may be to apply the same general principle and methods as those used in the EU-MM when compiling the EU greenhouse gas inventory and inventory report.

For this report, the emission trends of the main pollutants (SO_X, NO_X, CO, NMVOCs and NH_3) are compiled from 1990 onward and emission trends of PM_{10} and $PM_{2.5}$ are compiled from 2000 onward. For Member States that did not provide their LRTAP Convention emission inventory (or provided incomplete inventories) to the EEA, emissions of air pollutants (SO_X, NO_X, CO, NMVOCs, NH_3, PM_{10} and $PM_{2.5}$) officially reported under the LRTAP Convention to EMEP were used. In addition, emissions data officially reported by Member States under NECD and EU-MM were used to fill gaps where possible (see Table 1.5 for details). This helped determine provisional emission trends and the most significant emission sources of the various pollutants for the European Community as a whole. This is the same procedure used in previous years to compile the European Community's inventory.

Box 1.1 Compilation of a consistent NFR dataset for the European Community

To allow the European Community inventory to be reported in the requested NFR08 format, emissions inventories submitted by some Member States in NFR02 (see Table 1.7) needed to be transferred into the newer format. As the categories in NFR02 and NFR08 are not identical, a procedure for allocating the source categories from NFR02 to NFR08 was developed. Appendix 3 provides details of the mapping schema used. The most detailed information that a Member State provided was always used, even if such detailed information was only available for a few source categories. The same mapping schema was applied for all Member States that reported in NFR02 formats.

Table 1.4 Overview of air pollutants and years covered in Member State LRTAP Convention submissions in 2009 (as of 26 May 2009)

Member State	SO_X, NO_X, CO, NH_3, NMVOC	Cd, Hg, Pb	Additional HMs ([a])	PM_{10}, $PM_{2.5}$	TSP ([b])	POPs (PAH, DIOX, HCB) ([c])	Activity data ([d])
Austria	1980–2007	1985–2007	np	1990, 1995, 1999–2007	1990, 1995, 1999–2007	1985–2007	1980–2007
Belgium	1990–2007	1990–2007	1990–2007	2000–2007	2000–2007	1990–2007	np
Bulgaria	2007	2007	2007	2007	2007	2007	np
Cyprus	1990–2007	1990–2007	1990–2007	2000–2007	2000–2007	1990–2007	np
Czech Republic	2007	2007	2007	2007	2007	2007	np
Denmark	1980–2007	1990–2007	1990–2007	2000–2007	2000–2007	1990–2007	np
Estonia	1990–2007	1990–2007	1990–2007	2000–2007	1990–2007	1990–2007	2007
Finland	1980–2007	1990–2007	1990–2007	2000–2007	2000–2007	1990–2007	2007
France	1980–2007	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	1980–2007
Germany	1990–2007	1990–2007	1990–2007	1995–2007	1990–2007	1990–2007	1990–2007
Greece	2003–2007	np	np	np	np	np	np
Hungary	2002–2007	2002–2007	2002–2007	2002–2007	2002–2007	2002–2007	2007
Ireland	1987, 1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	np
Italy	1980–2007	1990–2007	1990–2007	1990–2007	np	1990–2007	np
Latvia	1990–2007	1990–2007	1990–2007	2000–2007	2000–2007	1990–2007	1990–2007
Lithuania	2007	2007	2007	2007	2007	2007	2007
Luxembourg	1990–2007	np	np	np	np	np	np
Malta	2000–2007	2000–2007	2000–2007	2000–2007	2000–2007	np	2000–2007
Netherlands	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	np
Poland	2006–2007	2006–2007	2006–2007	2006–2007	2006–2007	2006–2007	np
Portugal	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007	1990–2007
Romania	1980–2004, 2007	2007	2007	2007	2007	1990, 2004–2007	2007
Slovakia	2000–2007	2000–2007	2000–2007	2000–2007	2000–2007	2000–2007	2000–2007
Slovenia	2000–2007	2000–2007	2007	2000–2007	2000–2007	2000–2007	2007
Spain	1980–2007	1990–2007	1990–2007	2000–2007	2000–2007	1990–2007	1990–2007
Sweden	1980–2007	1990–2007	1990–2007	1980–2007	1980–2007	1980–2007	1990–2007
United Kingdom	1980–2007	1980–2007	1980–2007	1980–2007	np	1990–2007	1990–2007

Note: ([a]) 'HMs' denotes 'heavy metals'.

([b]) 'TSP' denotes 'total suspended particles'.

([c]) 'PAH' denotes 'polycyclic aromatic hydrocarbons'; 'DIOX' denotes 'dioxins'; 'HCB' denotes 'hexachlorobenzene'.

([d]) 'Activity data' related to emissions and reported in NFR Table 1.

'np' denotes 'not provided'.

Reporting of additional HM is not obligatory for Parties.

Reporting of PM_{10} and $PM_{2.5}$ is requested from 2000 onward. Slovakia and Slovenia also submitted national total emissions for 1990–2000.

Romania also submitted national total emissions for 1990–2004.

Table 1.5 Sources of SO_X, NO_X, CO, NMVOC, NH_3, PM_{10} and $PM_{2.5}$ emissions data used for EU-27 inventory compilation in 2009

Member State	NFR as provided as LRTAP Convention submission under Eionet		CRF as provided under Council Decision 280/2004/EC under Eionet (SO_X, NO_X, CO, NMVOC)	Data submitted under LRTAP Convention to EMEP (CEIP database)
	SO_X, NO_X, CO, NMVOC, NH_3	PM_{10} and $PM_{2.5}$		
Austria	1990–2007	1990, 1995, 1999–2007		
Belgium	1990–2007	2000–2007		
Bulgaria	2002–2007	2007	1990–2001	NH_3 1990–2001
Cyprus	1990–2007	1990–2007		
Czech Republic (a)	2002–2007	PM_{10} 2002–2007, $PM_{2.5}$ 2003–2007	1990–2001	
Denmark	1990–2007	2000–2007		
Estonia	1990–2007	2000–2007		
Finland	1990–2007	2000–2007		
France	1990–2007	1990–2007		
Germany	1990–2007	1995–2007		
Greece	1990–2007	–		
Hungary	1990, 1995 (totals), 2002–2007	1995–2007	1991–1994, 1995 (CO), 1996–2002	CO 2000, NO_X 2000–2001
Ireland	1990–2007	1990–2007		
Italy	1990–2007	1990–2007		
Latvia	1990–2007	1990–2007		
Lithuania (b)	2002, 2005–2007	2005–2007	1990–2001	All 2003–2004; NH_3 1990–2000
Luxembourg	1990–2007	–	1990–2007 (CO)	
Malta	2000–2007	2000–2007	1990–1999	
Netherlands	1990–2007	1990–2007		
Poland (c)	2002–2007	2000–2007	1990–1999, 2000 (NMVOC)	NO_X, CO, SO_X 2000; all 2001; NH_3 2001
Portugal	1990–2007	1990–2007		
Romania	2005–2007	PM_{10} 2005–2007, $PM_{2.5}$ 2007	1990–2004	
Slovakia	2000–2007	2000–2007	1990–1999	
Slovenia	1990–1999 (nat. total); 1990–2007	2000–2007		
Spain	1990–2007	2000–2007		
Sweden	1990–2007	1990–2007		
United Kingdom	1990–2007	1990–2007		

Note: 'All' in the table refers to all main pollutants SO_X, NO_X, CO, NMVOC and NH_3.

(a) The Czech Republic's emissions from 1990 to 2001 were reported under CLRTAP but only national totals were provided and they seemed not to be consistent with data reported for 2002–2005. For that reason, the 1990–2001 emissions data submitted under the EU-MM in March 2009 are instead used in this report.

(b) Lithuania's 2003 and 2004 emissions are taken from data reported directly to UNECE, as they were not submitted to the CDR before 26 May 2009.

(c) Poland's 1990–1999 data submitted under CLRTAP are available only in the earlier SNAP format and therefore emissions reported in CRF tables were used in the report. National totals in NFR and CRF for this period are consistent. CO emissions for 1991 are not available either from submitted NFR or CRF tables. For the years 2000–2004 only national totals are available for PM_{10} and $PM_{2.5}$ emissions. The data for 2000 and 2001 is taken from the Polish IIR 2002 and 2003.

1.4.2 Gridded data and large point sources

According to the revised Reporting Guidelines, Parties within the geographical scope of EMEP should report gridded data every five years, commencing 1990. In 2009, Finland, Denmark, Slovakia and Spain submitted updated gridded data. Gridded data for the EU-27 were last submitted in 2007 and hence are not reported again this year.

Parties within the geographical scope of EMEP are also required to provide data on large point sources (LPS) every five years, commencing 2000. Finland and Spain reported updated LPS data in 2009. EU-27 LPS data were last submitted in 2007 and hence are not reported in 2009.

Further information concerning EU-27 gridded and LPS data are provided in Annexes G and H of the European Community emission inventory report 1990–2005 (EEA, 2007).

1.4.3 Basis of emissions estimation in the transport sectors by Member States

Concerning the estimation and reporting of transport emissions, the revised Reporting Guidelines state that 'emissions from road vehicle transport should … be calculated and reported on the basis of the fuel sold in the Party concerned … In addition, Parties may report emissions from road vehicles based on fuel used or kilometres driven in the geographic area of the Party'. Furthermore, the Reporting Guidelines allow certain Parties to report emissions just on a 'fuel consumed' basis.

Given this different basis upon which Member States may estimate emissions from mobile sources, an aggregated EU-27 inventory (which is the sum of the emissions reported by Member States) is at risk of double counting or omitting emissions from mobile sources if different countries apply different methodologies. To help increase the transparency of the EU-27 inventory, information on the basis for estimating emissions from mobile sources is given in Table 1.6.

Table 1.6 Basis for estimating emissions from mobile sources

		Austria		Belgium		Bulgaria		Cyprus		Czech Republic		Denmark		Estonia		Finland		France		Germany		Greece	
NFR code	Description	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used
1 A 3 a i (i)	International Aviation (LTO)	x			x					x	x	x				x			x	x		x	
1 A 3 a i (ii)	International Aviation (Cruise)	x			x			NE	NE	x	x	x		x		x				IE	IE	x	
1 A 3 a ii (i)	Civil Aviation (Domestic, LTO)	x			x	x		NO	NO	x	x	x		x			x		x	x		x	
1 A 3 a ii (ii)	Civil Aviation (Domestic, Cruise)	x			x	x		NO	NO	x	x	x		x			x		x	IE	IE	x	
1 A 3 b	Road transport	x			x	x			x	x	x	x		x		x	x			x		x	
1 A 3 c	Railways	x			x	x		NO	NO	x	x	x		x		x				x		x	
1 A 3 d i (i)	International maritime Navigation	x			x			NE	NE			x		x		x				x		x	
1 A 3 d i (ii)	International inland waterways	x			x			NO	NO			NO				x				IE	IE	x	
1 A 3 d ii	National Navigation	x			x			NE	NE			x		x			x			x		x	
1 A 4 c i	Agriculture	x			x		x		x		x	x		x			x		x	x		x	
1 A 4 c ii	Off-road vehicles and other machinery	x			x	x			x		x	x		x			x		x	x		x	
1 A 4 c iii	National Fishing	x			x			NE	NE			x		x		x				IE	IE	x	
1 A 5 b	Other, Mobile (Including military)	x			x	x		NE	NE	x	x	x		x		x		NO	NO	x			

Table 1.6 Basis for estimating emissions from mobile sources (contd)

		Hungary		Ireland		Italy		Latvia		Lithuania		Luxem-bourg		Malta		Nether-lands		Poland		Portugal		Romania	
NFR code	Description	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used
1 A 3 a i (i)	International Aviation (LTO)					x			x	x		x					x	x			x		
1 A 3 a i (ii)	International Aviation (Cruise)					x			x	x		x					x	x		x			
1 A 3 a ii (i)	Civil Aviation (Domestic, LTO)					x			x		x	x					x	x			x		
1 A 3 a ii (ii)	Civil Aviation (Domestic, Cruise)					x			x		x	x					x	x		x			
1 A 3 b	Road transport					x			x	x			x	x			x		x	x		x	
1 A 3 c	Railways					x			x		x	x		NO	NO	x			x	x		x	
1 A 3 d i (i)	International maritime Navigation					x			x	x		x			x		x	x		x			
1 A 3 d i (ii)	International inland waterways								NO	NO	NO	x		NO	NO		x	x					
1 A 3 d ii	National Navigation					x			x	x		x			x		x	x		x		x	
1 A 4 c i	Agriculture					x			x		x	x		x					x	x		x	
1 A 4 c ii	Off-road vehicles and other machinery					x			x		x	x		x					x	x		x	
1 A 4 c iii	National Fishing					x			x	x	x	x		IE	IE		x	x		x		x	
1 A 5 b	Other, Mobile (Including military)					x			x		x	x				x				x			

Table 1.6 Basis for estimating emissions from mobile sources (contd)

		Slovakia		Slovenia		Spain		Sweden		United Kingdom	
		Fuel sold	Fuel used	Fuel sold	Fuel used	Fuel sold	Fuel used			Fuel sold	Fuel used
NFR code	Description										
1 A 3 a i (i)	International Aviation (LTO)			NE	NE		x				x
1 A 3 a i (ii)	International Aviation (Cruise)			NE	NE		x				x
1 A 3 a ii (i)	Civil Aviation (Domestic, LTO)		x	NE	NE		x				x
1 A 3 a ii (ii)	Civil Aviation (Domestic, Cruise)			NE	NE		x				x
1 A 3 b	Road transport		x	x		x					x
1 A 3 c	Railways		x	x		x					x
1 A 3 d i (i)	International maritime Navigation			NO	NO	x					x
1 A 3 d i (ii)	International inland waterways			NO	NO	NO	NO			IE	IE
1 A 3 d ii	National Navigation		x	NE	NE	x (Residual oil)	x (Diesel oil)				x
1 A 4 c i	Agriculture					x (Fuels other than diesel oil)	x (Diesel oil)				x
1 A 4 c ii	Off-road vehicles and other machinery		x	x			x				x
1 A 4 c iii	National Fishing			NE	NE		x			IE	IE
1 A 5 b	Other, Mobile (Including military)			C	C	NE	NE				x

Note: 'NE' denotes 'not estimated'; 'NO' denotes 'not occurring'; 'IE' denotes 'included elsewhere' (see Appendix 1 for a full explanation of the notation keys in this report).

Unless otherwise indicated, the information presented is that provided by Member States in their data submissions. Denmark, Ireland, Hungary, Latvia and Sweden provided separate information on the basis for estimating mobile sources (explained below). The specific details received for certain Member States are provided below. The NFR codes used correspond to the source categories of the NFR reporting format, which are described in Appendix 3.

Belgium	1 A 3 b: The emissions are the sum of the emissions of the regions and there is no national model calculating these emissions. The quantities of fuel sold by regions are not known and a working group has been set up to determine the amount of fuels sold by the regions.
Cyprus	1 A 3 a i (i): The number of landing and take-off cycles (LTOs) was used for estimating emissions for this category.
Denmark	The Danish inventory is based on fuel sold.
Estonia	1 A 3 a ii (i): Emissions have been estimated on the basis of LTOs and emission factors.
	1 A 3 a i (i): Emissions have been estimated on the base of LTOs and emission factors.
	1A 4 c iii: Emissions have been calculated under agriculture machinery.
	1 A 5 b: Emissions have been calculated under road transport.
Finland	1 A 3 b: Gasoline is calculated as fuel sold minus use for other purposes (boats, working machines). Diesel is calculated as fuel sold.
France	1 A 3 a i (ii): Balance of total fuel sold minus consumption by other aviation activities.

Germany	1 A 3 a i(i),1A3aii(i), 1A3b, 1A3c, 1A3di(i), 1A3dii, 1A4ci, 1A4cii,1A5b: Activity data based on the national energy balance.
Hungary	The transport emissions are not based on person km, but on fuel. The feedstock and non-energy use of the motor fuel (because it is not fuelled) are excluded, when calculating the emissions connected with the transportation.
Ireland	Submitted two inventories, one with, and the other without, fuel 'tank tourism'. The inventory adjusted for fuel tourism was used was used for the compilation of the EU-27 inventory.
	Explanatory comments given by Member States in Table IV 1 F5: Basis for estimating emissions from mobile sources.
Latvia	Emissions from transport are based on fuel used.
Malta	1 A 3 a i (i), 1 A 3 a i (ii), 1 A 3 a ii (i),1 A 3 a ii (ii): Based only on LTOs.
	1 A 4 c i, 1A4cii: Apart from fuel sold, other data are used e.g. number of units being used, and total hours used per day.
Poland	1 A 3 a ii (i) and 1 A 3 a ii (ii):Domestic as weighted share of Aviation total.
Portugal	1 A 3 a i (i), 1 A 3 a ii (i): Based on number of LTO and specific aircraft EF (see IIR for more detail).
	1 A 3 a i (ii), 1 A 3 a ii (ii): Cruise=Sales-LTO (see IIR for more details).
	1 A 3 d i (i): International=Total Sales — Domestic Use.
Slovenia	1 A 4 c i: Expert judgment.
Spain	1 A 3 a i (i): International LTO consumption is based on fuel consumption factors by aircraft type and airport.
	1 A 3 a i (ii): International Cruise consumption adds-up (together with international LTO consumption) to total international fuel sold.
	1 A 3 a ii (i): Domestic LTO consumption is based on fuel consumption factors by aircraft type and airport.
	1 A 3 a ii (ii): Domestic cruise consumption adds-up (together with domestic LTO consumption) to total domestic fuel sold.
	1 A 3 d ii, 1A 4 c i: For diesel oil, an aggregated (including national navigation, agriculture and national fishing) consumption estimate was split among the three said components. So, the aggregated diesel oil figure is based in fuel sold but, as the components are calculated, it could be said that they are based on fuel used.
	1 A 4 c iii: An aggregated (including national navigation, agriculture and national fishing) consumption estimate was split among the three said components. So, the aggregated figure is based in fuel sold but, as the components are calculated, it could be said that they are based on fuel used.
Sweden	Statistics on the supply and delivery of petroleum products are used to calculate emissions from mobile combustion. Data from the survey is used at national level and by fuel type. Emissions are reported in NFR 1 A 2 f, 1 A 3, 1 A 4 b, 1 A 4 c, 1 A 5 b, 1 B 2 a v and 1 C.
United Kingdom	1 A 3 d i (ii): Not resolved from national navigation.
	1 A 4 c iii: Not resolved from national navigation.

1.5 Key category analyses

It is good practice to identify key inventory categories in a systematic and objective manner by performing a quantitative analysis of the magnitude of emissions (a 'level' assessment) or change in emissions from year to year (a 'trend' assessment) relative to total national emissions. A key category is one that has significant influence on a country's total inventory in terms of the absolute level of emissions, the trend in emissions, or both. In this report, the categories that are together responsible for 80 % of the national total emission of a given pollutant are classified as key categories (EMEP/EEA, 2009).

EU-27 key categories were determined using a level analysis of 2007 emissions for each pollutant. The EU-27 values are the sum of those of all Member States that reported a value or an explanation for not submitting data (using the notation keys set out in Appendix 1 to this report) for the category and pollutant concerned. Where the notation key 'IE' (included elsewhere) is reported by a Member State it may imply an underestimate of the category concerned and an overestimate of another category. The analysis does not include emissions data from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg, and Romania for PM_{10} and $PM_{2.5}$ because not all years from 2000 onwards were reported. PM_{10} and $PM_{2.5}$ data from Poland was excluded from the key source analysis as sectoral data were only provided from 2005 onwards. Data from Malta for NH_3 and Luxembourg for CO were also excluded as the time series was incomplete.

Chapter 2 provides a summary of the top five EU-27 key categories in 2007 for each pollutant. A complete list of all EU-27 key categories for NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$ emissions is given in Chapter 3, together with tables showing emissions by Member State for the top three key source categories. The key source categories for each pollutant were ranked according to their contribution to total national emissions for that pollutant. Summing the percentage contributions of categories to national totals of various pollutants, (as presented in table 3.23), provides an indication of which contribute most to air pollution. The results of this analysis are presented in Chapter 3. Detailed Key Category Analysis (KCA) calculations are provided in Annex C.

1.6 Quality assurance, quality control and verification methods

Member States are encouraged to use appropriate quality assurance and quality control procedures to ensure data quality and to verify and validate their emissions data. These procedures should be consistent with those described in the EMEP/CORINAIR emission inventory guidebook (EMEP/EEA, 2007).

There is no formal quality assurance and quality control plan available for the European Community inventory. The main activities to enhance the quality of the inventory are the checks performed by the EEA-ETC/ACC on the status of each Member State's submission. In addition, the internal consistencies of the data tables submitted by Member States are checked before EU-27 tables are compiled. External checks are also provided by Member States through an Eionet review before the EU-27 inventory is submitted to the secretariat of the LRTAP Convention.

All inventory documents (submissions, inventory master file, inventory report, status reports and related correspondence) are archived electronically at the EEA-ETC/ACC. Revisions of data sets are recorded.

More detailed quality assurance activities are performed by the EEA-ETC/ACC and the EMEP Centre on Emission Inventories and Projections (CEIP) in an annual review process ([10]). The review of Member State LRTAP Convention emission inventories is performed jointly with the review of those reported under the national emissions ceilings Directive (2001/81/EC). The technical review of inventories is carried out in three stages. The review stage 1 and stage 2 includes checks on timeliness, formats, consistency, accuracy, completeness and comparability of actual Member State inventory submissions. Test results are provided to Member States and used to improve the quality of the national emission inventories. Summary results of the review (stage 1 and 2) are published each year in a joint EMEP/EEA review report ([11]).

In 2008 CEIP in cooperation with EEA and Member States started centralised reviews ([12]) of national inventories (stage 3). France, Norway, Portugal

([10]) More information is available on this process at www.ceip.at/review-process.
([11]) A summary of the results of the stage 1 and 2 review performed in 2009 will be jointly published by EMEP/EEA in mid-2009.
([12]) In cooperation with EEA and TFEIP, CEIP selects countries to be reviewed and sets up an expert review team (ERT) from inventory experts nominated by countries to the EMEP roster. The ERT performs detailed reviews of submitted inventories and IIRs.

and Sweden volunteered to be reviewed in 2008. The results are published in individual country reports. The long-term goal of EMEP is to perform a centralised review of 10 Parties to CLRTAP in June 2009, an additional 15 Parties in 2010, 10 in 2011 and 10 in 2012, so that every Party undergoes the centralised review approximately once every five years.

1.7 General uncertainty evaluation

A quantification of uncertainty in the European Community LRTAP emission inventory first requires Member States to provide detailed information on emission uncertainties. To date, Member States have reported insufficient information to evaluate uncertainty at the European Community level (including all EU-27 Member States).

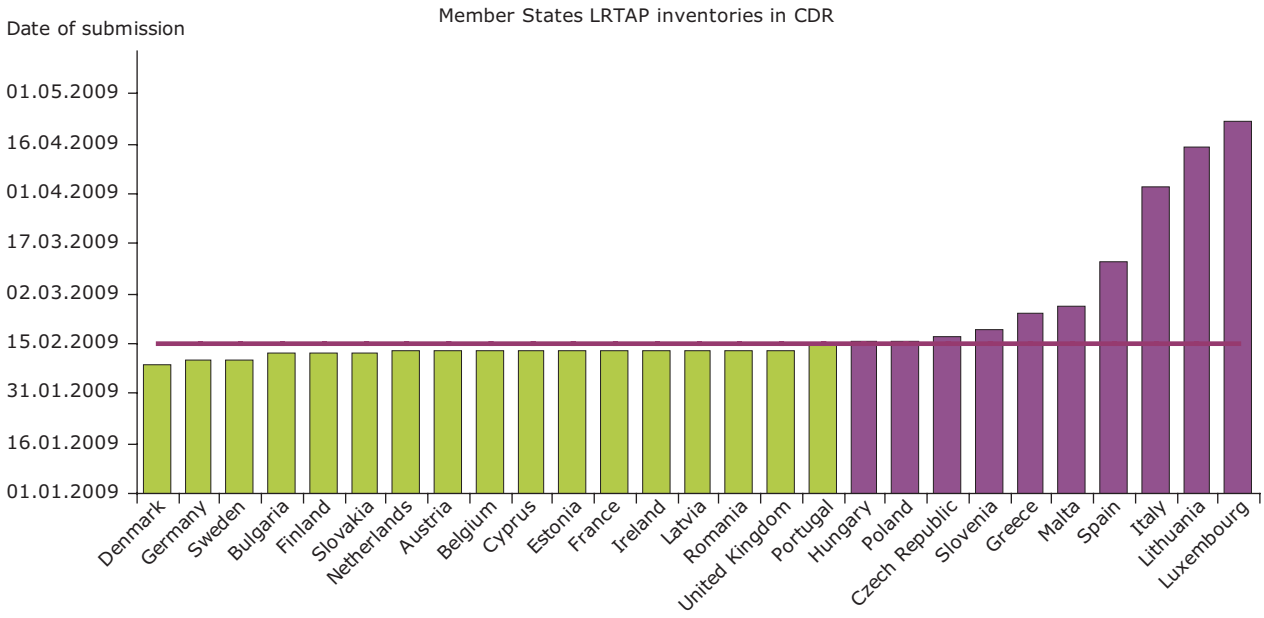
1.8 General assessment of timeliness and completeness

Member States should have reported inventory data to UNECE and were requested also to provide a copy of this data to EEA no later than 15 February 2009.

For the inventory prepared in 2009, all 27 EU Member States provided data. This is a similar level of reporting compared to 2008. The Czech Republic, Greece, Hungary, Italy, Lithuania, Luxembourg, Malta, Poland, Slovenia and Spain did not submit on time (Figure 1.2). Only ten Member States reported activity ([13]) data for the entire time series, and an additional six Member Sates reported activity data for year 2007. Seventeen Member States posted more than one submission on the CDR, providing either additional information and/or revised inventories following their original data submission. Table 1.7 summarises the data received by Member States in 2009 (information concerning data submitted in previous years is not provided).

Due to data gaps (and the lack of an agreed procedure to fill gaps where they exist), total European Community emissions could not be estimated for all years and all pollutants. Therefore this report presents trends and KCAs only for the main pollutants (NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$). Data reported for POPs and HMs are presented in Annex D.

Figure 1.2 Dates of the first data submissions received from Member States (as of 26 May 2009)



([13]) Reporting of activity data in Annex IV, Table 1 together with emissions is mandatory 2009 onwards.

Table 1.7 Date on which EEA received inventory submissions, years covered and information provided by Member States, as of 26 May 2009

	Annual reporting						Minimum 5-year reporting		
							Voluntary reporting in 2009		
Member State	**Submission date (a)**	**Re-submission date**	**NFR template**	**Other format**	**IIR 2009**	**Activity data (b)**	**Projections**	**Gridded data**	**LPS emissions**
Austria	13.02.2009		1980–2007: NFR08		16.03.2009	np	np	np	np
Belgium	13.02.2009		1990–2007: NFR08		13.03.2009	np	2010	np	np
Bulgaria	12.02.2009	09.03.2009	2007: NFR08		9.3.2009	np	np	np	np
Cyprus	13.02.2009		1990–2007: NFR02		13.2.2009	np	np	np	np
Czech Republic	17.02.2009	25.05.2009	2007: NFR08		17.3.2009	np	np	np	np
Denmark	09.02.2009	17.02.2009	1980–2007: NFR01		13.3.2009	1990, 1995, 2000, 2005, 2010, 2015, 2020	2010, 2015, 2020	2005	np
Estonia	13.02.2009	17.03.2009	1990–2007: NFR08		np	np	2010, 2015	np	np
Finland	12.02.2009	13.02.2009, 26.02.2009, 08.05.2009		1980–2007: flat file	13.3.2009	np	2010, 2020, 2050	2007	2007
France	13.02.2009	17.02.2009	1980–2007: NFR08		np	np	2010, 2020	np	np
Germany	10.02.2009		1990–2007: NFR08		30.1.2009	2010, 2015, 2020, 2030, 2050	2010, 2015, 2020	np	np
Greece	24.02.2009	02.04.2009	2003: NFR01; 2004–2006: NFR02; 2007: NFR08		np	np	2010, 2015	np	np
Hungary	16.02.2009	19.05.2009	2002: NFR01; 2003–2006: NFR02; 2007: NFR08		12.3.2009	np	2010, 2015, 2020, 2030	np	np
Ireland	13.02.2009	20.02.2009, 09.04.2009		1987, 1990–2007: flat file	19.05.2009	np	2010	np	np
Italy	03.04.2009		1980–2007: NFR02		09.5.2009	np	np	np	np
Latvia	13.02.2009	13.03.2009	1990–2007: NFR08		13.3.2009	np	2010, 2015, 2020	np	np
Lithuania	15.04.2009		2007: NFR08		np	np	2010, 2015, 2020	np	np
Luxembourg	23.04.2009		1990–2007: NFR02		np	np	2010	np	np
Malta	26.02.2009		2000–2007: NFR08		np	np	2010	np	np
Netherlands	13.02.2009	29.01.2009,	1990–2007: NFR02		np	np	2010, 2015, 2020	np	np
Poland	16.02.2009	26.05.2009	2006–2007: NFR08		17.02.2009 (polish) 10.06.2009 (English)	np	np	np	np
Portugal	15.02.2009	09.04.2009	1990–2007: NFR08		9.4.2009	np	np	np	np
Romania	13.02.2009	14.02.2009	2007: NFR08	1980–2004: national totals	14.3.2009	np	2010, 2015, 2020	np	np
Slovakia	12.02.2009	18.03.2009	2000–2007: NFR08	1990–2006: national totals	12.2.2009	np	2010, 2015, 2020, 2030, 2050	1990, 1995, 2000, 2005	np
Slovenia	19.02.2009		2000–2006: NFR02; 2007: NFR08	1980–2007 (level 1)	20.3.2009	2010, 2015, 2020	2010, 2015, 2020	np	np
Spain	12.03.2009		1990–2007: NFR08	1980–1989 (level 1)	np	np	2010, 2015, 2020	1990–2007	1990–2007
Sweden	10.02.2009	13.03.2009	1980–1989: NFR02; 1990–2007: NFR08		10.2.2009	np	2010, 2015, 2020, 2030	np	np
United Kingdom	13.02.2009	15.02.2009	1980–2007: NFR08		9.3.2009	np	2010, 2015, 2020	np	np

Note: (a) refers to the first submission of inventory data to the CDR; submission of other data are possible at later dates.
(b) Activity data related to the projections.
'IIR' denotes 'informative inventory report'. Submission of an IRR is not mandatory for Parties.
'np' denotes 'not provided'.
'x' denotes 'provided'.

