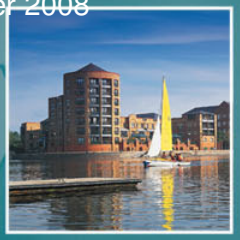
European Commission

Evaluation of the Member States' emission inventories 2004-2006 for LCPs under the LCP Directive (2001/80/EC)

Final Report

September 2008










Entec

Creating the environment for business

Entec

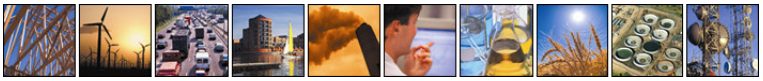
Creating the environment for business

Copyright and Non-Disclosure Notice

Third-Party Disclaimer

Document Revisions

No.	Details	Date
1	Draft interim report for client comment	20/03/2008
2	Draft final report for client comment	21/05/2008
3	Final report (Issue 1)	26/06/2008
4	Final report (Issue 2)	06/08/2008
5	Final report (Issue 3)	04/09/2008



Entec

Creating the environment for business

European Commission

Evaluation of the Member States' emission inventories 2004-2006 for LCPs under the LCP Directive (2001/80/EC)

Final Report

September 2008

Entec UK Limited

Report for

DG Environment
Unit C4
Beaulieuaan 5
B-1160 Brussels
Belgium

Main Contributors

Ben Grebot
Alistair Ritchie
Tim Scarbrough
Tassos Shialis

Issued by

.....
Ben Grebot

Approved by

.....
Alistair Ritchie

Entec UK Limited

17 Angel Gate
City Road
London EC1V 2SH
England
Tel: +44 (0) 207 843 1400
Fax: +44 (0) 207 843 1410

Doc Reg No. 21942

h:\projects\em-260\21000 projects\21942 ppaqcc ec lcpd emission inventories\c client\reports\final report\issue 3 04-09-08\21942 final report (issue 3).doc

Executive Summary

This final report has been produced for the purpose of providing the Commission with findings on the collation and review of Member States' (MS) LCP emission inventories under the Large Combustion Plant Directive (LCPD).

As part of the requirements of the LCPD, Annex VIII(B) requires MS to establish an inventory of SO_2, NO_x and dust (as total suspended particles) emissions from all plants covered by the Directive, and to also report the total annual amount of energy input broken down into five categories of fuel: biomass, other solid fuels, liquid fuels, natural gas and other gases. A summary of this inventory has to be reported to the Commission every three years, with refineries reported separately. In addition, the Commission has asked MS to provide plant-by-plant data. The first inventories covering the period 2004-2006, for which a summary report had to be sent to the Commission by 31 December 2007, are summarised by this report.

Data limitations

The inventories, as initially submitted by MS to the Commission, have been assessed. In order to provide an analysis of the MS LCP data, key data gaps and inconsistencies were identified. Member State Competent Authorities were consulted to try and correct mistakes and request additional information to inform the analysis.

Data gaps do remain however; these are listed in detail, alongside their implications for this analysis in section 3.3 on page 10. Key data gaps related to the reporting requirements are the following:

- For the Netherlands, energy input data are in unknown units and have been excluded from this analysis;
- For Italy, the 2004 LCP inventory is missing key data and has been excluded from this analysis; and
- Sweden has not provided 2004 or 2005 plant-by-plant LCP inventories for plants other than refineries.

In addition, there appear to be inconsistencies between some Member States in relation to the interpretation of 'combustion plant' for the reporting of emission and fuel use data.

Number of LCPs

The total number of LCPs in the EU-27 which have been included in MS emission inventories for each reporting year (2004, 2005 and 2006) is shown in Figure 1. Note that the 2004 data does not include LCPs in Italy or Swedish LCPs other than refineries; also the 2005 data does not include Swedish LCPs other than refineries.

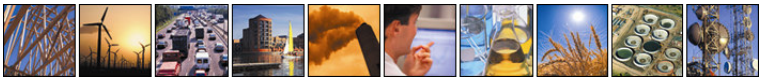
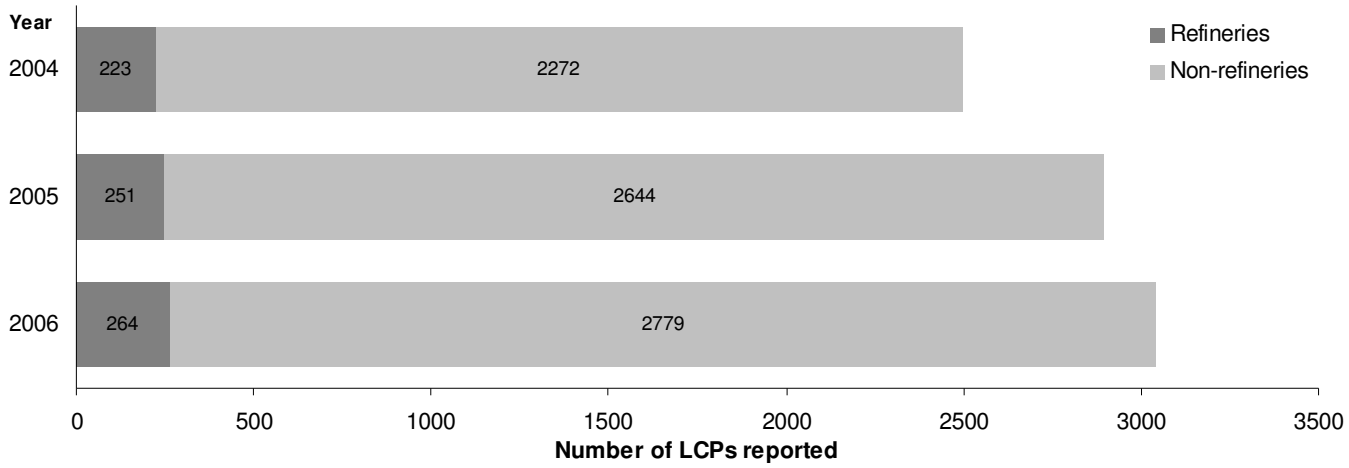


Figure 1 **Total number of reported LCPs in the EU-27 for each year 2004-2006, reported separately for refinery and non-refinery LCPs.**



Energy input

The total amount of energy input (in PJ, 10^{15}J) combusted in reported LCPs in the EU-27 for each year 2004-2006, is shown in Figure 2. Again, refinery and non-refinery LCPs are reported separately. Total energy input is split into the five fuel categories mentioned in the Directive. Note that the data from the Netherlands is not included in this figure. Also note that the 2004 data does not include LCPs in Italy.

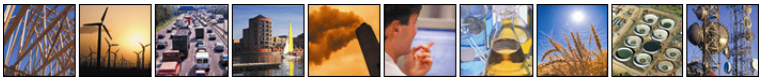
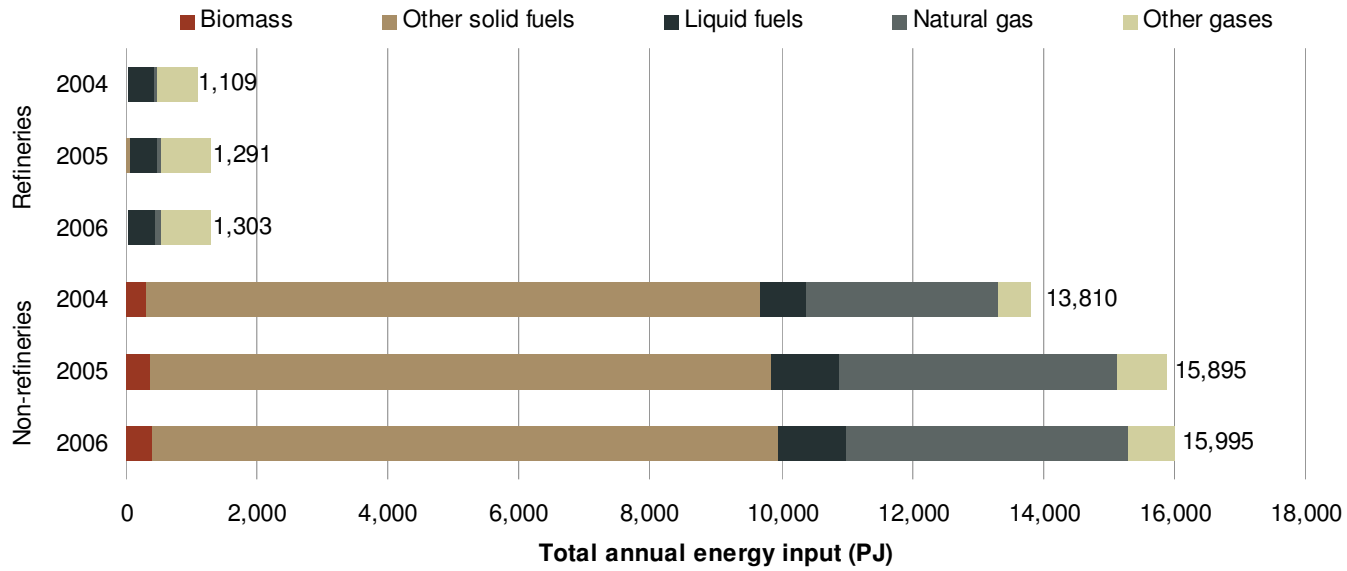


Figure 2 **Total amount of energy input (in PJ, 10^{15}J) for reported LCPs in the EU-27 for each year 2004-2006, reported separately for refinery and non-refinery LCPs, broken down in the five fuel categories.**



Total emissions

The total SO_2, NO_X and dust emissions (in kilotonnes, kt) from reported LCPs in the EU-27, for each year 2004-2006, are shown in Figure 3. Again, refinery and non-refinery LCPs are reported separately. Total energy input is split into the five fuel categories mentioned in the Directive. Note that, for the purposes of comparison between years, the 2004 emissions data from LCPs in Italy has been set equal to 2005 emissions data in this figure. The plot indicates that the total SO_2, NO_X and dust emissions from LCPs in the EU have decreased over the time period 2004 to 2006. Dust emissions decreased most markedly (by 23%), followed by SO_2 emissions (by 8.6%), whilst the total NO_X emissions decreased least (by 1.8%) over the 2004-2006 period.

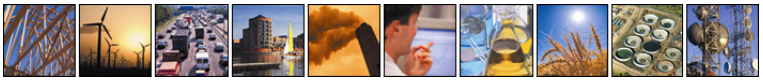
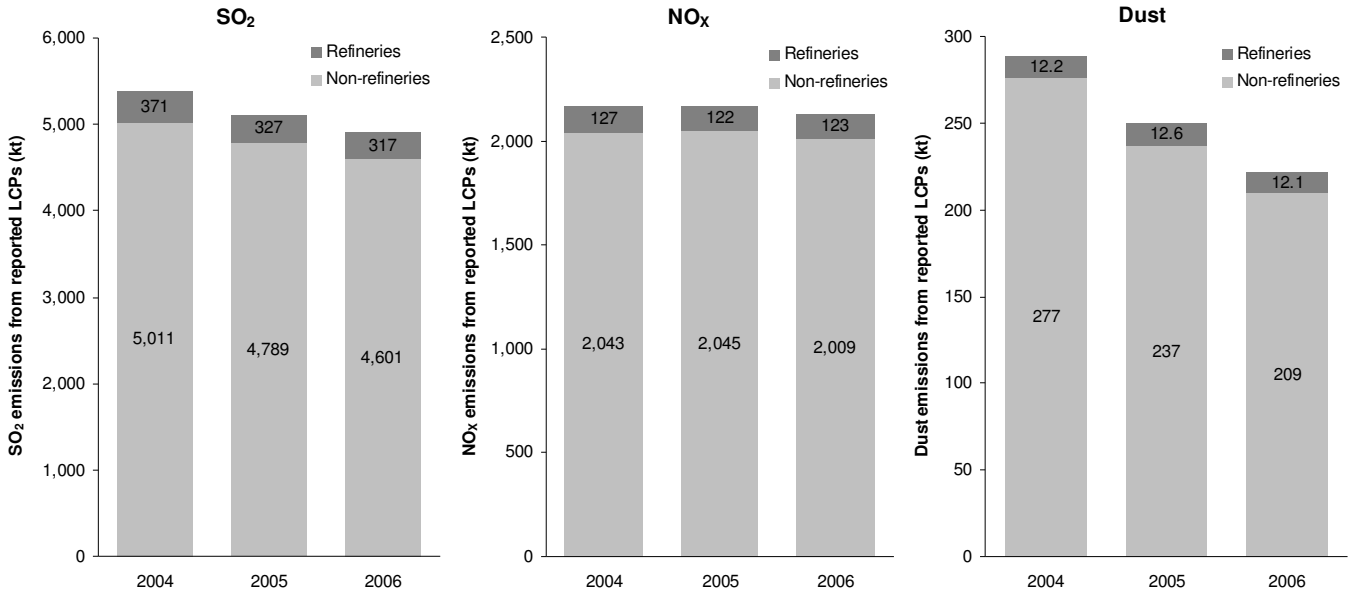


Figure 3 **Total emissions of SO_2, NO_X and dust (in kilotonnes) for reported LCPs in the EU-27 for each year 2004-2006, reported separately for refinery and non-refinery LCPs.**



Additional analysis

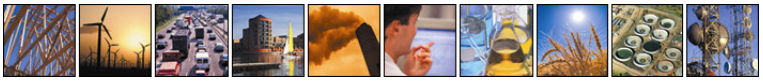
Additional analysis has been undertaken at the level of individual LCPs.

Calculating emission factors – mass of pollutant emitted per unit energy input – allows for an assessment of the environmental performance of LCPs. This has been undertaken at a LCP level, at the MS level and overall for the EU. Results of this analysis are in section 4.2.5 on page 45.

The total LCP emissions from the inventories can also be compared to other data sources. This has been undertaken for the European Pollutant Emission Register (EPER) and is discussed with respect to the NECD inventories. For MS having acceded to the EU since 2003, comparison against Accession Treaty ceilings and derogations has also been undertaken. Results of these analyses are in section 4.3 on page 51.