2 Trends and projections of pollutant emissions

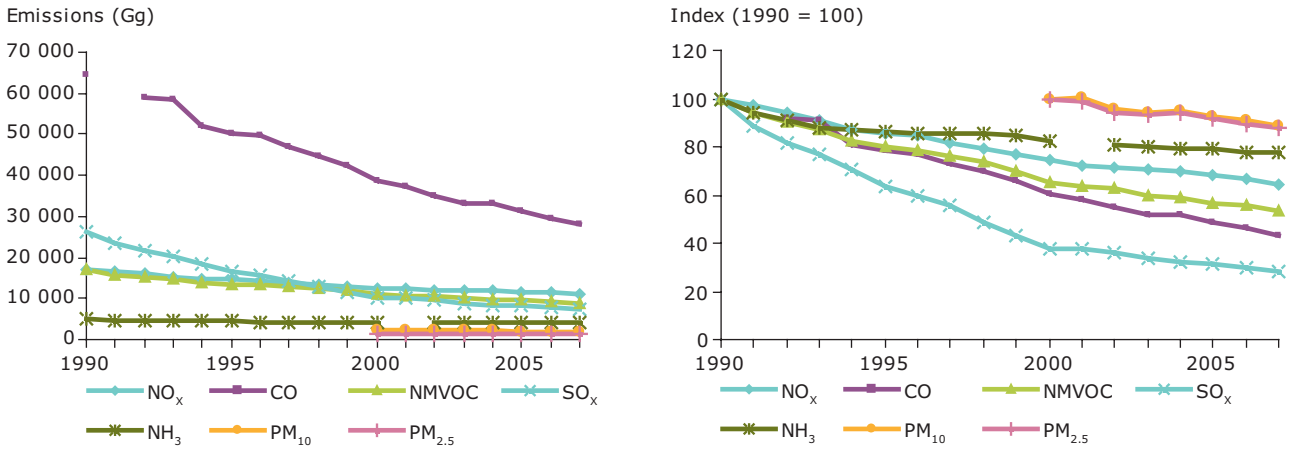
Total emissions of air pollutants for the EU-27 are not estimated for all years because of gaps in the data reported by Member States. Section 1.4.1 above provides details of the available data used in this report.

Across the EU-27 the largest reductions (in percentage terms) have been achieved for SO_X emissions (which decreased by 72 % since 1990), followed by CO (57 %), NMVOC (47 %), NO_X (36 %) and NH_3 (22 %). PM_{10} and $PM_{2.5}$ emission trends which have been compiled only for years 2000 to 2007, indicate that emissions have been fallen by 11 and 12 % respectively (Table 2.1).

The 1990–2007 changes of emissions in Table 2.1 and subsequent tables are expressed as $100*(E_{2007} - E_{1990})/E_{1990}$ (%), where E_{2007} and E_{1990} are 2007 and 1990 total emissions, respectively. The 2006–2007 changes of emissions are expressed as $100*(E_{2007} - E_{2006})/E_{2006}$ (%), where E_{2007} and E_{2006} are the 2007 and 2006 total emissions, respectively.

The following sections of this Chapter show Member States' contributions to EU-27 total emissions of NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$. A summary of the top five EU-27 key categories in 2007 for each pollutant is also presented. Due to historical data not being provided in NFR by

Figure 2.1 EU-27 emission trends for NO_X, CO, NMVOCs, SO_X, and NH_3 in Gg between 1990 and 2007 (index year 1990 = 100) and for PM_{10} and $PM_{2.5}$ between 2000 and 2007 (index year 2000 = 100)



Note: To enable presentation of provisional emission trends, in some instances (due to non-reporting of data) emissions have been aggregated without including data for all the EU-27 Member States. Gaps in the trend curves therefore appear for years where emissions have not been reported by one or more countries and totals from available data (in the expert judgment of ETC/ACC) would significantly change the overall trend shown. Further details are provided below.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards. Hence emission trends for these years only are shown.

The gap for CO emissions in 1991 is due to missing data from Poland. The gap in the NH_3 emissions in 2001 is due to missing data from Lithuania. To enable the presentation of provisional NH_3 and CO emission trends NH_3 emissions have been aggregated without including data for Malta, as data were missing for 1990–1999 and CO emissions without data for Luxembourg as these emissions were missing for 2006–2007.

PM_{10} and $PM_{2.5}$ totals for the EU-27 exclude emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg, and Romania for all years as they did not report all years from 2000 onwards.

$PM_{2.5}$ data are missing for the years 2000–2006 (Bulgaria), 2000–2002 (Czech Republic), 2000–2007 (Greece), 2000–2004 (Lithuania), 2000–2007 (Luxembourg), and 2000–2006 (Romania).

PM_{10} data are missing for the years 2000–2006 (Bulgaria), 2000–2001 (Czech Republic), 2000–2007 (Greece), 2000–2004 (Lithuania), 2000–2007 (Luxembourg), and 2000–2004 (Romania).

Table 2.1 Total EU-27 emissions of NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$ (Gg)

	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	Change 1990–2007	Change 2006-2007
NO_X	16 984	14 524	12 603	12 317	12 099	12 047	11 865	11 545	11 371	10 939	– 35.6 %	– 3.8 %
CO	64 327	50 297	38 860	37 161	35 079	33 314	33 048	31 365	29 651	27 921	– 56.6 %	– 5.8 %
NMVOC	16 897	13 471	10 970	10 761	10 550	10 088	9 900	9 573	9 419	8 951	– 47.0 %	– 5.0 %
SO_X	26 211	16 710	9 928	9 939	9 458	8 899	8 329	8 138	7 889	7 442	– 71.6 %	– 5.7 %
NH_3	5 088	4 383	4 199	NE	4 102	4 063	4 036	4 022	3 959	3 953	– 22.3 %	– 0.1 %
											Change 2000–2007	Change 2006–2007
PM_{10}			2 197	2 199	2 105	2 073	2 080	2 042	1 999	1 952	– 11.2 %	– 2.3 %
$PM_{2.5}$			1 445	1 426	1 365	1 349	1 358	1 329	1 296	1 266	– 12.4 %	– 2.3 %

Note: Reporting of PM emissions is requested only for the years 2000–2007.
EU-27 NH_3 emissions for the year 2001 could not be estimated due to missing data from Lithuania.
Negative values indicate that emissions have fallen.

a number of countries, the summary of emission trends for key categories is presented only for years where data were available, i.e. the years 2002–2007 for NO_X; 2001–2007 for CO and NMVOC; and 2000–2007 for SO_X, PM_{10} and $PM_{2.5}$. In addition, where Member States have reported updated projections of NO_X, NMVOCs, SO_X, and NH_3 under the LRTAP Convention these are also shown below. As there is no formal commitment under CLRTAP to report projections annually, not all Member States provided projections in the 2009 reporting round. A complete list of the EU-27 key categories for main pollutants is presented in Chapter 3.

2.1 NO_X emission trends and projections

Between 1990 and 2007, NO_X emissions decreased in the EU-27 by 36 %. Between 2006 and 2007 the decrease was 3.8 %, mainly caused by reductions in Bulgaria, France, Germany and the United Kingdom (Table 2.2).

Six Member States (Austria, Cyprus, Greece, Malta, Portugal and Spain) reported increases between 1990 and 2007, with the highest relative increase occurring in Greece (25 %). Emissions from 2006 to 2007 increased in six Member States (Czech Republic, Estonia, Greece, Lithuania, Romania and Spain) with the highest relative increase occurring in Lithuania (13 %) (Table 2.2). The two Member States that contribute most to the emissions of NO_X in 2007 are Spain and the United Kingdom.

EU-27 emissions of NO_X from '1 A 3 b iii — Road transport: heavy duty vehicles', i.e. the most important key category which contributes about 19 % of total NO_X emissions, decreased by 13 % between 2002 and 2007 (Figure 2.2).

EU-27 emissions of NO_X from '1 A 3 b i — Road transport: passenger cars', i.e. the third most important key category, which contributes about 16 % of total NO_X emissions, decreased by 27 % between 2002 and 2007.

Reduced emissions from the road transport sector has mainly resulted from the introduction of three-way catalytic converters on cars and stricter regulation of emissions from heavy goods vehicles across Europe. In contrast to the decrease in emissions the road transport sector, the other top five NO_X key categories recorded little change since 2002.

Table 2.2 Member States' contributions to European Community emissions of NO_x (Gg)

Member State	NO_x (Gg)										Change		Share in EU-27	
	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	1990–2007 (%)	2006–2007 (%)	1990 (%)	2007 (%)
Austria	193	179	204	215	225	237	236	240	227	220	14	– 3.2	1.1	2.0
Belgium	380	372	331	316	299	296	299	286	268	260	– 32	– 2.9	2.2	2.4
Bulgaria	242	151	128	128	197	209	216	233	246	187	– 23	– 24.1	1.4	1.7
Cyprus	16	20	21	20	20	21	20	20	20	20	24	– 0.2	0.1	0.2
Czech Republic	742	430	397	333	318	323	328	278	282	284	– 62	0.6	4.4	2.6
Denmark	273	265	201	198	195	204	188	180	181	167	– 39	– 7.7	1.6	1.5
Estonia	74	38	35	38	40	39	37	32	31	35	– 53	12.0	0.4	0.3
Finland	300	259	210	220	208	219	205	177	193	183	– 39	– 5.3	1.8	1.7
France	1 935	1 761	1 614	1 567	1 531	1 496	1 478	1 459	1 397	1 345	– 30	– 3.7	11.4	12.3
Germany	2 850	2 109	1 792	1 710	1 615	1 541	1 478	1 393	1 354	1 284	– 55	– 5.2	16.8	11.7
Greece	300	321	330	344	341	361	359	386	361	374	25	3.5	1.8	3.4
Hungary	238	190	185	183	185	180	180	203	208	190	– 20	– 8.6	1.4	1.7
Ireland	124	125	136	138	128	123	123	124	119	117	– 6	– 1.4	0.7	1.1
Italy	2 007	1 868	1 434	1 422	1 367	1 360	1 319	1 229	1 188	1 147	– 43	– 3.4	11.8	10.5
Latvia	68	40	37	38	38	40	45	43	44	43	– 37	– 3.3	0.4	0.4
Lithuania	136	51	46	44	51	53	55	58	61	69	– 49	12.8	0.8	0.6
Luxembourg	23	19	16	16	16	16	14	14	14	14	– 41	– 5.1	0.1	0.1
Malta	10	10	9	10	10	11	13	12	12	11	20	– 0.9	0.1	0.1
Netherlands	536	440	377	367	360	358	337	323	307	280	– 48	– 8.8	3.2	2.6
Poland	1 280	1 120	838	805	796	808	804	811	921	885	– 31	– 3.9	7.5	8.1
Portugal	229	259	271	272	282	261	261	265	245	233	2	– 4.9	1.3	2.1
Romania	462	387	305	328	342	354	367	323	326	331	– 28	1.5	2.7	3.0
Slovakia	222	178	109	109	101	98	98	98	87	83	– 63	– 3.9	1.3	0.8
Slovenia	65	59	49	50	49	48	48	47	47	45	– 31	– 4.8	0.4	0.4
Spain	1 235	1 340	1 450	1 435	1 486	1 490	1 519	1 515	1 465	1 481	20	1.1	7.3	13.5
Sweden	301	265	212	203	197	192	182	175	170	165	– 45	– 3.0	1.8	1.5
United Kingdom	2 744	2 267	1 867	1 813	1 701	1 710	1 657	1 622	1 597	1 486	– 46	– 6.9	16.2	13.6
EU-27 (a)	**16 984**	**14 524**	**12 603**	**12 317**	**12 099**	**12 047**	**11 865**	**11 545**	**11 371**	**10 939**	**– 36**	**– 3.8**	**100.0**	**100.0**
EU-27 (b)	**NE**	**NE**	**NE**	**NE**	**12 126**	**12 054**	**11 870**	**11 549**	**11 377**	**10 942**				

Note([14]): (a) Sum of national totals as reported by Member States.

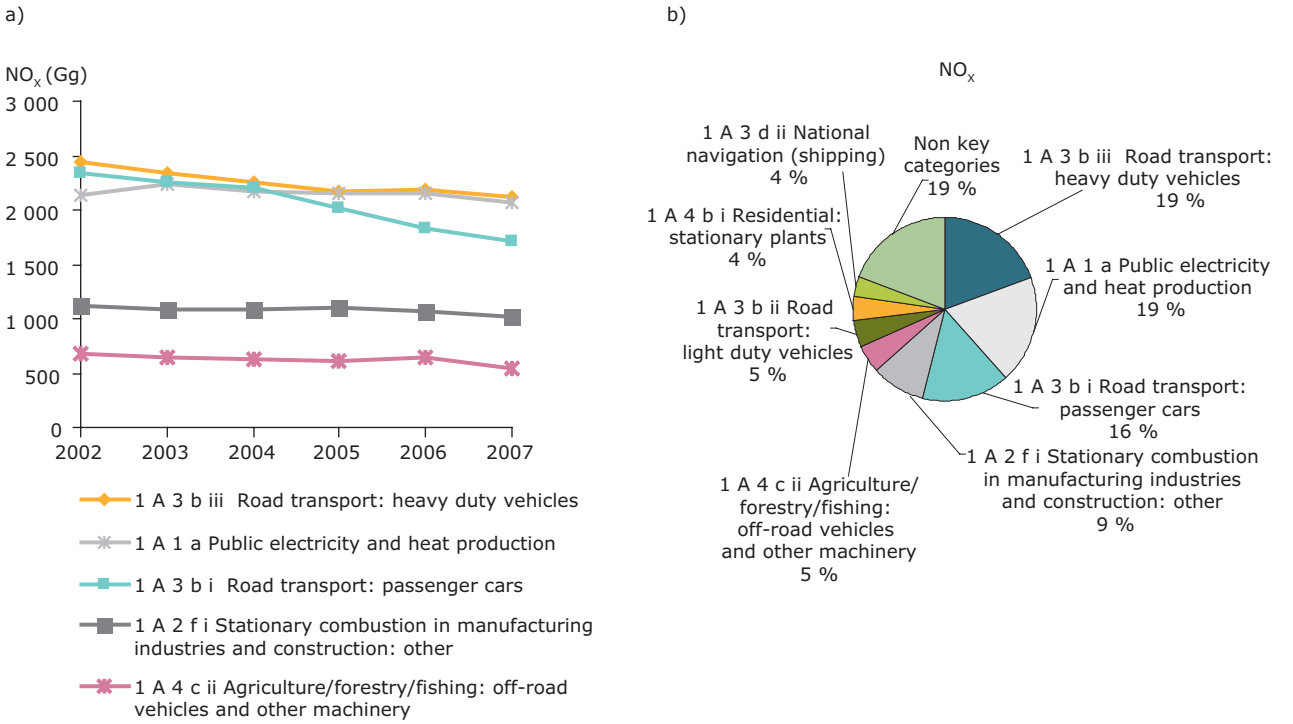
(b) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. The EU-27 totals for years before 2002 could not be estimated because the following Member States only reported national totals: Hungary (1990), Poland (2000–2001) and Slovenia (1990–1999).

Negative values indicate that emissions have fallen.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

([14]) For Table 2.2 and the following tables, two EU-27 totals are given. The first corresponds to the sum of national totals officially reported by Member States. The second is a re-calculated EU-27 total following the mapping of emissions reported in the older NFR formats to NFR08. As described earlier, the national totals in these respective reporting formats differ slightly due to the inclusion of different 'memo items' in the required total (see e.g. Appendix 3). Hence following a conversion of inventories in the NFR02 format to NFR08 and subsequent aggregation, the aggregated EU-27 total also changes.

Figure 2.2 NO_x emissions from key categories in EU-27: (a) trend in NO_x emissions from the five most important key categories, 2002–2007; (b) contribution of key categories to EU-27 emissions, 2007



Note: A complete EU-27 time series 1990–2007 of key category data cannot be presented due to non-reporting of sectoral data by several Member States.

Emissions from '1 A 3 b iii — Road transport: Heavy duty vehicles' were reported as being included elsewhere (IE) for the following Member States: Bulgaria (2002–2007), the Czech Republic (2002–2005), Greece (2003–2007), Hungary (2002) and Romania (2002–2004).

Emissions from '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' for Luxembourg (2007) and Lithuania (2002–2003) were not estimated (NE).

Emissions from '1 A 4 c ii — Agriculture / forestry / fishing: off-road vehicles and other machinery' were reported as being included elsewhere (IE) for the following Member States: Bulgaria, Hungary (2003–2007) and Slovakia (2002–2007). For Malta (2000–2003) and Luxembourg (2007) emissions were not estimated (NE) and Latvia reported not occurring (NO) for 2002.

Twenty-one Member States provided NO_X projections for 2010 (Table 2.3). Five Member States projected that NO_X emissions will increase until 2010. EU-27 projections for 2010 could not be estimated because six Member States did not report projections. 2015 and 2020 projections were reported only by 13 and 14 Member States, respectively.

Table 2.3 Member State NO_X projections as reported under the LRTAP Convention

NO_X (Gg)	2007	WM					WAM				
		2010	2015	2020	2030	2050	2010	2015	2020	2030	2050
Austria	220										
Belgium	260	129									
Bulgaria	187										
Cyprus	20										
Czech Republic	284										
Denmark	167	126	121	110							
Estonia	35	39	36								
Finland	183	151		121		101					
France	1 345	1 071		682							
Germany	1 284	1 112	976	937							
Greece	374	320									
Hungary	190	164	172	173	192						
Ireland	117	103					101				
Italy	1 147	1 057									
Latvia	43	45	45	46							
Lithuania	69	43	34	23							
Luxembourg	14	13					13				
Malta	11	8									
Netherlands	280	261	233	218			261	228	205		
Poland	885										
Portugal	233										
Romania	331	336	345	362							
Slovakia	83	90	86	73	82	110					
Slovenia	45	49	42	38			49	42	38		
Spain	1 481	1 223	1 142	1 017							
Sweden	165	149	132	113	112						
United Kingdom	1 486	1 251	1 027	798							

Note: A WM (with measures) projection shall include implemented and adopted policies and measures. It will include the most likely economic and energy projections and the impacts of existing policies and measures irrespective of whether their primary objective was the mitigation of air emissions or not (consistent with UNFCCC, 1999).

A WAM (with additional measures) projection shall include planned but not yet adopted policies and measures. 'With additional measures' presents a picture of the expected outcome of emissions if, on top of WM, planned policies and measures with a realistic chance of being adopted and implemented in time to influence the emissions are included (EMEP/EEA, 2009).

Source: Data source: Member State submissions 2009 (projections tables), Italy: data taken from the IIR of Italy 2009 (Table 5.1), Finland: data for 2010 taken from the IIR of Finland 2009 (Table 13.1).

2.2 CO emission trends

In the EU-27, emissions of CO decreased 57 % between 1990 and 2007, to around 28 000 Gg. Decreased emissions were reported in all Member States except Romania. The largest absolute decreases were reported by France, Germany, Italy, Poland, Spain and the United Kingdom. However, these countries remained the largest emitters of CO in absolute terms in 2007 (Table 2.4). The largest relative decrease was observed in the United Kingdom and Malta. For Malta emission trends are a combination of data submitted to the UNFCCC and to the LRTAP Convention and these two data sets appear to be inconsistent.

The EU-27 emission reduction between 2006 and 2007 was 5.8 % (Table 2.4).

Table 2.4 Member States' contribution to European Community CO emissions (Gg)

Member State	CO (Gg)										Change		Share in EU-27	
	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	1990-2007 (%)	2006-2007 (%)	1990 (%)	2007 (%)
Austria	1 433	1 257	955	947	931	954	912	870	839	769	– 46	– 8.3	2.2	2.8
Belgium	1 378	1 116	1 071	1 013	983	951	897	839	817	750	– 46	– 8.3	2.1	2.7
Bulgaria	790	644	635	583	700	716	755	740	785	250	– 68	– 68.1	1.2	0.9
Cyprus	39	35	30	29	28	28	27	26	24	24	– 38	– 2.0	0.1	0.1
Czech Republic	1 071	932	680	687	546	578	572	511	484	509	– 53	5.1	1.7	1.8
Denmark	717	645	472	467	446	452	439	448	439	448	– 38	2.0	1.1	1.6
Estonia	313	206	184	190	190	184	175	159	149	170	– 46	14.0	0.5	0.6
Finland	561	436	610	604	600	564	551	522	510	501	– 11	– 1.7	0.9	1.8
France	11 030	9 516	7 066	6 518	6 282	5 984	6 153	5 632	5 134	4 674	– 58	– 8.9	17.1	16.7
Germany	12 131	6 656	5 056	4 801	4 514	4 302	4 084	3 795	3 777	3 748	– 69	– 0.8	18.9	13.4
Greece	1 302	1 334	1 364	1 275	1 244	1 200	637	1 075	956	726	– 44	– 24.1	2.0	2.6
Hungary	997	645	592	579	564	600	559	587	569	507	– 49	– 10.8	1.5	1.8
Ireland	418	317	254	244	225	213	203	192	182	171	– 59	– 6.3	0.6	0.6
Italy	6 927	6 876	4 857	4 646	4 218	4 064	3 881	3 506	3 342	3 334	– 52	– 0.2	10.8	11.9
Latvia	383	314	302	308	305	316	323	320	313	300	– 22	– 4.1	0.6	1.1
Lithuania	499	279	281	217	224	225	184	190	200	208	– 58	4.1	0.8	0.7
Luxembourg	17	10	7	7	7	7	4	4	NE	NE	NE	NE	0.03	NE
Malta	24	30	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5	– 98	– 0.7	0.0	0.0
Netherlands	1 070	801	647	626	605	585	585	556	547	528	– 51	– 3.4	1.7	1.9
Poland	7 406	4 547	3 463	3 528	3 410	2 626	3 426	3 333	2 804	2 603	– 65	– 7.2	11.5	9.3
Portugal	878	850	762	708	699	678	667	641	618	601	– 32	– 2.7	1.4	2.2
Romania	824	1 370	1 196	1 238	1 233	1 269	1 610	1 496	1 417	1 495	81	5.5	1.3	5.4
Slovakia	512	420	313	315	292	308	310	299	290	282	– 45	– 2.9	0.8	1.0
Slovenia	257	247	162	154	141	135	121	117	109	99	– 61	– 9.1	0.4	0.4
Spain	3 878	3 473	2 981	2 958	2 734	2 825	2 687	2 548	2 529	2 546	– 34	0.7	6.0	9.1
Sweden	936	865	663	625	609	612	582	580	548	565	– 40	3.1	1.5	2.0
United Kingdom	8 555	6 485	4 264	3 901	3 355	2 946	2 707	2 383	2 270	2 114	– 75	– 6.9	13.3	7.6
EU-27 ([a])	**64 327**	**50 297**	**38 860**	**37 161**	**35 079**	**33 314**	**33 048**	**31 365**	**29 651**	**27 921**	**– 57**	**– 5.8**	**100.0**	**100.0**
EU-27 ([b])	**NE**	**NE**	**NE**	**37 115**	**35 086**	**32 800**	**33 025**	**31 356**	**29 645**	**27 923**				

Note: ([a]) Sum of national totals as reported by Member States without Luxembourg (grey text) while 2006-2007 data are not reported.

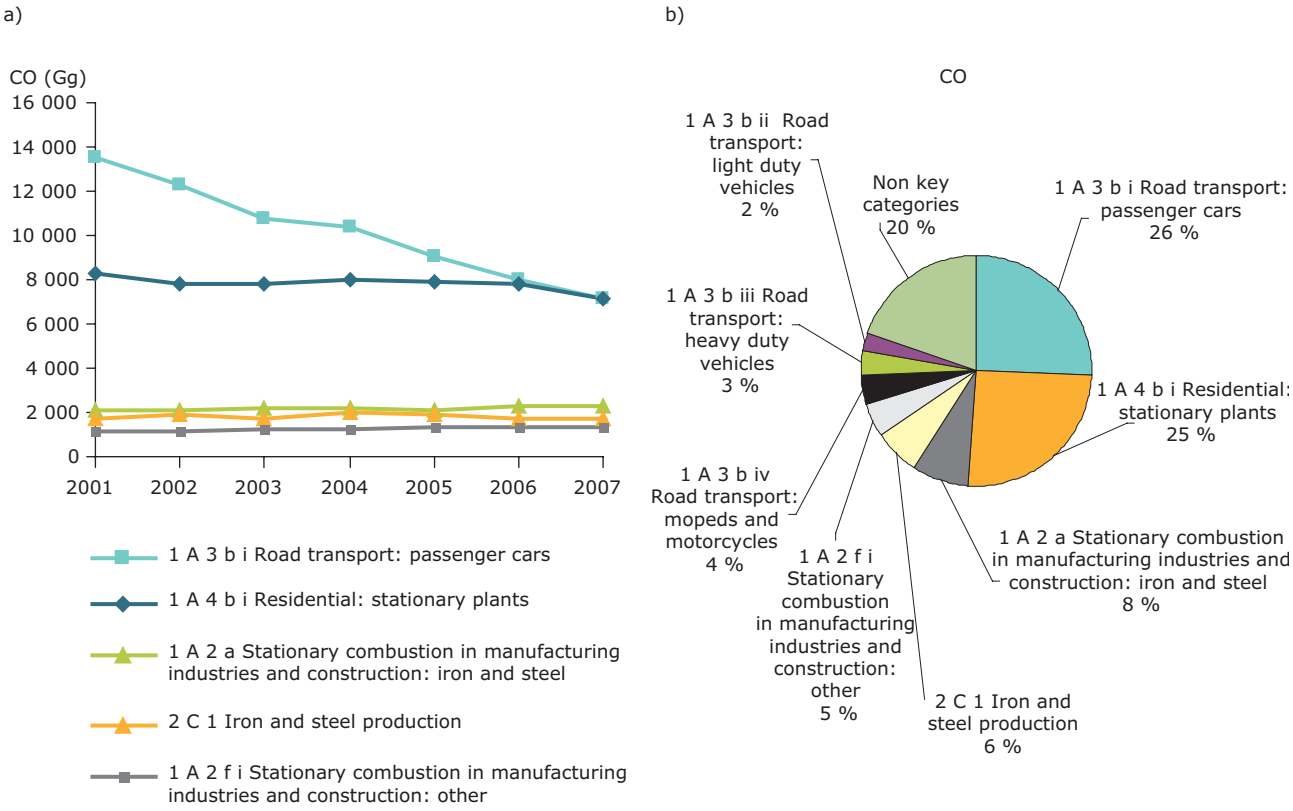
([b]) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. The EU-27 totals for years before 2001 could not be estimated because the following Member States only reported national totals: Hungary (1990), Lithuania (2000), Poland (2000) and Slovenia (1990–1999).

Negative values indicate that emissions have fallen.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

The most significant key category, '1 A 3 b i Road transport: passenger cars', which in 2007 contributed about 26 % to total CO emissions, decreased by 47 % since 2001. CO emissions from the second most significant key category, '1 A 4 b i — Residential: stationary plants', which in 2007 contributed about 25 % to total CO emissions, decreased by 14% between 2001 and 2007 (Figure 2.3).

Figure 2.3 CO emissions from key categories in the EU-27: (a) trend in CO emissions from the five most important key categories, 2001–2007; (b) contribution of key categories to EU-27 CO emissions, 2007



Note: A complete EU-27 time series 1990–2007 of key category data cannot be presented due to non-reporting of sectoral data by several Member States.

Emissions from '1 A 3 b i — Road transport: passenger cars' for Luxembourg and Malta (2001–2007) were not estimated (NE).

Emissions from '1 A 4 b i — Residential: stationary plants' for Luxembourg (2001–2007) and Malta (2001–2004) were not estimated (NE).

Emissions from '1 A 2 a — Stationary combustion and manufacturing industries and Construction: iron and steel' were reported as being included elsewhere (IE) for the following Member States: Bulgaria (2001), the Czech Republic (2001–2005), Denmark, Cyprus, Italy, Luxembourg (2001–2007), Hungary (2001–2002), Lithuania (2001), Romania (2001–2004) and Slovenia 2007. For Slovenia (2001–2006) emissions were not estimated (NE). Lithuania (2004–2007) and Malta (2001–2007) reported emissions as not occurring (NO).

Emissions from '2 C 1 — Iron and steel production' were reported as being included elsewhere (IE) for the following Member States: Denmark, Finland, Italy, Luxembourg, the Netherlands, Cyprus, Slovakia (2001–2007), Bulgaria, the Czech Republic, Greece, Hungary, Lithuania, Romania, Slovenia (2001–2006) and Poland (2001-2005). For Slovenia (2007) emissions were not estimated (NE). Lithuania (2007) and Malta (2001–2007) reported emissions as not occurring (NO).

Emissions from '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' for Lithuania (2002–2003) and Luxembourg (2001–2007) were not estimated (NE).

2.3 NMVOC emission trends and projections

In the EU-27, NMVOC emissions declined by 47 % between 1990 and 2007, reaching 8 951 Gg. Twenty-six countries reported emission reductions between 1990 and 2007, with Belgium, France, Germany, the Netherlands and the United Kingdom cutting emissions by more than 50%. Only Poland reported an increase in NMVOC emissions (8 %) during this period. The largest emitters in 2007 were France, Germany and Italy.

Between 2006 and 2007, EU-27 emissions decreased by around 5 %. Emissions increased in only three Member States (Estonia, Luxembourg and Sweden) (Table 2.5).

Table 2.5 Member States' contribution to European Community NMVOC emissions (Gg)

Member State	NMVOC (Gg)										Change		Share in EU-27	
	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	1990-2007 (%)	2006-2007 (%)	1990 (%)	2007 (%)
Austria	274	222	176	180	185	189	170	179	187	180	– 34	– 3.7	1.6	2.0
Belgium	309	259	202	196	182	174	161	154	149	145	– 53	– 3.1	1.8	1.6
Bulgaria	117	94	79	79	292	119	130	147	159	82	– 30	– 48.4	0.7	0.9
Cyprus	12	13	12	12	12	12	12	12	11	10	– 16	– 3.2	0.1	0.1
Czech Republic	311	215	244	220	203	203	203	182	179	174	– 44	– 2.6	1.8	1.9
Denmark	181	161	133	125	123	117	115	113	107	104	– 42	– 2.8	1.1	1.2
Estonia	70	46	41	40	41	40	40	36	34	36	– 48	6.7	0.4	0.4
Finland	226	185	160	155	154	145	140	132	133	129	– 43	– 2.7	1.3	1.4
France	2 730	2 348	1 914	1 789	1 641	1 589	1 478	1 394	1 306	1 199	– 56	– 8.2	16.2	13.4
Germany	3 756	2 088	1 592	1 497	1 422	1 350	1 354	1 333	1 297	1 278	– 66	– 1.4	22.2	14.3
Greece	280	305	299	294	289	288	332	289	291	204	– 27	– 29.9	1.7	2.3
Hungary	205	150	166	162	156	155	157	177	177	148	– 28	– 16.1	1.2	1.7
Ireland	81	75	69	70	64	62	59	59	58	57	– 30	– 1.4	0.5	0.6
Italy	1 939	2 001	1 565	1 500	1 431	1 373	1 319	1 248	1 221	1 194	– 38	– 2.2	11.5	13.3
Latvia	90	54	53	54	55	57	60	60	60	58	– 35	– 3.6	0.5	0.7
Lithuania	110	72	70	66	72	74	67	84	78	74	– 33	– 5.5	0.7	0.8
Luxembourg	14	14	10	10	10	9	10	9	9	9	– 38	1.6	0.1	0.1
Malta	6	7	3	3	3	3	3	3	3	3	– 46	– 7.3	0.0	0.0
Netherlands	457	318	223	200	189	177	166	171	166	164	– 64	– 1.3	2.7	1.8
Poland	831	769	599	873	898	892	888	885	929	898	8	– 3.4	4.9	10.0
Portugal	304	305	293	292	295	290	290	287	285	283	– 7	– 0.5	1.8	3.2
Romania	335	281	265	266	282	301	359	332	353	330	– 2	– 6.5	2.0	3.7
Slovakia	141	101	76	80	77	82	83	79	75	74	– 48	– 1.4	0.8	0.8
Slovenia	65	64	51	50	48	47	46	42	41	39	– 39	– 4.7	0.4	0.4
Spain	1 095	1 031	1 085	1 062	1 021	1 040	1 020	990	973	958	– 12	– 1.6	6.5	10.7
Sweden	352	247	199	187	185	186	185	182	177	178	– 50	0.5	2.1	2.0
United Kingdom	2 604	2 045	1 391	1 297	1 221	1 113	1 051	993	960	942	– 64	– 1.9	15.4	10.5
EU-27 ([a])	**16 897**	**13 471**	**10 970**	**10 761**	**10 550**	**10 088**	**9 900**	**9 573**	**9 419**	**8 951**	**– 47**	**– 5.0**	**100.0**	**100.0**
EU-27 ([b])	**NE**	**NE**	**NE**	**10 664**	**10 430**	**9 783**	**9 870**	**9 549**	**9 394**	**8 925**				

Note: ([a]) Sum of national totals as reported by Member States

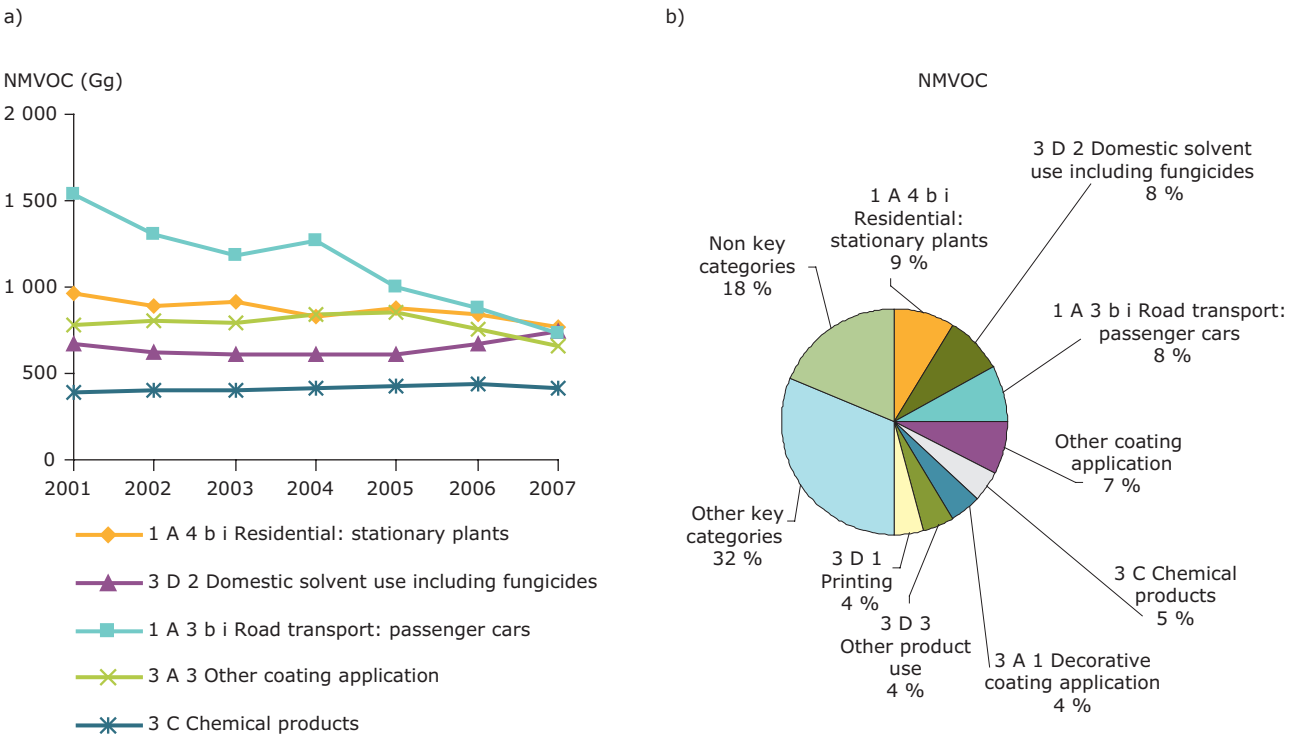
([b]) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. The EU-27 totals for years before 2001 could not be estimated because the following Member States only reported national totals: Hungary (1990), Poland (2000), Slovakia (1991–1992, 1994) and Slovenia (1990–1999).

Negative values indicate that emissions have fallen.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

For NMVOC the first three key categories have a similar share in total emissions (between 8.2 and 8.6 %). The third most significant key category, '1 A 3 b i — Road transport: passenger cars' showed the highest percentage emission reduction since 2001 (53 %), followed by the largest key category '1 A 4 b i — Residential: stationary plants' (20 %) and 3 A 3 Other coating applications (16%) Emissions of the other top five EU-27 key categories have recorded less pronounced changes since 2001 (Figure 2.4).

Figure 2.4 NMVOC emissions from key categories in EU-27: (a) trend in NMVOC emissions from the five most important key categories, 2001–2007; (b) contribution of key categories to EU-27 NMVOC emissions, 2007



Note: A complete EU-27 time series 1990–2007 of key category data cannot be presented due to non-reporting of sectoral data by several Member States.

Emissions from '3 D 2 — Domestic solvent use including fungicides' were reported as being included elsewhere (IE) for the following Member States: Cyprus, Denmark, Italy, Luxembourg, Malta, the Netherlands, Romania, Sweden, the United Kingdom, (2001–2007), Bulgaria, the Czech Republic, Finland, Greece, Hungary, Lithuania, Slovenia (2001–2006) and Poland (2001–2005). For Bulgaria, 2007 emissions were not estimated (NE). For Slovakia (2001–2007) emissions estimates were not applicable (NA).

Emissions from '3 A 3 — Other coating applications' were reported as being included elsewhere (IE) for Finland, Sweden, Latvia, Malta (2001–2007) and Slovenia (2007). For Austria, France, the United Kingdom (2001–2007) and Hungary (2007) emission estimates were not applicable (NA). Emissions in Spain (2001) were not estimated (NE).

Emissions from '3C Chemical Products' were reported as being included elsewhere (IE) for Greece (2004–2007), Hungary, (2001, 2003) and Malta (2001–2005, 2007). The Netherlands reported emissions as not occurring for 2001–2007 and Hungary for 2004–2006. Hungary reported 2007 emissions as not applicable. Emissions for Lithuania (2001–2007) and Malta (2006) were not estimated (NE).

Twenty-one Member States provided NMVOC projections for 2010 (Table 2.6). Fourteen Member States project that NMVOC emissions will decrease until 2010 and seven Member States (Estonia, Finland, Greece, Luxembourg, Malta, Romania, and Slovakia) project that NMVOC emissions will increase until 2010. However, for Finland, Malta and Luxembourg the increase is less than 1 Gg. EU-27 projections for 2010 could not be estimated because six Member States did not report projections this year. 2015 and 2020 projections were reported by only 13 and 14 Member States, respectively.

Table 2.6 Member State NMVOC projections as reported under the LRTAP Convention

NMVOC (Gg)	2007	WM					WAM				
		2010	2015	2020	2030	2050	2010	2015	2020	2030	2050
Austria	180										
Belgium	145	90									
Bulgaria	82										
Cyprus	10										
Czech Republic	174										
Denmark	104	85	76	72							
Estonia	36	41	42								
Finland	129	130		82		74					
France	1 199	1 057		926							
Germany	1 278	987	1 003	1 052							
Greece	204	261					235				
Hungary	148	123	133	137	157						
Ireland	57	54					52				
Italy	1 194	941									
Latvia	58	55	53	51							
Lithuania	74	50	49	29							
Luxembourg	9	9					9				
Malta	3	4									
Netherlands	164	162	170	165			162	165	170		
Poland	898										
Portugal	283										
Romania	330	347	356	371							
Slovakia	74	97	111	137	335	341					
Slovenia	39	37	35	34			37	35	34		
Spain	958	790	798	837							
Sweden	178	168	156	143	130						
United Kingdom	942	784	756	754							

Note: A WM (with measures) projection shall include implemented and adopted policies and measures. It will include the most likely economic and energy projections and the impacts of existing policies and measures irrespective of whether their primary objective was the mitigation of air emissions or not (consistent with UNFCCC, 1999).

A WAM (with additional measures) projection shall include planned but not yet adopted policies and measures. 'With additional measures' presents a picture of the expected outcome of emissions if, on top of WM, planned policies and measures with a realistic chance of being adopted and implemented in time to influence the emissions are included (EMEP/EEA, 2009).

Source: Data source: Member State submissions 2009 (projections tables), Italy: data taken from the IIR of Italy 2009 (Table 5.1), Finland: data for 2010 taken from the IIR of Finland 2009 (Table 13.1).

2.4 SO_x emission trends and projections

EU-27 total SO_x emissions in 2007 were 7 442 Gg. This is a 72 % reduction compared to the emissions reported in 1990. Since 1990, SO_x emissions have increased in only two Member States: Greece (12 %) and Malta (16 %). Inspection of the time-series trends for some Member States shows some steep changes in emission reductions have occurred since 1990. For example, emissions of SO_x in Slovenia fell considerably in 2001 and again in 2006 due to the introduction of flue gas desulphurisation abatement equipment in thermal power plants.

Between 2006 and 2007, the SO_x emission reduction in the EU was 5.7 %, but four Member States (Czech Republic, Estonia, Greece and Malta) reported increased emissions. The highest increases in 2006–2007 were reported by Estonia (24.5 %) (Table 2.7). The two Member States that contribute to most of the emissions of SO_2 in 2007 are Poland and Spain.

Table 2.7 Member States' contribution to European Community SO_x emissions (Gg)

Member State	SO_x (Gg)										Change		Share in EU-27	
	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	1990-2007 (%)	2006-2007 (%)	1990 (%)	2007 (%)
Austria	74	47	32	33	32	33	28	27	29	26	– 66	– 11.6	0.3	0.3
Belgium	362	262	171	167	158	154	157	145	134	126	– 65	– 6.0	1.4	1.7
Bulgaria	1 517	1 300	1 045	1 045	965	968	929	900	877	859	– 43	– 2.1	5.8	11.5
Cyprus	36	44	52	50	48	51	44	42	34	32	– 12	– 7.5	0.1	0.4
Czech Republic	1 876	1 095	264	251	237	231	227	219	211	217	– 88	2.7	7.2	2.9
Denmark	178	137	29	27	25	32	25	22	25	23	– 87	– 8.5	0.7	0.3
Estonia	273	117	96	91	87	101	89	77	71	88	– 68	24.5	1.0	1.2
Finland	259	95	74	85	79	99	84	69	85	83	– 68	– 2.4	1.0	1.1
France	1 337	980	621	566	518	508	503	485	453	435	– 67	– 4.1	5.1	5.8
Germany	5 310	1 712	626	623	579	556	530	510	514	493	– 91	– 4.0	20.3	6.6
Greece	487	536	493	502	513	545	529	545	536	543	12	1.4	1.9	7.3
Hungary	1 010	705	489	404	365	347	247	129	118	84	– 92	– 28.6	3.9	1.1
Ireland	182	161	140	135	102	79	71	70	60	54	– 70	– 9.5	0.7	0.7
Italy	1 795	1 320	749	697	616	518	480	401	379	339	– 81	– 10.7	6.8	4.6
Latvia	102	49	10	8	6	5	4	5	4	3	– 97	– 11.5	0.4	0.0
Lithuania	214	85	42	38	43	43	42	44	43	39	– 82	– 9.8	0.8	0.5
Luxembourg	18	8	1	1	1	1	1	1	1	1	– 93	– 0.6	0.1	0.0
Malta	16	29	24	26	25	27	17	18	18	18	16	1.9	0.1	0.2
Netherlands	190	128	71	73	67	63	65	64	63	59	– 69	– 6.6	0.7	0.8
Poland	3 210	2 376	1 202	1 564	1 455	1 375	1 241	1 222	1 222	1 131	– 65	– 7.4	12.2	15.2
Portugal	291	304	282	271	270	186	188	194	175	170	– 42	– 2.9	1.1	2.3
Romania	757	639	460	506	540	532	514	831	863	754	0	– 12.5	2.9	10.1
Slovakia	526	246	127	131	103	106	97	89	88	71	– 87	– 19.6	2.0	0.9
Slovenia	198	126	99	69	71	66	54	41	18	14	– 93	– 20.5	0.8	0.2
Spain	2 166	1 781	1 455	1 428	1 531	1 266	1 309	1 264	1 160	1 154	– 47	– 0.5	8.3	15.5
Sweden	105	68	44	42	42	43	38	37	37	33	– 68	– 8.5	0.4	0.4
United Kingdom	3 724	2 360	1 231	1 106	979	966	813	687	671	591	– 84	– 11.9	14.2	7.9
EU-27 ([a])	**26 211**	**16 710**	**9 928**	**9 939**	**9 458**	**8 899**	**8 329**	**8 138**	**7 889**	**7 442**	**– 72**	**– 5.7**	**100.0**	**100.0**
EU-27 ([b])	**NE**	**NE**	**9 909**	**9 920**	**9 438**	**8 337**	**8 314**	**8 138**	**7 886**	**7 439**				

Note: ([a]) Sum of national totals as reported by Member States

([b]) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. The EU-27 totals for years before 2000 could not be estimated because the following Member States only reported national totals: Hungary (1990) and Slovenia (1990–1999)

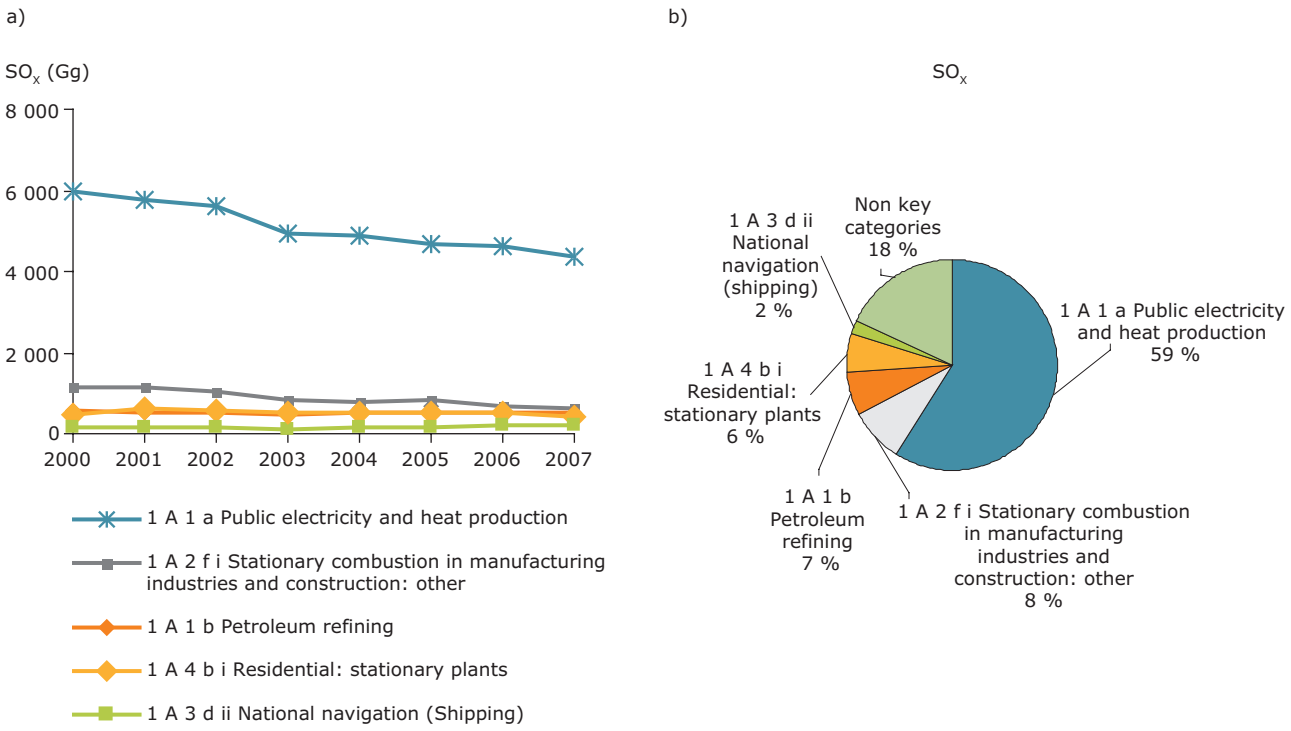
Negative values indicate that emissions have fallen.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

Emissions of SO_X from the two most important key categories in the EU-27 decreased between 2000 and 2007 (Figure 2.5). SO_X emissions from most significant key category, '1 A 1 a — Public electricity and heat production', which accounted for 59 % of total SO_X emissions in 2007, decreased by 27 %.

SO_X emissions from the second most significant key category, '1 A 2 f i — Stationary combustion in manufacturing industry', which accounted for more than 8 % of total SO_X emissions in 2007, decreased since 2000 by 45.3 %. This reduction is higher than this sector's cut in NO_X output (8 % reduction between 2002 and 2007), while CO emissions from this sector actually increased by 16 %. Emissions from key category '1 A 3 d ii — National navigation and shipping' (2 % in 2007) increased by 13 % in 2000–2007.

Figure 2.5 SO_x emissions from key categories in EU-27: (a) trend in SO_x emissions from the five most important key categories, 2000–2007; (b) contribution of key categories to SO_x emissions, 2007



Note: A complete EU-27 time series 1990–2007 of key category data cannot be presented due to non-reporting of sectoral data by several Member States.

Emissions from '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' were not estimated (NE) for Lithuania (2002–2003) and were reported as being included elsewhere (IE) for Ireland (2000-2007).

Emissions from '1 A 1 b — Petroleum refining' were reported as being included elsewhere (IE) for the following Member States: Hungary (2000–2007), Romania (2000–2004) and Slovenia (2007). For Bulgaria (2000–2001), Cyprus (2005–2007), Luxembourg, Latvia, Malta (2000–2007) and Slovenia (2001–2006), emissions were reported as not occurring (NO). Emissions estimates for Estonia (2000–2007) were not applicable (NA). Emissions were not estimated for the Lithuania (2000),

Emissions from '1 A 4 b i — Residential: stationary plants' for Poland (2000) were not estimated (NE).

Emissions from '1 A 3 d ii — National Navigation' were reported as being included elsewhere (IE) for the following Member States: Bulgaria (2002-2007) and Hungary (2002) and Slovenia (2007). Emissions were reported as not occurring (NO) for Bulgaria 2000-2001. Emissions were not estimated (NE) for the following Member States: Poland (2000) and Slovenia (2000-2006).

Twenty-one Member States (Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom) provided SO_X projections for 2010 (Table 2.8). Twelve Member States project that SO_X emissions will decrease until 2010 and nine Member States (Belgium, Finland, Italy, Latvia, Lithuania, Luxembourg, Romania, Slovakia, Slovenia) project that SO_X emissions will increase until 2010. However, for Latvia and Lithuania the projected increase and for Sweden the projected decrease is less than 1 Gg. EU-27 projections for 2010 could not be estimated because six Member States did not report projections. 2015 and 2020 projections were reported only by 13 and 14 Member States, respectively.

Table 2.8 Member State SO_x projections as reported under the LRTAP Convention

SO_x (Gg)	2007	WM					WAM				
		2010	2015	2020	2030	2050	2010	2015	2020	2030	2050
Austria	26										
Belgium	126	196									
Bulgaria	859										
Cyprus	32										
Czech Republic	217										
Denmark	23	20	21	21							
Estonia	88	80	43								
Finland	83	98		76		65					
France	435	337		289							
Germany	493	459	459	459							
Greece	543	523					315				
Hungary	84	72	61	59	59						
Ireland	54	30					28				
Italy	339	376									
Latvia	3	4	6	6							
Lithuania	39	39	37	20							
Luxembourg	1	3					3				
Malta	18	9									
Netherlands	59	53	55	57			48	50	51		
Poland	1 131										
Portugal	170										
Romania	754	826	843	867							
Slovakia	71	87	61	63	69	89					
Slovenia	14	17	14	13			17	14	13		
Spain	1 154	427	412	363							
Sweden	33	33	31	29	27						
United Kingdom	591	454	378	344							

Note: A WM (with measures) projection shall include implemented and adopted policies and measures. It will include the most likely economic and energy projections and the impacts of existing policies and measures irrespective of whether their primary objective was the mitigation of air emissions or not (consistent with UNFCCC, 1999).

A WAM (with additional measures) projection shall include planned but not yet adopted policies and measures. 'With additional measures' presents a picture of the expected outcome of emissions if, on top of WM, planned policies and measures with a realistic chance of being adopted and implemented in time to influence the emissions are included (EMEP/EEA, 2009).

Source: Data source: Member State submissions 2009 (projections tables), Italy: Data taken from the IIR of Italy 2009 (Table 5.1), Finland: Data for 2010 taken from the IIR of Finland 2009 (Table 13.1).

2.5 NH_3 emission trends

EU-27 total NH_3 emissions in 2007 were 3 953 Gg (excluding data from Malta). Emissions of NH_3 decreased by 22 % between 1990 and 2007, and remained virtually unchanged between 2006 and 2007 (Table 2.9). Since 1990, emissions have increased in only two Member States: Cyprus and Spain (by 18 % and 25 %, respectively). The countries that accounted for the greatest share of EU-27 NH_3 emissions in 2007 were France (737 Gg) and Germany (624 Gg).

Table 2.9 Member States' contribution to European Community NH_3 emissions (Gg)

Member State	NH_3 (Gg)										Change		Share in EU-27	
	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	1990-2007 (%)	2006-2007 (%)	1990 (%)	2007 (%)
Austria	71	75	69	69	68	67	67	66	66	66	– 7	0.6	1.4	1.7
Belgium	123	121	91	88	85	82	75	74	73	70	– 43	– 3.6	2.4	1.8
Bulgaria	144	99	56	56	56	52	54	57	55	58	– 60	5.9	2.8	1.5
Cyprus	5	5	6	6	6	6	6	6	6	5	18	– 3.4	0.1	0.1
Czech Republic	156	86	74	77	72	82	70	68	63	60	– 62	– 5.3	3.1	1.5
Denmark	122	103	96	94	92	84	83	79	76	75	– 39	– 0.9	2.4	1.9
Estonia	26	12	10	10	9	10	10	9	9	10	– 63	3.7	0.5	0.2
Finland	42	35	33	33	33	33	33	36	36	35	– 17	– 3.3	0.8	0.9
France	791	773	797	783	785	758	751	745	740	737	– 7	– 0.3	15.5	18.7
Germany	718	626	627	643	630	628	623	621	620	624	– 13	0.7	14.1	15.8
Greece	79	85	74	74	73	73	73	73	73	65	– 17	– 10.7	1.6	1.6
Hungary	124	77	71	66	65	67	74	80	81	71	– 43	– 12.8	2.4	1.8
Ireland	110	115	122	116	113	112	111	110	110	106	– 4	– 3.9	2.2	2.7
Italy	466	448	451	452	439	434	426	414	410	418	– 10	2.0	9.2	10.6
Latvia	47	15	12	14	13	14	14	14	15	15	– 67	5.0	0.9	0.4
Lithuania	84	38	25	NE	51	34	33	39	35	36	– 57	3.9	1.7	0.9
Luxembourg	5	6	6	6	5	5	5	5	5	5	– 4	– 0.7	0.1	0.1
Malta	NE	NE	2	2	2	2	2	2	2	2	NE	NE	NE	NE
Netherlands	250	193	152	144	139	135	134	133	130	133	– 47	2.2	4.9	3.4
Poland	512	380	322	328	325	323	317	326	287	292	– 43	1.7	10.1	7.4
Portugal	65	64	66	65	65	61	62	60	58	56	– 13	– 3.7	1.3	1.4
Romania	300	217	206	164	156	182	191	204	199	198	– 34	– 0.6	5.9	5.0
Slovakia	65	40	30	31	31	29	27	27	27	32	– 50	21.8	1.3	0.8
Slovenia	24	22	20	20	20	19	17	18	19	19	– 23	– 0.5	0.5	0.5
Spain	342	340	411	413	409	424	423	406	417	426	25	2.0	6.7	10.8
Sweden	54	62	56	53	52	53	53	53	52	50	– 6	– 3.1	1.1	1.3
United Kingdom	364	344	316	313	307	298	303	297	297	289	– 21	– 2.7	7.2	7.3
EU-27 (a)	**5 088**	**4 383**	**4 199**	**NE**	**4 102**	**4 063**	**4 036**	**4 022**	**3 959**	**3 953**	**– 22**	**– 0.1**	**100.0**	**100.0**
EU-27 (b)	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**3 936**				

Note: (a) Sum of national totals as reported by Member States summed excluding data for Malta (grey text) as the time series values provided by this country are not complete.

For Greece, NH_3 emissions for 2003–2006 were assumed to equal the reported emissions for 2002 (following confirmation from Greece that after 1998 these emissions are considered to be constant.

(b) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. The EU-27 totals for years before 2007 could not be estimated because the following Member States provided no information on emissions on the level of categories: Greece (1990–2006), Hungary, Bulgaria, the Czech Republic, Lithuania and Poland (1990–2001), Malta, Slovakia and Slovenia (1990–1999) and Romania (1990–2004).

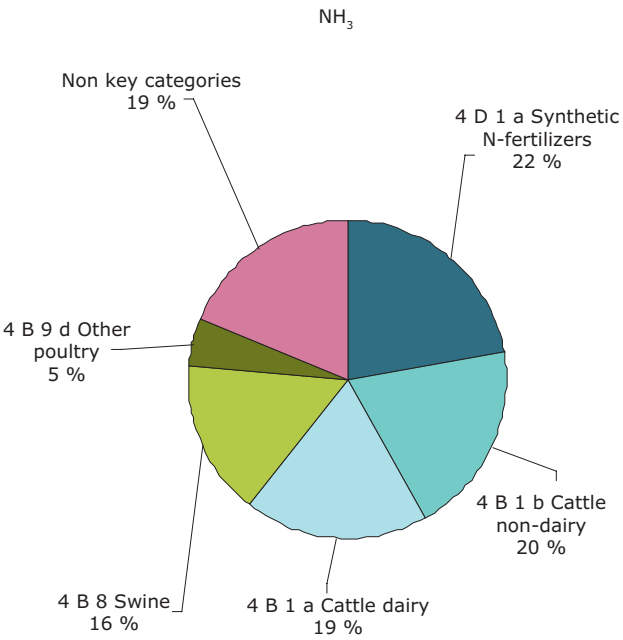
Negative values indicate that emissions have fallen.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

Reporting of emissions at the sectoral level is rather incomplete and therefore EU-27 trends for the top five NH_3 key categories are not presented. The three most significant key categories of NH_3 '4 D 1 a — Synthetic N-fertilizers', '4 B 1 b — Cattle non-dairy' and '4 B 1 a — Cattle dairy' contributed together 61 % of total EU-27 emissions in 2007.