The fraction of installed capacity and emissions from existing LCPs declared for eligibility under Article 4(4) of the LCPD ('opted out' plants) has been analysed. These LCPs must operate no more than 20,000 hours in total between 2008 and 2015 and close by the end of 2015. This analysis is presented in section 4.5 on page 51.

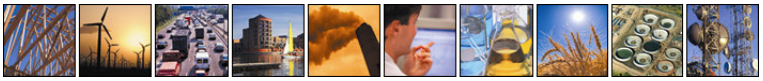
Although during the reporting period 2004-2006 the LCPD ELVs were not yet in force for existing installations (this was only the case after 1 January 2008), a comparison of LCP emission factors against the LCPD emission limit values (ELVs) has been undertaken. LCP emission factors derived from the inventories have also been compared to the LCP BREF BAT-AELs, which are emission levels indicating what can be achieved if an



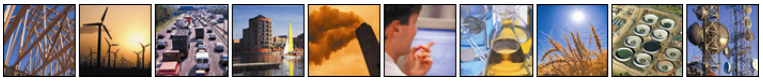
installation applies the best available techniques (BAT), as indicated in the relevant BREF document. This analysis is presented in section 4.6 on page 51.

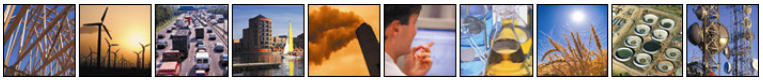
Recommendations

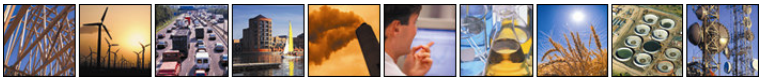
During the course of this study some MS provided feedback on the reporting process under the LCPD and, in particular, suggestions for improvements to the data collection template. Section 5 on page 51 summarises direct feedback from MS and discussions with the Commission, and outlines the proposed recommendations for future reporting based on the issues encountered during this study.

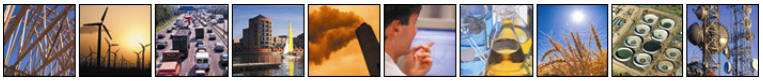


Contents









1. Introduction

1.1 Purpose of this report

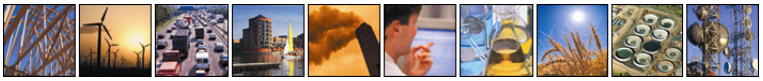
This final report has been produced for the purpose of providing the Commission with findings on the collation and review of Member States' LCP emission inventories for the reporting period 2004-2006 under the Large Combustion Plant Directive (LCPD). It provides an overview of the data that has been provided by each Member State, key outstanding data gaps and efforts to fill them and analysis of the data available within the timescales of the study.

1.2 Understanding the issues

Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (the LCP Directive) was set up to reduce the emissions of sulphur dioxide (SO_2), oxides of nitrogen (NO_x) and particulate matter (PM) from existing and new combustion plants through the introduction of Emission Limit Values (ELVs) for these pollutants. The emission limit values came into force for existing plants from 1 January 2008. For existing plants, MS may choose to make use of a National Emission Reduction Plan, setting overall emission limitations for a defined group of plants, instead of applying the ELVs of the Directive to individual plants.

As part of the requirements of this Directive, Annex VIII(B) requires Member States (MS) to establish an inventory of SO_2, NO_x and dust emissions from all plants covered by the Directive. A summary of this inventory has to be reported to the Commission every three years. The first summary covering the period 2004-2006 had to be submitted by 31 December 2007:

> *Member States shall establish, starting in 2004 and for each subsequent year, an inventory of SO_2, NO_x and dust emissions from all combustion plants with a rated thermal input of 50 MW or more. The competent authority shall obtain for each plant operated under the control of one operator at a given location the following data:*
>
> – *the total annual emissions of SO_2, NO_x and dust (as total suspended particles); and*
>
> – *the total annual amount of energy input, related to the net calorific value, broken down in terms of the five categories of fuel: biomass, other solid fuels, liquid fuels, natural gas, other gases.*



> *A summary of the results of this inventory that shows the emissions from refineries separately shall be communicated to the Commission every three years within twelve months from the end of the three-year period considered.*

The Commission is required to undertake a comparison and an evaluation of the emission inventories and communicate a summary of the findings to the MS by the 31st December 2008. In addition to the summary of the inventories, the Commission has requested MS also to report the yearly plant-by-plant data for 2004, 2005 and 2006 (the possibility for such request is explicitly mentioned in Annex VIII(B) of the Directive). The Commission has also developed a data collection template[1] that has been distributed to the MS, and has invited them to use it to report their emission inventories. The template is developed to collect data at a plant level in each country (plants are categorised into "Refineries" and "Other than Refineries") for years 2004, 2005 and 2006 separately. The detailed data requirements for each plant are:

- Plant name and location;
- Rated thermal input (MWth);
- Total annual amount of energy input, relating to net calorific value (GJ) for different fuel types, i.e. biomass, other solid fuels, liquid fuels, natural gas and other gases; and
- Total annual emissions (kilotonnes) for SO_2, NO_x and dust.

1.3 Objectives of the project

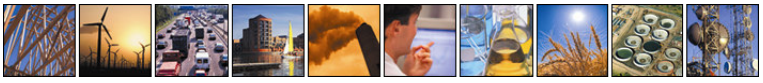
This project supports the Commission to fulfil its obligation to assess the Member State emission inventories that are developed under the LCP Directive requirements.

This project aims to:

- Compare and evaluate the emission inventories for all MS[2] and highlight which countries and plants are having the highest emissions;
- Develop a detailed overview of the number and size of LCPs across all MS, their emissions per pollutant, energy use etc;
- Compare the data provided in the emission inventories with other data sources in order to understand better the quality and transparency of these reports; and

[1] http://eea.eionet.europa.eu/Public/irc/eionet-circle/reporting/library?l=/lcp_reporting/inventories_2004-06xls/_EN_1.0_&a=d

[2] As Romania and Bulgaria have acceded to the EU after the period covered by the reporting (on 1/1/2007), these MS were not obliged to report the emissions for 2004-2006. However, data sets for the three years have been received from these MS.

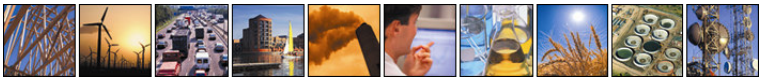


- Develop recommendations for improvement in the reporting requirements and identify any non-compliance issues.

1.4 Structure of this report

This report is structured according to the following sections:

- Section 2 presents a qualitative assessment of the inventories provided up to 25 June 2008;
- Section 3 provides an overview of key data gaps and consultation undertaken with MSs to fill these gaps;
- Section 4 presents the analysis of the data available; and
- Section 5 presents the overall recommendations.



2. Task 1 - Data Gathering

2.1 Introduction

This section provides an overview of the inventories submitted including a qualitative assessment of the data reported in the inventory. The analysis undertaken under this task has identified key data gaps and informed the consultation with MS competent authorities under Task 2.

2.2 Qualitative assessment

As a first step of the data gathering exercise, the national emission inventories were qualitatively assessed against the requirements and provisions that are set in the LCP Directive. Annex VIII (B) of the directive states that for each large combustion plant the competent authorities should include the following information in their inventory:

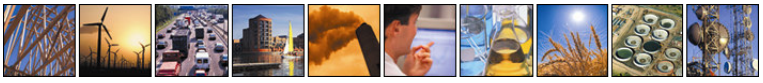
- The total annual emissions of SO_2, NO_X and dust.
- The total annual amount of energy input, related to the net calorific value, broken down in terms of five categories of fuel: biomass, other solid fuels, liquid fuels, natural gas and other gases.

Additionally, the Commission asked MSs to prepare this information on a plant-by-plant level for each of the three years covered.

The qualitative assessment judged the 'completeness' of the national emission inventories by employing a 'traffic light' system, where 'completeness' refers to whether inventories reported all the information required by the LCPD, taking into account the request for plant-by-plant data by the Commission. This system uses colours green, orange and red to indicate the degree to which the Member State concerned has provided complete information. This provides a high level overview of the quality of the national emission inventories and an early understanding of the content of these inventories, and more importantly where data gaps existed and needed to be addressed (see Section 3). In addition, this preliminary analysis provided a better understanding of the difficulties in the reporting requirements and helped inform recommendations for improvements of the reporting (see Section 5).

The qualitative assessment also extends to review the extent to which MSs have provided any further information, beyond the requirements of the LCPD, which may be of use for this study and could be considered for inclusion in future reporting. This included information on:

- thermal capacity of each LCP;
- sectoral classification of each LCP; and



- 'new' vs. 'existing' plants[3].

In addition, information was collected on those plants which have opted-out of the LCPD (i.e. opted for the limited life derogation in Article 4.4 of the Directive) as reported by MS to the Commission (separate reporting obligation under Annex VIII(B) of the Directive commencing on 1 January 2008).

The qualitative assessment is shown in Table 2.1 below. It represents not only the status of inventories originally submitted to the Commission, but is up-to-date following additional communication with the MS Competent Authority where clarifications and/or additional data have been requested. The 'traffic light' colours system should be interpreted as follows:

- Green – indicates that a MS has provided sufficient information against the reporting requirement and the data are clear and transparent;
- Orange – indicates that a MS has provided some information against the reporting requirement but the data are incomplete and/or unclear;
- Red – indicates that a MS has not provided any information against the reporting requirement; and
- NR – Not Relevant – indicates that the specific reporting requirement is not relevant to the MS concerned.

Please note that where the colour green has been used it does not necessarily mean that the inventory is complete. For example, LCPs that should have been included but were not, for whatever reason, cannot be checked.

As a further example, an assessment of the completeness of inventories with respect to the 'common stack' interpretation of the definition of a combustion plant under the LCPD[4] is outside the scope of this work. Nevertheless, an informed speculation of which inventories appear to adopt alternative interpretations is possible for some MS, and is included in section 3.3 in Table 3.1.

Furthermore, no formal checking has been undertaken of the methodology in which MS obtained the reported emission data. For example data could be obtained through measurement, calculation or estimation. The methodology selected will likely vary on a plant-by-plant basis, depending on monitoring systems used at each LCP, which are prescribed in Annex VIII of the Directive. Again, close assessment of the inventories and the derived emission factors can be used to indicate if an emission factor may have been used to estimate emissions from an LCP, or if a range of LCPs have used identical emission factors.

[3] As defined by Article 2(9) and 2(10) of the LCPD, 'existing plant' refers to LCPs licensed before 1 July 1987, and 'new plant refers to LCPs licensed after 1 July 1987. An additional category, 'new new' has been used for new plants licensed after 27 November 2002 (Article 4(2) of the LCPD).

[4] http://ec.europa.eu/environment/air/pollutants/stationary/lcp_interpretation.htm

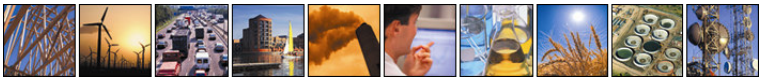
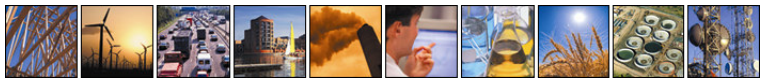
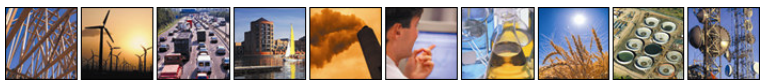


Table 2.1 Qualitative Assessment of MS LCP emission inventories, including subsequent submissions of additional data

LCPD reporting requirements	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	EL	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	ES	SE	UK
Data provided for each plant																	NR										
Data provided for different years																	NR										
Data provided for refineries separately				NR			NR								NR		NR	NR						NR			
Total annual emissions SO_2																	NR										
Total annual emissions NO_x																	NR										
Total annual emissions Dust																	NR										
Total energy input																	NR										
Additional data provided																											
Rated thermal input																	NR										
Opted out LCPs	NR				NR					NR		NR	NR			NR	NR		NR							NR	
New/Existing																	NR										
Sector classification																	NR										



Key for Table 2.1	
	indicates that a country has provided sufficient information against the reporting requirement and the data are clear and transparent
	indicates that a country has provided some information against the reporting requirement but the data are incomplete and unclear
	indicates that a country has not provided any information against the reporting requirement
NR	Not Relevant – indicates that the specific reporting requirement is not relevant to the country of interest

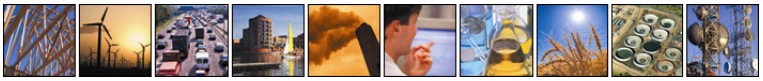


For the obligatory LCPD reporting requirements in the top half of Table 2.1, the MS with orange boxes have the following missing information in their inventories:

- Denmark: It is unclear whether the stack approach has been adopted in compilation of the inventory. Also, three LCPs are missing energy input and emissions data;
- Ireland: It is unclear whether the stack approach has been adopted in compilation of the inventory;
- Italy: The 2004 inventory is missing dust and energy input data, and has far fewer LCPs listed than the 2005 and 2006 inventories;
- Latvia: Energy data has not been provided in GJ; units have not been specified;
- The Netherlands: plant-by-plant inventory submitted, but without names and locations of plants, and with inconsistent reference numbers to compare year to year. Also, the energy input data are in unknown units;
- Poland: It is unclear whether the stack approach has been adopted in compilation of the inventory; and
- Sweden: No plant-by-plant inventory submitted for non-refineries for 2004 or 2005 (the two refineries are separated). Summary emissions that are presented have been estimated using fuel consumption data and emission factors. It is unclear whether the stack approach has been adopted in compilation of the inventory.

2.3 Summary

The main outputs of this task were the qualitative assessment which acted as a useful tool for recording data gaps and identifying alternative data sources that may be relevant. The emission inventory database that has been developed was kept 'live' throughout the study and updated with additional information when received from MS contacts and/or from alternative data sources.



3. Task 2 - Data Gaps

3.1 Introduction

It is important to note that this study does not aim to assess the formal compliance of the submitted inventories against the requirements of the LCP Directive. From the reported information and the assessment no final conclusions can be drawn about the completeness of the inventories (inclusion of all combustion plants which are covered by the LCP Directive, taking into account the definition in article 2(7) ("common stack" approach)).

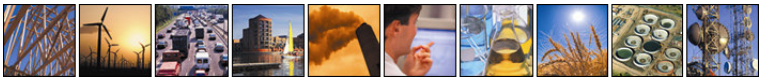
However, based on previous experience it is evident that MS may report insufficient data or in a format that is inconsistent with the provisions set out in the LCP Directive. Entec has reviewed the data provided in the emission inventories and identified any data gaps, whether null data or missing entries, or inconsistencies that need to be filled or corrected before the data analysis is undertaken.

Entec developed a list of the data gaps in the national emission inventories for each MS and submitted this list to the Commission for discussion. Questions or statements related to both the requirements of the Directive, as well as additional information that would be of use for further analysis were prepared for each MS. It was agreed with the Commission to distribute this list to the relevant MS in order to fill in any missing data that is required for the data analysis. Entec has contacted the relevant MS representatives directly to introduce the study and to request clarifications or missing data. This involved sending an introductory email with the data request, followed up by a telephone call where possible to confirm the receipt of the email and to discuss the request in more detail. If no answers to the data request were received within three weeks, the MS representative was contacted once more.

For a small number of data gaps, information on sectoral classification and the age of the LCP has been sourced from additional data sources, where possible, such as EPER, existing LCP inventories and MS LCP national emission reduction plans prepared and submitted under the LCPD.

3.2 Consultation

Appendix A summarises the status (at 25 June 2008) of consultation Entec has had with each Member State competent authority. It does not list explicitly what the specific data gaps still outstanding with each Member State were.



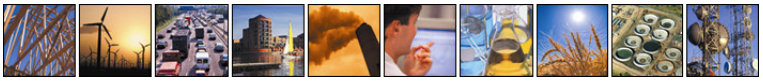
3.3 Limitations and implications of data gaps

Table 3.1 summarises all the data gaps and/or inconsistencies identified in each MS's inventory, the limitations of these data gaps/inconsistencies, and the implications these data gaps/inconsistencies have on the analysis in subsequent chapters of this report. For the MS not listed in the table (Austria, Belgium, Cyprus, Estonia, Finland, France, Greece, Hungary, Malta, Portugal, Romania and Slovenia) the available information does not seem to indicate potential inconsistencies.

Table 3.1 Summary of limitations of MS LCP inventories and their implications for this report

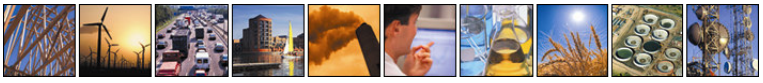
Member State	Limitation	Implications
Bulgaria	No data reported for one heavy fuel oil LCP in 2004 and 2005.	Set equal to 2006. Small error introduced to '04 and '05 inventories.
	No data reported for one natural gas fired LCP in 2005.	Set as average of 2004 and 2006. Small error introduced to 2005 inventory.
	No data reported for one natural gas fired LCP in 2004 and 2005.	Set equal to 2006. Small error introduced to '04 and '05 inventories.
Czech Republic	Rated thermal input is reported as the operating capacity	Installed capacity will be underestimated. LCP may be placed in a lower capacity class than its nameplate capacity would indicate.
Denmark	An informed speculation of the submitted inventories suggests that data may have been reported at an installation level (i.e. emissions from all stacks from a single installation have been combined) and it is unclear at what level the 50 MWth capacity threshold has been applied for inclusion in the inventory.	Number of reported LCPs may be an underestimate. Additional non-LCP energy and emissions may have been reported (i.e. stacks <50 MWth).
	Three LCPs missing energy and emissions data for all years.	Underestimates of total energy and emissions. Slightly unrepresentative MS emission factors.
	Inventories do not provide thermal capacities.	No analysis by capacity class.
	No age classification (existing/new) of LCPs.	No analysis by age class.
Germany	Incomplete age classification (existing/new) of LCPs.	Limited analysis by age class.
	Incomplete sector classification of LCPs.	Limited analysis by sector.
Ireland	An informed speculation of the submitted inventories suggests that data may have been reported at an installation level (i.e. emissions from all stacks from a single installation have been combined).	Number of reported LCPs may be an underestimate.
Italy	2004 inventory is missing energy input and dust emissions, and number of LCPs reported is inconsistent with 2005 and 2006 inventories.[5]	Only the 2005 and 2006 inventories will be used in this report.

[5] In Italy the LCP Directive was only transposed in April 2006, rendering it difficult to collect 2004 data.



Member State	Limitation	Implications
	Erroneous energy input data; several LCPs (31 in 2005, one in 2006 inventory) listed with data out by 1, 2 or 3 orders of magnitude. Data have been corrected either through being brought into same order of magnitude as alternative inventory year or through emission factor being brought into acceptable range.	Errors have been corrected (but not confirmed by MS competent authority).
	Incomplete age classification (existing/new) of LCPs.	Limited analysis by age class.
	Incomplete sector classification of LCPs.	Limited analysis by sector.
	No list of existing LCPs declared for eligibility under Article 4.4 ('opted out')	No inclusion in 'opted out' analysis.
Latvia	Energy input has been reported in unknown units. However, the reported values appeared to be consistently either a factor of 10^6 or 10^9 too small. Natural gas energy inputs have been multiplied by 10^9; all other energy inputs have been multiplied by 10^6. This has produced consistent emission factors between years.	May introduce uncertainty in energy input and emission factors (not confirmed by MS competent authority).
	No age classification (existing/new) of LCPs.	No analysis by age class.
	Incomplete sector classification of LCPs.	Limited analysis by sector.
Lithuania	No age classification (existing/new) of LCPs.	No analysis by age class.
	Incomplete sector classification of LCPs.	Limited analysis by sector.
Netherlands	Inventories do not include rated thermal inputs.	No analysis by capacity class.
	Energy input has been reported in unknown and inconsistent units and this cannot be corrected through a best estimate due to missing rated thermal input.	No analysis of total energy input, energy mix or emission factors.
	No age classification (existing/new) of LCPs.	No analysis by age class.
	No sector classification of LCPs.	No analysis by sector.
Poland	An informed speculation of the submitted inventories suggests that only boilers having a rated thermal input of more than 50 MW have been included[6]. 26 combustion plants covered by derogations from the LCPD in the Accession Treaty were not included in the inventory.	Number of reported LCPs may be an underestimate.
	List of LCPs declared for eligibility under Article 4.4 ('opted out') includes seven LCPs that are not listed in the LCP inventory.	Total LCP numbers, energy input and emissions will be underestimates.
	List of LCPs declared for eligibility under Article 4.4 ('opted out') specifies the emission source ("Źródło emisji") which is opted out. It is unclear if this is the entire LCP or part of it (e.g. one boiler).	May bring in errors into opt out analysis.
	List of LCPs declared for eligibility under Article 4.4 ('opted out') includes three 'new' LCPs.	May bring in errors into opt out analysis.
Slovakia	Incomplete sector classification of LCPs.	Limited analysis by sector.
Spain	Incomplete age classification (existing/new) of LCPs.	Limited analysis by age class.
	Incomplete sector classification of LCPs.	Limited analysis by sector.
	Age classification where provided includes nine LCPs which are listed under Article 5(2). For the purposes of this report, these LCPs have been listed as 'new' (as the article applies for new plants).	

[6] Clarification received from Polish CA regarding inventory approach: *'Summary of emission inventory from large combustion plants (LCP) 2004-2006' (…) contains data on sources (boilers) of the rated thermal input greater or equal 50 MW (…).*



Member State	Limitation	Implications
Sweden	2004 and 2005 inventories are summary statistics derived from fuel consumption. Only 2006 inventory is broken down plant-by-plant.	2004 and 2005 data may not be accurate. 2006 inventory used for comparison purposes.
	An informed speculation of the submitted inventories suggests that data may have been reported at an installation level (i.e. emissions from all stacks from a single installation have been combined).	Number of reported LCPs may be an underestimate.
	Incomplete sector classification of LCPs.	Limited analysis by sector.
	No age classification (existing/new) of LCPs.	No analysis by age class.
United Kingdom	Three plants have been reported at the site level rather than at the stack level.	Number of reported LCPs, energy input and emissions may be inaccurate.

Minor errors have not been included in the Table 3.1. The most common example of minor errors is misreporting of energy input data in incorrect units, where data are reported in TJ or MJ instead of in GJ. Such errors are easily identifiable (and have been corrected where found) through assessment of emission factors, and through comparison with rated thermal input (assuming 100% load factor).

3.4 Gas turbines

Gas turbines which have been licensed before 27 November 2002 as well as offshore gas turbines are excluded from the scope of the LCPD. However, the reporting of gas turbines appears to have been interpreted differently between MS. Several MS appear to have included gas turbines licensed before 27 November 2002 in their inventories.

No MS has stated explicitly that gas turbines have been excluded from inventories. Four MS have specifically stated that their LCP inventories include gas turbines licensed before 27 November 2002: Finland, Italy, Slovakia and the United Kingdom (except Scotland). For these four MS, the fraction of MS NO_X emissions for each reporting year that are from gas turbine LCPs are included in Table 3.2

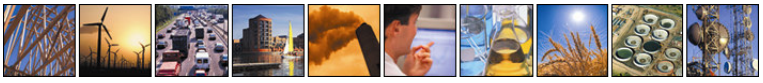


Table 3.2 Contribution of gas turbine LCPs licensed before 27 November 2002 to total MS LCP numbers and total MS NO_X emissions

Member State	Number of gas turbine LCPs licensed before 27 November 2002, and as % of MS total LCP numbers			NO_X emissions in kt (and % of MS total) attributed to gas turbine LCPs licensed before 27 November 2002		
	2004	2005	2006	2004	2005	2006
Finland	32 (16.9%)	32 (16.9%)	32 (16.8%)	4.63 (9.0%)	4.17 (13.6%)	4.36 (8.7%)
Italy		167 (41.6%)	151 (38.2%)		23.3 (17.9%)	22.0 (17.5%)
Slovakia	10 (13.7%)	10 (14.7%)	10 (15.9%)	4.69 (15.8%)	3.97 (13.9%)	2.75 (10.9%)
United Kingdom	74 (30.7%)	74 (30.5%)	75 (30.6%)	26.6 (7.1%)	24.3 (6.4%)	22.2 (5.5%)

The inclusion of gas turbines licensed before 27 November 2002 in an inventory will lead to an increase in the total NO_X emissions than would otherwise be submitted (without gas turbines).

3.5 Summary

Formal reporting requirements

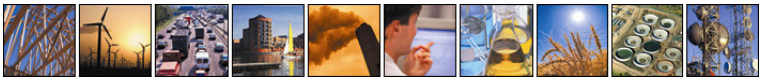
Twenty one MS inventories require no further clarifications with regards to formal reporting requirements. Four MS inventories are either incomplete or require further clarifications regarding inconsistencies, gaps or other queries in formal reporting requirements (Denmark, Italy, Latvia, Netherlands). Sweden has submitted a summary report for its LCPs, with refineries reported separately but for the non-refinery LCPs the plant-by-plant inventory is missing for 2004 and 2005. One MS has stated they have zero LCPs (Luxembourg).

Additionally, no information on opted-out LCPs has been received from Italy.

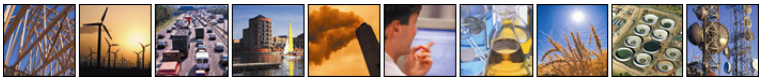
Additional data

In terms of additional data which are not formal reporting requirements there are:

- Two MS inventories without rated thermal inputs;
- Eight MS inventories with either missing or incomplete sector classifications; and



- Eight MS inventories with either missing or incomplete age classification (existing, new or new new).



4. Task 3 - Data Analysis

4.1 Introduction

This section presents an overview of the analysis that has been undertaken on the information received from MS. Although many of the data gaps initially present in MS inventories have been filled and/or corrected, section 3 lists the data gaps outstanding and how this limits the analysis.

4.2 Overview statistics

This section presents an overview of the data received from MS in their LCP inventories and via consultation to address key data gaps.

4.2.1 Numbers of LCPs

Table 4.1 presents the total numbers of LCPs reported by each MS – separated into refineries and non-refineries as set out in Annex VIII(B) of the Directive – as an average of 2004, 2005 and 2006 inventories. Note the numbers are likely to be underestimates due to the limitations in some MS inventories listed below (see section 3.3 for details):

- For several MS it is unclear whether the stack approach has been adopted for inventory reporting (e.g. Denmark, Ireland, Poland, Sweden);
- The Italian 2004 inventory has not been used; and
- For Sweden a plant-by-plant inventory for non-refineries was only available for 2006.

Figure 4.1 presents the numbers of LCPs from Table 4.1, as an average of 2004, 2005 and 2006, split by sector. This sectoral classification goes beyond the refineries/non-refineries split; these data have been sourced through consultation with MS, or through additional sources (EPER or previous inventories). For those MS (Denmark, Germany, Italy, Latvia, Lithuania, Netherlands, Slovakia, Spain and Sweden) which still have LCPs with sector classifications outstanding, those LCPs are listed as non-refineries.

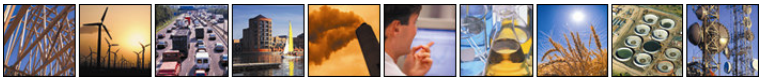


Table 4.1 Total LCP numbers reported by MS, split by refineries and non-refineries.