Twenty-one Member States (Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom) provided NH_3 projections for 2010 (Table 2.10). Fourteen Member States project that NH_3 emissions will decrease until 2010 and six Member States (Hungary, Lithuania, Malta, Romania, Slovenia and the United Kingdom) project that NH_3 emissions will increase until 2010. Belgium projects no changes between 2007 and 2010. However, the projected increase for Lithuania, Malta and Slovenia and the projected decrease for Estonia, Latvia, Luxembourg and Sweden is less than 1 Gg. The EU-27 2010 projections could not be estimated because six Member States did not report projections. 2015 and 2020 projections were reported only by 13 and 14 Member States, respectively.

Figure 2.6 NH_3 emissions from key categories in EU-27: contribution of key categories to NH_3 emissions, 2007



Note: An EU-27 time series of key category data cannot be presented due to non-reporting of sectoral data by the following Member States: Bulgaria (1990–2001), the Czech Republic (1990–2001), Greece (1990–2006), Hungary (1990–2002), Lithuania (1990–2001), Malta (1990–1999), Poland (1990–2000), Romania (1990–2004), Slovakia (1990–1999) and Slovenia (1990–1999).

Table 2.10 Member State NH_3 projections as reported under the LRTAP Convention

NH_3 (Gg)	2007	WM					WAM				
		2010	2015	2020	2030	2050	2010	2015	2020	2030	2050
Austria	66										
Belgium	70	70									
Bulgaria	58										
Cyprus	5										
Czech Republic	60										
Denmark	75	65	58	55							
Estonia	10	9	7								
Finland	35	31		31		30					
France	737	729		708							
Germany	624	610	609	609							
Greece	65	63					50				
Hungary	71	78	82	80	74						
Ireland	106	104					104				
Italy	418	416									
Latvia	15	14	14	14							
Lithuania	36	37	38	23							
Luxembourg	5	5					5				
Malta	2	2									
Netherlands	133	123	133	143			123	133	143		
Poland	292										
Portugal	56										
Romania	198	205	209	220							
Slovakia	32	27	27	28	28	29					
Slovenia	19	19	18	18			19	18	18		
Spain	426	391	396	402							
Sweden	50	50	51	51	51						
United Kingdom	289	294	292	291							

Note: A WM (with measures) projection shall include implemented and adopted policies and measures. It will include the most likely economic and energy projections and the impacts of existing policies and measures irrespective of whether their primary objective was the mitigation of air emissions or not (consistent with UNFCCC, 1999).

A WAM (with additional measures) projection shall include planned but not yet adopted policies and measures. 'With additional measures' presents a picture of the expected outcome of emissions if, on top of WM, planned policies and measures with a realistic chance of being adopted and implemented in time to influence the emissions are included (EMEP/EEA, 2009).

Source: Data source: Member State submissions 2009 (projections tables), Italy: data taken from the IIR of Italy 2009 (Table 5.1), Finland: data for 2010 taken from the IIR of Finland 2009 (Table 13.1)

2.6 PM_{10} emission trends and projections

The EU-27 total PM_{10} emissions in 2007 exclude data for Greece and Luxembourg (which were not reported). In order to determine at least an indicative emission trend, EU-27 2000–2007 ([15]) aggregated emissions were also estimated without consideration of data from Bulgaria, the Czech Republic, Lithuania, and Romania (which were not complete). Excluding the data from these countries, emissions of PM_{10} decreased by 11 % in 2007 compared to 2000; between 2006 and 2007 the reduction was 2.3 % (Table 2.11). France and Poland were the biggest contributors to emissions of PM_{10} in absolute terms in 2007.

Table 2.11 Member States' contribution to European Community PM_{10} emissions (Gg)

Member State	PM_{10} (Gg)								Change		Share in EU-27	
	2000	2001	2002	2003	2004	2005	2006	2007	2000–2007 (%)	2006–2007 (%)	2000 (%)	2007 (%)
Austria	43	44	44	45	45	44	45	43	– 1	– 4.4	2.0	2.2
Belgium	48	45	44	44	42	38	37	34	– 28	– 7.9	2.2	1.7
Bulgaria	NE	NE	NE	NE	NE	NE	NE	16	NE	NE	NE	0.8
Cyprus	4	4	4	4	4	4	4	4	19	3.5	0.2	0.2
Czech Republic	NE	NE	51	51	47	34	35	35	NE	NE	NE	1.8
Denmark	35	36	35	36	36	38	40	43	22	9.2	1.6	2.2
Estonia	37	37	33	30	30	26	20	28	– 23	42.6	1.7	1.4
Finland	47	54	55	55	57	51	55	48	2	– 12.4	2.1	2.5
France	590	564	535	536	530	505	490	475	– 20	– 3.0	26.9	24.3
Germany	230	225	219	213	211	207	206	204	– 11	– 1.2	10.5	10.4
Greece	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Hungary	47	48	44	33	47	52	48	36	– 24	– 25.8	2.1	1.8
Ireland	17	17	16	15	15	16	15	14	– 17	– 6.1	0.8	0.7
Italy	192	191	179	175	177	165	162	163	– 15	0.4	8.8	8.3
Latvia	13	14	14	14	15	15	15	15	15	– 0.6	0.6	0.7
Lithuania	NE	NE	NE	NE	NE	11	11	12	NE	4.0	NE	0.6
Luxembourg	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Malta	2	1	2	2	2	2	1	1	– 17	3.1	0.1	0.1
Netherlands	44	42	41	39	38	37	37	36	– 17	– 1.7	2.0	1.9
Poland	281	305	303	303	280	289	285	269	– 4	– 5.8	12.8	13.8
Portugal	134	145	131	127	142	141	137	139	4	1.7	6.1	7.1
Romania	NE	NE	NE	NE	NE	47	46	64	NE	37.4	NE	3.3
Slovakia	40	41	36	34	39	45	38	34	– 15	– 11.8	1.8	1.7
Slovenia	8	8	8	8	8	8	8	7	– 12	– 5.4	0.4	0.4
Spain	173	174	179	178	179	179	176	179	3	1.9	7.9	9.2
Sweden	43	43	43	43	44	44	44	44	4	1.4	1.9	2.3
United Kingdom	170	162	139	139	138	135	137	135	– 20	– 1.3	7.7	6.9
EU-27 ([a])	**2 197**	**2 199**	**2 105**	**2 073**	**2 080**	**2 042**	**1 999**	**1 952**	**– 11**	**– 2.3**	**100.0**	**100.0**
EU-27 ([b])	**1 868**	**1 845**	**1 801**	**1 782**	**1 799**	**2 040**	**1 997**	**1 915**				

Note: Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

([a]) Sum of national totals as reported by Member States. PM_{10} totals for the EU-27 exclude emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg, and Romania as data were not reported for each year (grey text).

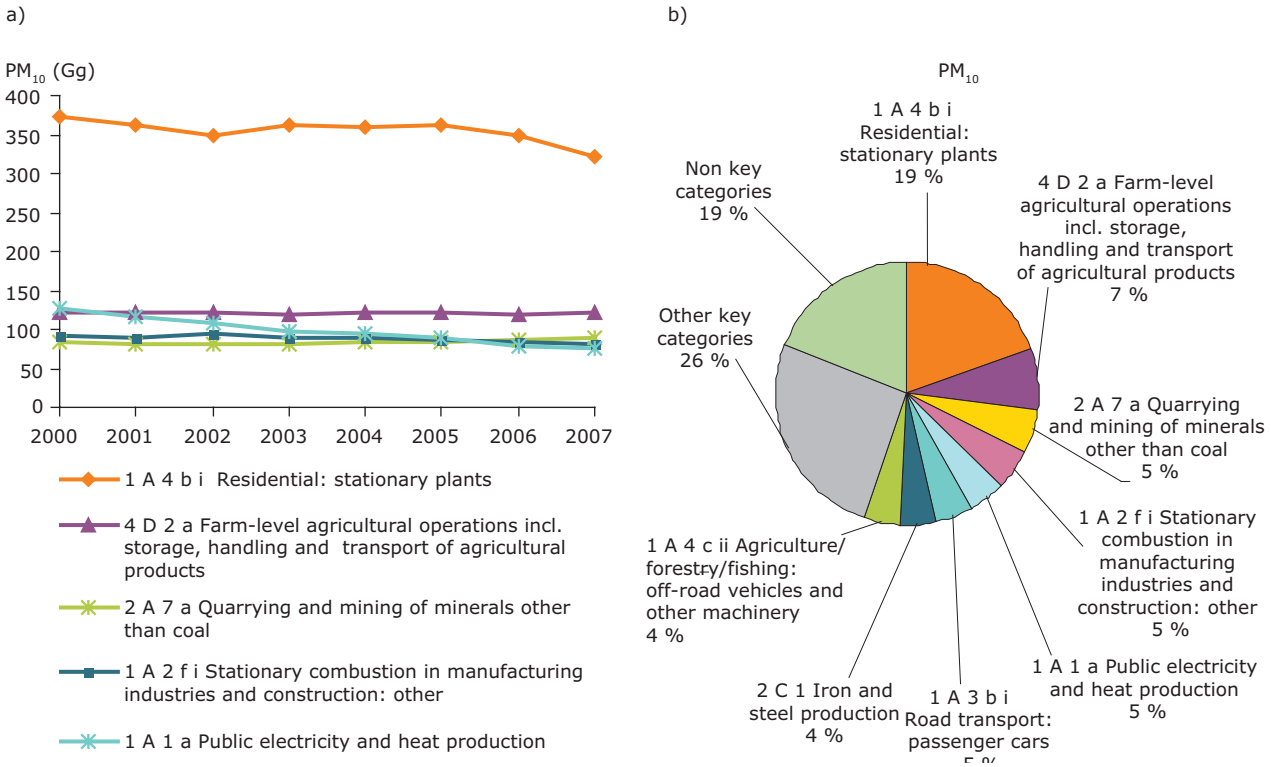
([b]) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. Sectoral data for Poland was only available from 2005 onwards. This results in a considerable difference between the sum of national totals as reported by Member States and the sum of national total emissions after re-allocation of Memo Items in line with the new LRTAP Convention emission reporting guidelines for the years before 2005.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

([15]) Reporting of PM emissions is formally requested under the LRTAP Convention only for years 2000–2006 (Appendix 1I). Other years are reported by Member States on a voluntary basis.

Emissions of PM_{10} from the most significant key category in the EU-27, '1 A 4 b i — Residential: stationary plants', which contributed 19 % to total PM_{10} emissions in 2007, decreased between 2000 and 2007 by 14 % (Figure 2.7). This reduction is lower than the one achieved in the same sector for NMVOC (19 % reduction between 2001 and 2007) and higher than the one achieved for SO_X (6 % reduction in 2000—2007). The highest relative reduction between 2000 and 2007 of the top five key categories was achieved in '1 A 1 a — Public electricity and heat production' (41 %). This reduction is considerably higher than the one achieved in the same sector for NO_X (3 % reduction in 2002–2007) and SO_X (26 % reduction in 2000–2007).

Figure 2.7 PM_{10} emissions from key categories in EU-27: (a) trend in PM_{10} emissions from the five most important key categories, 2000–2007; (b) contribution of key categories to PM_{10} emissions, 2007



Note: Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

PM_{10} totals for the EU-27 in the figures above exclude emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg, Poland and Romania as sectoral data were not reported by these countries in every year. Emissions from '1 A 4 b i — Residential: stationary plants' for Malta (2003–2004) and Hungary (2000–2001) were not estimated (NE). Emissions for Finland in 2007 were reported as not occurring, Emissions from Malta (2001–2002,2005–2007) were reported as being included elsewhere.

Emissions from '4 D 2 a — Farm-level agricultural operations including storage, handling and transport of agricultural products' were only estimated by France, Germany, and Sweden (2000–2007) and by Finland and Slovenia (2007). Other Member States did not report values.

Emissions from '2 A 7 a — Quarrying and mining of minerals other than coal' were only estimated by Austria, Belgium, France, Slovakia, Sweden and the United Kingdom (2000–2007) and Finland (2007). Other Member States did not report values.

Emissions from '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' were not estimated for Hungary (2000–2001) or Malta (2000). Emissions estimates for Finland (2007) were not applicable (NA).

Emissions from '1 A 1 a — Public electricity and production' for Hungary (2000–2002) were not estimated (NE).

Seven Member States (Estonia, Germany, Hungary, Lithuania, Romania, Slovakia, Spain) provided PM_{10} projections for 2010 (Table 2.12). Six Member States project that PM_{10} emissions will decrease until 2010 and Slovakia projects that PM_{10} emissions will increase slightly until 2010. EU-27 projections for 2010 could not be estimated because 20 Member States did not report projections. 2015 and 2020 projections were reported by seven Member States.

Table 2.12 Member State PM_{10} projections as reported under the LRTAP Convention

PM_{10} (Gg)	2007	WM					WAM				
		2010	2015	2020	2030	2050	2010	2015	2020	2030	2050
Austria	43										
Belgium	34										
Bulgaria	16										
Cyprus	4										
Czech Republic	35										
Denmark	43										
Estonia	28	17	17								
Finland	48			32		30					
France	475										
Germany	204	181	176	174							
Greece	NE										
Hungary	36	34	35	35	37						
Ireland	14										
Italy	163										
Latvia	15										
Lithuania	12	8	14	13							
Luxembourg	NE										
Malta	1										
Netherlands	36										
Poland	269										
Portugal	139										
Romania	64	56	62	68							
Slovakia	34	34	34	35	36	38					
Slovenia	7										
Spain	179	152	144	140							
Sweden	44										
United Kingdom	135										

Note: A WM (with measures) projection shall include implemented and adopted policies and measures. It will include the most likely economic and energy projections and the impacts of existing policies and measures irrespective of whether their primary objective was the mitigation of air emissions or not (consistent with UNFCCC, 1999).

A WAM (with additional measures) projection shall include planned but not yet adopted policies and measures. 'With additional measures' presents a picture of the expected outcome of emissions if, on top of WM, planned policies and measures with a realistic chance of being adopted and implemented in time to influence the emissions are included (EMEP/EEA, 2009).

Source: Data source: Member State submissions 2009 (projections tables).

2.7 $PM_{2.5}$ emission trends and projections

The completeness of $PM_{2.5}$ emissions is rather limited. The EU-27 total $PM_{2.5}$ emissions exclude data for Greece and Luxembourg (which were not reported). In order to determine at least an indicative emission trend since 2000 ([16]), EU-27 emissions were estimated without consideration of data from Bulgaria, the Czech Republic, Greece, Luxembourg, Lithuania, and Romania (which were not complete). Excluding the data from these countries, since the year 2000 aggregated emissions of $PM_{2.5}$ have decreased by about 12 % (Table 2.13). France and Spain were the biggest contributors to $PM_{2.5}$ emissions in absolute terms in 2007.

Table 2.13 Member States' contribution to European Community $PM_{2.5}$ emissions (Gg)

Member State	$PM_{2.5}$ (Gg)								Change		Share in EU-27	
	2000	2001	2002	2003	2004	2005	2006	2007	2000–2007 (%)	2006–2007 (%)	2000 (%)	2007 (%)
Austria	23	24	24	25	24	24	24	23	– 2	– 5.5	1.6	1.8
Belgium	33	30	29	29	28	25	25	23	– 30	– 7.4	2.3	1.8
Bulgaria	NE	NE	NE	NE	NE	NE	NE	1	NE	NE	NE	0.1
Cyprus	2	2	2	3	2	3	3	3	13	2.5	0.2	0.2
Czech Republic	NE	NE	NE	38	35	21	22	21	NE	– 1.5	NE	1.7
Denmark	24	25	24	26	26	28	29	33	35	13.0	1.7	2.6
Estonia	21	23	23	21	22	20	15	20	– 4	33.3	1.5	1.6
Finland	37	38	39	38	38	34	35	34	– 6	– 1.5	2.5	2.7
France	402	380	355	356	349	331	317	303	– 25	– 4.5	27.8	23.9
Germany	126	124	119	115	113	109	109	106	– 16	– 2.2	8.7	8.4
Greece	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Hungary	26	26	25	18	27	31	29	21	– 17	– 27.0	1.8	1.7
Ireland	11	11	11	10	10	11	10	10	– 16	– 4.7	0.8	0.8
Italy	161	158	147	143	144	133	130	131	– 19	0.2	11.1	10.3
Latvia	11	12	12	13	13	13	13	13	18	1.1	0.8	1.0
Lithuania	NE	NE	NE	NE	NE	9	9	10	NE	6.9	NE	0.8
Luxembourg	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Malta	1	1	1	1	1	1	1	1	– 47	1.4	0.1	0.0
Netherlands	25	24	23	23	21	21	20	19	– 24	– 3.7	1.8	1.5
Poland	135	142	142	142	131	138	136	128	– 5	– 5.8	9.3	10.1
Portugal	105	108	102	102	113	109	109	111	6	1.5	7.3	8.8
Romania	NE	NE	NE	NE	NE	NE	NE	31	NE	NE	NE	2.5
Slovakia	33	33	30	27	34	40	34	29	– 10	– 13.8	2.3	2.3
Slovenia	6	6	6	6	6	6	6	5	– 17	– 5.5	0.4	0.4
Spain	131	132	135	136	137	138	136	140	7	2.4	9.1	11.0
Sweden	31	31	31	31	31	32	31	32	3	2.0	2.1	2.5
United Kingdom	100	95	84	84	84	83	84	82	– 18	– 2.1	6.9	6.5
EU-27 ([a])	**1 445**	**1 426**	**1 365**	**1 349**	**1 358**	**1 329**	**1 296**	**1 266**	**– 12**	**– 2.3**	**100.0**	**100.0**
EU-27 ([b])	**1 284**	**1 257**	**1 222**	**1 216**	**1 226**	**1 328**	**1 295**	**1 265**				

Note: ([a]) Sum of national totals as reported by Member States. $PM_{2.5}$ totals for the EU-27 exclude emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg, and Romania as data were not reported for each year (grey text).

([b]) Sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines (NFR08) for countries that reported emissions in older NFR formats. Sectoral data for Poland was only available from 2005 onwards. This results in a considerable difference between the sum of national totals as reported by Member States and the sum of national total emissions after re-allocation of Memo Items in line with the new reporting Guidelines for the years before 2005.

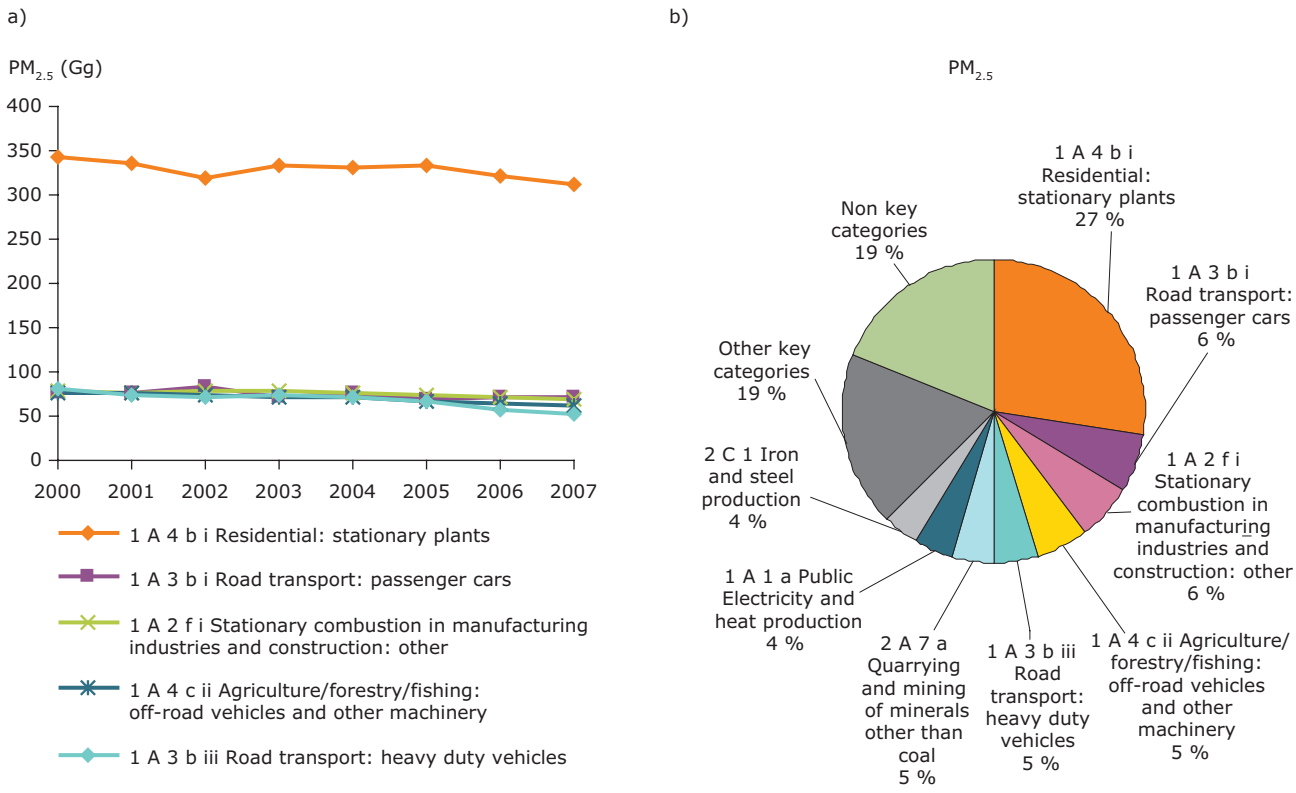
Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for years 2000 onwards.

'NE' denotes 'not estimated' (see Appendix 1 for an explanation of the notation keys used in this report).

([16]) Reporting of PM emissions is formally requested under the LRTAP Convention only for years 2000–2006 (Appendix 1I). Other years are reported by Member States on a voluntary basis.

Emissions of $PM_{2.5}$ from the most significant key category in the EU-27, '1 A 4 b i — Residential: stationary plants', which contributed 27 % to total $PM_{2.5}$ emissions in 2007, decreased between 2000 and 2007 by 9 % (Figure 2.8). This reduction is almost the same as the one achieved for PM_{10} during the same period of time. The highest relative reduction between 2000 and 2007 of the top five key categories was achieved in '1 A 3 b iii — Road transport: heavy duty vehicles' (34 %). This reduction is considerably higher than the one achieved in the same sector for NO_X (13 % reduction between 2002 and 2007).

Figure 2.8 $PM_{2.5}$ emissions from key categories in EU-27: (a) trend in $PM_{2.5}$ emissions from the five most important key categories, 2000–2007; (b) contribution of key categories to $PM_{2.5}$ emissions, 2007



Note: Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

$PM_{2.5}$ totals for the EU-27 in the figures above exclude emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg, Poland and Romania as sectoral data were not reported for each year.

Emissions from '1 A 4 b i — Residential: stationary plants' were not estimated (NE) for Hungary (2000–2001) and Malta (2003–2004). Emissions from Malta were reported as being included elsewhere (IE) (2001–2002 and 2005–2007).

Emissions from '1 A 3 b i — Road transport: passenger cars' were not estimated for Hungary (2000–2001). For Hungary (2003–2005) emissions were included elsewhere.

Emissions from '1 A 2 f i Stationary combustion in manufacturing industries and construction: other' were not estimated for Hungary (2000–2001) and Malta (2000). For Ireland (2000–2007) emissions were reported as being included elsewhere (IE).

Emissions from '1 A 4 c ii — Agriculture / forestry / fishing: off road vehicles and Other machinery emission' were reported as being included elsewhere for Hungary (2002–2007) and Slovakia (2000–2007). Emissions were not estimated for Malta and Germany (2000–2007) or Hungary (2000–2001), Emissions were not occurring in Latvia (2000–2007).

Emissions from '1 A 3 b iii — Road transport: heavy duty vehicles' for Hungary (2000–2002) were not estimated for Hungary.

Seven Member States (Estonia, France, Germany, Latvia, Lithuania, Slovakia and Spain) provided $PM_{2.5}$ projections for 2010 (Table 2.14). Six Member States project that $PM_{2.5}$ emissions will decrease until 2010. For Latvia the projected decrease is below 1 Gg. One Member State (Slovakia) projects that $PM_{2.5}$ emissions will increase slightly until 2010 (below 1 Gg). EU-27 projections for 2010 could not be estimated because 20 Member States did not report projections. 2015 and 2020 projections were reported by six and seven Member States, respectively.

Table 2.14 Member State $PM_{2.5}$ projections as reported under the LRTAP Convention

$PM_{2.5}$ (Gg)	2007	WM					WAM				
		2010	2015	2020	2030	2050	2010	2015	2020	2030	2050
Austria	23										
Belgium	23										
Bulgaria	1										
Cyprus	3										
Czech Republic	21										
Denmark	33										
Estonia	20	15	15								
Finland	34			23		21					
France	303	291		243							
Germany	106	104	98	95							
Greece	NE										
Hungary	21										
Ireland	10										
Italy	131										
Latvia	13	13	13	12							
Lithuania	10	8	10	10							
Luxembourg	NE										
Malta	1										
Netherlands	19										
Poland	128										
Portugal	111										
Romania	31										
Slovakia	29	29	29	30	30	32					
Slovenia	5										
Spain	140	118	110	104							
Sweden	32										
United Kingdom	82										

Note: A WM (with measures) projection shall include implemented and adopted policies and measures. It will include the most likely economic and energy projections and the impacts of existing policies and measures irrespective of whether their primary objective was the mitigation of air emissions or not (consistent with UNFCCC, 1999).

A WAM (with additional measures) projection shall include planned but not yet adopted policies and measures. 'With additional measures' presents a picture of the expected outcome of emissions if, on top of WM, planned policies and measures with a realistic chance of being adopted and implemented in time to influence the emissions are included (EMEP/EEA, 2009).

Source: Data source: Member State submissions 2009 (projections tables).

3 Emission trends of key categories

This chapter provides detail on emission trends for EU-27 key categories (determined by a level assessment ([17]) for the year 2007. Results are presented for NO_X, CO, NMVOCs, SO_X, NH_3 and for particulate matter (PM_{10} and $PM_{2.5}$). In addition, a combined key category analysis ([18]) was performed for NO_X, CO, NMVOC, SO_X, NH_3, PM_{10} and $PM_{2.5}$. More detailed KCA results are provided in Annex C to this report.

The analysis does not include PM_{10} and $PM_{2.5}$ emission data from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg and Romania, or NH_3 emission data for Malta or CO emission data for Luxembourg due to incomplete reporting of sectoral emissions or exclusion of the complete time series due to data not reported for several years. Data from Poland was excluded from the key source analysis as sectoral data were only provided from 2005 onwards.

Forty-two emission inventory source categories were identified as being key categories for at least one pollutant. A number of emission categories were identified as being key categories for more than one of the seven pollutants assessed. '1 A 4 b i — Residential: stationary plants' was identified as being a key category for six pollutants. '1 A 3 b i — Road transport: passenger cars', '1 A 3 b iii — Road transport: heavy duty vehicles', '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' were identified as being common key categories for five pollutants.

For NO_X eight key categories were identified, all energy related. Eight key sources were identified for CO and all but one ('2 C 1 — Iron and steel production') were energy related. Only five key categories were respectively identified for NH_3 (all from the agriculture sector) and SO_X (all from the energy sector). PM_{10} and $PM_{2.5}$ and NMVOC emission sources are more diverse, 20, 17 and 21 key categories identified for each pollutant respectively.

The results of the KCA presented in Table 3.1 show that '1 A 4 b i — Residential: stationary plants' is the most important key category for PM_{10}, $PM_{2.5}$ and NMVOC and is also a key source for CO, SO_X and NO_X. In the combined key source analysis, '1 A 4 b i — Residential: stationary plants' is also ranked as the most important category.

In the combined key category analysis '1 A 1 a — Public electricity and heat production', '1 A 3 b i — Road transport: passenger cars', '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other','1 A 3 b iii — Road transport: heavy duty vehicles' and follow. In the pollutant specific key source analyses, '1 A 3 b i — Road transport: passenger cars' is among the top six key categories for CO, NO_X, PM_{10}, $PM_{2.5}$ and NMVOC. '1 A 1 a — Public electricity and heat production' is responsible for a significant portion of NO_X and SO_X emissions.

It is important to note that several factors may affect which emission categories are determined as being key categories at the EU-27 level. Specifically, Member States sometimes report using different levels of aggregation within the NFR reporting nomenclature. This of course influences the amount of emissions assigned to specific NFR categories. Similarly, Member States' use of the emission inventory notation key IE ('included elsewhere' — see Appendix 1) means emission estimates for one NFR sector can be included in emission estimates of a different sector. Also the transfer of emission inventories submitted in NFR02 into the NFR08 format might lead to an over- or underestimation of a category that is affected by the mapping. Due to such issues, the EU-27 KCA may not always accurately reflect the share of all main emission sources. It is also important to note that the results of KCA in individual Member States may differ from key sources determined for the EU-27.

The following sections of this chapter provide detailed tables showing the emissions in the top three key categories for each pollutant in 1990, 2006 and 2007. The absolute and relative change in 1990–2007 and 2006–2007 is also shown for each Member State and the EU-27 as a whole.

([17]) A key category level assessment identifies those source categories that have a significant influence on a country's total inventory in terms of their absolute level of emissions. In this report, the categories that are together responsible for 80 % of the total emission of a given pollutant are classified as key categories (EMEP/EEA, 2009).

([18]) A combined key category analysis combines the results of the individual KCAs to identify those sources that overall contribute most to the emissions of pollutants. For each key category, the contributions to total levels of each pollutant (expressed as percentages) are summed. The source categories are then ranked to provide an overall assessment of the most important emissions sources (EMEP/EEA, 2009).