Member State	Refineries			Non-refineries		
	2004	2005	2006	2004	2005	2006
Austria	8	8	8	72	72	72
Belgium	17	17	17	82	83	83
Bulgaria	1	1	1	28	28	28
Cyprus	0	0	0	3	3	3
Czech Republic	6	6	6	117	114	112
Denmark	3	3	3	28	28	28
Estonia	0	0	0	13	14	14
Finland	5	5	5	184	184	185
France	17	17	17	251	248	241
Germany	45	45	45	561	559	552
Greece	8	9	9	29	29	31
Hungary	1	1	1	44	44	44
Ireland	1	1	1	17	15	15
Italy		25	26		376	369
Latvia	0	0	0	22	23	22
Lithuania	3	3	3	34	34	35
Luxembourg	0	0	0	0	0	0
Malta	0	0	0	10	10	10
Netherlands	10	11	21	133	134	134
Poland	2	2	2	92	92	91
Portugal	3	3	3	20	20	21
Romania	9	7	7	167	166	165
Slovakia	1	1	1	72	67	62
Slovenia	0	0	0	8	8	9
Spain	30	31	33	94	102	107
Sweden	3	3	3			153
United Kingdom	50	52	52	191	191	193
EU-27 total	**223**	**251**	**264**	**2272**	**2644**	**2779**

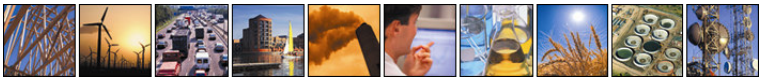
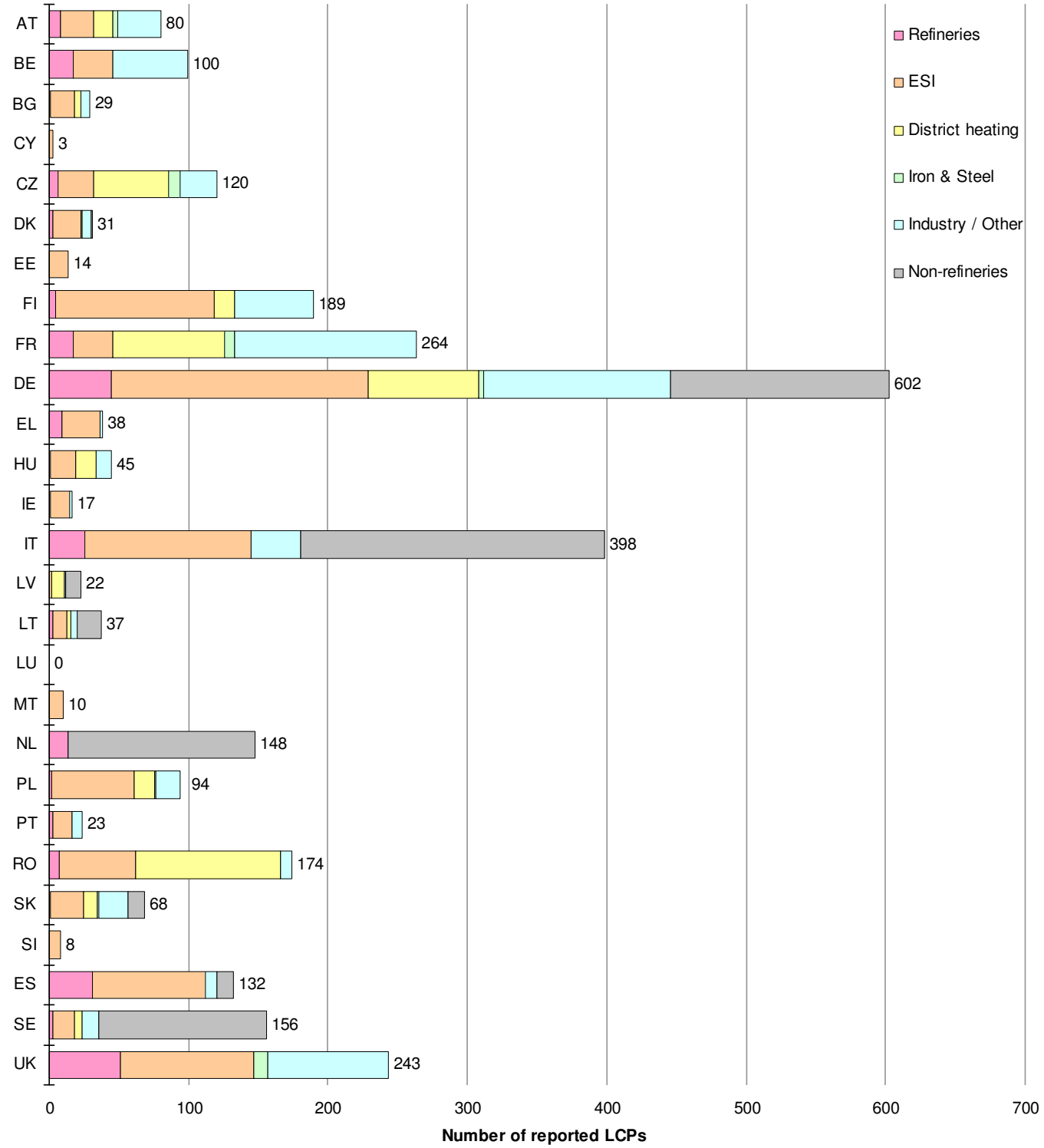
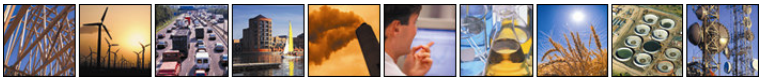


Figure 4.1 Number of reported LCPs (as 2004-2006 average), split by sector.



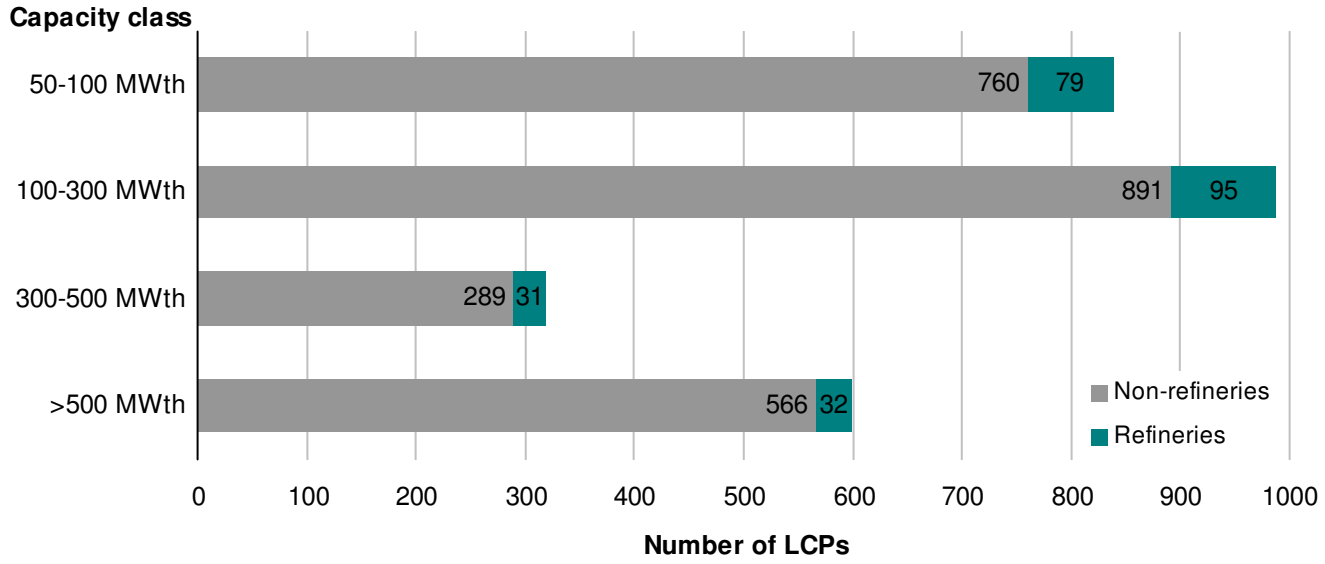
Note: LCPs without sectoral classification are presented as 'non-refineries'. IT: 2005/2006 average; SE: 2006 data



The total number of LCPs reported on by each MS is again shown in Table 4.2 (on the following page), averaged over the 2004-2006 period and split by sector (refineries/non-refineries), but further disaggregated into four capacity classes: 50-100MWth, 100-300MWth, 300-500MWth and LCPs with rated thermal input greater than 500MWth. EU totals are included at the bottom. Limitations placed on this analysis are outlined in section 3.3. Those MS without capacity class splits are shown with totals only (Denmark and the Netherlands). For Sweden, 2006 LCP numbers are presented; for Italy 2005-2006 average LCP numbers are presented.

Figure 4.2 (below) presents these data graphically for the EU as a whole. Please note that this figure cannot include MS for which no capacity split is available (NL, DK) and therefore shows underestimates.

Figure 4.2 Total number of LCPs in the EU-27 which have been included in MS emission inventories, reported separately for refineries and non-refinery LCPs, and split by capacity class.



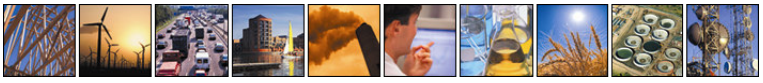
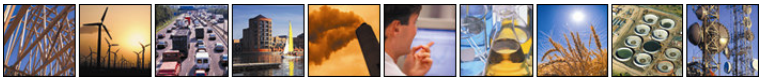


Table 4.2 Summary of total MS LCP numbers (as an average 2004 to 2006; Note 1), split by capacity class.

Member State	Non-refineries (numbers by capacity class - MWth)					Refineries (numbers by capacity class - MWth)					All LCPs
	50-100	100-300	300-500	>500	Total	50-100	100-300	300-500	>500	Total	TOTAL
Austria	25	31	6	10	72	4	2	1	1	8	**80**
Belgium	23	35	10	15	83	6	9	1	1	17	**100**
Bulgaria	5	6	5	12	28	0	0	0	1	1	**29**
Cyprus	0	0	0	3	3	0	0	0	0	0	**3**
Czech Republic	34	48	12	20	114	2	1	2	1	6	**120**
Denmark					28	1	2	0	0	3	**31**
Estonia	2	7	2	3	14	0	0	0	0	0	**14**
Finland	77	84	13	11	184	0	5	0	0	5	**189**
France	113	92	16	26	247	4	3	5	5	17	**264**
Germany	184	203	51	120	557	15	18	5	7	45	**602**
Greece	7	1	6	15	30	5	4	0	0	9	**38**
Hungary	6	21	6	11	44	0	0	0	1	1	**45**
Ireland	1	2	6	6	16	0	1	0	0	1	**17**
Italy (Note 2)	66	66	52	65	249	7	3	5	7	22	**271**
Latvia	8	10	2	2	22	0	0	0	0	0	**22**
Lithuania	12	11	5	7	34	0	1	1	1	3	**37**
Malta	0	9	1	0	10	0	0	0	0	0	**10**
Netherlands					134					14	**148**
Poland	7	18	17	50	92	0	0	0	2	2	**94**
Portugal	7	4	2	7	20	0	3	0	0	3	**23**
Romania	33	84	15	35	166	4	1	2	0	8	**174**
Slovakia	26	24	6	11	67	0	0	0	1	1	**68**
Slovenia	0	4	2	2	8	0	0	0	0	0	**8**
Spain	5	18	12	66	101	15	11	3	2	31	**132**
Sweden (Note 2)	66	55	19	13	153	0	3	0	0	3	**156**
United Kingdom	53	59	22	57	192	16	28	6	2	51	**243**
EU total	**760**	**891**	**289**	**566**	**2667**	**79**	**95**	**31**	**32**	**251**	**2918**
EU total (%) (Note 3)	**30.3%**	**35.6%**	**11.5%**	**22.6%**	**100%**	**31.1%**	**37.2%**	**12.2%**	**12.7%**	**100%**	



Note 1: Due to rounding of 2004-2006 averages, components may not sum exactly to the totals presented.
Note 2: Figures for Italy are 2005-2006 averages. Figures for Sweden are from the 2006 inventory.
Note 3: EU total (%) excludes MS with greyed out capacity split.

4.2.2 Installed Capacity

Although not a formal reporting requirement under the Directive, most MS reported the rated thermal input (in MWth) at a plant level. The vast majority appear to have reported the nameplate capacity (indicated by unchanging MWth from year to year), but the reported capacities for LCPs in the Czech Republic appear to be operating capacities, as indicated by comments supplied within the Czech Republic inventory.

Figure 4.3 displays the total installed thermal capacity of reported LCPs by each MS, as an average of 2004-2006 reported capacities. The totals are split by age classification (existing, new, 'new new'[7]) where possible to show the broad age profile of LCPs; this is additional information sought from MS. Information on which plants were licensed after 27th November 2002 ('new new') has not been possible to gather from all MS. However, the fractions of 'new new' plants are small, and are otherwise incorporated in the category 'new'.

The installed thermal capacity can also be presented split by capacity class or by sector.

[7] 'Existing' LCPs are defined in the LCP Directive as those "*…for which the original construction licence or, in the absence of such a procedure, the original operating licence was granted before 1 July 1987.*" A 'new' LCP relates to those granted a licence on or after 1 July 1987 but before 27 November 2002 and a 'new-new' LCP from 27 November 2002 onwards.

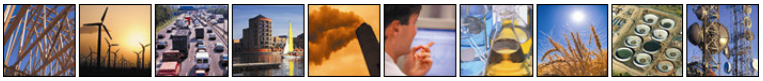
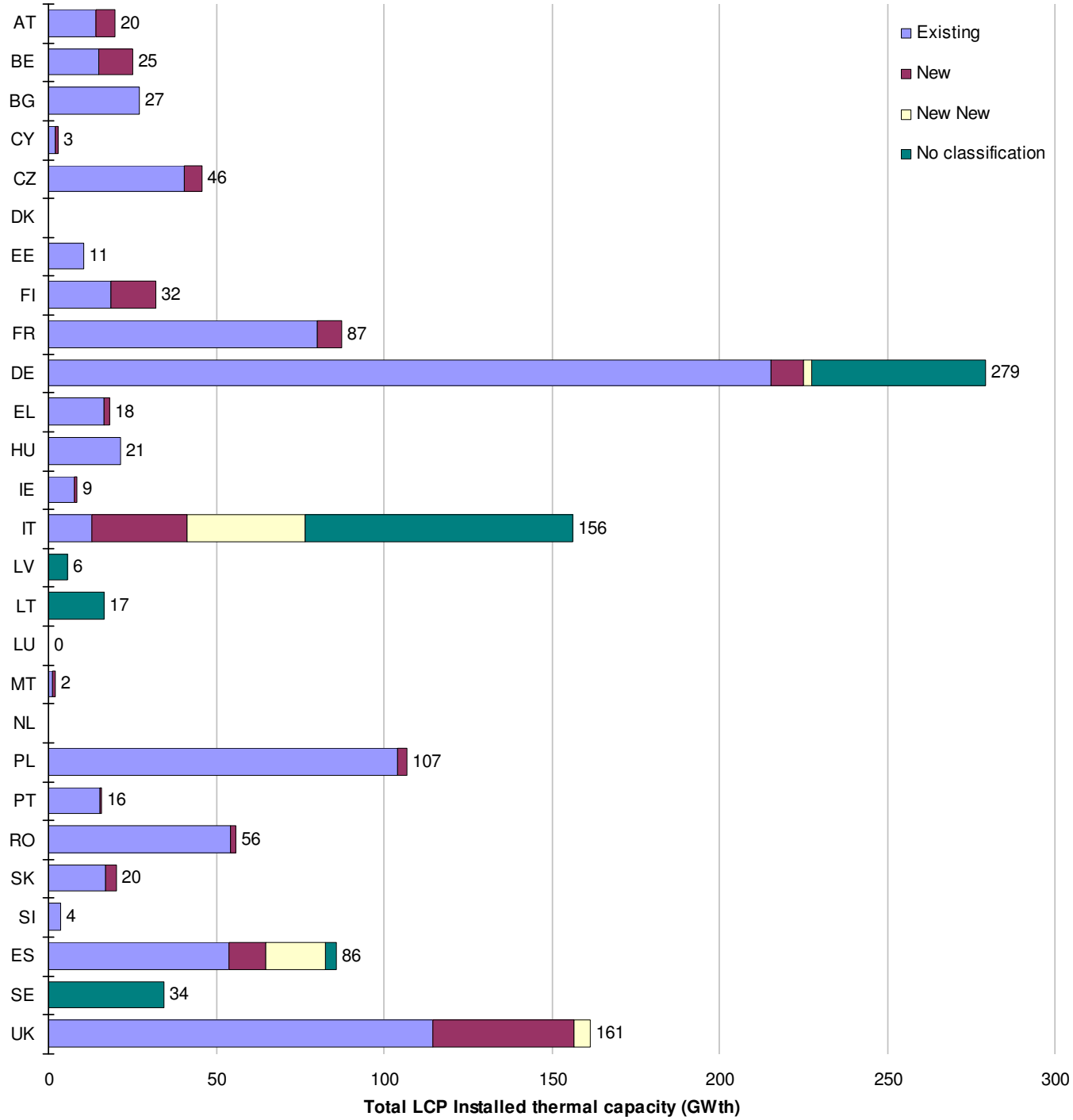
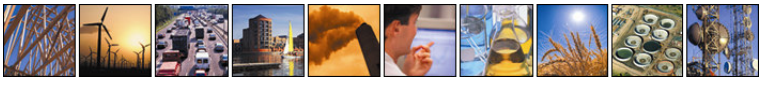


Figure 4.3 **Average (2004-2006) total installed thermal capacity (GWth) of reported LCPs, split by age classification where possible.**





4.2.3 Total energy input and energy mix

MS were asked to report the total annual energy input, relating to net calorific value, in GJ, broken down into five fuel categories: biomass, other solid fuels, liquid fuels, natural gas and other gases. Figure 4.4 displays the average total energy input for each MS and overall for the EU (averaged over the three reporting years 2004, 2005 and 2006), split into the five fuel categories, but expressed as a percentage to show the fractional split by fuel type (energy mix). This data is also presented in tabular form, but split into non-refineries and refineries in Table 4.3 and Table 4.4 respectively.

The same energy input data but shown year-by-year is displayed in Figure 4.5, presented for each MS, again split into the five fuel categories. This plot helps to illustrate shifts in fuel use. For example, there is a visible increase in biomass use in Austria, Denmark, France, Germany, Poland and Sweden over the period 2004 to 2006.

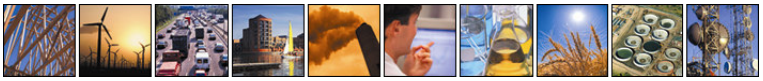


Table 4.3 Average annual (2004-2006) total energy input for non-refineries, relating to net calorific value (PJ), split by fuel type.

Member State	Biomass		Other solid fuels		Liquid fuels		Natural gas		Other gases		TOTAL
	PJ	%	PJ	%	PJ	%	PJ	%	PJ	%	PJ
Austria	24	10.6%	74	32.2%	24	10.5%	103	44.7%	4	1.9%	**230**
Belgium	8	2.7%	77	24.9%	20	6.6%	167	54.4%	35	11.4%	**308**
Bulgaria	1	0.5%	240	83.5%	5	1.8%	36	12.6%	5	1.7%	**287**
Cyprus	0	0.0%	0	0.0%	46	100.0%	0	0.0%	0	0.0%	**46**
Czech Republic	7	1.0%	591	87.3%	21	3.1%	20	3.0%	38	5.6%	**677**
Denmark	18	7.3%	174	71.1%	14	5.5%	39	16.1%	0	0.0%	**245**
Estonia	0	0.3%	101	86.8%	1	0.5%	11	9.5%	3	3.0%	**116**
Finland	70	17.9%	203	52.1%	6	1.6%	102	26.3%	8	2.0%	**389**
France	16	2.8%	297	52.0%	100	17.6%	99	17.4%	58	10.2%	**570**
Germany	37	0.9%	2,848	71.4%	86	2.2%	790	19.8%	227	5.7%	**3,988**
Greece	0	0.0%	350	85.0%	41	10.0%	21	5.0%	0	0.0%	**411**
Hungary	12	5.4%	86	39.4%	8	3.7%	104	47.7%	8	3.8%	**217**
Ireland	0	0.0%	74	52.2%	43	30.3%	25	17.4%	0	0.0%	**141**
Italy	11	0.6%	400	20.0%	335	16.7%	1,092	54.5%	164	8.2%	**2,002**
Latvia	0	0.6%	0	0.0%	2	4.6%	35	94.8%	0	0.0%	**37**
Lithuania	3	5.2%	0	0.1%	8	13.4%	49	81.4%	0	0.0%	**60**
Malta	0	0.0%	0	0.0%	26	100.0%	0	0.0%	0	0.0%	**26**
Netherlands (Note 1)											
Poland	13	0.8%	1,530	95.8%	13	0.8%	9	0.6%	32	2.0%	**1,597**
Portugal	6	2.2%	134	52.4%	36	14.2%	79	30.8%	1	0.5%	**256**
Romania	0	0.0%	279	60.3%	40	8.6%	142	30.7%	2	0.4%	**462**
Slovakia	2	1.4%	85	55.8%	1	0.7%	54	35.3%	10	6.8%	**152**
Slovenia	0	0.3%	59	98.3%	0	0.3%	1	1.1%	0	0.0%	**60**
Spain	8	0.6%	744	62.0%	111	9.2%	323	27.0%	14	1.1%	**1,199**
Sweden (Note 2)	99	60.7%	22	13.8%	21	13.2%	9	5.6%	11	6.6%	**162**
United Kingdom	26	1.1%	1,228	54.3%	44	2.0%	879	38.9%	85	3.8%	**2,262**
EU Total	**361**	**2.3%**	**9,593**	**60.3%**	**1,052**	**6.6%**	**4,188**	**26.3%**	**707**	**4.4%**	**15,901**

Note 1: Netherlands energy input data is in unknown units and has been removed.

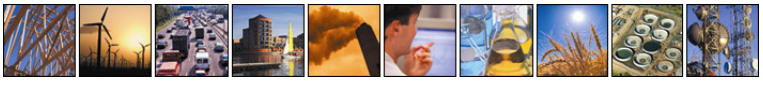


Table 4.4 **Average annual (2004-2006) total energy input for refineries, relating to net calorific value (PJ), split by fuel type (Note 1).**

Member State	Biomass		Other solid fuels		Liquid fuels		Natural gas		Other gases		TOTAL
	PJ	%	PJ	%	PJ	%	PJ	%	PJ	%	PJ
Austria	0	0.0%	0	0.0%	8	25.1%	1	2.8%	22	72.1%	**30**
Belgium	0	0.0%	0	0.0%	10	17.9%	13	21.5%	35	60.6%	**58**
Bulgaria	0	0.0%	0	0.0%	8	47.2%	8	48.2%	1	4.6%	**17**
Czech Republic	0	0.0%	27	64.2%	11	26.2%	3	7.0%	1	2.5%	**43**
Denmark	0	0.0%	0	0.0%	1	4.7%	0	0.0%	15	95.3%	**16**
Finland	0	0.0%	0	0.0%	5	27.5%	12	70.5%	0	2.0%	**16**
France	0	0.0%	1	0.6%	68	38.6%	2	0.9%	105	59.8%	**176**
Germany	0	0.0%	0	0.0%	61	23.3%	7	2.6%	194	74.1%	**261**
Greece	0	0.0%	0	0.0%	11	48.8%	0	0.0%	12	51.2%	**23**
Hungary	0	0.0%	0	0.0%	0	3.5%	1	32.6%	2	63.9%	**2**
Ireland	0	0.0%	0	0.0%	2	32.2%	0	0.0%	4	67.8%	**6**
Italy	0	0.0%	16	7.4%	53	25.0%	15	6.9%	130	60.7%	**213**
Lithuania	0	0.0%	0	0.0%	6	33.5%	0	0.0%	12	66.5%	**18**
Netherlands (Note 2)											
Poland	0	0.0%	0	0.0%	42	97.1%	0	0.0%	1	2.9%	**44**
Portugal	0	0.0%	0	0.0%	11	83.4%	0	0.0%	2	16.6%	**13**
Romania	0	0.0%	0	0.0%	6	49.0%	2	20.2%	4	30.8%	**12**
Slovakia	0	0.0%	0	0.0%	14	98.4%	0	0.3%	0	1.3%	**14**
Spain	0	0.0%	0	0.0%	63	52.5%	0	0.0%	57	47.5%	**120**
Sweden	0	0.0%	0	0.0%	2	5.7%	1	3.5%	26	90.8%	**28**
United Kingdom	0	0.0%	0	0.0%	45	23.2%	19	9.8%	130	67.0%	**194**
EU Total	**0**	**0.0%**	**44**	**3.4%**	**427**	**32.7%**	**83**	**6.3%**	**752**	**57.6%**	**1,306**

Note 1: Cyprus, Estonia, Latvia, Luxembourg, Malta and Slovenia are not included because they have reported zero refineries.
Note 2: Netherlands energy input data is in unknown units and has been removed.

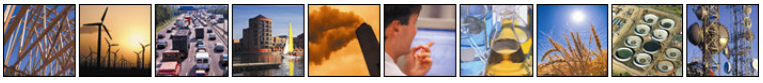
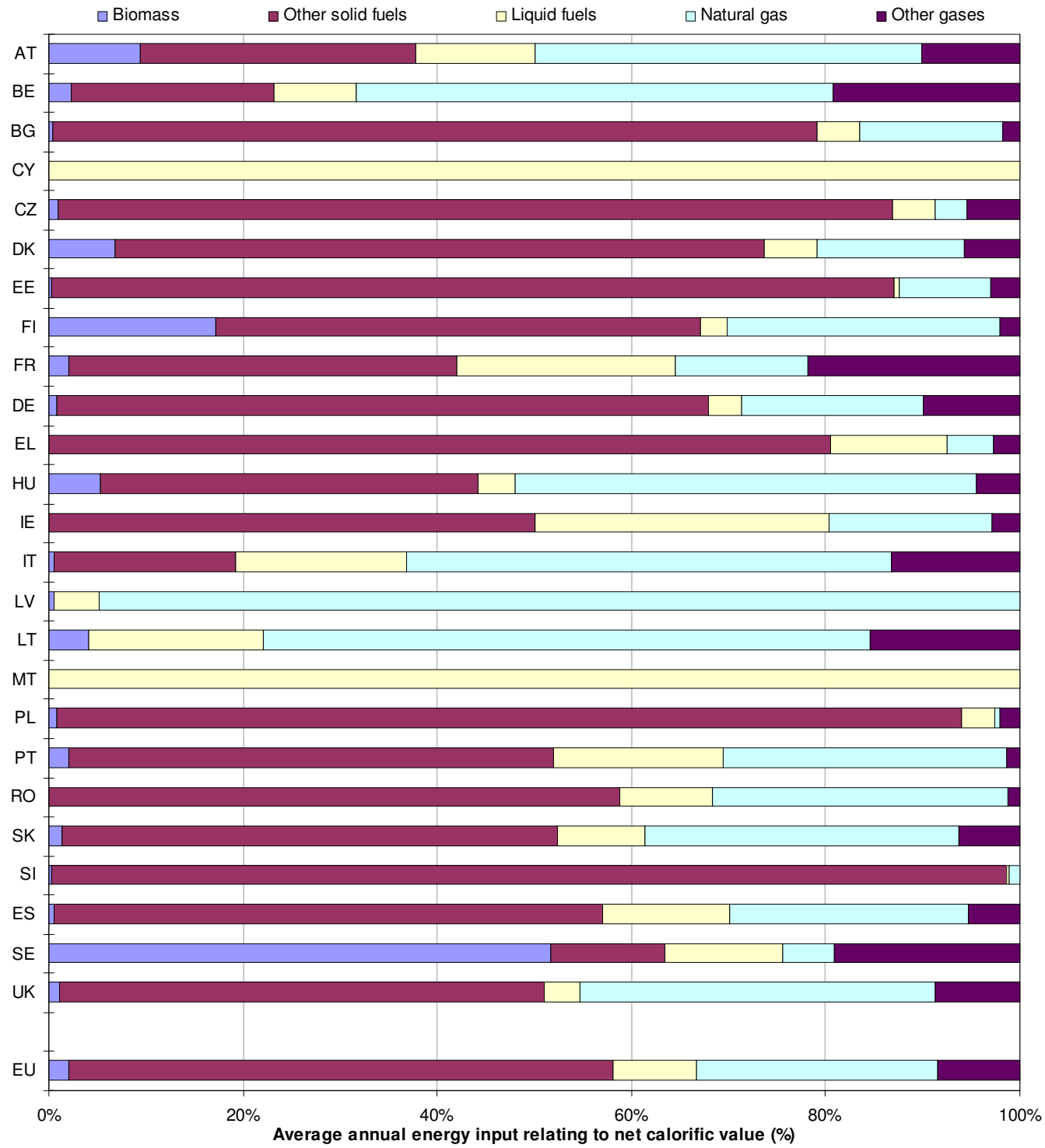