Table 3.1 Results of key category analysis for the EU-27 in 2007 — cumulative contribution of emission sources to total emissions of NO_X, CO, NMVOCs, SO_X, NH_3, PM_{10} and $PM_{2.5}$ (in descending order)

CO key categories	(%)	(%) cumul.
1 A 3 b i Road transport:, Passenger cars	26	26
1 A 4 b i Residential: stationary plants	25	51
1 A 2 a Stationary combustion in manufacturing industries and construction: iron and steel	8	59
2 C 1 Iron and steel production	6	65
1 A 2 f i Stationary combustion in manufacturing industries and construction: other	5	70
1 A 3 b iv Road transport: Mopeds & Motorcycles	4	75
1 A 3 b iii Road transport: Heavy duty vehicles	3	78
1 A 3 b ii Road transport: Light duty vehicles	2	80

NO_x key categories	(%)	(%) cumul.
1 A 3 b iii Road transport: Heavy duty vehicles	19	19
1 A 1 a Public electricity and heat production	19	38
1 A 3 b i Road transport: Passenger cars	16	54
1 A 2 f i Stationary combustion in manufacturing industries and construction: other	9	63
1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery	5	68
1 A 3 b ii Road transport: Light duty vehicles	5	73
1 A 4 b i Residential: stationary plants	4	77
1 A 3 d ii National navigation (Shipping)	4	81

NMVOC key categories	(%)	(%) cumul.
1 A 4 b i Residential: stationary plants	9	9
3 D 2 Domestic solvent use including fungicides	8	17
1 A 3 b i Road transport: Passenger cars	8	25
3 A 3 Other coating application	7	32
3 C Chemical products	5	37
3 A 1 Decorative coating application	4	42
3 D 3 Other product use	4	46
3 D 1 Printing	4	50
3 A 2 Industrial coating application	4	54
7 A Other (included in National Total for Entire Territory)	3	57
1 A 3 b iv Road transport: Mopeds & Motorcycles	3	61
2 D 2 Food and drink	3	64
3 B 1 Degreasing	2	66
1 A 3 b iii Road transport:, Heavy duty vehicles	2	68
1 B 2 a v Distribution of oil products	2	71
1 B 2 a iv Refining/storage	2	73
1 A 3 d ii National navigation (Shipping)	2	75
1 A 3 b v Road transport: Gasoline evaporation	2	77
2 B 5 a Other chemical industry	2	78
1 B 2 a i Exploration production, transport	2	80
1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery	2	82

SO_x key categories	(%)	(%) cumul.
1 A 1 a Public electricity and heat production	59	59
1 A 2 f i Stationary combustion in manufacturing industries and construction: other	8	67
1 A 1 b Petroleum refining	7	74
1 A 4 b i Residential: stationary plants	6	80
1 A 3 d ii National navigation (Shipping)	2	82

NH_3 key categories	(%)	(%) cumul.
4 D 1 a Synthetic N-fertilizers	22	22
4 B 1 b Cattle non-dairy	20	42
4 B 1 a Cattle dairy	19	61
4 B 8 Swine	16	76
4 B 9 d Other poultry	5	81

PM_{10} key categories	(%)	(%) cumul.
1 A 4 b i Residential: stationary plants	19	19
4 D 2 a Farm-level agricultural operations including storage, handling and transport of agricultural products	7	27
2 A 7 a Quarrying and mining of minerals other than coal	5	32
1 A 2 f i Stationary combustion in manufacturing industries and construction: other	5	37
1 A 1 a Public electricity and heat production	5	42
1 A 3 b i Road transport: Passenger cars	5	46
2 C 1 Iron and steel production	4	51
1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery	4	55
1 A 3 b vi Road transport: Automobile tyre and brake wear	3	59
1 A 3 b iii Road transport: Heavy duty vehicles	3	62
1 A 3 b ii Road transport: Light duty vehicles	2	65
2 G Other production, consumption, storage, transportation or handling of bulk products	2	67
4 B 8 Swine	2	69
2 A 7 b Construction and demolition	2	71
1 A 3 b vii Road transport: Automobile road abrasion	2	73
1 A 2 d Stationary combustion in manufacturing industries and construction: pulp, paper and print	2	75
1 A 3 d ii National navigation (Shipping)	2	77
2 A 6 Road paving with asphalt	2	78
1 A 2 f ii Mobile combustion in manufacturing industries and construction:	1	80
4 B 9 d Other poultry	1	81

$PM_{2.5}$ key categories	(%)	(%) cumul.
1 A 4 b i Residential: stationary plants	27	27
1 A 3 b i Road transport: Passenger cars	6	34
1 A 2 f i Stationary combustion in manufacturing industries and construction: other	6	40
1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery	5	45
1 A 3 b iii Road transport: Heavy duty vehicles	5	50
2 A 7 a Quarrying and mining of minerals other than coal	5	55
1 A 1 a Public electricity and heat production	4	59
2 C 1 Iron and steel production	4	62
1 A 3 b ii Road transport: Light duty vehicles	3	66
1 A 3 b vi Road transport: Automobile tyre and brake wear	3	69
1 A 3 d ii National navigation (Shipping)	2	71
1 A 2 d Stationary combustion in manufacturing industries and construction: pulp, paper and print	2	73
4 D 2 a Farm-level agricultural operations including storage, handling and transport of agricultural products	2	75
1 A 2 f ii Mobile combustion in manufacturing industries and construction:	2	77
1 A 3 b vii Road transport: Automobile road abrasion	1	79
3 D 3 Other product use	1	80
2 D 3 Wood processing	1	81

3.1 NO_x key categories

For NO_x, eight key categories were identified. The top three key categories, together contributing a total of more than 50 % to NO_x emissions, are '1 A 3 b iii — Road transport: heavy duty vehicles' (Table 3.2), '1 A 1 a — Public electricity and heat production (Table 3.3) and '1 A 3 b i — Road transport: passenger cars' (Table 3.4).

Table 3.2 NO_x emissions from key category '1 A 3 b iii — Road transport: heavy duty vehicles' in the energy sector

1 A 3 b iii	NO_x emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	48	92	89	4	– 2.9	-3.1	41	86
Belgium	76	65	65	3	0.0	0.1	– 11	-14
Bulgaria	IE	IE	IE					
Cyprus	3	4	4	0	– 0.1	-3.6	1	23
Czech Republic	IE	70	68	3	– 2.1	-3.0		
Denmark	39	35	34	2	– 0.3	-1.0	– 5	-13
Estonia	16	5	5	0	0.0	-0.8	– 10	-67
Finland	IE	24	23	1	– 0.5	-2.2		
France	388	349	338	16	– 11.3	-3.2	– 50	-13
Germany	490	366	321	15	– 45.7	-12.5	– 169	-34
Greece	45	IE	IE					
Hungary	NE	63	57	3	– 6.3	-10.0		
Ireland	10	16	16	1	– 0.3	-2.1	6	55
Italy	354	259	250	12	– 9.2	-3.5	– 104	-29
Latvia	12	15	15	1	0.0	-0.2	4	34
Lithuania	IE	13	21	1	8.1	62.1		
Luxembourg	3	4	3	0	– 0.5	-13.2	0	9
Malta	IE	2	2	0	– 0.2	-8.2		
Netherlands	94	66	63	3	– 3.4	-5.2	– 31	-33
Poland	IE	123	128	6	4.6	3.7		
Portugal	24	43	40	2	– 2.8	-6.5	16	70
Romania	IE	56	62	3	5.9	10.4		
Slovakia	IE	19	21	1	2.4	12.6		
Slovenia	NE	10	10	0	0.1	1.3		
Spain	171	179	187	9	8.8	4.9	17	10
Sweden	59	45	45	2	0.4	0.8	– 14	-23
United Kingdom	346	259	248	12	– 10.8	-4.2	– 97	-28
EU-27	**NR**	**2 183**	**2 117**	**100**	**– 66.4**	**-3.0**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 3 b (an aggregated source category), emissions were accounted for under 1 A 3 b i which might lead to an underestimation of sector 1 A 3 b iii. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

Table 3.3 NO_x emissions from key category '1 A 1 a — Public electricity and heat production' in the energy sector

1 A 1 a	NO_x emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	12	10	10	0	– 0.4	– 3.8	– 2	– 18
Belgium	61	28	25	1	– 3.6	– 12.8	– 36	– 59
Bulgaria	59	59	55	3	– 3.8	– 6.5	– 4	– 8
Cyprus	3	7	7	0	0.2	3.1	4	117
Czech Republic	335	91	96	5	4.9	5.4	– 239	– 71
Denmark	91	43	34	2	– 9.5	– 22.1	– 57	– 63
Estonia	26	11	14	1	3.2	29.8	– 12	– 47
Finland	42	50	46	2	– 4.4	– 8.9	4	9
France	115	99	93	4	– 6.4	– 6.4	– 22	– 19
Germany	464	247	257	12	10.2	4.1	– 206	– 45
Greece	54	133	143	7	10.1	7.6	89	165
Hungary	NE	27	28	1	1.3	4.8		
Ireland	46	30	27	1	– 2.9	– 9.5	– 19	– 42
Italy	409	78	68	3	– 10.4	– 13.2	– 341	– 83
Latvia	16	4	4	0	– 0.2	– 6.0	– 12	– 76
Lithuania	47	6	9	0	3.7	63.7	– 38	– 80
Luxembourg	0	1	1	0	– 0.1	– 7.9	1	308
Malta	6	5	5	0	0.1	1.9	0	– 7
Netherlands	82	39	30	1	– 8.5	– 21.9	– 52	– 63
Poland	IE	290	284	14	– 6.3	– 2.2		
Portugal	61	47	39	2	– 7.0	– 15.1	– 22	– 35
Romania	262	111	87	4	– 23.4	– 21.2	– 175	– 67
Slovakia	147	13	11	1	– 1.4	– 11.3	– 136	– 92
Slovenia	NE	13	12	1	– 0.7	– 5.5		
Spain	228	301	314	15	12.8	4.3	85	37
Sweden	14	13	13	1	– 0.2	– 1.6	– 2	– 13
United Kingdom	775	392	360	17	– 31.3	– 8.0	– 415	– 53
EU-27	**NR**	**2 148**	**2 074**	**100**	**– 74.2**	**– 3.5**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

In 1990 1 A 1 a, emissions from Slovakia also include emissions from Energy industries (1 A 1), Manufacturing, industries and constructions (1 A 2) and all other sectors (1 A 4) except 1 A 4 b — Residential, and 1 A 3 — Transport.

Table 3.4 NO_x emissions from key category '1 A 3 b i — Road transport: passenger cars' in the energy sector

1 A 3 b i	NO_x emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	44	42	41	2	– 0.5	– 1.1	– 3	– 6
Belgium	101	48	48	3	– 0.1	– 0.3	– 52	– 52
Bulgaria	44	98	43	3	– 54.2	– 55.6	0	– 1
Cyprus	3	2	2	0	0.0	– 0.5	– 1	– 27
Czech Republic	180	15	18	1	2.5	16.6	– 162	– 90
Denmark	58	20	19	1	– 0.5	– 2.6	– 39	– 67
Estonia	13	5	5	0	0.1	1.5	– 8	– 64
Finland	IE	25	24	1	– 1.8	– 7.3		
France	628	266	257	15	– 9.2	– 3.5	– 371	– 59
Germany	820	202	202	12	0.1	0.1	– 618	– 75
Greece	42	103	106	6	3.3	3.2	64	153
Hungary	NE	68	56	3	– 12.0	– 17.7		
Ireland	28	14	13	1	– 0.2	– 1.6	– 14	– 52
Italy	506	246	240	14	– 6.3	– 2.6	– 267	– 53
Latvia	7	7	6	0	– 0.7	– 10.3	– 1	– 12
Lithuania	53	20	18	1	– 1.7	– 8.8	– 35	– 66
Luxembourg	5	3	3	0	– 0.2	– 4.5	– 2	– 39
Malta	3	1	1	0	– 0.1	– 9.3	– 3	– 79
Netherlands	133	39	36	2	– 3.3	– 8.2	– 97	– 73
Poland	IE	92	94	5	2.0	2.1		
Portugal	40	33	32	2	– 1.7	– 5.2	– 8	– 20
Romania	64	33	38	2	5.5	16.8	– 26	– 40
Slovakia	46	9	8	0	– 0.5	– 5.5	– 38	– 83
Slovenia	NE	8	8	0	– 0.1	– 1.1		
Spain	301	245	228	13	– 16.9	– 6.9	– 73	– 24
Sweden	106	28	26	1	– 2.5	– 9.0	– 80	– 76
United Kingdom	650	158	137	8	– 21.0	– 13.3	– 513	– 79
EU-27	**NR**	**1 828**	**1 708**	**100**	**– 120.0**	**– 6.6**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 3 b (an aggregated source category), emissions were accounted for under 1 A 3 b i which might lead to an overestimation of sector 1 A 3 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

3.2 CO key categories

Eight categories were identified as key categories for CO. The top three that together contribute almost 60 % of total CO emissions are all from the energy sector. Namely, '1 A 3 b i — Road transport: passenger cars' ' (Table 3.5), '1 A 4 b i — Residential: stationary plants' (Table 3.6) and '1 A 2 a — Stationary combustion in manufacturing industries and construction: iron and steel' (Table 3.7).

Table 3.5 CO emissions from key category '1 A 3 b i — Road transport: passenger cars' in the energy sector

1 A 3 b i	CO emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	567	190	169	2	– 21.4	– 11.3	– 398	– 70
Belgium	586	205	204	3	– 1.5	– 0.7	– 382	– 65
Bulgaria	413	233	170	2	– 63.0	– 27.0	– 243	– 59
Cyprus	25	15	15	0	– 0.3	– 1.9	– 10	– 40
Czech Republic	195	81	93	1	11.7	14.4	– 103	– 53
Denmark	422	131	117	2	– 14.0	– 10.7	– 305	– 72
Estonia	103	38	37	1	– 1.0	– 2.7	– 66	– 64
Finland	IE	190	180	3	– 10.1	– 5.3		
France	5 309	820	673	9	– 146.3	– 17.8	– 4 635	– 87
Germany	5 904	1 093	1 009	14	– 83.8	– 7.7	– 4 895	– 83
Greece	555	608	491	7	– 116.8	– 19.2	– 63	– 11
Hungary	NE	343	343	5	0.0	0.0		
Ireland	263	92	83	1	– 9.3	– 10.1	– 181	– 69
Italy	4 481	894	776	11	– 118.2	– 13.2	– 3 706	– 83
Latvia	62	46	38	1	– 8.2	– 17.9	– 25	– 39
Lithuania	450	59	79	1	19.5	32.9	– 371	– 83
Luxembourg	NE	NE	NE					
Malta	23	NE	NE					
Netherlands	558	196	187	3	– 8.8	– 4.5	– 371	– 67
Poland	IE	501	533	7	31.7	6.3	533	
Portugal	399	181	163	2	– 17.4	– 9.6	– 235	– 59
Romania	405	268	311	4	43.1	16.1	– 94	– 23
Slovakia	151	73	69	1	– 3.6	– 5.0	– 82	– 54
Slovenia	NE	66	58	1	– 8.0	– 12.0		
Spain	1 912	760	561	8	– 199.2	– 26.2	– 1 351	– 71
Sweden	554	172	154	2	– 17.6	– 10.2	– 399	– 72
United Kingdom	4 857	760	639	9	– 120.8	– 15.9	– 4 218	– 87
EU-27	**NR**	**8 015**	**7 152**	**100**	**– 863.5**	**– 10.8**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 3 b (an aggregated source category), emissions were accounted for under 1 A 3 b i which might lead to an overestimation of sector 1 A 3 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

The high change in the emissions between 2006 and 2007 in Greece is a result of different allocation of emissions in 2006 and 2007. 2006 values refer to 1 A 3 b.

Table 3.6 CO emissions from key category '1 A 4 b i — Residential: stationary plants' in the energy sector

1 A 4 b i	CO emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	416	309	274	4	– 34.5	– 11.2	– 142	– 34
Belgium	84	74	70	1	– 3.7	– 5.0	– 14	– 17
Bulgaria	152	426	2	0	– 424.9	– 99.6	– 151	– 99
Cyprus	0	0	0	0	0.0	– 17.5	0	– 3
Czech Republic	342	77	73	1	– 3.5	– 4.5	– 269	– 79
Denmark	85	116	139	2	23.0	19.9	54	63
Estonia	73	77	98	1	21.0	27.2	25	35
Finland	IE	87	86	1	– 1.0	– 1.1		
France	2 483	1 621	1 487	21	– 134.4	– 8.3	– 996	– 40
Germany	1 925	708	693	10	– 15.2	– 2.1	– 1 232	– 64
Greece	177	154	62	1	– 92.6	– 60.1	– 115	– 65
Hungary	NE	32	21	0	– 11.5	– 35.7		
Ireland	96	37	36	1	– 1.1	– 2.9	– 60	– 63
Italy	241	452	570	8	118.1	26.1	329	136
Latvia	115	158	154	2	– 3.9	– 2.5	39	34
Lithuania	4	101	94	1	– 6.2	– 6.1	90	2260
Luxembourg	NE	NE	NE					
Malta	0	0	0	0	0.0	0.0	0	29
Netherlands	68	54	53	1	– 0.4	– 0.7	– 15	– 22
Poland	IE	1 492	1 315	19	– 177.3	– 11.9		
Portugal	279	252	252	4	– 0.4	– 0.2	– 27	– 10
Romania	156	639	663	9	23.6	3.7	507	326
Slovakia	162	41	37	1	– 3.9	– 9.6	– 125	– 77
Slovenia	NE	29	28	0	– 0.6	– 2.0		
Spain	517	477	477	7	0.1	0.0	– 40	– 8
Sweden	142	115	143	2	28.5	24.9	1	1
United Kingdom	1 047	266	279	4	12.3	4.6	– 768	– 73
EU-27	**NR**	**7 794**	**7 106**	**100**	**– 688.5**	**– 8.8**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 4 b (an aggregated source category), emissions were accounted for under 1 A 4 b i which might lead to an overestimation of sector 1 A 4 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

The high change in the emissions between 2006 and 2007 in Greece is a result of different allocation of emissions in 2006 and 2007. 2006 values refer to 1 A 4 b.

Table 3.7 CO emissions from key category '1 A 2 a — Stationary combustion in manufacturing industries and construction: iron and steel' in the energy sector

1 A 2 a	CO emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	211	148	139	6	– 9.1	– 6.2	– 72	– 34
Belgium	261	331	300	13	– 30.5	– 9.2	39	15
Bulgaria	IE	55	0	0	– 54.9	– 99.7		
Cyprus	IE	IE	IE					
Czech Republic	IE	87	149	7	62.2	71.5		
Denmark	IE	IE	IE					
Estonia	IE	0	0	0	0.0	0.0		
Finland	IE	7	7	0	– 0.5	– 6.7		
France	728	652	628	28	– 24.0	– 3.7	– 100	– 14
Germany	555	478	548	24	69.8	14.6	– 7	– 1
Greece	0	0	0	0	0.0	20.0	0	– 20
Hungary	NE	2	2	0	0.2	10.2		
Ireland	IE	IE	IE					
Italy	IE	IE	IE					
Latvia	0.2	0.2	0.1	0	0.0	– 1.9	0	– 5
Lithuania	IE	NO	NO					
Luxembourg	IE	IE	IE					
Malta	IE	NO	NO					
Netherlands	104	83	84	4	0.1	0.1	– 20	– 20
Poland	IE	0	0	0	0.0	5.3		
Portugal	10	0	0	0	0.0	86.5	– 10	– 99
Romania	IE	0	0	0	0.0	– 2.9		
Slovakia	IE	97	89	4	– 7.3	– 7.5		
Slovenia	NE	NE	IE					
Spain	97	92	97	4	4.9	5.3	0	0
Sweden	0	0	0	0	0.0	– 0.9	0	4
United Kingdom	384	239	217	10	– 22.6	– 9.5	– 167	– 44
EU-27	**NR**	**2 273**	**2 262**	**100**	**– 11.7**	**– 0.5**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 2 (an aggregated source category), emissions were accounted for under 1 A 2 f i which might lead to an underestimation of sector 1 A 2 a. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

In 1990 1 A 2 a emissions from Slovakia are included in 1 A 1 a.

3.3 NMVOC key categories

For NMVOC, 21 key categories were identified. Of these, 34 % of emissions come from energy-related sectors, with a further 39 % from the solvents sector. Detailed tables (Tables 3.8, 3.9 and 3.10) set out the three key categories with the highest contribution to EU-27 emissions (i.e. '1 A 4 b i — Residential: stationary plants', '3 D 2 — Domestic solvent use including fungicides' and '1 A 3 b i — Road transport: passenger cars').

Table 3.8 NMVOC emissions from key category '1 A 4 b i — Residential: stationary plants' in the energy sector

1 A 4 b i	NMVOC emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	51	36	32	4	– 4.2	– 11.6	– 20	– 38
Belgium	9	7	7	1	– 0.4	– 5.5	– 2	– 20
Bulgaria	2	26	0	0	– 25.7	– 100.0	– 2	– 100
Cyprus	0	0	0	0	0.0	– 17.5	0	– 3
Czech Republic	26	16	15	2	– 0.7	– 4.6	– 11	– 43
Denmark	9	18	21	3	3.3	18.7	12	145
Estonia	10	12	16	2	3.5	28.7	5	50
Finland	IE	25	25	3	– 0.3	– 1.1		
France	540	275	242	31	– 33.6	– 12.2	– 298	– 55
Germany	108	36	35	5	– 1.7	– 4.8	– 73	– 68
Greece	15	13	5	1	– 7.6	– 61.1	– 10	– 67
Hungary	NE	32	15	2	– 17.5	– 53.9		
Ireland	10	4	4	1	– 0.2	– 3.9	– 6	– 59
Italy	20	39	48	6	9.3	24.0	27	134
Latvia	14	19	18	2	– 0.5	– 2.5	5	36
Lithuania	1	11	10	1	– 0.8	– 7.1	9	937
Luxembourg	0	0	0	0	0.0	0.0	0	0
Malta	0	0	0	0	0.0	– 5.5	0	4
Netherlands	11	9	8	1	– 0.1	– 0.7	– 3	– 26
Poland	IE	93	83	11	– 9.9	– 10.7		
Portugal	22	20	20	3	0.0	0.0	– 2	– 10
Romania	18	52	54	7	2.2	4.1	36	204
Slovakia	12	11	11	1	– 0.1	– 0.6	– 1	– 11
Slovenia	NE	8	8	1	– 0.1	– 1.1		
Spain	41	39	39	5	0.0	0.0	– 2	– 5
Sweden	10	8	10	1	2.0	24.6	0	– 3
United Kingdom	74	38	42	5	3.7	9.8	– 32	– 43
EU-27	**NR**	**847**	**767**	**100**	**– 79.3**	**– 9.4**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 4 b (an aggregated source category), emissions were accounted for under 1 A 4 b i which might lead to an overestimation of this sector. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

Table 3.9 NMVOC emissions from key category '3 D 2 — Domestic solvent use including fungicides' in the solvents sector

3 D 2	NMVOC emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	12	24	24	3	0.1	0.3	13	109
Belgium	19	20	20	3	0.2	0.8	1	7
Bulgaria	IE	IE	NE					
Cyprus	IE	IE	IE					
Czech Republic	IE	IE	11	1				
Denmark	IE	IE	IE					
Estonia	5	4	3	0	– 0.5	– 11.7	– 2	– 32
Finland	IE	IE	5	1				
France	114	114	114	15	0.2	0.2	– 1	0
Germany	436	325	326	44	1.0	0.3	– 110	– 25
Greece	IE	IE	29	4				
Hungary	IE	IE	20	3				
Ireland	IE	IE	IE					
Italy	IE	IE	IE					
Latvia	5	4	4	1	0.0	– 0.6	– 1	– 14
Lithuania	IE	IE	3	0				
Luxembourg	IE	IE	IE					
Malta	IE	NE	IE					
Netherlands	IE	IE	IE					
Poland	IE	46	46	6	0.0	0.0		
Portugal	0.20	0.24	0.24	0	0.0	0.0	0	20
Romania	IE	IE	IE					
Slovakia	IE	NA	NA					
Slovenia	IE	IE	5	1				
Spain	98	134	132	18	– 2.1	– 1.5	34	34
Sweden	IE	IE	IE					
United Kingdom	IE	IE	IE					
EU-27	**NR**	**671**	**743**	**100**	**71.7**	**10.7**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 3 D emissions were accounted for under 3 D 3, which might lead to an underestimation of sector 3 D 2. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

Table 3.10 NMVOC emissions from key category '1 A 3 b i — Road transport: passenger cars' in the energy sector

1 A 3 b i	NMVOC emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	40	11	9	1	– 1.4	– 13.1	– 31	– 77
Belgium	74	19	19	3	– 0.1	– 0.7	– 56	– 75
Bulgaria	60	39	32	4	– 6.9	– 17.7	– 27	– 46
Cyprus	3	2	2	0	0.0	– 1.6	– 1	– 41
Czech Republic	45	11	14	2	2.8	24.6	– 31	– 69
Denmark	44	12	10	1	– 1.6	– 13.1	– 34	– 76
Estonia	11	3	3	0	0.1	2.6	– 7	– 70
Finland	IE	17	15	2	– 1.3	– 8.0		
France	540	98	83	11	– 15.1	– 15.4	– 458	– 85
Germany	1 027	64	59	8	– 4.6	– 7.2	– 968	– 94
Greece	79	124	54	7	– 70.6	– 56.9	– 25	– 32
Hungary	NE	54	52	7	– 1.4	– 2.7		
Ireland	30	10	8	1	– 1.2	– 12.2	– 22	– 73
Italy	452	94	81	11	– 13.3	– 14.2	– 371	– 82
Latvia	6	6	5	1	– 1.5	– 22.8	– 1	– 15
Lithuania	45	9	10	1	1.4	16.3	– 35	– 78
Luxembourg	5	2	1	0	– 0.1	– 6.3	– 4	– 74
Malta	4	0	0	0	– 0.1	– 11.9	– 4	– 91
Netherlands	96	18	17	2	– 1.2	– 6.4	– 79	– 82
Poland	NE	58	56	8	– 2.3	– 3.9		
Portugal	38	15	13	2	– 1.5	– 10.4	– 25	– 65
Romania	76	48	47	6	– 1.3	– 2.7	– 29	– 38
Slovakia	33	9	9	1	– 0.3	– 2.7	– 24	– 72
Slovenia	NE	5	5	1	– 0.7	– 13.1		
Spain	184	66	53	7	– 13.2	– 19.8	– 130	– 71
Sweden	138	30	28	4	– 2.0	– 6.8	– 111	– 80
United Kingdom	530	49	41	6	– 7.6	– 15.5	– 489	– 92
EU-27	**NR**	**873**	**728**	**100**	**– 145.0**	**– 16.6**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 3 b (an aggregated source category), emissions were accounted for under 1 A 3 b i which might lead to an overestimation of sector 1 A 3 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

The high change in the emissions between 2006 and 2007 in Greece is a result of different allocation of emissions in 2006 and 2007. 2006 values refer to 1 A 3 b.

3.4 SO_x key categories

For SO_x, five key categories were identified. All key categories are within the energy sector. Detailed tables are provided for three key categories contributing more than 70 % to EU-27 emissions: '1 A 1 a — Public electricity and heat production' (Table 3.11), '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' (Table 3.12) and '1 A 1 b — Petroleum refining' (Table 3.13).

Table 3.11 SO_x emissions from key category '1 A 1 a — Public electricity and heat production' in the energy sector

1 A 1 a	SO_x emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	12	4	3	0	– 1.4	– 34.1	– 9	– 77
Belgium	95	25	18	0	– 6.8	– 27.0	– 77	– 81
Bulgaria	1 104	725	769	18	44.0	6.1	– 335	– 30
Cyprus	22	28	25	1	– 2.0	– 7.4	4	18
Czech Republic	844	127	130	3	3.3	2.6	– 714	– 85
Denmark	126	10	9	0	– 1.2	– 12.1	– 118	– 93
Estonia	220	61	82	2	20.5	33.5	– 139	– 63
Finland	68	40	38	1	– 1.4	– 3.6	– 29	– 43
France	342	100	100	2	– 0.2	– 0.2	– 242	– 71
Germany	2 435	208	210	5	2.3	1.1	– 2 225	– 91
Greece	277	358	375	9	17.1	4.8	98	36
Hungary	NE	10	10	0	0.3	3.2		
Ireland	103	37	31	1	– 6.0	– 16.2	– 72	– 70
Italy	769	116	82	2	– 34.2	– 29.5	– 688	– 89
Latvia	36	1	1	0	0.0	1.9	– 35	– 97
Lithuania	105	9	10	0	1.0	10.9	– 95	– 90
Luxembourg	0	0	0	0	0.0	– 5.0	0	– 94
Malta	15	12	12	0	0.3	2.6	– 2	– 16
Netherlands	48	10	9	0	– 1.1	– 11.8	– 40	– 82
Poland	IE	818	763	17	– 54.8	– 6.7		
Portugal	156	85	80	2	– 5.3	– 6.3	– 76	– 49
Romania	572	595	462	11	– 133.3	– 22.4	– 111	– 19
Slovakia	459	46	38	1	– 8.2	– 17.9	– 422	– 92
Slovenia	NE	10	8	0	– 1.3	– 13.9		
Spain	1 459	829	822	19	– 7.0	– 0.8	– 637	– 44
Sweden	17	8	8	0	– 0.4	– 5.1	– 9	– 54
United Kingdom	2 736	361	285	7	– 75.9	– 21.0	– 2 450	– 90
EU-27	**NR**	**4 633**	**4 381**	**100**	**– 251.8**	**– 5.4**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

In 1990, 1 A 1 a emissions from Slovakia also include emissions from Energy Industries (1 A 1), Manufacturing, Industries and Constructions (1 A 2) and all other sectors (1 A 4) except 1 A 4 b — Residential, and 1 A 3 — Transport.