Figure 4.4 **Share (%) of different fuel types in annual 2004-2006 average energy input for each MS and overall for the EU**



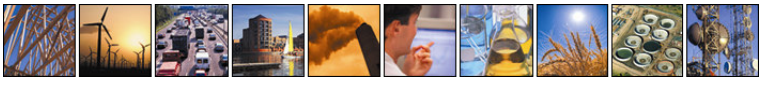
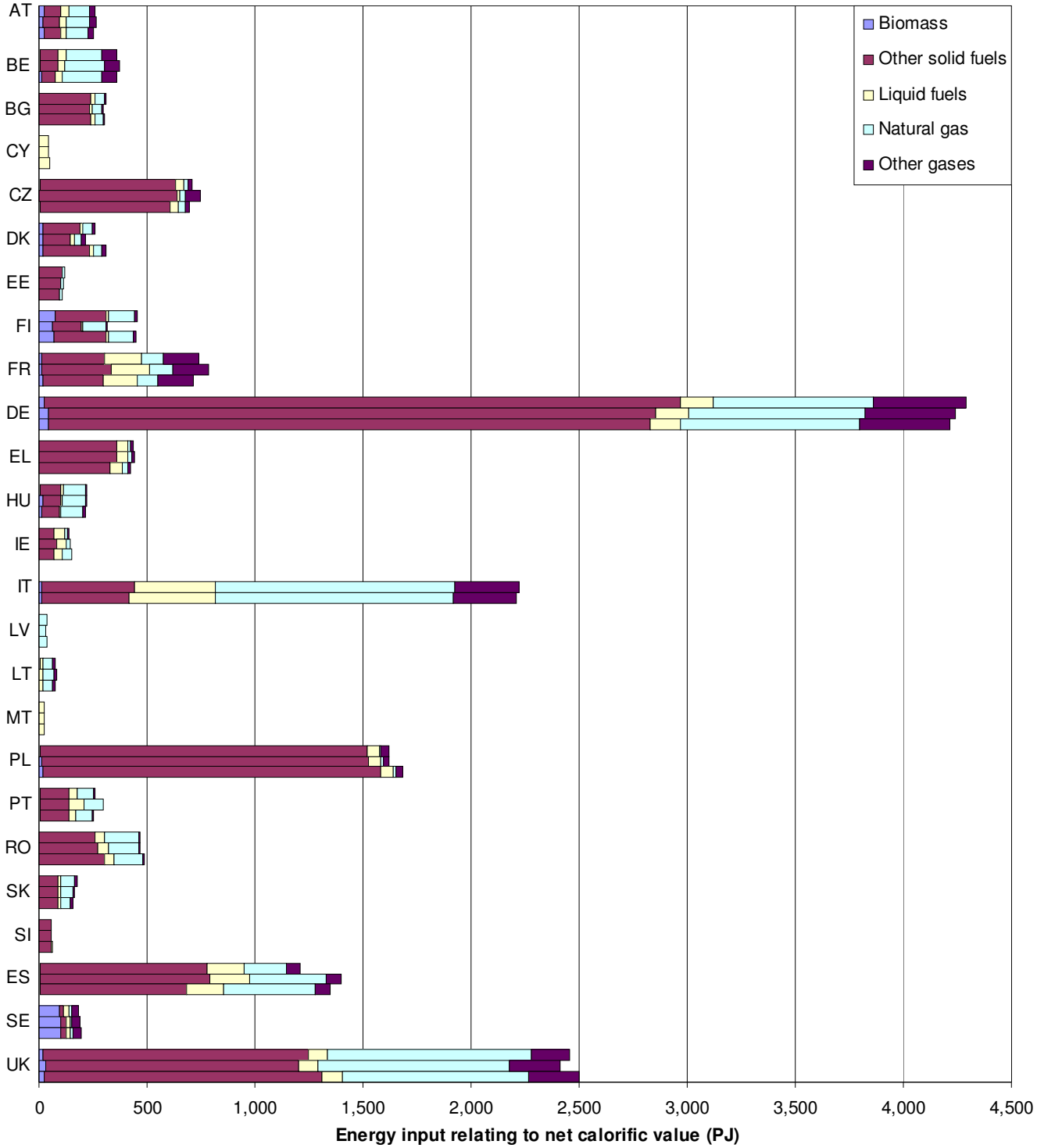
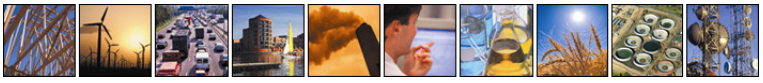


Figure 4.5 **Total energy input (PJ, 10^{15}J) relating to net calorific value for each MS in 2004, 2005 and 2006, split by fuel type. Three bars per MS: top: 2004, middle: 2005, bottom: 2006.**





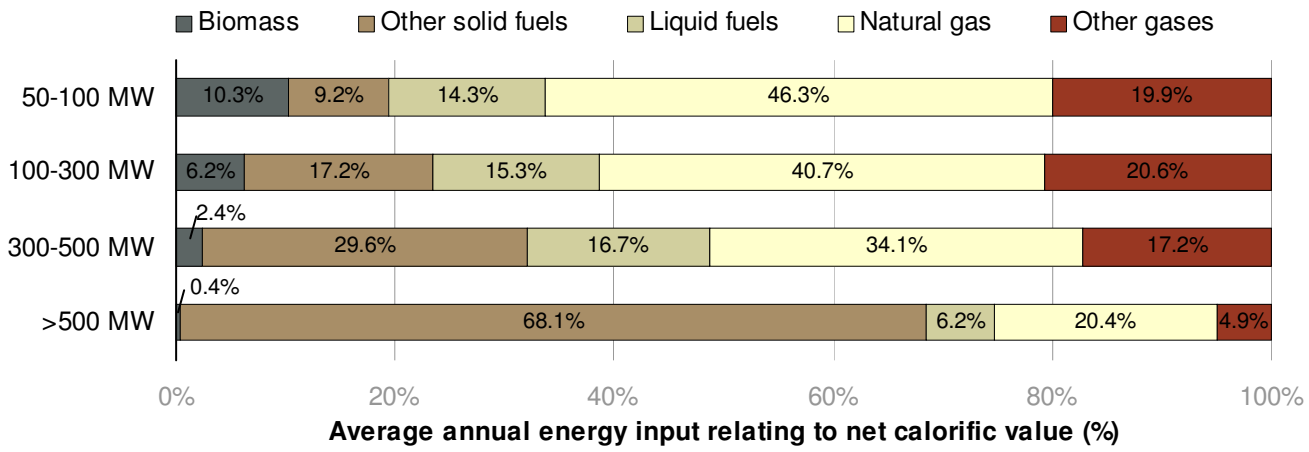
The energy input data presented in Figure 4.4 and Figure 4.5 indicates the strong reliance of LCPs in many EU MS on solid fuels ('other solid fuels', covering mainly hard coal and lignite: 56.0%) as well as the importance of natural and 'other gases' (combined: 33.3%) for many MSs.

It is also possible to analyse the total fuel use split by capacity class. The classes are the same assumed in section 4.2.1, i.e. 50-100MWth, 100-300MWth, 300-500MWth and >500MWth. For the purposes of this split, those MS which did not provide LCP rated thermal inputs are treated individually:

- No capacity split is available for Denmark, so only totals are possible; and
- No capacity split is available for the Netherlands, and energy data was provided in unknown units, so totals are not available.

The total EU fuel use for reported LCPs from each MS, split by capacity class and split by fuel type is shown in Figure 4.6, calculated as an average of 2004, 2005 and 2006 data. This data shows the increasing reliance on solid fuels (coal and lignite) for LCPs of higher capacity. It also shows the increasing use of biomass and natural gas in LCPs of smaller capacity.

Figure 4.6 Average fuel use (%) per capacity class for the EU (2004-2006 annual average)



The total fuel use (i.e. not split by fuel type) for reported LCPs from each MS, split by capacity class, and shown as an average of 2004, 2005 and 2006 data is listed in Table 4.5, and shown in Figure 4.7.

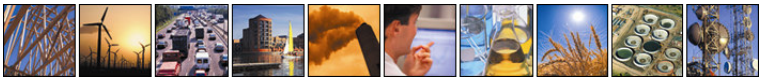


Table 4.5 Average annual LCP total fuel use per capacity class (PJ, and %)

Member State	50-100MWth		100-300MWth		300-500MWth		>500MWth		TOTAL
	PJ	%	PJ	%	PJ	%	PJ	%	PJ
Austria	40	15.5%	70	26.8%	27	10.5%	123	47.1%	**260**
Belgium	26	7.2%	91	24.9%	62	16.8%	187	51.1%	**366**
Bulgaria	1	0.5%	18	5.9%	20	6.6%	265	87.0%	**304**
Cyprus	0	0.0%	0	0.0%	0	0.0%	46	100.0%	**46**
Czech Republic	20	2.8%	104	14.5%	79	11.0%	516	71.7%	**720**
Denmark									**260**
Estonia	1	1.0%	7	6.3%	3	2.8%	105	90.0%	**116**
Finland	44	10.9%	186	45.9%	85	21.0%	90	22.2%	**405**
France	70	9.4%	144	19.3%	112	15.0%	420	56.2%	**746**
Germany	138	3.2%	459	10.8%	276	6.5%	3,377	79.5%	**4,249**
Greece	18	4.2%	17	3.9%	45	10.4%	353	81.4%	**434**
Hungary	4	1.8%	27	12.2%	15	6.9%	173	79.1%	**219**
Ireland	1	0.8%	11	7.8%	35	24.0%	99	67.4%	**147**
Italy	83	3.7%	289	13.1%	419	18.9%	1,424	64.3%	**2,216**
Latvia	3	7.2%	8	22.6%	5	12.3%	21	58.0%	**37**
Lithuania	6	7.1%	10	13.3%	7	8.4%	56	71.3%	**79**
Malta	0	0.0%	17	67.1%	9	32.9%	0	0.0%	**26**
Netherlands									
Poland	1	0.1%	31	1.9%	73	4.5%	1,535	93.6%	**1,641**
Portugal	10	3.6%	25	9.1%	5	2.0%	229	85.3%	**269**
Romania	15	3.1%	46	9.7%	43	9.1%	370	78.1%	**474**
Slovakia	12	7.3%	26	15.4%	20	12.0%	108	65.3%	**166**
Slovenia	0	0.0%	2	4.1%	16	25.9%	42	70.0%	**60**
Spain	30	2.3%	106	8.1%	89	6.7%	1,094	82.9%	**1,319**
Sweden (Note 1)	37	18.7%	92	46.6%	38	19.3%	30	15.4%	**198**
United Kingdom	95	3.9%	222	9.0%	219	8.9%	1,920	78.2%	**2,456**
Total	**656**	**3.8%**	**2,009**	**11.7%**	**1,702**	**9.9%**	**12,585**	**73.1%**	**17,212**

Note 1: Sweden only provided data disaggregated by LCP for 2006 (and totals for 2004 and 2005); therefore the figures in this table will not directly correlate with the totals presented in Table 4.3 and Table 4.4 which are based on an average of 2004-2006 energy data.

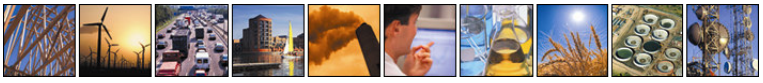
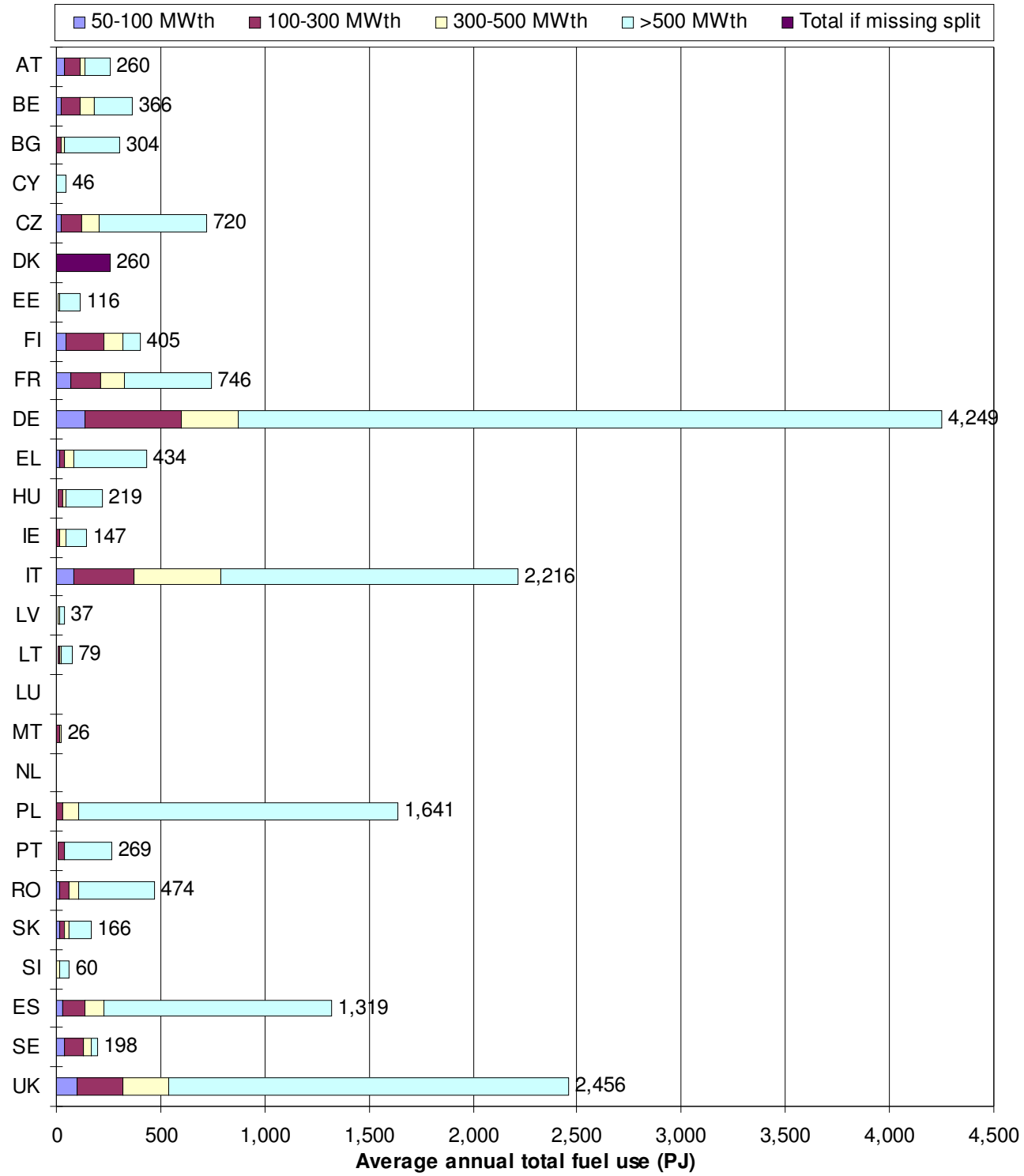
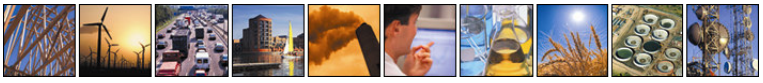


Figure 4.7 Average annual (2004-2006) LCP total fuel use per capacity class (PJ)





MS with highest energy input

Drawing on the data presented in Figure 4.5, Table 4.6 presents the five MS with the highest energy input to LCPs, for each of the five fuel types, and for total energy input. This data excludes the Netherlands because its data have been compiled in unknown/incorrect/inconsistent units.

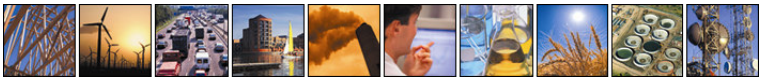
Table 4.6 The five MS with highest total average annual energy input for each fuel type, and for all fuels

Biomass	Other solid fuels	Liquid fuels	Natural gas	Other gases	Total all fuels
1. Sweden	1. Germany	1. Italy	1. Italy	1. Germany	**1. Germany**
2. Finland	2. Poland	2. Spain	2. United Kingdom	2. Italy	**2. United Kingdom**
3. Germany	3. United Kingdom	3. France	3. Germany	3. United Kingdom	**3. Italy**
4. United Kingdom	4. Spain	4. Germany	4. Spain	4. France	**4. Poland**
5. Austria	5. Czech Republic	5. United Kingdom	5. Belgium	5. Spain	**5. Spain**

An alternative to showing the highest total average annual energy input for each fuel type is to sort MS by the fraction that a fuel type makes compared to the MS total energy input. This is essentially identifying from Figure 4.4 those MS with the highest fractional use of a fuel. Table 4.7 lists the top 5 MS for each fuel type and the fraction that fuel comprises the total MS energy input.

Table 4.7 The five MS with highest fractional energy input for each fuel type (as a proportion of total MS fuel consumption)

Biomass		Other solid fuels		Liquid fuels		Natural gas		Other gases	
MS	**% of total input**	**MS**	**% of total input**	**MS**	**% of total input**	**MS**	**% of total input**	**MS**	**% of total input**
1. Sweden	51.7%	1. Slovenia	98.3%	=1. Cyprus	100%	1. Latvia	94.8%	1. France	21.9%
2. Finland	17.2%	2. Poland	93.3%	=1. Malta	100%	2. Lithuania	62.5%	2. Belgium	19.2%
3. Austria	9.4%	3. Estonia	86.8%	3. Ireland	30.4%	3. Italy	49.9%	3. Sweden	19.1%
4. Denmark	6.9%	4. Czech Republic	86.0%	4. France	22.6%	4. Belgium	49.2%	4. Lithuania	15.4%
5. Hungary	5.3%	5. Greece	80.5%	5. Lithuania	18.0%	5. Hungary	47.6%	5. Italy	13.3%



LCPs with highest energy input

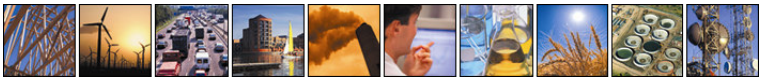
Table 4.8 lists the ten LCPs (which are all non-refineries) with the highest average annual energy input over the three years 2004, 2005, 2006. Considering both Table 4.8 and the MSs listed in Table 4.6 in the right-most column, it is evident that Germany has six of the ten LCPs with highest average annual energy input. The top ten consists entirely of LCPs from Poland, Germany and the UK, i.e. MS that typically have very large plants. On the other hand, although Italy is listed as the country with third highest total annual average energy input, it does not have any LCPs listed in Table 4.8 (indeed by comparison its LCP with highest energy input is 99th highest) as it has a much larger number of medium/large LCPs.

It is important to note that this list may be impacted by the stack configuration of installations as well as by the aggregation level used for reporting emissions by each MS (see section 3.3). It seems likely that some Member States have reported emissions at the installation level (adding data for several stacks), rather than at the stack level. This may be the case for some of the plants mentioned in the top ten lists in this and following sections.

Note that the total average annual energy input from the ten LCPs listed in Table 4.8 sums to 1,827 PJ, which represents 10.6% of the total energy input to all EU LCPs.

Table 4.8 The ten LCPs (non-refineries) with highest average annual energy input

Number	Member State	LCP Name	LCP Location	Average annual energy input (GJ)
1.	Poland	BOT Elektrownia Bełchatów S.A.	Rogowiec, ul. Energetyczna 7, 97-406 Bełchatów	273,697,270
2.	Germany	Kraftwerk	Bergheim	247,193,493
3.	United Kingdom	Drax	Drax Power, Drax P Stn, Selby	233,087,359
4.	Germany	Vattenfall Europe Generation AG & Co. KG/Kraftwerk	Peitz	220,319,667
5.	Germany	Kraftwerk	Eschweiler	173,686,477
6.	Germany	Kraftwerk Frimmersdorf	Grevenbroich	171,019,422
7.	Germany	Kraftwerk Neurath	Grevenbroich	163,083,469
8.	Poland	BOT Elektrownia Turów S.A.	ul. Młodych Energetyków 12, 59-916 Bogatynia 3	117,490,526
9.	Germany	Vattenfall Europe Generation; KW Lippendorf, Block S+R	Böhlen	116,373,853
10.	Poland	Elektrownia "Kozienice" S.A.	Świerże Górne, gm. Kozienice, 26-900 Kozienice 1	110,847,562



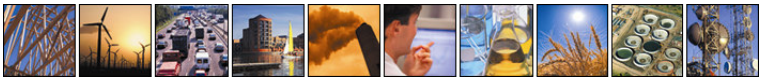
Other queries

The ten LCPs with highest average annual biomass energy input over the period 2004 to 2006 are shown below in Table 4.9. Note that the total average annual biomass input from the ten LCPs listed in Table 4.9 sums to 59.9 PJ, which represents 15.6% of the total average annual biomass input (383.7 PJ) to all EU LCPs.

Table 4.9 The ten LCPs with highest average annual biomass energy input

Member State	Plant Name	Plant Location	Sector	Biomass input 2006 (GJ)	Total biomass input 2004-2006 (GJ)	Average annual biomass input (GJ)
Germany	Laugenkessel	Arneburg	Industry/Other	14,672,000	28,289,000	14,144,500 (Note 1)
Germany	Heizkraftwerk	Blankenstein	Electricity Supply Industry (ESI)	7,138,130	22,603,977	7,534,659
Denmark	Avedøreværket	Hvidovre	Electricity Supply Industry (ESI)	5,148,688	18,533,392	6,177,797
Spain	Tarragona Power (Boilers)	Tarragona (Cataluña)	Electricity Supply Industry (ESI)	5,682,384	16,504,812	5,501,604
Czech Republic	Teplárna Ško-Energo s.r.o.	Mladá Boleslav	Industry/Other	5,371,103	5,371,103	5,371,103
Finland	Kymin Voima Oy Power plant, K7	Kuusankoski	Industry/Other	4,592,470	13,729,470	4,576,490
Finland	Stora Enso Oyj, Imatra mills Bark Boiler 2	Imatra	Industry/Other	4,763,000	13,297,000	4,432,333
Austria	Lenzing AG	Energieanlage Iia, 4860 Lenzing	Industry/Other	4,512,006	12,958,589	4,319,530
Austria	Sappi Gratkorn GmbH	Laugenverbrennungskessel, 8101 Gratkorn	Industry/Other	4,090,037	12,135,767	4,045,256
Germany	SCA Hygiene Products GmbH	Mannheim	Industry/Other	3,913,000	11,669,463	3,889,821

Note 1: This LCP began operating in 2005.



4.2.4 Total emissions

Table 4.10 summarises the total SO_2, NO_X and dust emissions from refinery and non-refinery LCPs that were reported by MS for 2004, 2005 and 2006.

Although Italy reported SO_2 and NO_X emissions, the 2004 inventory was not included due to missing energy input and dust emissions, and due to significantly fewer reported LCPs. For the purposes of 'like-for-like' comparison between years in this table, Italy's 2004 emissions data has been set equal to 2005 emissions.

Table 4.10 Total SO_2, NO_X and dust emissions (in kilotonnes, kt) from refinery and non-refinery LCPs that were reported by EU27 MS for 2004, 2005 and 2006

	Refineries			Non-refineries		
	2004	2005	2006	2004	2005	2006
SO_2 (kt)	371	327	317	5,011	4,789	4,601
NO_X (kt)	127	122	123	2,043	2,045	2,009
Dust (kt)	12.2	12.6	12.1	277	237	209

The total SO_2 emissions from each MS's LCP inventory are shown in Table 4.11, showing emissions from each inventory year (2004, 2005 and 2006). Emissions are shown split by refineries and 'non-refineries'. Table 4.12 and Table 4.13 additionally show the total NO_X and dust emissions from each MS LCP inventory respectively.

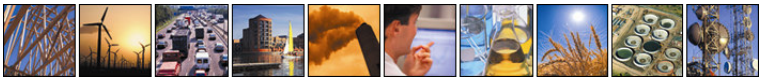


Table 4.11 Total SO_2 emissions (kt) from reported LCPs (split refineries/non-refineries) for each reporting year.

Member State	SO_2 emissions from refineries (kt)			SO_2 emissions from non-refineries (kt)		
	2004	2005	2006	2004	2005	2006
Austria	3.7	3.4	3.5	4.3	4.3	4.4
Belgium	13.2	8.9	8.8	35.9	31.3	27.0
Bulgaria	18.0	11.2	5.8	767.0	766.0	759.5
Cyprus	0	0	0	31.4	34.0	27.5
Czech Republic	10.4	10.4	9.5	148.2	148.1	145.3
Denmark	0.4	0.5	0.4	10.7	6.1	8.5
Estonia	0	0	0	77.6	66.8	60.2
Finland	3.5	2.9	2.4	36.7	20.1	33.9
France	69.1	54.5	55.1	144.6	159.8	139.5
Germany	28.6	26.2	24.2	201.5	185.6	178.0
Greece	9.8	9.8	9.7	362.3	386.2	341.3
Hungary	0	0.0	0.0	96.5	9.8	8.6
Ireland	0.7	0.9	1.0	47.9	46.3	38.1
Italy		45.6	38.9		147.0	149.6
Latvia	0	0	0	2.0	1.9	1.0
Lithuania	7.2	8.1	6.5	9.2	8.7	7.5
Malta	0	0	0	11.6	11.9	12.1
Netherlands	18.8	17.5	18.0	12.0	11.0	11.0
Poland	28.2	26.7	30.4	718.9	705.4	753.0
Portugal	11.0	9.7	9.1	92.1	104.3	82.0
Romania	3.0	3.4	3.9	490.4	514.4	561.5
Slovakia	7.3	6.8	8.9	66.1	60.9	57.0
Slovenia	0	0	0	39.8	31.7	8.8
Spain	60.0	50.0	51.9	942.0	924.1	819.8
Sweden	0.5	0.4	0.2	8.1	7.6	7.4
United Kingdom	31.4	29.9	28.3	507.2	395.9	358.3
EU	**325.0**	**326.7**	**316.5**	**4,864**	**4,789**	**4,601**

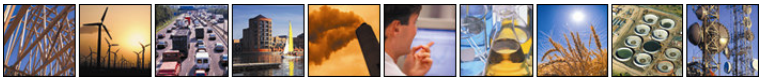


Table 4.12 Total NO_X emissions (kt) from reported LCPs (split refineries/non-refineries) for each reporting year.