Table 3.12 SO_x emissions from key category '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' in the energy sector

1 A 2 f i	SO_x emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	4	3	3	1	0.1	3.5	– 1	– 23
Belgium	62	12	12	2	– 0.3	– 2.3	– 50	– 81
Bulgaria	220	25	5	1	– 20.3	– 80.6	– 215	– 98
Cyprus	8	6	6	1	– 0.5	– 7.7	– 2	– 30
Czech Republic	631	8	7	1	– 1.1	– 12.9	– 623	– 99
Denmark	18	8	7	1	– 0.7	– 9.3	– 10	– 59
Estonia	39	6	4	1	– 1.6	– 27.1	– 34	– 89
Finland	IE	4	4	1	– 0.3	– 7.9		
France	125	43	39	6	– 4.3	– 9.9	– 86	– 69
Germany	863	42	41	7	– 1.0	– 2.4	– 822	– 95
Greece	62	19	23	4	3.9	20.5	– 39	– 63
Hungary	NE	1	1	0	– 0.2	– 19.2		
Ireland	IE	IE	IE					
Italy	304	65	65	10	0.1	0.2	– 238	– 78
Latvia	10	1	1	0	0.1	10.8	– 9	– 93
Lithuania	38	3	0	0	– 2.5	– 96.5	– 38	– 100
Luxembourg	1	1	1	0	0.0	0.0	0	21
Malta	0	0	0	0	0.0	9.0	0	– 43
Netherlands	7	4	3	1	– 0.4	– 10.7	– 4	– 50
Poland	IE,NE	73	62	10	– 11.5	– 15.7		
Portugal	31	15	15	2	0.4	3.0	– 16	– 51
Romania	73	179	176	28	– 3.7	– 2.0	102	140
Slovakia	IE	4	3	1	– 0.1	– 4.1		
Slovenia	NE	4	3	0	– 0.9	– 23.8		
Spain	127	64	65	10	0.8	1.3	– 62	– 49
Sweden	7	2	2	0	0.0	– 0.9	– 4	– 64
United Kingdom	388	81	76	12	– 5.6	– 6.9	– 312	– 81
EU-27	**NR**	**674**	**624**	**100**	**– 49.6**	**– 7.4**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting emissions from 1 A 2 f without providing further detail then emissions reported as 1 A 2 f were accounted for under 1 A 2 f i. Furthermore, where a Member State used NFR02 for reporting and only provided information for 1 A 2 (aggregation line) and gave no further details, emissions were accounted for under 1 A 2 f i. This might lead to an overestimation of sector 1 A 2 f i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

In 1990, 1 A 2 f i emissions from Slovakia are included in 1 A 1 a.

Table 3.13 SO_x emissions from key category '1 A 1 b — Petroleum refining' in the energy sector

1 A 1 b	SO_x emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	2	4	3	1	– 0.5	– 12.4	1	44
Belgium	41	24	23	5	– 0.7	– 3.0	– 18	– 44
Bulgaria	NO	10	12	2	1.9	20.1		
Cyprus	1	NO	NO					
Czech Republic	8	1	1	0	0.1	9.9	– 7	– 87
Denmark	3	0	0	0	0.2	77.0	– 3	– 88
Estonia	NA	NA	NA					
Finland	IE	2	1	0	– 0.5	– 32.4		
France	135	54	52	10	– 1.8	– 3.3	– 84	– 62
Germany	162	55	53	11	– 2.4	– 4.3	– 108	– 67
Greece	21	44	39	8	– 4.6	– 10.4	18	84
Hungary	NE	IE	IE					
Ireland	1	1	1	0	0.0	– 0.3	0	37
Italy	192	54	48	10	– 5.3	– 9.8	– 144	– 75
Latvia	NO	NO	NO					
Lithuania	NE	12	4	1	– 7.9	– 68.2		
Luxembourg	NO	NO	NO					
Malta	NA	NO	NO					
Netherlands	60	15	13	3	– 1.2	– 8.0	– 46	– 78
Poland	IE	36	26	5	– 9.6	– 26.9		
Portugal	19	19	19	4	0.0	0.0	1	4
Romania	IE	28	56	11	28.3	102.6		
Slovakia	IE	2	2	0	– 0.5	– 21.0		
Slovenia	NE	NO	IE					
Spain	134	64	62	13	– 2.0	– 3.1	– 72	– 54
Sweden	2	1	0	0	– 0.1	– 20.5	– 1	– 76
United Kingdom	138	75	79	16	3.8	5.1	– 59	– 43
EU-27	**NR**	**498**	**495**	**100**	**– 2.6**	**– 0.5**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

In 1990, 1 A 1 b emissions from Slovakia are included in 1 A 1 a.

3.5 NH_3 key categories

For NH_3 five key categories were identified, all within the agriculture sector. Detailed tables are provided for the top three key categories that together contribute more than 60 % to total EU-27 emissions: '4 D 1 a — Synthetic N-fertilizers' (Table 3.14), '4 B 1 b — Cattle non-dairy' (Table 3.15) and '4 B 1 a — Cattle dairy' (Table 3.16).

Table 3.14 NH_3 emissions from key category '4 D 1 a — Synthetic N-fertilizers' in the agriculture sector

4 D 1 a	NH_3 emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	4	4	4	0	0.3	8.7	1	14
Belgium	11	9	9	1	0.0	– 0.5	– 2	– 19
Bulgaria	NE	5	5	1	0.7	15.1		
Cyprus	1	0	0	0	– 0.2	– 41.6	0	– 47
Czech Republic	NE	NE	NE					
Denmark	28	12	12	1	0.1	1.0	– 16	– 58
Estonia	5	2	2	0	0.0	0.0	– 4	– 68
Finland	2	1	2	0	0.5	38.0	0	– 13
France	157	149	145	16	– 4.1	– 2.7	– 13	– 8
Germany	73	86	83	9	– 3.0	– 3.5	10	14
Greece	NE	NE	16	2				
Hungary	NE	12	NA					
Ireland	IE	IE	IE					
Italy	189	165	168	19	2.2	1.3	– 22	– 11
Latvia	13	4	5	1	0.3	8.0	– 9	– 65
Lithuania	NE	4	5	1	1.0	24.5		
Luxembourg	NO	NO	NO					
Malta	NE	0	0	0	0.0	24.3		
Netherlands	NO	NO	NO					
Poland	NE	73	78	9	4.3	5.9		
Portugal	27	21	19	2	– 2.0	– 9.5	– 8	– 29
Romania	NE	9	10	1	0.7	7.3		
Slovakia	NE	3	4	0	1.1	35.3		
Slovenia	NE	2	2	0	– 0.5	– 20.6		
Spain	221	254	260	30	5.5	2.2	39	18
Sweden	10	6	6	1	0.4	5.9	– 3	– 34
United Kingdom	65	39	43	5	3.9	10.1	– 22	– 34
EU-27	**NR**	**861**	**876**	**100**	**15.2**	**1.8**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting emissions from 4 D 1 without providing further detail then the emissions were accounted for under 4 D 1 a, which might lead to an overestimation of sector 4 D 1 a. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

Table 3.15 NH_3 emissions from key category '4 B 1 b — Cattle non-dairy' in the agriculture sector

4 B 1 b	NH_3 emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	22	23	22	3	– 0.1	– 0.3	0.13	1
Belgium	24	15	14	2	– 0.7	– 4.7	– 9.57	– 40
Bulgaria	IE	5	5	1	– 0.7	– 12.4		
Cyprus	0	0	0	0	0.0	– 3.1	– 0.01	– 1
Czech Republic	IE	11	9	1	– 1.9	– 17.7		
Denmark	24	14	14	2	0.4	3.1	– 9.88	– 41
Estonia	7	2	2	0	0.1	6.7	– 4.74	– 70
Finland	10	8	9	1	1.3	16.4	– 0.74	– 7
France	243	233	235	30	2.6	1.1	– 7.82	– 3
Germany	188	128	129	17	1.8	1.4	– 59.05	– 31
Greece	NE	NE	6	1				
Hungary	NE	6	6	1	– 0.4	– 6.2		
Ireland	53	56	54	7	– 1.8	– 3.3	0.97	2
Italy	85	67	71	9	4.1	6.1	– 13.81	– 16
Latvia	12	3	3	0	0.3	12.3	– 9.26	– 76
Lithuania	IE	6	6	1	0.0	0.0		
Luxembourg	2	1	1	0	0.0	0.0	– 0.26	– 15
Malta	IE	0.1	0.1	0	– 0.01	– 7.8		
Netherlands	54	19	20	3	0.7	3.7	– 33.97	– 63
Poland	IE	41	42	5	1.9	4.6		
Portugal	6	6	6	1	0.1	1.0	0.76	13
Romania	IE	14	14	2	– 0.5	– 3.3		
Slovakia	IE	5	5	1	– 0.7	– 13.1		
Slovenia	NE	5	6	1	0.3	5.8		
Spain	12	22	23	3	1.1	4.9	10.68	88
Sweden	24	13	13	2	– 0.7	– 5.0	– 11.24	– 47
United Kingdom	72	63	63	8	0.1	0.2	– 9.30	– 13
EU-27	**NR**	**766**	**779**	**100**	**13.1**	**1.7**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 4 B 1 (aggregation line), giving no further details on emission, emissions were included under 4 B 1 a this might lead to an underestimation of sector 4 B 1 b. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

Table 3.16 NH_3 emissions from key category '4 B 1 a — Cattle dairy' in the agriculture sector

4 B 1 a	NH_3 emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	18	14	14	2	0.0	0.3	– 4	– 21
Belgium	23	11	11	1	– 0.2	– 2.2	– 12	– 53
Bulgaria	IE	8	9	1	0.9	11.1		
Cyprus	1	1	1	0	0.0	– 1.7	0	5
Czech Republic	IE	14	13	2	– 0.3	– 2.1		
Denmark	IE	IE	IE					
Estonia	8	3	3	0	0.0	0.0	– 5	– 61
Finland	18	10	10	1	0.3	3.0	– 8	– 45
France	151	111	110	15	– 0.9	– 0.8	– 42	– 27
Germany	184	160	162	22	2.1	1.3	– 22	– 12
Greece	NE	NE	6	1				
Hungary	NE	8	11	2	3.6	45.8		
Ireland	37	31	30	4	– 0.6	– 2.0	– 7	– 18
Italy	98	65	66	9	0.6	1.0	– 32	– 33
Latvia	12	4	4	1	0.0	– 1.1	– 8	– 67
Lithuania	IE	11	11	2	0.0	0.0		
Luxembourg	3	3	3	0	0.0	0.0	0	– 12
Malta	IE	0	0	0	0.0	7.8		
Netherlands	80	35	35	5	– 0.3	– 0.7	– 45	– 57
Poland	IE	59	59	8	– 0.8	– 1.3		
Portugal	6	5	5	1	– 0.2	– 3.3	– 1	– 21
Romania	IE	64	62	8	– 2.8	– 4.3		
Slovakia	IE	6	7	1	1.2	20.0		
Slovenia	NE	5	5	1	0.2	4.0		
Spain	17	10	10	1	– 0.5	– 4.6	– 7	– 42
Sweden	IE	13	13	2	– 0.8	– 6.0		
United Kingdom	82	75	71	10	– 3.4	– 4.6	– 11	– 13
EU-27	**NR**	**726**	**730**	**100**	**4.2**	**0.6**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 4 B 1 (aggregation line), emissions were included under 4 B 1 a. This might lead to an overestimation of sector 4 B 1 a. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

3.6 PM_{10} key categories

For PM_{10}, 20 key categories were identified, illustrating the diversity of emission sources for this pollutant. Of these, 54 % of emissions were from the energy sector, 16 % from industry and 10 % from the agriculture sector. The top three key categories are '1 A 4 b i — Residential: stationary plants' (Table 3.17), '4 D 2 a — Farm-level agricultural operations including storage, handling and transport of agricultural products' (Table 3.18) and '2 A 7 a — Quarrying and mining of minerals other than coal' (Table 3.19).

Table 3.17 PM_{10} emissions from key category '1 A 4 b i — Residential: stationary plants' in the energy sector

1 A 4 b i	PM_{10} emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	9	9	8	2	– 1	– 9.4	– 2	– 16
Belgium	NE	2	2	1	0	– 6.8	2	
Bulgaria	NE	NE	0	0				
Cyprus	NE	0.01	0.01	0	0	– 17.5		
Czech Republic	NE	12	12	4	0	– 3.6		
Denmark	NR	20	24	8	4	21.0		
Estonia	NR	9	11	3	2	28.4		
Finland	NE	16	NO					
France	222	125	112	35	– 13	– 10.4	– 110	– 50
Germany	NE	23	22	7	– 1	– 2.9		
Greece	NE	NE	NE					
Hungary	NE	22	10	3	– 12	– 54.5		
Ireland	6	2	2	1	0	– 0.6	– 3	– 58
Italy	12	19	24	7	5	26.0	11	95
Latvia	NR	9	9	3	0	– 2.5		
Lithuania	NE	4	4	1	0	– 8.6		
Luxembourg	NE	NE	NE					
Malta	NE	IE	IE					
Netherlands	3	2	2	1	0	– 0.5	– 1	– 27
Poland	NE	114	100	31	– 13	– 11.7		
Portugal	22	20	20	6	0	0.0	– 2	– 10
Romania	NE	8	7	2	– 1	– 17.7		
Slovakia	NE	25	25	8	0	– 0.5		
Slovenia	NE	3	3	1	0	– 11.2		
Spain	NE	23	23	7	0	– 0.1		
Sweden	6	5	6	2	1	24.6	0	– 3
United Kingdom	49	16	18	6	2	11.5	– 31	– 63
EU-27	**NR**	**350**	**321**	**100**	**– 29**	**– 8.3**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 4 b (aggregation line), emissions were accounted for under 1 A 4 b i. This might lead to an overestimation of sector 1 A 4 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

PM_{10} emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg and Romania (grey text) have been excluded from the EU-27 total for the whole time series 2000–2007 because at least one year was not reported. PM_{10} data are missing for the years 2000–2006 (Bulgaria), 2000–2001 (Czech Republic), 2000–2007 (Greece), 2000–2004 (Lithuania), 2000–2007 (Luxembourg), 2000–2004 (Romania). PM_{10} emissions from Poland have also been excluded from the EU-27 sectoral total in the table above because sectoral data were only available from 2005 onwards.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

Table 3.18 PM_{10} emissions from key category '4 D 2 a — Farm-level agricultural operations including storage, handling and transport of agricultural products' in the agriculture sector

4 D 2 a	PM_{10} emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	NA	NA	NA					
Belgium	NE	NE	NE					
Bulgaria	IE	IE	NE					
Cyprus	IE	IE	IE					
Czech Republic	IE	IE	IE					
Denmark	IE	IE	IE					
Estonia	NE	NE	NE					
Finland	IE	IE	0.1	0				
France	105	99	100	82	0.63	0.6	– 5	– 5
Germany	NE	19	19	15	0.01	0.1		
Greece	IE	IE	IE					
Hungary	IE	IE	NA					
Ireland	IE	IE	IE					
Italy	IE	IE	IE					
Latvia	NR	NA	NA					
Lithuania	IE	IE	NE					
Luxembourg	IE	IE	IE					
Malta	IE	NE	NE					
Netherlands	IE	IE	IE					
Poland	IE	IE	IE					
Portugal	NE	NE	NE					
Romania	IE	IE	NA					
Slovakia	IE	NA	NA					
Slovenia	IE	IE	1	1				
Spain	NE	NE	NE					
Sweden	3	2	2	2	0.03	1.5	– 0.50	– 18
United Kingdom	IE	IE	IE					
EU-27	**NR**	**120**	**122**	**100**	**1.44**	**1.2**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

Table 3.19 PM_{10} emissions from key category '2 A 7 a — Quarrying and mining of minerals other than coal' in the industrial processes sector

2 A 7 a	PM_{10} emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	6	11	10	12	– 0.57	– 5.2	4.16	66
Belgium	NE	2	2	3	0.00	0.0	2.24	
Bulgaria	IE	IE	NE					
Cyprus	IE	IE	IE					
Czech Republic	IE	IE	IE					
Denmark	IE	IE	IE					
Estonia	NO	NO	NO					
Finland	IE	IE	0.04	0				
France	51	60	62	70	2.4	3.9	11	22
Germany	NE	NA	NA					
Greece	IE	IE	IE					
Hungary	IE	IE	NA					
Ireland	NO	NO	NO					
Italy	IE	IE	IE					
Latvia	NR	NO	NO					
Lithuania	IE	IE	NE					
Luxembourg	IE	IE	IE					
Malta	IE	NE	NE					
Netherlands	IE	IE	IE					
Poland	IE	IE	IE					
Portugal	IE	IE	IE					
Romania	IE	IE	0.25	0				
Slovakia	IE	0	0	0	0.25	538.3		
Slovenia	IE	IE	NE					
Spain	NE	NE	NE					
Sweden	0.005	0.005	0.01	0	0.00	0.6	0.00	3
United Kingdom	18	14	14	16	0.28	2.0	– 3.89	– 22
EU-27	**NR**	**87**	**89**	**100**	**2.36**	**2.7**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting emissions from 2 A 7 were recorded under 2 A 7 d. If a Member State used NFR02 for reporting and only provided information for 2 A (aggregation line), emissions were recorded under 2 A 7 d. This might lead to an underestimation of sector 2 A 7 a. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

3.7 $PM_{2.5}$ key categories

For $PM_{2.5}$, 17 key categories were identified. Of these, 68 % of emissions were from energy-related sectors. The top three key categories are '1 A 4 b i — Residential: stationary plants' (Table 3.20), '1 A 3 b i — Road transport: passenger cars' (Table 3.21) and '1 A 2 f i— Stationary combustion in manufacturing industries and construction: other (Table 3.22).

Table 3.20 $PM_{2.5}$ emissions from key category '1 A 4 b i — Residential: stationary plants' in the energy sector

1 A 4 b i	$PM_{2.5}$ emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	8	8	7	2	– 1	– 9.3	– 1	– 16
Belgium	NE	2	2	1	0	– 7.2		
Bulgaria	NE	NE	0.01	0				
Cyprus	NE	0.01	0.01	0	0	– 17.5		
Czech Republic	NE	6	6	2	0	– 4.3		
Denmark	NR	19	23	7	4	21.0		
Estonia	NR	9	11	4	2	28.4		
Finland	NE	16	15	5	0	– 1.1		
France	217	122	110	35	– 13	– 10.4	– 108	– 50
Germany	NE	22	21	7	– 1	– 2.9		
Greece	NE	NE	NE	0				
Hungary	NE	13	6	2	– 7	– 54.5		
Ireland	3	1	1	0	0	1.5	– 2	– 55
Italy	11	18	22	7	5	26.1	12	109
Latvia	NR	8	8	3	0	– 2.5		
Lithuania	NE	4	4	1	0	– 10.3		
Luxembourg	NE	NE	NE					
Malta	NE	IE	IE					
Netherlands	2	2	2	1	0	– 0.5	– 1	– 26
Poland	NE	50	45	14	– 6	– 11.1		
Portugal	22	20	20	6	0	0.0	– 2	– 10
Romania	NE	NE	8	3				
Slovakia	NE	22	23	7	0	1.6		
Slovenia	NE	3	2	1	0	– 9.7		
Spain	NE	22	22	7	0	– 0.1		
Sweden	6	5	6	2	1	24.6	0	– 3
United Kingdom	20	9	10	3	1	10.6	– 9	– 48
EU-27	**NR**	**321**	**312**	**100**	**– 9**	**– 2.7**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 4 b (aggregation line), emissions were accounted for under 1 A 4 b i which might lead to an overestimation of sector 1 A 4 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

$PM_{2.5}$ emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg and Romania (grey text) have been excluded from the EU-27 total for the whole time series 2000–2007 as at least one year was not reported. $PM_{2.5}$ data are missing for the years 2000–2006 (Bulgaria), 2000–2002 (Czech Republic), 2000–2007 (Greece), 2000–2004 (Lithuania), 2000–2007 (Luxembourg), 2000–2006 (Romania). $PM_{2.5}$ emissions from Poland have also been excluded from the EU-27 sectoral total in the table above because sectoral data were only available from 2005 onwards.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

Table 3.21 $PM_{2.5}$ emissions from key category '1 A 3 b i — Road transport: passenger cars' in the energy sector

1 A 3 b i	$PM_{2.5}$ emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	1	2	2	3	– 0.09	– 4.6	1.2	170
Belgium	NE	3	3	5	0.00	– 0.1		
Bulgaria	NE	NE	NA					
Cyprus	IE	0	0	0	0.00	– 1.4		
Czech Republic	NE	1	1	1	0.25	36.9		
Denmark	NR	1	1	1	0.11	15.7		
Estonia	NR	0	0	0	0.06	35.3		
Finland	NE	1	1	1	– 0.03	– 3.2		
France	18	15	15	21	– 0.28	– 1.9	– 3.7	– 20
Germany	NE	8	8	11	– 0.22	– 2.7		
Greece	NE	NE	NE	0				
Hungary	NE	5	5	7	0.00	0.0		
Ireland	1	1	1	1	0.04	7.6	– 0.0	– 2
Italy	21	11	11	16	– 0.11	– 0.9	– 9.5	– 46
Latvia	NR	0.4	0.4	1	0.02	6.3		
Lithuania	NE	0.2	0.3	0	0.14	73.0		
Luxembourg	NE	NE	NE					
Malta	NE	0.1	0.1	0	0.00	– 1.3		
Netherlands	5	2	2	3	– 0.06	– 2.6	– 3.1	– 58
Poland	NE	3	3	5	0.71	27.6		
Portugal	0	2	2	2	– 0.01	– 0.5	1.1	244
Romania	NE	NE	NE					
Slovakia	NE	0	1	1	0.15	41.4		
Slovenia	NE	1	1	1	0.06	11.2		
Spain	NE	13	13	19	0.26	2.0		
Sweden	1	0	0	1	– 0.03	– 6.0	– 1.0	– 69
United Kingdom	7	5	5	7	– 0.15	– 2.7	– 1.7	– 24
EU-27	**NR**	**71**	**71**	**100**	**– 0.28**	**– 0.4**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 3 b (aggregation line) emissions were accounted for under 1 A 3 b i which might lead to an overestimation of sector 1 A 3 b i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

$PM_{2.5}$ emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg and Romania (grey text) have been excluded from the EU-27 total for the whole time series 2000 to 2007 as at least one year was not reported. $PM_{2.5}$ data are missing for 2000–2006 (Bulgaria), 2000–2002 (Czech Republic), 2000–2007 (Greece), 2000–2004 (Lithuania), 2000–2007 (Luxembourg), and 2000–2006 (Romania). $PM_{2.5}$ emissions from Poland have also been excluded from the EU-27 sectoral total in the table above because sectoral data were only available from 2005 onwards.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

Table 3.22 $PM_{2.5}$ emissions for key category 1 A 2 f i Stationary combustion in manufacturing industries and construction: other in the energy sector

1 A 2 f i	$PM_{2.5}$ emissions (Gg)			Share of EU-27 emissions in 2007	Change 2006–2007		Change 1990–2007	
	1990	2006	2007	(%)	(Gg)	(%)	(Gg)	(%)
Austria	0	1	1	2	0.11	10.7	0.9	271
Belgium	NE	1	1	2	– 0.17	– 11.6	1.3	
Bulgaria	NE	NE	0	0				
Cyprus	NE	0	0	1	0.01	1.7		
Czech Republic	NE	1	1	1	– 0.26	– 21.0		
Denmark	NR	1	1	2	– 0.08	– 5.8		
Estonia	NR	2	1	2	– 0.17	– 10.8		
Finland	NE	1	0	0	– 0.67	– 69.7		
France	13	5	5	7	– 0.06	– 1.1	– 7.4	– 59
Germany	NE	1	1	2	– 0.07	– 5.3		
Greece	NE	NE	0	0				
Hungary	NE	0	0	0	– 0.07	– 51.4		
Ireland	IE	IE	IE					
Italy	39	23	23	33	– 0.42	– 1.8	– 16.4	– 42
Latvia	NR	0	0	0	– 0.03	– 7.6		
Lithuania	NE	1	0	0	– 0.96	– 91.4		
Luxembourg	NE	NE	NE					
Malta	NE	0	0	0	0.00	17.8		
Netherlands	2	1	1	1	– 0.25	– 23.9	– 1.1	– 58
Poland	NE	12	13	18	0.46	3.7		
Portugal	4	17	17	25	0.85	5.1	13.0	297
Romania	NE	NE	NE					
Slovakia	NE	1	1	1	– 0.06	– 7.4		
Slovenia	NE	1	0	0	– 0.28	– 44.4		
Spain	NE	5	5	7	0.20	4.0		
Sweden	2	1	1	1	– 0.11	– 11.0	– 0.6	– 42
United Kingdom	17	10	9	13	– 0.75	– 7.6	– 7.9	– 46
EU-27	**NR**	**72**	**70**	**100**	**– 2.03**	**– 2.8**		

Note: An explanation of the notation keys used in this table is given in Appendix 1.

If a Member State used NFR02 for reporting and only provided information for 1 A 2 f or 1 A 2 (aggregation line) emissions were accounted for under 1 A 2 f i which might lead to an overestimation of sector 1 A 2 f i. For information on which Member States used NFR02 format for reporting see Table 1.7 and for further details of the mapping between NFR02 and NFR08 see Appendix 3.

$PM_{2.5}$ emissions from Bulgaria, the Czech Republic, Greece, Lithuania, Luxembourg and Romania (grey text) have been excluded from the EU-27 total for the whole time series 2000 to 2007 as at least one year was not reported. $PM_{2.5}$ data are missing for 2000–2006 (Bulgaria), 2000–2002 (Czech Republic), 2000–2007 (Greece), 2000–2004 (Lithuania), 2000–2007 (Luxembourg), and 2000–2006 (Romania). $PM_{2.5}$ emissions from Poland have also been excluded from the EU-27 sectoral total in the table above because sectoral data were only available from 2005 onwards.

Parties to the LRTAP Convention are formally requested to report emissions of particulate matter (PM) only for the years 2000 onwards.

3.8 European Community combined key category analysis

A combined key category analysis ([19]) was performed for NO_X, CO, NMVOC, SO_X, NH_3, PM_{10} and $PM_{2.5}$. A high rank in the list (Table 3.23) indicates that a source category contributes significantly to output of several of the main pollutants. '1 A 4 b i — Residential: stationary plants', '1 A 1 a — Public electricity and heat production', '1 A 3 b i — Road transport: passenger cars', '1 A 2 f i — Stationary combustion in manufacturing industries and construction: other' and '1 A 3 b iii — Road transport: heavy duty vehicles' have the highest ranks. Note the various caveats concerning the KCA analysis made earlier in this report. Uncertainty may be introduced as a result of the use of notation keys by Member States. For example where the notation key 'IE' (included elsewhere) is reported by a Member State it may imply an underestimate of the category concerned and an overestimate of another category. Similarly, the conversion of emissions reported by Member States in the NFR02 format to the NFR08 format may also provide a source of potential bias in the analysis.

([19]) A combined key category analysis combines the results of the individual KCAs to identify those sources that overall contribute most to the emissions of pollutants. For each key category, the contributions to total levels of each pollutant (expressed as percentages) are summed. The source categories are then ranked to provide an overall assessment of the most important emissions sources (EMEP/EEA, 2009).

Table 3.23 Combined key category analysis for emission sources in the European Community

NFR Category	% contributions to pollutant totals for key categories							Sum of KCA % contributions	Rank
	NO_x	CO	NMVOC	SO_x	NH_3	PM_{10}	$PM_{2.5}$		
1 A 4 b i Residential: stationary plants	4	25	9	6	0	19	27	91	1
1 A 1 a Public electricity and heat production	19	0	0	59	0	5	4	86	2
1 A 3 b i Road transport: passenger cars	16	26	8	0	0	5	6	60	3
1 A 2 f i Stationary combustion in manufacturing industries and construction: other	9	5	0	8	0	5	6	34	4
1 A 3 b iii Road transport: Heavy duty vehicles	19	3	2	0	0	3	5	33	5
4 D 1 a Synthetic N-fertilizers	0	0	0	0	22	0	0	22	6
4 B 1 b Cattle non-dairy	0	0	0	0	20	0	0	20	7
4 B 1 a Cattle dairy	0	0	0	0	19	0	0	19	8
4 B 8 Swine	0	0	0	0	16	2	0	18	9
1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery	5	0	2	0	0	4	5	16	10
2 C 1 Iron and steel production	0	6	0	0	0	4	4	15	11
1 A 3 b ii Road transport: Light duty vehicles	5	2	0	0	0	2	3	13	12
1 A 3 d ii National navigation (Shipping)	4	0	2	2	0	2	2	12	13
2 A 7 a Quarrying and mining of minerals other than coal	0	0	0	0	0	5	5	10	14
4 D 2 a Farm-level agricultural operations including storage, handling and transport of agricultural products	0	0	0	0	0	7	2	10	15
3 D 2 Domestic solvent use including fungicides	0	0	8	0	0	0	0	8	16
1 A 2 a Stationary combustion in manufacturing industries and construction: iron and steel	0	8	0	0	0	0	0	8	17
1 A 3 b iv Road transport: Mopeds and motorcycles	0	4	3	0	0	0	0	8	18
3 A 3 Other coating application	0	0	7	0	0	0	0	7	19
1 A 1 b Petroleum refining	0	0	0	7	0	0	0	7	20
1 A 3 b vi Road transport: Automobile tyre and brake wear	0	0	0	0	0	3	3	6	21
4 B 9 d Other poultry	0	0	0	0	5	1	0	6	22
3 D 3 Other product use	0	0	4	0	0	0	1	6	23
3 C Chemical products	0	0	5	0	0	0	0	5	24
3 A 1 Decorative coating application	0	0	4	0	0	0	0	4	25
1 A 2 d Stationary combustion in manufacturing industries and construction: pulp, paper and print	0	0	0	0	0	2	2	4	26
3 D 1 Printing	0	0	4	0	0	0	0	4	27
3 A 2 Industrial coating application	0	0	4	0	0	0	0	4	28
7 A Other	0	0	3	0	0	0	0	3	29
1 A 2 f ii Mobile combustion in manufacturing industries and construction	0	0	0	0	0	1	2	3	30
1 A 3 b vii Road transport: Automobile road abrasion	0	0	0	0	0	2	1	3	31
2 D 2 Food and drink	0	0	3	0	0	0	0	3	32
3 B 1 Degreasing	0	0	2	0	0	0	0	2	33
2 G Other production, consumption, storage, transportation or handling of bulk products	0	0	0	0	0	2	0	2	34
1 B 2 a v Distribution of oil products	0	0	2	0	0	0	0	2	35
1 B 2 a iv Refining/storage	0	0	2	0	0	0	0	2	36
2 A 7 b Construction and demolition	0	0	0	0	0	2	0	2	37
1 A 3 b v Road transport: Gasoline evaporation	0	0	2	0	0	0	0	2	38
2 B 5 a Other chemical industry	0	0	2	0	0	0	0	2	39
2 A 6 Road paving with asphalt	0	0	0	0	0	2	0	2	40
1 B 2 a i Exploration production, transport	0	0	2	0	0	0	0	2	41
2 D 3 Wood processing	0	0	0	0	0	0	1	1	42

4 Recalculations and improvements

4.1 Recalculations

It is important and necessary to identify inventory recalculations and to understand their origin in order to evaluate officially reported emissions data properly. From a country perspective, it is considered good practice to recalculate the whole time series when new information (i.e. activity, methodologies or emission factor data) becomes available in order to provide comparable and consistent data. The magnitude of recalculations also provides some indication of the general uncertainty of the emissions data.

It is often not clear why Member States have reported different numbers in one year compared to an earlier year. However, it is noted that in some instances, under encouragement from EMEP, the European Commission and the EEA, Member States have submitted Informative Inventory Reports (IIRs) together with their emission inventory data.

The tables below provide an overview of NO_X, CO, NMVOC, SO_X, NH_3, PM_{10} and $PM_{2.5}$ recalculations for the data used for the European Community CLRTAP inventory report, i.e. the gap filled data (for the sources of SO_X, NO_X, CO, NMVOC, NH_3, PM_{10} and $PM_{2.5}$ emissions data used for EU-27 inventory compilation in 2009 see Table 1.5). Where available ([20]) explanatory information concerning significant changes is provided.

In general terms, recalculations reported by Member States and recalculation due to changes in data sources in 2009 led to little change in the EU-27 emissions data. For most years and pollutants the EU-27 total changed by less than 2 %. However, in more than half of the Member States (Belgium, Cyprus, Denmark, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Malta, Portugal, Romania, Slovakia, Sweden and the United Kingdom) emissions data were revised by more than 10 % for at least one pollutant in one year. Last year for Luxembourg SO_X, NO_X, CO and NMVOC data was gapfilled with CRF data submitted under the Council decision 280/ 2004/ EC under EIONET. This year only CO data was gapfilled. The change in data sources used might explain the high absolute recalculations for Luxembourg.

4.1.1 NO_X recalculations

At an EU-27 level, the recalculations resulted in an overall emissions reductions of 117 Gg in 1990 and increase in NO_X emissions of 173 Gg in 2006. The highest absolute recalculations for the period 1990–2006 occurred in the United Kingdom, followed by Italy and France (Table 4.1). For France, Portugal and Germany no explanatory information on the recalculations was obtained. In percentage terms (Table 4.2), the highest relative change occurred in Luxembourg. The changes in the data from Luxembourg origin from the different data sources; until this year data were gapfilled with CRF data and in 2009 NFR data could be used for the first time. Explanations for the recalculated emissions in other countries included:

- United Kingdom: NO_X emission factors revised using new speed-emission factor functions developed by the Transport Research Laboratory for the UK Department for Transport (IIR United Kingdom, 2009).
- Cyprus: use of revised emission factors as suggested in the new draft EMEP/EEA Emission Inventory Guidebook (IIR Cyprus, 2009).
- Sweden: emissions from off-road vehicles and working machinery have been revised for the whole time series 1990–2006 (IIR Sweden, 2009).

([20]) Explanatory information is provided in cases where Member States submitted an IIR that included a transparent explanation of their recalculations.

Table 4.1 Member State recalculations of NO_x emissions (Gg)

NO_x (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	– 1	– 1	– 2	– 2	– 3	– 4	– 4	– 2	– 1	0	1	1	3	3	2
Belgium	13	– 2	– 2	– 1	0	1	0	– 3	0	0	1	0	– 1	– 1	0	1	– 9
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	– 10	0	0	0	0	0
Cyprus	1	1	2	3	2	2	2	1	0	1	– 1	– 1	– 2	0	1	3	2
Czech Republic	1	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0
Denmark	– 1	– 2	– 2	– 2	– 2	– 2	– 2	– 3	– 3	– 6	– 5	– 5	– 4	– 5	– 5	– 5	– 5
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	79	80	81	59	62	65	56	54	54	53	55	50	48	46	47	46	46
Germany	– 12	– 12	– 15	– 19	– 22	– 22	– 25	– 26	– 29	– 29	– 23	– 25	– 26	– 39	– 55	– 53	– 40
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	18	43	54	45
Hungary	0	0	0	0	0	5	0	0	0	0	0	0	2	0	– 5	0	0
Ireland	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Italy	66	64	64	67	61	60	74	75	75	75	61	70	109	110	139	117	126
Latvia	1	1	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	9	9	10	10	9	14	13	15	15	14	13	12	13	13	12	11	14
Malta	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	3	3
Netherlands	1	– 21	– 18	– 18	– 13	0	– 16	– 15	0	0	0	0	0	0	– 1	– 2	– 4
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31
Portugal	– 26	– 28	– 27	– 26	– 28	– 28	– 27	– 26	– 27	– 28	– 27	– 28	– 27	– 25	– 27	– 24	– 22
Romania	0	0	0	0	0	0	0	0	0	0	0	0	– 3	– 3	– 5	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	– 11	– 9	– 9	– 8	– 6	– 8	– 9	– 9	– 10	– 11	– 12	– 11	– 10	– 10	– 10	– 14	– 16
Sweden	– 13	– 9	– 16	– 16	– 18	– 15	– 15	– 18	– 20	– 20	– 7	– 6	– 6	– 6	– 6	– 5	– 4
United Kingdom	– 224	– 143	– 171	– 139	– 127	– 122	– 112	– 94	– 68	– 65	– 33	– 15	– 14	– 11	– 3	2	2
EU-27	**– 117**	**– 71**	**– 103**	**– 90**	**– 83**	**– 52**	**– 65**	**– 54**	**– 17**	**– 17**	**22**	**31**	**80**	**92**	**138**	**139**	**173**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.2 Member State recalculations of NO_x emissions (%)

NO_x (%)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	0	0	– 1	– 1	– 1	– 2	– 2	– 1	0	0	0	1	1	1	1
Belgium	3	0	0	0	0	0	0	– 1	0	0	0	0	0	0	0	0	– 3
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	– 7	0	0	0	0	0
Cyprus	9	8	12	16	11	13	9	7	1	4	– 5	– 6	– 8	0	6	16	13
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 3	– 2	– 2	– 2	– 2	– 3	– 2	– 3
Estonia	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	4	4	4	3	4	4	3	3	3	3	4	3	3	3	3	3	3
Germany	0	0	– 1	– 1	– 1	– 1	– 1	– 1	– 2	– 2	– 1	– 1	– 2	– 2	– 4	– 4	– 3
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	5	13	16	14
Hungary	0	0	0	0	0	3	0	0	0	0	0	0	1	0	– 3	0	0
Ireland	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Italy	3	3	3	4	3	3	4	5	5	5	4	5	9	9	12	11	12
Latvia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	6	1
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	66	67	74	77	73	247	232	322	428	412	364	311	380	381	429	409	3 336
Malta	0	0	0	0	0	0	0	0	0	0	0	7	7	9	38	33	35
Netherlands	0	– 4	– 4	– 4	– 3	0	– 4	– 4	0	0	0	0	0	0	0	– 1	– 1
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Portugal	– 10	– 10	– 9	– 9	– 10	– 10	– 10	– 9	– 9	– 9	– 9	– 9	– 9	– 9	– 9	– 8	– 8
Romania	0	0	0	0	0	0	0	0	0	0	0	0	– 1	– 1	– 1	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	– 1	– 1	– 1	– 1	0	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1
Sweden	– 4	– 3	– 5	– 5	– 6	– 5	– 6	– 7	– 8	– 8	– 3	– 3	– 3	– 3	– 3	– 3	– 2
United Kingdom	– 8	– 5	– 6	– 5	– 5	– 5	– 5	– 4	– 3	– 3	– 2	– 1	– 1	– 1	0	0	0
EU-27	**– 1**	**0**	**– 1**	**– 1**	**– 1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**2**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008
'0' indicates that the change in reported emissions was less than 0.5 %.

4.1.2 *NMVOC recalculations*

At the EU-27 level, the recalculations performed by Member States resulted in an overall increase of 28 Gg in 1990 and in 2006. In absolute terms United Kingdom has the highest recalculations (up to 216 Gg). However, explanatory information for this change was not provided in an IIR. The greatest relative changes occurred in Luxembourg followed by Malta with recalculations resulting in an increase of 171 % (1995) and a reduction of 64 % (2001) respectively. The changes in the data from Luxembourg origin from the different data sources; until this year data were gapfilled with CRF data and in 2009 NFR data could be used for the first time.

Reasons for recalculations in other countries were, for example for Sweden, the revision of emissions from off-road vehicles and working machinery across the whole time series 1990–2006 (IIR Sweden, 2009). Data for all countries are shown in Tables 4.3 and 4.4.

Table 4.3 Member State recalculations of NMVOC emissions (Gg)

NMVOC (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	– 10	– 10	– 11	– 9	– 9	– 7	– 8	– 7	– 7	– 7	– 1	– 8	– 3	6	– 6	15	15
Belgium	– 90	– 43	– 47	– 43	– 49	– 46	3	4	5	3	– 48	– 47	– 48	– 50	– 44	1	0
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	– 3	0	0	0	0	0
Cyprus	– 2	– 2	– 2	– 2	– 2	– 3	– 3	– 3	– 3	– 4	– 4	– 4	– 4	– 3	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	9	8	8	7	7	0	6	4	4	4	4	3	3	3	– 1	– 3	– 3
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	– 14	– 19	– 23	– 32	– 27	– 25	– 23	– 22	– 21	– 19	– 20	– 21	– 21	– 17	– 27	– 32	– 30
Germany	– 12	– 9	– 9	– 7	– 7	– 6	– 8	– 13	– 20	– 20	– 21	– 26	– 29	– 40	– 48	– 53	– 52
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	1	– 20	1	1	1	0	0	0	– 4	0	0	0	0
Ireland	– 27	– 29	– 29	– 28	– 29	– 29	– 32	– 33	– 33	– 18	– 12	– 8	– 7	– 5	– 4	– 3	– 2
Italy	– 40	– 42	– 66	– 11	11	– 3	10	24	53	43	69	75	101	85	60	36	47
Latvia	– 5	– 5	– 4	– 3	– 5	– 5	– 6	– 7	– 6	– 6	– 3	– 1	– 2	– 2	0	– 3	– 5
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	6	6	7	7	7	7	7	6	5	5	4	4	4	4	4	3	5
Malta	0	0	0	0	0	0	– 4	– 2	– 2	– 2	0	– 5	– 3	– 3	– 1	– 1	0
Netherlands	7	– 5	– 6	– 10	– 8	3	– 7	– 4	2	2	3	0	0	2	– 2	2	2
Poland	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	13
Portugal	10	11	11	12	8	8	7	8	8	10	9	7	8	3	2	0	0
Romania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	– 2	– 1	– 2	– 4	– 5	– 4	– 6	– 3	– 3
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	1	1	1	1	1	1	1	– 3	1	– 2	1	– 7	0	9
Sweden	– 21	– 20	– 21	– 21	– 22	– 21	– 21	– 22	– 22	– 22	– 21	– 21	– 21	– 21	– 18	– 18	– 18
United Kingdom	216	202	198	176	170	116	104	93	85	60	52	60	64	50	49	32	50
EU-27	**28**	**45**	**7**	**36**	**45**	**– 31**	**26**	**28**	**48**	**30**	**NE**	**1**	**30**	**6**	**– 48**	**– 23**	**28**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.
'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.4 Member State recalculations of NMVOC emissions (%)

NMVOC (%)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	– 3	– 4	– 4	– 4	– 4	– 3	– 3	– 3	– 4	– 4	– 1	– 4	– 2	3	– 3	9	9
Belgium	– 23	– 12	– 14	– 13	– 15	– 15	1	2	2	1	– 19	– 19	– 21	– 22	– 22	1	0
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	– 4	0	0	0	0	0
Cyprus	– 13	– 13	– 17	– 15	– 16	– 18	– 18	– 19	– 19	– 22	– 24	– 23	– 24	– 20	– 4	1	– 1
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	5	5	5	4	4	0	4	3	3	3	3	2	2	2	– 1	– 2	– 2
Estonia	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 2	– 2	– 2
Germany	0	0	0	0	0	0	0	– 1	– 1	– 1	– 1	– 2	– 2	– 3	– 3	– 4	– 4
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	1	– 12	1	1	0	0	0	0	– 2	0	0	0	0
Ireland	– 25	– 26	– 26	– 26	– 28	– 28	– 29	– 29	– 29	– 20	– 15	– 11	– 10	– 8	– 6	– 5	– 4
Italy	– 2	– 2	– 3	– 1	1	0	1	1	3	3	5	5	8	7	5	3	4
Latvia	– 5	– 7	– 6	– 5	– 8	– 8	– 9	– 11	– 10	– 10	– 5	– 2	– 4	– 4	0	– 4	– 7
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	71	68	77	80	81	92	87	83	80	90	71	73	77	66	77	57	171
Malta	1	2	2	3	3	2	– 35	– 19	– 21	– 20	– 2	– 64	– 48	– 55	– 21	– 15	– 9
Netherlands	2	– 1	– 2	– 3	– 2	1	– 3	– 1	1	1	1	0	0	1	– 1	1	1
Poland	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	1
Portugal	3	4	4	4	3	3	2	3	3	3	3	3	3	1	1	0	0
Romania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	– 2	– 1	– 2	– 5	– 6	– 5	– 6	– 4	– 4
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 1	0	1
Sweden	– 6	– 6	– 7	– 7	– 8	– 8	– 8	– 9	– 9	– 9	– 10	– 10	– 10	– 10	– 9	– 9	– 9
United Kingdom	9	9	9	8	8	6	6	5	5	4	4	5	6	5	5	3	5
EU-27	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**NE**	**0**	**0**	**0**	**0**	**0**	**0**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.
'0' indicates that the change in reported emissions was less than 0.5 %.

4.1.3 SO_X recalculations

The most significant recalculations were performed for SO_X emission data from United Kingdom (92 Gg for 1991), Germany (– 64 Gg for 2005) and Romania (60 Gg for 1993) but explanations for these recalculations were not provided in an IIR. The greatest relative changes occurred in Luxembourg for the year 2006. Data for all countries are shown in Tables 4.5 and 4.6.

Table 4.5 Member State recalculations of SO_x emissions (Gg)

SO_x (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0
Belgium	8	– 1	– 1	– 1	0	0	0	– 1	0	0	0	– 3	0	0	0	1	– 4
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	– 51	0	0	0	0	0
Cyprus	0	– 1	0	0	0	0	0	0	– 6	0	0	0	– 3	6	– 1	– 1	– 1
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	– 15	0	0	0	0	0	0
France	5	3	16	17	11	10	7	11	8	7	6	4	2	– 2	– 1	– 1	1
Germany	– 43	– 14	– 16	– 14	– 14	– 12	– 4	– 7	– 11	– 13	– 11	– 18	– 23	– 49	– 52	– 64	– 44
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	– 2	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	1	1	1	1	1	1	2	1	2	3	6	2	1	– 1	– 1	0
Italy	1	2	3	0	0	0	0	0	– 2	– 4	– 6	– 7	– 6	– 7	– 8	– 6	– 9
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	4	3	3	3	3	2	2	2	0	0	0	0	0	0	0	0	1
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5
Netherlands	0	0	0	0	0	0	– 2	0	0	0	– 1	0	0	0	0	– 2	– 1
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
Portugal	– 29	– 30	– 37	– 30	– 26	– 30	– 21	– 23	– 28	– 29	– 25	– 25	– 26	– 17	– 25	– 20	– 16
Romania	49	40	48	60	51	20	13	21	17	16	20	37	57	39	35	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	– 3	– 4	– 4	– 5	– 4	– 5	– 2	– 5	– 1	– 2	– 2	– 5	– 5	– 4	– 4	0	– 10
Sweden	– 3	– 3	– 3	– 3	– 3	– 2	– 2	– 2	– 2	– 2	– 2	– 2	– 2	– 3	– 3	– 2	– 3
United Kingdom	7	92	1	18	5	8	35	1	– 3	9	33	11	1	– 1	0	– 1	– 5
EU-27	**– 6**	**90**	**11**	**47**	**24**	**– 9**	**26**	**– 2**	**– 27**	**– 17**	**– 1**	**– 53**	**– 3**	**– 36**	**– 53**	**– 89**	**– 57**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.6 Member State recalculations of SO_x emissions (%)

SO_x (%)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	2	2
Belgium	2	0	0	0	0	0	0	0	0	0	0	– 2	0	0	0	1	– 3
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	– 5	0	0	0	0	0
Cyprus	– 1	– 2	– 1	1	– 1	1	1	1	– 13	1	– 1	0	– 6	12	– 3	– 1	– 4
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	– 17	0	0	0	0	0	0
France	0	0	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0
Germany	– 1	0	0	0	– 1	– 1	0	– 1	– 1	– 2	– 2	– 3	– 4	– 8	– 9	– 11	– 8
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	1	1	1	1	1	0	1	1	1	2	4	2	2	– 1	– 1	0
Italy	0	0	0	0	0	0	0	0	0	0	– 1	– 1	– 1	– 1	– 2	– 2	– 2
Latvia	0	0	0	0	0	0	0	1	1	1	2	3	2	2	3	28	16
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	30	22	20	21	21	38	41	45	23	16	4	– 4	– 5	1	15	30	3203
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	44	44
Netherlands	0	0	0	0	0	0	– 2	0	0	0	– 1	0	0	0	0	– 3	– 1
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Portugal	– 9	– 10	– 10	– 10	– 9	– 9	– 8	– 8	– 8	– 9	– 8	– 9	– 9	– 8	– 12	– 9	– 8
Romania	7	7	8	10	9	3	2	4	4	4	5	8	12	8	7	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 1
Sweden	– 3	– 3	– 3	– 3	– 4	– 3	– 3	– 4	– 4	– 3	– 5	– 5	– 5	– 6	– 7	– 6	– 7
United Kingdom	0	3	0	1	0	0	2	0	0	1	3	1	0	0	0	0	– 1
EU-27	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**– 1**	**0**	**0**	**– 1**	**– 1**	**– 1**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

'0' indicates that the change in reported emissions was less than 0.5 %.

4.1.4 NH_3 recalculations

The largest absolute and relative recalculations occurred in Belgium, Germany, the United Kingdom and Poland. For Belgium the notable absolute difference in recalculations within the time series can be attributed to the submission of an inconsistent time series in 2008. In 2009 the complete time series was revised (see CLRTAP-EMEP Emission Inventory Status Report Belgium 2009 and Informative Inventory Report) to meet previous comments of the review team. Malta recorded a low absolute change (1 Gg) of NH_3 emissions, which corresponded to a high relative adjustment (e.g. 176 % for 2000). Explanations for these recalculations were not provided in an IIR. Data for all countries are shown in Tables 4.7 and 4.8.

Table 4.7 Member State recalculations of NH_3 emissions (Gg)

NH_3 (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belgium	14	0	0	0	0	18	0	0	0	0	5	4	4	4	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	– 12	– 12	– 11	– 13	– 12	– 12	– 11	– 11	– 10	– 11	– 10	– 10	– 9	– 13	– 15	– 15	– 14
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany	– 20	– 16	– 15	– 9	– 7	– 5	– 2	– 2	– 5	0	0	4	3	– 4	– 1	1	– 1
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	2	2	2	1	1	2	2	2	2	4	10	8	5	4	4	3	1
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Luxembourg	– 2			– 3	– 2	– 2	– 2	– 2	– 2	– 2	– 2	– 2	0	0	0		
Malta											1	1	1	1	1	1	1
Netherlands	0	0	0	0	0	0	13	13	0	0	0	0	0	0	0	0	– 3
Poland	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0
Portugal	– 1	– 2	– 2	– 3	– 3	– 4	– 4	– 4	– 5	– 6	– 5	– 5	– 4	– 4	– 4	– 3	– 6
Romania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 2	– 1	– 7
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	– 19	– 19	– 17	– 18	– 18	– 18	– 18	– 21	– 20	– 19	– 19	– 18	– 19	– 18	– 19	– 18	– 17
EU-27	**– 38**	**– 47**	**– 44**	**– 43**	**– 40**	**– 19**	**– 23**	**– 24**	**– 39**	**– 33**	**NE**	**NE**	**– 19**	**– 30**	**– 36**	**– 30**	**– 45**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.
'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.8 Member State recalculations of NH_3 emissions (%)

NH_3 (%)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belgium	13	0	0	0	0	17	0	0	0	0	5	4	5	5	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
Cyprus	1	2	2	2	2	2	2	2	1	3	4	4	4	5	5	6	6
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	– 9	– 9	– 9	– 10	– 10	– 10	– 10	– 10	– 9	– 10	– 9	– 9	– 9	– 14	– 15	– 16	– 15
Estonia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany	– 3	– 2	– 2	– 1	– 1	– 1	0	0	– 1	0	0	1	1	– 1	0	0	0
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	0	0	0	0	0	0	0	0	1	1	2	2	1	1	1	1	0
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 1	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Luxembourg	– 27			– 33	– 25	– 25	– 24	– 26	– 25	– 24	– 23	– 23	2	1	0		
Malta											176	117	121	125	129	131	122
Netherlands	0	0	0	0	0	0	7	7	0	0	0	0	0	0	0	0	– 2
Poland	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Portugal	– 2	– 3	– 3	– 4	– 4	– 5	– 6	– 6	– 7	– 8	– 7	– 7	– 6	– 7	– 6	– 5	– 10
Romania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 1	0	– 2
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Kingdom	– 5	– 5	– 5	– 5	– 5	– 5	– 5	– 6	– 5	– 5	– 6	– 6	– 6	– 6	– 6	– 6	– 6
EU-27	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**0**	**– 4**	**– 4**	**NE**	**NE**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.
'0' indicates that the change in reported emissions was less than 0.5 %.

4.1.5 CO recalculations

The highest absolute recalculations occurred in Greece, Germany, Italy and the United Kingdom. In relative terms the highest recalculations were performed in Luxembourg (89 % reduction for 1993) and Cyprus (67 % reduction for 2001. The high recalculations for Germany are mostly due to corrected activity data in sector '1 A 4 b i — Residential: stationary plants' and to a lesser extent to the reallocation of '1 A 3 a i (i) — International aviation (LTO)' under '1 A 3 a i (ii) — (domestic cruise)', which is not included in the national total (IIR Germany, 2009). Reasons for recalculations of CO emissions in Cyprus included the new use of COPERT software to estimate emissions of sector '1 A 3 b — 'Road transportation' and all subsectors (IIR Cyprus, 2009). Data for all countries are shown in Tables 4.9 and 4.10.

Table 4.9 Member State recalculations of CO emissions (Gg)

CO (Gg)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	– 12	– 11	– 11	– 11	– 11	– 10	– 10	– 10	– 9	– 8	– 4	17	33	54	55	46	53
Belgium	– 151	3	3	3	4	2	1	– 1	1	1	– 1	4	– 3	– 2	– 1	0	– 20
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyprus	– 49	– 47	– 56	– 56	– 58	– 62	– 62	– 62	– 58	– 61	– 58	– 58	– 55	– 56	– 18	– 15	– 9
Czech Republic	8	5	5	7	7	6	7	6	5	5	4	4	0	0	0	0	0
Denmark	– 43	– 51	– 52	– 58	– 56	– 57	– 62	– 61	– 54	– 57	– 71	– 92	– 97	– 112	– 119	– 144	– 151
Estonia	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 1
France	– 24	– 56	– 108	– 202	– 171	– 152	– 128	– 112	– 100	– 83	– 65	– 57	– 38	– 41	– 31	– 36	– 46
Germany	– 14	– 14	– 15	– 16	– 17	– 15	– 29	– 45	– 58	– 75	– 78	– 106	– 120	– 182	– 232	– 406	– 229
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 518	0	0
Hungary	0	0	0	0	1	1	2	2	1	0	0	0	– 10	0	– 28	0	0
Ireland	14	14	17	13	12	12	13	12	13	11	11	11	10	10	10	8	8
Italy	– 197	– 248	– 261	– 147	– 215	– 279	– 281	– 301	– 275	– 382	– 265	– 412	– 228	– 281	– 301	– 302	– 234
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	– 1	1	– 8	– 17
Lithuania	0	0	– 2	– 1	– 1	– 1	– 1	– 1	0	– 1	0	0	0	0	0	0	0
Luxembourg	– 115	– 124	– 114	– 125	– 100	– 53	– 50	– 32	– 9	– 9	– 8	– 9	– 6	– 6	– 6	– 8	
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	4	– 12	– 15	– 28	– 21	– 1	– 14	– 15	0	– 7	– 5	6	7	9	10	13	28
Poland	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Portugal	– 15	– 17	– 17	– 17	– 16	– 14	– 7	– 3	0	2	3	– 1	2	– 4	– 5	– 4	– 2
Romania	0	0	0	0	0	0	0	0	0	0	0	0	– 65	– 52	– 108	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	– 5	– 3	– 3	– 3	– 1	– 2	– 3	– 3	– 4	– 5	– 17	– 5	– 4	4	– 30	18	96
Sweden	– 38	– 38	– 41	– 42	– 43	– 43	– 43	– 44	– 45	– 46	– 47	– 48	– 52	– 39	– 34	– 29	– 30
United Kingdom	320	294	264	221	217	184	155	120	89	49	34	22	17	13	18	– 5	2
EU-27	**– 316**	**– 303**	**– 405**	**– 459**	**– 469**	**– 484**	**– 512**	**– 551**	**– 504**	**– 665**	**– 567**	**– 723**	**– 608**	**– 684**	**– 1 338**	**– 870**	**– 549**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.

'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.10 Member State recalculations of CO emissions (%)

CO (%)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	0	2	4	6	6	6	7
Belgium	– 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 2
Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyprus	– 56	– 55	– 60	– 60	– 60	– 64	– 64	– 65	– 63	– 66	– 66	– 67	– 66	– 66	– 41	– 37	– 28
Czech Republic	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0
Denmark	– 6	– 6	– 7	– 7	– 8	– 8	– 9	– 10	– 9	– 10	– 13	– 16	– 18	– 20	– 21	– 24	– 26
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	– 1	– 2	– 2	– 2	– 1	– 1	– 1	– 1	– 1	– 1	– 1	– 1	0	– 1	– 1
Germany	0	0	0	0	0	0	0	– 1	– 1	– 1	– 2	– 2	– 3	– 4	– 5	– 10	– 6
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 45	0	0
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	– 2	0	– 5	0	0
Ireland	3	3	4	4	4	4	4	4	4	4	5	5	5	5	5	5	4
Italy	– 3	– 3	– 3	– 2	– 3	– 4	– 4	– 5	– 4	– 7	– 5	– 8	– 5	– 6	– 7	– 8	– 7
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	– 2	– 5
Lithuania	0	0	– 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	– 87	– 88	– 88	– 89	– 88	– 84	– 87	– 88	– 77	– 56	– 56	– 55	– 46	– 47	– 58	– 64	
Malta	0	0	0	0	0	0	0	0	0	0	1	18	4	4	8	– 43	6
Netherlands	0	– 1	– 2	– 3	– 2	0	– 2	– 2	0	– 1	– 1	1	1	2	2	2	5
Poland	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal	– 2	– 2	– 2	– 2	– 2	– 2	– 1	0	0	0	0	0	0	– 1	– 1	– 1	0
Romania	0	0	0	0	0	0	0	0	0	0	0	0	– 5	– 4	– 6	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	– 1	0	0	0	– 1	1	4
Sweden	– 4	– 4	– 4	– 4	– 5	– 5	– 5	– 5	– 6	– 6	– 7	– 7	– 8	– 6	– 6	– 5	– 5
United Kingdom	4	4	3	3	3	3	3	2	2	1	1	1	1	0	1	0	0
EU-27	**0**	**0**	**– 1**	**– 1**	**– 1**	**– 1**	**– 1**	**– 1**	**– 1**	**– 2**	**– 1**	**– 2**	**– 2**	**– 2**	**– 4**	**– 3**	**– 2**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.

'0' indicates that the change in reported emissions was less than 0.5 %.

4.1.6 PM_{10} recalculations

For the years before 2000, few Member States have submitted consistent time series of PM_{10} emissions data. For 2000–2006, in eight Member States (Czech Republic, Estonia, Finland, Hungary, Lithuania, Poland, Romania, Slovenia and Spain) no recalculations or recalculations of less than 0.5 % occurred. Data for all countries are shown in Tables 4.11 and 4.12.

The reasons for recalculations in the United Kingdom included the revision of the PM hot exhaust emission factor using new speed-emission factor functions developed for the Department for Transport (IIR United Kingdom, 2009). In Sweden an error in the calculation sheet for road abrasion regarding the fraction of vehicle kilometres driven with studded tyres had been corrected. This had implications for the calculated emissions of PM_{10} and $PM_{2.5}$ (IIR Sweden, 2009).

Table 4.11 Member State recalculations of PM_{10} emissions (Gg)

PM_{10} (Gg)	2000	2001	2002	2003	2004	2005	2006
Austria	0	0	0	1	1	1	2
Belgium	– 19	– 19	– 19	– 18	– 3	– 3	– 3
Bulgaria							
Cyprus	3	3	3	3	3	3	3
Czech Republic			0	0	0	0	0
Denmark	0	0	0	0	0	– 1	1
Estonia	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
France	2	2	3	3	2	3	2
Germany	15	14	14	12	10	9	12
Greece							
Hungary	0	0	0	0	0	0	0
Ireland	4	5	4	4	4	4	4
Italy	– 8	– 8	– 8	– 9	– 8	– 9	– 9
Latvia	0	0	0	0	0	0	– 1
Lithuania						0	0
Luxembourg							
Malta	0	0	1	0	0	0	0
Netherlands	– 1	0	0	0	0	0	0
Poland				0	0	0	1
Portugal	3	5	2	– 4	0	4	– 3
Romania						0	0
Slovakia	– 1	0	– 1	0	3	0	– 2
Slovenia	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0
Sweden	– 6	– 6	– 6	– 5	– 5	– 5	– 4
United Kingdom	– 14	– 15	– 15	– 16	– 15	– 15	– 14
EU-27	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.
Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.
'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.12 Member State recalculations of PM_{10} emissions (%)

PM_{10} (%)	2000	2001	2002	2003	2004	2005	2006
Austria	– 1	0	1	2	3	3	4
Belgium	– 28	– 30	– 30	– 29	– 7	– 6	– 8
Bulgaria							
Cyprus	351	310	317	326	349	297	296
Czech Republic			0	0	0	0	0
Denmark	0	0	0	0	0	– 2	3
Estonia	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
France	0	0	1	1	0	1	0
Germany	7	7	7	6	5	5	6
Greece							
Hungary	0	0	0	0	0	0	0
Ireland	34	36	36	35	37	35	34
Italy	– 4	– 4	– 4	– 5	– 4	– 5	– 5
Latvia	– 1	0	0	0	2	0	– 4
Lithuania						0	0
Luxembourg							
Malta	– 1	11	99	0	0	0	– 2
Netherlands	– 1	– 1	– 1	– 1	– 1	– 1	– 1
Poland				0	0	0	0
Portugal	2	4	1	– 3	0	3	– 2
Romania						0	0
Slovakia	– 2	– 1	– 2	1	9	0	– 4
Slovenia	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0
Sweden	– 12	– 12	– 12	– 11	– 11	– 10	– 9
United Kingdom	– 7	– 9	– 10	– 10	– 10	– 10	– 9
EU-27	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.

'0' indicates that the change in reported emissions was less than 0.5 %.

4.1.7 *$PM_{2.5}$ recalculations*

For the years before 2000, few Member States have submitted consistent time series of $PM_{2,5}$ emissions data.

For 2000–2006, in Czech Republic, Estonia, Finland, Lithuania, Slovenia and Spain no recalculations or recalculations of less than 0.5 % occurred. Italy, the United Kingdom and Slovakia have the largest recalculation in absolute terms. Cyprus has the largest recalculation in relative terms (a 402 % increase for 2000). The reasons for recalculations in United Kingdom and Sweden are described above in Section 4.1.6. Data for all countries are shown in Tables 4.13 and 4.14.

Table 4.13 Member State recalculations of $PM_{2.5}$ emissions (Gg)

$PM_{2.5}$ (Gg)	2000	2001	2002	2003	2004	2005	2006
Austria	– 1	0	0	1	1	1	1
Belgium	– 2	– 2	– 2	– 1	– 3	– 2	– 3
Bulgaria							
Cyprus	2	2	2	2	2	2	2
Czech Republic				0	0	0	0
Denmark	0	0	0	0	0	– 1	1
Estonia	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
France	2	2	3	3	2	3	1
Germany	0	– 1	– 1	– 3	– 5	– 6	– 3
Greece							
Hungary	0	0	– 1	0	0	0	0
Ireland	1	1	1	1	1	1	1
Italy	– 5	– 6	– 5	– 6	– 5	– 6	– 6
Latvia	0	0	0	0	0	0	0
Lithuania						0	0
Luxembourg							
Malta	0	0	1	0	0	0	0
Netherlands	0	0	0	0	0	0	0
Poland				0	– 3	0	0
Portugal	0	0	– 1	– 2	– 1	0	– 1
Romania							
Slovakia	7	7	3	3	6	4	1
Slovenia	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	1
Sweden	– 6	– 6	– 6	– 5	– 5	– 5	– 4
United Kingdom	– 11	– 13	– 12	– 13	– 12	– 12	– 12
EU-27	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.
Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.
'0' indicates that the change in reported emissions was less than 0.5 Gg.

Table 4.14 Member States recalculations of $PM_{2.5}$ emissions (%)

$PM_{2.5}$ (%)	2000	2001	2002	2003	2004	2005	2006
Austria	– 2	0	1	3	4	4	5
Belgium	– 6	– 7	– 7	– 3	– 9	– 8	– 10
Bulgaria							
Cyprus	402	346	346	375	394	325	310
Czech Republic				0	0	0	0
Denmark	0	0	0	0	0	– 3	4
Estonia	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0
France	1	1	1	1	1	1	0
Germany	0	– 1	– 1	– 2	– 4	– 5	– 3
Greece							
Hungary	0	0	– 4	0	0	0	0
Ireland	11	11	12	11	12	11	11
Italy	– 3	– 3	– 4	– 4	– 4	– 4	– 5
Latvia	0	0	0	0	3	3	– 1
Lithuania						0	0
Luxembourg							
Malta	– 2	8	319	0	0	0	– 1
Netherlands	0	0	0	0	0	0	– 1
Poland				0	– 2	0	0
Portugal	0	0	– 1	– 1	– 1	0	– 1
Romania							
Slovakia	25	27	9	11	22	10	3
Slovenia	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0
Sweden	– 15	– 15	– 16	– 15	– 15	– 14	– 13
United Kingdom	– 10	– 12	– 13	– 13	– 13	– 12	– 12
EU-27	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

Note: Negative values indicate that the value submitted in 2009 was lower than the one in 2008.

Empty cells indicate instances where one of the two submissions (submitted in 2008 and 2009) did not contain data.

'0' indicates that the change in reported emissions was less than 0.5 %.

4.2 Planned improvements

The EEA-ETC/ACC has noted that the main future challenge for the European Community continues to be improving the data reporting procedures in order to obtain more complete and timely UNECE LRTAP Convention emission inventories from EU Member States. The improvements cannot be implemented at the Community level alone but also need to involve the development of reliable and timely inventory reporting systems in the Member States.

The updated Reporting Guidelines request that all Parties to the LRTAP Convention report emissions using the new NFR08 reporting format for their 2009 submissions. Of the 27 Member States that submitted inventories in 2009, 20 used the new template at least for one inventory year but only nine ([21]) reported entire time series in the NFR08 format. The aggregated EU-27 inventory is reported in the new format. The mapping schema used to convert emissions reported in the older NFR02 format to the newer NFR08 format is provided in Appendix 3. Member States are therefore encouraged to report using the new reporting format in the future.

Despite clear progress in recent years concerning the completeness of reporting, as noted earlier in this report, a complete set of emission inventory data for the main air pollutants is still not available from all Member States. This prevents the compilation of a complete inventory at the European Community level and the possibility of comprehensive analysis. It is essential for the European Community emission inventory preparation process that the timeliness, consistency of reporting and completeness of Member States' submissions further improves, particularly for reporting of 1990–2001 data, to facilitate reliable trend analysis.

The ETC/ACC has drafted a paper proposing technical methods that could be used in the future to fill gaps in reported data (ETC/ACC, 2008). Such methods could, for example, be applied for the following purposes when estimates are not included in Member States' LRTAP inventory submissions to the EEA:

1. to complete specific years in the inventory time series for a specific Member State for the most recent inventory year(s) or for some years of the time series from 1990 to the most recent year;

2. to complete individual source categories for individual Member States that did not estimate specific source categories for any year of the inventory time series and reported 'NE' ([22]);

3. to provide complete NFR data tables for the European Community when some Member States provide only national total emissions ([23]);

4. to enable the presentation of consistent trends for the European Community.

However, before any such gap-filling methods are applied to the European Community emission inventory, any such procedure will have to be formalised, discussed and agreed in close cooperation with emission experts from the Member States. At the joint meeting of EIONET and the Task Force on Emission Inventories and Projections (TFEIP), held on 11 and 12 May 2009, the ETC/ACC gap-filling proposal was discussed with a view to reaching a technical agreement that such a gap-filling could be implemented in the future.

The EEA-ETC/ACC, together with EMEP CEIP, assists Member States in improving the quality of national inventories by reviewing inventory data annually. The review of data reported under the LRTAP Convention is performed jointly with the review of data reported by Member States under the National Emissions Ceilings Directive (2001/81/EC). Starting in 2009, a centralised Stage 3 review process is planned that will review inventories from up to ten countries by teams of emission experts. Member States are encouraged to nominate reviews to the EMEP roster of emission review experts; details on the nomination process may be obtained from the CEIP website.

An uncertainty and sensitivity analysis of the European Community's LRTAP Convention emission inventory could be used in the future to identify specific sources within the inventory

([21]) Austria, Belgium, Estonia, France, Germany, Latvia, Portugal, Spain and the United Kingdom.
([22]) Gap-filling methods could be used for major gaps when it is considered highly probable that emissions from these source categories exist in the Member States concerned.
([23]) In such cases, the gap-filling methods would be used to disaggregate further the emission estimates provided by Member States.

that would benefit from further improvements, for example scientific research to improve the robustness of emission factors. However, this type of analysis also requires Member States to report sufficient information to underpin the analysis, which is not yet done.

For the 2010 European Community inventory report cycle, the emissions inventory report will be elaborated to correspond to EMEP's recommended structure for IIRs. The improvements will depend on the information provided by Member States. For example, more complete emission trends of particulate matter and/or heavy metals, together with more explanatory information on emission trends and recalculations could be included within the next report if countries supply such data.

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Units and abbreviations

kg	1 kilogram = 10^3 g (gram)
t	1 tonne (metric) = 1 megagram (Mg) = 10^6 g
Mg	1 megagram = 10^6 g = 1 tonne (t)
Gg	1 gigagram = 10^9 g = 1 kilotonne (kt)
Tg	1 teragram = 10^{12} g = 1 megatonne (Mt)
TJ	1 terajoule
As	arsenic
Cd	cadmium
CDR	central data repository of EEA's Eionet Reportnet
CEIP	EMEP Centre on Emission Inventories and Projections
CH_4	methane
CLRTAP	LRTAP Convention
CO	carbon monoxide
CO_2	carbon dioxide
Cr	chromium
CRF	UNFCCC common reporting format for greenhouse gases
Cu	copper
EEA	European Environment Agency
Eionet	European environmental information and observation network
EMEP	Co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe
ERT	expert review team
ETC/ACC	European Topic Centre on Air and Climate Change
EU	European Union
HFCs	hydrofluorocarbons
Hg	mercury
HMs	heavy metals
IIR	informative inventory report
KCA	key category analysis
LRTAP Convention	UNECE Convention on Long-range Transboundary Air Pollution
N_2O	nitrous oxide
NECD	National Emission Ceilings Directive (2001/81/EC)
NFR	UNECE nomenclature for reporting of air pollutants
NH_3	ammonia
Ni	nickel
NMVOCs	non-methane volatile organic compounds
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
Pb	lead
PFCs	perfluorocarbons

PM	particulate matter
PM_{10}	particles measuring 10 μm or less
$PM_{2.5}$	particles measuring 2.5 μm or less
POPs	persistent organic pollutants
Se	selenium
SF_6	sulphur hexafluoride
SNAP	selected nomenclature for air pollution
SO_2	sulphur dioxide
SO_X	sulphur oxides
TFEIP	UNECE Task Force on Emission Inventories and Projections
TSP	total suspended particles
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
VOCs	volatile organic compounds
Zn	zinc

Appendix 1 Notation keys

Where methodological or data gaps in inventories exist, information on these gaps should be presented in a transparent manner. Parties should clearly indicate the sources not considered in their inventories but included in the *EMEP/EEA air pollutant emission inventory guidebook* (EMEP/EEA, 2007), and explain the reason for the exclusion. Similarly, each Party should indicate if part of its territory has been excluded and explain the reason for this. In addition, each Party should use the notation presented below to fill the blanks in all the tables of the (NFR) inventory. This approach facilitates assessment of the completeness of emission data reports. The notation is as follows ([24]):

NO 'Not occurring' is used where an emissions source or process does not exist within a country.

NE 'Not estimated' is used where emissions occur but have not been estimated or reported. Where 'NE' is used in an inventory, the Party should indicate why emissions could not be estimated.

NA 'Not applicable' is used where a source exists but relevant emissions are considered never to occur.

IE 'Included elsewhere' is used for emissions that are estimated and included in the inventory but not presented separately for the respective source. Where 'IE' is used the Party should indicate where in the inventory the emissions from the displaced source category have been included and should give the reasons for deviating from the expected category.

C 'Confidential' is used for aggregated and included elsewhere in the inventory because reporting at a disaggregated level could lead to the disclosure of confidential information. Where 'C' is used in an inventory, reference should be made to the Protocol provision that authorises such practice.

NR 'Not relevant' is used to ease reporting where emissions for a specific Party are not strictly required by the different Protocols**.**

If a Party estimates emissions from country-specific sources it should explicitly describe which source categories these are, as well as which methodologies, emission factors and activity data have been used for their estimation.

([24]) Further explanation and guidance concerning the use of these notation codes may be found in the EMEP emission reporting guidelines (UNECE, 2009).

Appendix 2 LRTAP Convention emission reporting programme for 2009

This appendix contains a summary of the information provided in the EMEP emission reporting guidelines (UNECE, 2009).

Reporting format

Each Party should use the reporting format set out in Annex IV of the reporting guidelines (UNECE, 2009) for its annual submissions. The information

Table A1 Summary of the information requested in the emission reporting guidelines

Description of contents	Components	Reporting years ([a])
Yearly: minimum (and additional)		
A. National totals:		
1. Main pollutants	SO_X, NO_X, NH_3, NMVOCs, CO	1980–2007
2. Particulate matter	$PM_{2.5}$, PM_{10}, TSP	2000–2007
3. Heavy metals	Pb, Cd, Hg / (*As, Cr, Cu, Ni, Se, Zn*)	1990–2007
4. POPs	([b])	1990–2007
B. Sector emissions:		
1. Main pollutants	SO_X, NO_X, NH_3, NMVOCs, CO	1980–2007
2. Particulate matter	$PM_{2.5}$, PM_{10}, TSP	2000–2007
3. Heavy metals	Pb, Cd, Hg / (*As, Cr, Cu, Ni, Se, Zn*)	1990–2007
4. POPs	([b])	1990–2007
5-yearly: minimum reporting		
C. Gridded data in the EMEP 50 × 50 km² grid		
1. National totals	Main pollutants, PM, Pb, Cd, Hg, PAHs, HCB, dioxins/furans	1990, 1995, 2000 and 2005 (PM for 2000 and 2005)
2. Sector emissions	Main pollutants, PM, Pb, Cd, Hg, PAHs, HCB, dioxins/furans	1990, 1995, 2000 and 2005 (PM for 2000 and 2005)
D. Emissions from large-point sources	Main pollutants, HM, PCDD/F, PAHs, HCB, PM	1990, 1995, 2000 and 2005 (PM for 2000 and 2005)
E. Historical and projected activity data and projected national total emissions		
1. National total emissions	See table IV 2A in the emission reporting guidelines	2010, 2015 and 2020
2. Energy consumption	See tables IV 2B and 2C in the emission reporting guidelines	1990, 1995, 2000, 2005, 2010, 2015 and 2020
3. Energy consumption for transport sector	See table IV 2D in the emission reporting guidelines	1990, 1995, 2000, 2005, 2010, 2015 and 2020
4. Agricultural activity	See table IV 2E in the emission reporting guidelines	1990, 1995, 2000, 2005, 2010, 2015 and 2020
5-yearly: additional reporting for review and assessment purposes		
VOC speciation/height distribution/temporal distribution		Parties are encouraged to review the information used for modelling at the Meteorological Synthesizing Centres and their country-specific review reports issued in May 2009, available from the CEIP website.
Land-use data/mercury breakdown		
% of toxic congeners of PCDD/F emissions		
Pre-1990 emissions of PAHs, HCB, PCDD/F and PCB		
Information on natural emissions		

Note: ([a]) As a minimum, data for the base year of the relevant protocol and from the year of entry into force of that protocol and up to the latest year (current year – 2) should be reported.
([b]) Aldrin, chlordane, chlordecone, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), Mirex, toxaphene, hexachlorocyclohexane (HCH), hexabromobiphenyl, polychlorinated biphenyls (PCBs), dioxins/furans (PCDD/F), polycyclic aromatic hydrocarbons (PAHs), and as additional information: short-chain chlorinated paraffins (SCCP) and pentachlorophenol (PCP) (see EU-27 and 2009 reporting instructions: www.emep-emissions.at/reporting-instructions).

should be formally submitted to the CEIP, with notification to the UNECE secretariat, preferably in electronic form. The reporting format, including NFR, is a standardised format for reporting estimates of emissions, including activity data, projected activity data, projected emissions and other relevant information. The reporting format aims at facilitating electronic submissions to simplify the processing of emissions information and the preparation of useful technical analysis and synthesis documentation. The reporting format covers:

- national annual emissions and national annual sector emissions using NFR08 (Annex IV, table IV 1A and table IV 1B);
- total and aggregated sector emissions for reporting emissions of sulphur, nitrogen oxides, ammonia, non-methane volatile organic compounds, carbon monoxide, particulate matter, lead, cadmium, mercury, PAHs, HCB and dioxins/furans, for the EMEP grid squares of 50 km x 50 km and emissions from large point sources (Annex IV, tables IV 3A, IV 3B and IV 3C);
- for the years 2010, 2015 and 2020, projected activity data and projected national total emissions of sulphur, nitrogen oxides, ammonia and non-methane volatile organic compounds to be reported for the source categories listed in Annex IV (Annex IV, tables IV 2B, IV 2C, IV 2D, IV 2E and IV 2A).

Appendix 3 Mapping tables

Appendix 3.1 Mapping from Annex IV Table I NFR02 to Annex IV Table I NFR08

NFR02		NFR08
1 A 1 a Public electricity and heat production	=	1 A 1 a Public electricity and heat production
1 A 1 b Petroleum refining	=	1 A 1 b Petroleum refining
1 A 1 c Manufacture of solid fuels and other energy industries	=	1 A 1 c Manufacture of solid fuels and other energy industries
1 A 2 Manufacturing industries and construction	Note: the allocation of aggregation lines is given in Appendix 3.2'	
1 A 2 a Iron and steel	=	1 A 2 a Stationary combustion in manufacturing industries and construction: iron and steel
1 A 2 b Non-ferrous metals	=	1 A 2 b Stationary combustion in manufacturing industries and construction: non-ferrous metals
1 A 2 c Chemicals	=	1 A 2 c Stationary combustion in manufacturing industries and construction: chemicals
1 A 2 d Pulp, paper and print	=	1 A 2 d Stationary combustion in manufacturing industries and construction: pulp, paper and print
1 A 2 e Food processing, beverages and tobacco	=	1 A 2 e Stationary combustion in manufacturing industries and construction: food processing, beverages and tobacco
1 A 2 f Other	→	1 A 2 f i Stationary combustion in manufacturing industries and construction: other
	x	1 A 2 f ii Mobile combustion in manufacturing industries and construction
1 A 3 a ii (i) Civil aviation (domestic, LTO)	=	1 A 3 a ii (i) Civil aviation (domestic, LTO)
1 A 3 a ii (ii) Civil aviation (domestic, cruise)	National total/ memo item	
	Memo item/ national total	1 A 3 a i (i) International aviation (LTO)
1 A 3 b Road transportation	Aggregation line	
1 A 3 b i Road transport: passenger cars	=	1 A 3 b i Road transport: passenger cars
1 A 3 b ii Road transport: light duty vehicles	=	1 A 3 b ii Road transport: light duty vehicles
1 A 3 b iii Road transport: heavy duty vehicles	=	1 A 3 b iii Road transport: heavy duty vehicles
1 A 3 b iv Road transport: mopeds and motorcycles	=	1 A 3 b iv Road transport: mopeds and motorcycles
1 A 3 b v Road transport: gasoline evaporation	=	1 A 3 b v Road transport: gasoline evaporation
1 A 3 b vi Road transport: automobile tyre and brake wear	=	1 A 3 b vi Road transport: automobile tyre and brake wear
1 A 3 b vii Road transport: automobile road abrasion	=	1 A 3 b vii Road transport: automobile road abrasion
1 A 3 c Railways	=	1 A 3 c Railways
	Memo Item/ National Total	1 A 3 d i (ii) International inland waterways
1 A 3 d ii National navigation	=	1 A 3 d ii National navigation (shipping)
1 A 3 e Other	added to 1A3e	
1 A 3 e i Pipeline compressors	→	1 A 3 e Pipeline compressors
1 A 3 e ii Other mobile sources and machinery	added to 1A3e	
1 A 4 a Commercial/institutional	→	1 A 4 a i Commercial/institutional: stationary
	x	1 A 4 a ii Commercial/institutional: mobile
1 A 4 b Residential	Aggregation line	
1 A 4 b i Residential plants	=	1 A 4 b i Residential: stationary plants
1 A 4 b ii Household and gardening (mobile)	=	1 A 4 b ii Residential: household and gardening (mobile)
1 A 4 c Agriculture/forestry/fishing	Aggregation line	
1 A 4 c i Stationary	=	1 A 4 c i Agriculture/forestry/fishing: stationary
1 A 4 c ii Off-road vehicles and other machinery	=	1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery
1A 4 c iii National fishing	=	1A 4 c iii Agriculture/forestry/fishing: national fishing
1 A 5 a Other, stationary (including military)	=	1 A 5 a Other, stationary (including military)
1 A 5 b Other, mobile (including military)	=	1 A 5 b Other, mobile (including military, land-based and recreational boats)

NFR02		NFR08
1B1 Fugitive emissions from solid fuels	Aggregation line	
1 B 1 a Coal mining and handling	=	1 B 1 a Fugitive emission from solid fuels: coal mining and handling
1 B 1 b Solid fuel transformation	=	1 B 1 b Fugitive emission from solid fuels: solid fuel transformation
1 B 1 c Other	=	1 B 1 c Other fugitive emissions from solid fuels
1 B 2 Oil and natural gas	Aggregation line	
1 B 2 a Oil	Aggregation line	
1 B 2 a i Exploration production, transport	=	1 B 2 a i Exploration production, transport
1 B 2 a iv Refining/storage	=	1 B 2 a iv Refining/storage
1 B 2 a v Distribution of oil products	=	1 B 2 a v Distribution of oil products
1 B 2 a vi Other	=	1 B 2 a vi Geothermal energy extraction
1 B 2 b Natural gas	=	1 B 2 b Natural gas
1 B 2 c Venting and flaring	=	1 B 2 c Venting and flaring
2 A Mineral products	Aggregation line	
2 A 1 Cement production	=	2 A 1 Cement production
2 A 2 Lime production	=	2 A 2 Lime production
2 A 3 Limestone and dolomite use	=	2 A 3 Limestone and dolomite use
2 A 4 Soda ash production and use	=	2 A 4 Soda ash production and use
2 A 5 Asphalt roofing	=	2 A 5 Asphalt roofing
2 A 6 Road paving with asphalt	=	2 A 6 Road paving with asphalt
	x	2 A 7 a Quarrying and mining of minerals other than coal
	x	2 A 7 b Construction and demolition
	x	2A 7 c Storage, handling and transport of mineral products
2 A 7 Other including non fuel mining and construction	→	2 A 7 d Other mineral products
2 B Chemical industry	Aggregation line	
2 B 1 Ammonia production	=	2 B 1 Ammonia production
2 B 2 Nitric acid production	=	2 B 2 Nitric acid production
2 B 3 Adipic acid production	=	2 B 3 Adipic acid production
2 B 4 Carbide production	=	2 B 4 Carbide production
2 B 5 Other (Please specify in a covering note)	→	2 B 5 a Other chemical industry
	x	2 B 5 b Storage, handling and transport of chemical products
	x	2 C 1 Iron and steel production
	x	2 C 2 Ferroalloys production
	x	2 C 3 Aluminum production
	x	2 C 5 a Copper production
	x	2 C 5 b Lead production
	x	2 C 5 c Nickel production
	x	2 C 5 d Zinc production
2 C Metal production	→	2 C 5 e Other metal production
	x	2 C 5 f Storage, handling and transport of metal products
2 D Other production	Aggregation line	
2 D 1 Pulp and paper	=	2 D 1 Pulp and paper
2 D 2 Food and drink	=	2 D 2 Food and drink
	x	2 D 3 Wood processing
	x	2 E Production of POPs
	x	2 F Consumption of POPs and heavy metals (e.g. electricial and scientific equipment)
2 G Other	=	2 G Other production, consumption, storage, transportation or handling of bulk products
	x	3 A 1 Decorative coating application
	x	3 A 2 Industrial coating application
3 A Paint application	→	3 A 3 Other coating application
3 B Degreasing and dry cleaning	→	3 B 1 Degreasing
	x	3 B 2 Dry cleaning
3 C Chemical products, manufacture and processing	=	3 C Chemical products
	x	3 D 1 Printing
	x	3 D 2 Domestic solvent use including fungicides
3 D Other, including products containing HMs and POPs	→	3 D 3 Other product use

NFR02		NFR08
4 B Manure management	Aggregation line	
4 B 1 Cattle	Aggregation line	
4 B 1 a Dairy	=	4 B 1 a Cattle dairy
4 B 1 b Non-dairy	=	4 B 1 b Cattle non-dairy
4 B 2 Buffalo	=	4 B 2 Buffalo
4 B 3 Sheep	=	4 B 3 Sheep
4 B 4 Goats	=	4 B 4 Goats
4 B 5 Camels and Llamas	Added to 4B13	
4 B 6 Horses	=	4 B 6 Horses
4 B 7 Mules and asses	=	4 B 7 Mules and asses
4 B 8 Swine	=	4 B 8 Swine
	x	4 B 9 a Laying hens
	x	4 B 9 b Broilers
	x	4 B 9 c Turkeys
4 B 9 Poultry	→	4 B 9 d Other poultry
4 B 13 Other	=	4 B 13 Other
4 C Rice cultivation	Added to 4G	
4 D 1 Direct soil emission	→	4 D 1 a Synthetic N-fertilizers
	x	4 D 2 a Farm-level agricultural operations including storage, handling and transport of agricultural products
	x	4 D 2 b Off-farm storage, handling and transport of bulk agricultural products
	x	4 D 2 c N-excretion on pasture range and paddock Unspecified
4 F Field burning of agricultural wastes	=	4 F Field burning of agricultural wastes
4 G Other	=	4 G Agriculture other
5 B Forest and grassland conversion	Added to 7A	
6 A Solid waste disposal on land	=	6 A Solid waste disposal on land
6 B Wastewater handling	=	6 B Wastewater handling
	x	6 C a Clinical waste incineration
6 C Waste incineration	→	6 C b Industrial waste incineration
	x	6 C c Municipal waste incineration
	x	6 C d Cremation
	x	6 C e Small scale waste burning
6 D Other waste	=	6 D Other waste
7 Other	→	7 A Other (included in National total for entire territory)
National total for the entire territory (2002 Guidelines)		National total for the entire territory
1 A 3 a i (i) International aviation (LTO)	Memo item/ national total	
		1 A 3 a ii (ii) Civil aviation (domestic, cruise)
1 A 3 a i (ii) International aviation (cruise)	=	1 A 3 a i (ii) International aviation (cruise)
1 A 3 d i (i) International maritime navigation	=	1 A 3 d i (i) International maritime navigation
1 A 3 d i (ii) International inland waterways	Memo item/ national total	
5 E Other	=	7 B Other not included in national total of the entire territory
X (11 08 Volcanoes)	=	X (11 08 Volcanoes)
		FF Forest fires
		Transport (fuel used)
		1 A 3 d i (ii) International inland waterways

Note: = Same category in NRF02 and NRF08.
→ The category from NFR02 was accounted for under the NFR08 category indicated.
x The category given in NFR08 does not exist in NFR02.

Appendix 3.2 Mapping Table I NFR02 to Table I NFR08 — accounting of aggregated emissions

NFR02		NFR08
1 A 2 Manufacturing industries and construction	→	1 A 2 f i Stationary combustion in manufacturing industries and construction: Other
1 A 3 b Road transportation	→	1 A 3 b i Road transport: passenger cars
1 A 4 b Residential	→	1 A 4 b i Residential: stationary plants
1 A 4 c Agriculture/forestry/fishing	→	1 A 4 c ii Agriculture/forestry/fishing: off-road vehicles and other machinery
1B1 Fugitive emissions from solid fuels	→	1 B 1 c Other fugitive emissions from solid fuels
1 B 2 Oil and natural gas	→	1 B 2 a i Exploration production, transport
1 B 2 a Oil	Also accounted under 1B2ai	1 B 2 a iv Refining/storage
2 A Mineral products	→	2 A 7 d Other mineral products
2 B Chemical industry	→	2 B 5 a Other chemical industry
2 D Other production	Added to 2G	2 D 1 Pulp and paper
4 B 1 Cattle	→	4 B 1 a Cattle dairy
4 B Manure management	→	4 B 13 Other
National total for the entire territory (2002 Guidelines)		National total for the entire territory

Note: → The aggregated category from NFR02 is accounted for under the NFR08 category indicated, unless more detail was given by the respective Member State.

Annexes

For Annexes A to D, see separate files.

European Environment Agency

European Community emission inventory report 1990–2007 under the Convention on Long-range Transboundary Air Pollution
Submission to the European Monitoring and Evaluation Programme through the Executive Secretary of the United Nations Economic Commission for Europe

2009 — 98 pp. — 21 x 29.7 cm

ISBN 978-92-9213-005-3
ISSN 1830-8139
EEA Technical report series: ISSN 1725-2237
DOI 10.2800/12414

TH-XB-09-001-EN-N

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