Member State	NO_X emissions from refineries (kt)			NO_X emissions from non-refineries (kt)		
	2004	2005	2006	2004	2005	2006
Austria	3.4	2.9	3.2	10.7	10.9	9.9
Belgium	5.5	4.8	4.5	35.7	32.7	27.4
Bulgaria	3.5	2.6	2.0	56.0	56.9	59.6
Cyprus	0	0	0	6.6	6.9	7.1
Czech Republic	8.3	5.1	5.0	107.8	100.8	104.0
Denmark	1.3	1.2	1.5	29.4	27.5	32.8
Estonia	0	0	0	12.3	10.7	9.4
Finland	1.1	1.1	1.1	50.3	29.6	49.0
France	15.8	16.8	16.6	92.2	110.9	97.5
Germany	16.8	17.1	16.0	261.8	254.0	247.7
Greece	2.1	2.3	2.7	71.4	75.9	68.2
Hungary	0.3	0.0	0.0	20.4	18.8	15.8
Ireland	0.8	0.9	0.8	30.2	30.6	27.2
Italy		14.7	16.1		115.5	109.7
Latvia	0	0	0	3.3	3.1	3.0
Lithuania	2.7	2.9	2.4	3.8	4.2	3.7
Malta	0	0	0	5.4	5.4	5.5
Netherlands	5.6	5.4	6.7	45.8	45.0	40.3
Poland	5.2	5.5	6.2	254.8	259.1	266.5
Portugal	4.1	2.5	2.1	46.4	56.7	49.4
Romania	1.2	1.3	1.7	92.8	93.6	99.0
Slovakia	2.1	2.0	2.0	27.7	26.6	23.3
Slovenia	0	0	0	12.3	12.1	12.3
Spain	13.3	13.6	14.1	286.4	290.0	243.7
Sweden	1.3	1.3	1.4	8.8	8.9	9.1
United Kingdom	18.0	17.5	16.9	355.6	358.8	388.2
EU	**112.4**	**121.6**	**122.9**	**1,928**	**2,045**	**2,009**

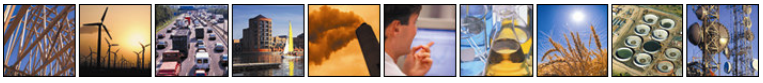


Table 4.13 Total dust emissions (kt) from reported LCPs (split refineries/non-refineries) for each reporting year.

Member State	Dust emissions from refineries (kt)			Dust emissions from non-refineries (kt)		
	2004	2005	2006	2004	2005	2006
Austria	0.11	0.10	0.10	0.87	0.79	0.74
Belgium	0.85	0.66	0.58	3.79	2.62	2.04
Bulgaria	0.37	0.23	0.14	22.03	21.74	21.38
Cyprus	0	0	0	0.50	0.73	0.75
Czech Republic	0.28	0.27	0.22	5.15	4.86	5.32
Denmark	0.08	0.09	0.02	0.95	0.81	0.67
Estonia	0	0	0	17.69	10.45	5.26
Finland	0.14	0.13	0.11	2.78	1.85	2.80
France	2.34	2.74	2.92	9.41	10.67	9.43
Germany	0.60	0.61	0.55	11.94	10.53	8.84
Greece	0.53	0.58	0.71	51.66	35.21	28.63
Hungary	0	0	0	3.16	0.51	0.45
Ireland	0	0	0	9.83	2.79	1.46
Italy		2.05	1.53		4.97	4.46
Latvia	0	0	0	0.05	0.04	0.02
Lithuania	0.02	0.02	0.02	0.27	0.23	0.20
Malta	0	0	0	0.75	0.77	0.78
Netherlands	0.21	0.14	0.09	0.53	0.64	0.48
Poland	0.40	0.50	0.80	45.98	41.74	40.73
Portugal	0.67	0.68	0.57	2.79	3.64	3.38
Romania	0.07	0.22	0.19	26.00	26.35	24.67
Slovakia	0.08	0.09	0.08	8.48	12.17	8.10
Slovenia	0	0	0	2.31	0.76	0.30
Spain	1.83	1.94	1.82	31.88	29.47	24.25
Sweden	0.10	0.10	0.10	1.29	1.32	0.63
United Kingdom	1.49	1.40	1.55	11.47	11.49	13.52
EU	**10.16**	**12.55**	**12.11**	**271.6**	**237.2**	**209.3**

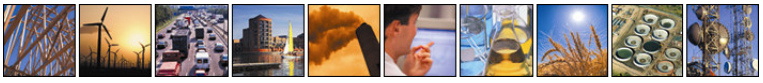


Table 4.14 summarises the total SO_2, NO_X and dust emissions from LCPs that were reported by MS for 2004, 2005 and 2006. Emissions have been attributed to each capacity class (50-100MWth, 100-300MWth, 300-500MWth and >500MWth) where possible; exceptions to this are Denmark and the Netherlands (all years), Italy (2004) and Sweden (2004 and 2005).

Table 4.14 Total SO_2, NO_X and dust emissions from LCPs that were reported by MS for 2004, 2005 and 2006, split by capacity class (50-100MWth, 100-300MWth, 300-500MWth and >500MWth)

Capacity class	SO_2 emissions (kt)			NO_X emissions (kt)			Dust emissions (kt)		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
50-100 MWth	68.7	65.6	65.0	46.3	54.2	55.1	5.19	4.46	4.34
100-300 MWth	306	328	314	164	181	185	18.4	17.8	15.9
300-500 MWth	461	494	416	148	162	156	30.9	28.3	23.5
>500 MWth	4,302	4,186	4,085	1,589	1,680	1,654	224	196	176
Number of MS reporting	23	24	25	23	24	25	23	24	25

The total SO_2 emissions (in kilotonnes) from each MS's LCP inventory are shown in Figure 4.8, showing emissions from each inventory year (2004, 2005 and 2006). Emissions have been attributed to each capacity class (50-100MWth, 100-300MWth, 300-500MWth and >500MWth) where possible; notable exceptions to this are Denmark, the Netherlands and Sweden, for whom totals have been provided due to lack of data. Similarly to Figure 4.8, Figure 4.9 and Figure 4.10 display the total NO_X and dust emissions for each MS respectively, also split for each year in order to show possible trends. As would be expected, the majority of SO_2, NO_X and dust emissions are from the largest plants, the >500MWth capacity class, which are mostly public electricity generation plants.

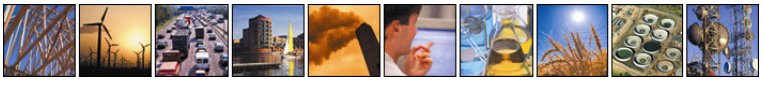
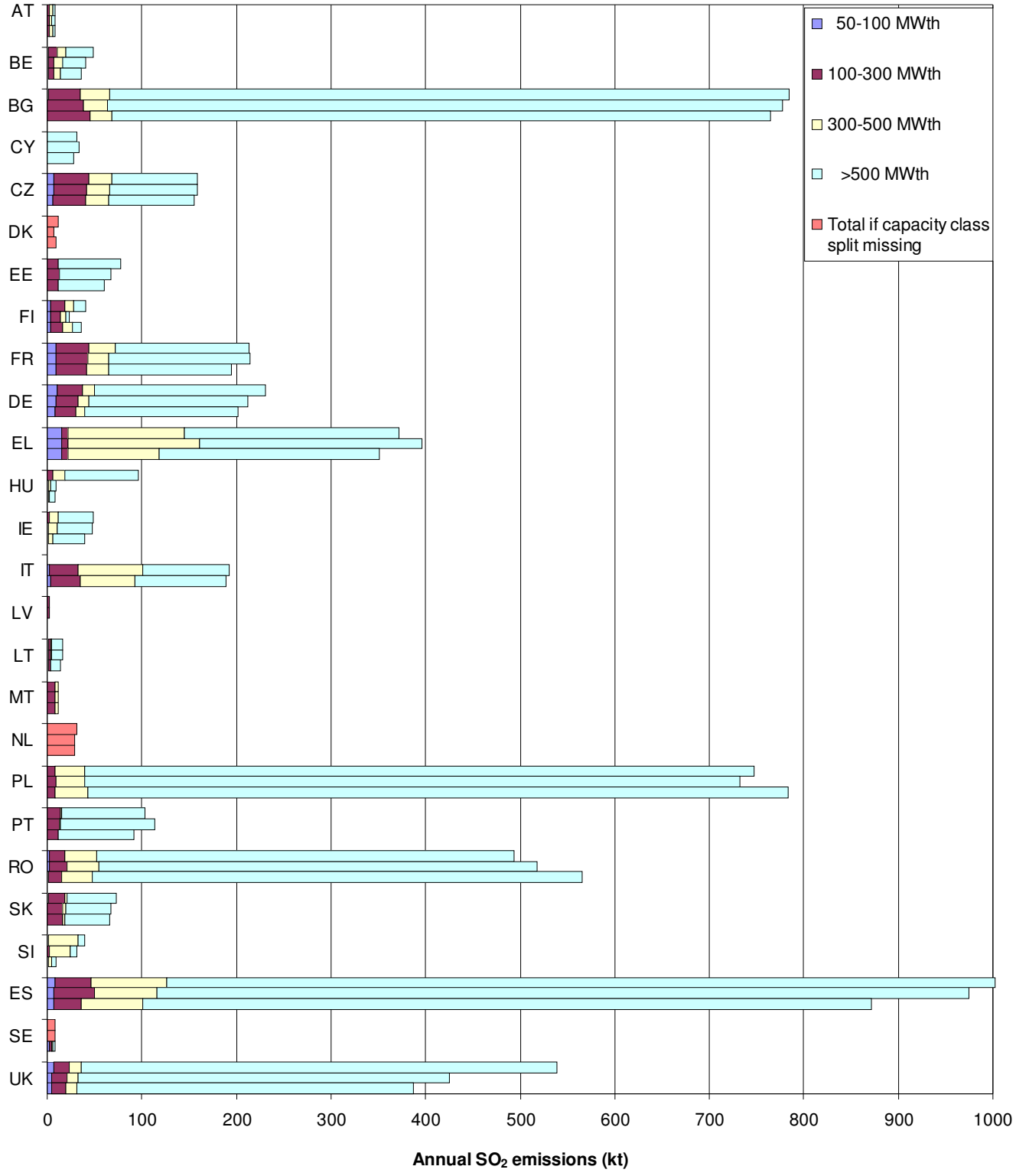


Figure 4.8 **Total reported LCP SO_2 emissions (in kt) from each MS for 2004, 2005 and 2006. Emissions are split by capacity class where possible. Three bars per MS: top: 2004, middle: 2005, bottom: 2006.**



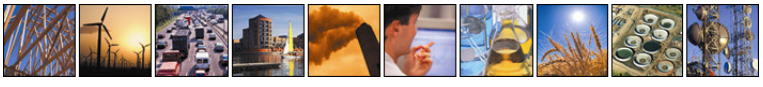
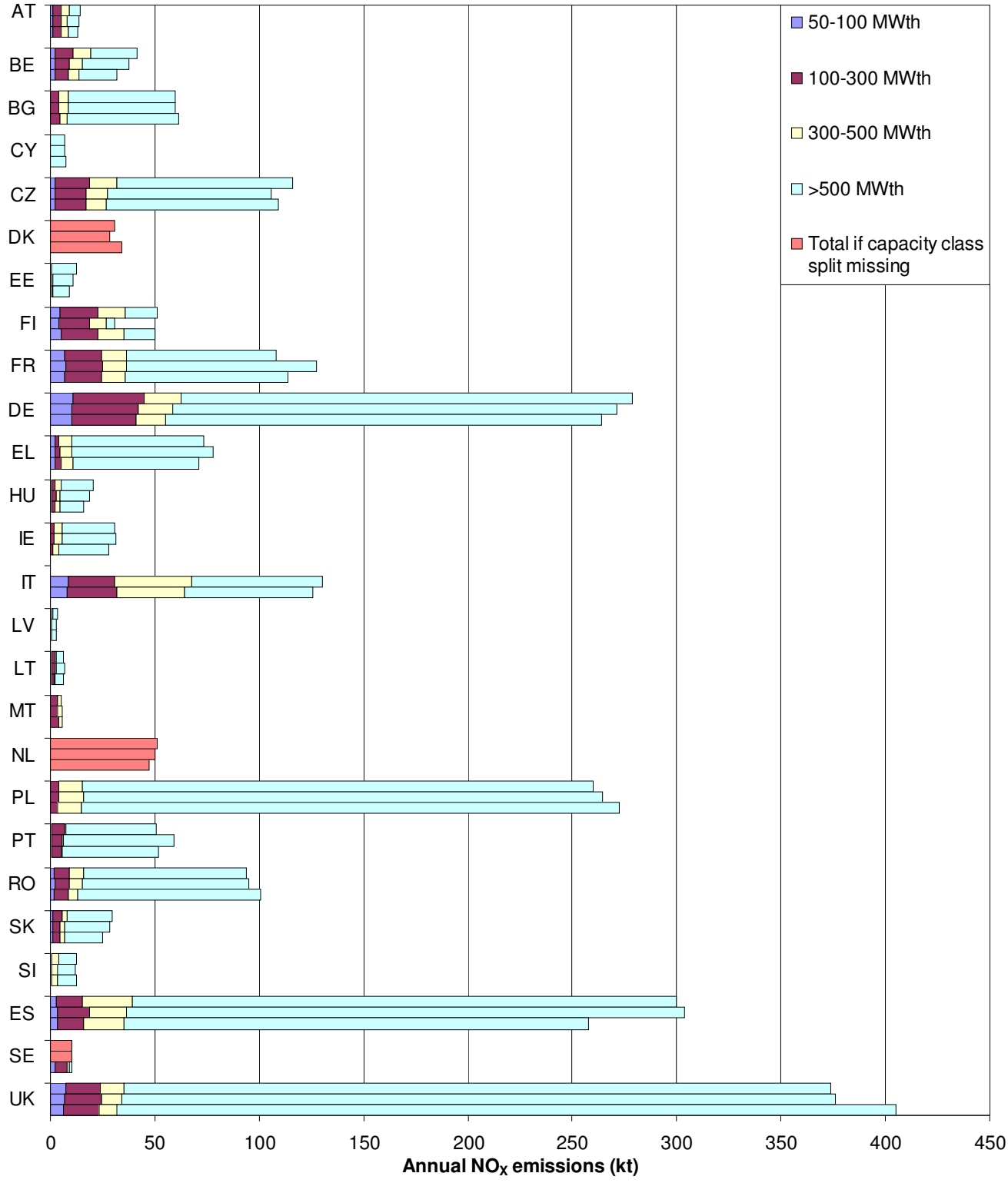


Figure 4.9 **Total reported LCP NO_X emissions (in kt) from each MS for 2004, 2005 and 2006. Emissions are split by capacity class where possible. Three bars per MS: top: 2004, middle: 2005, bottom: 2006.**



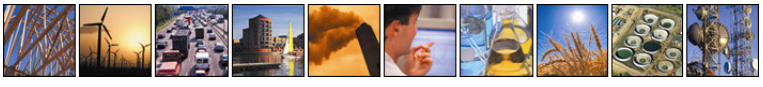
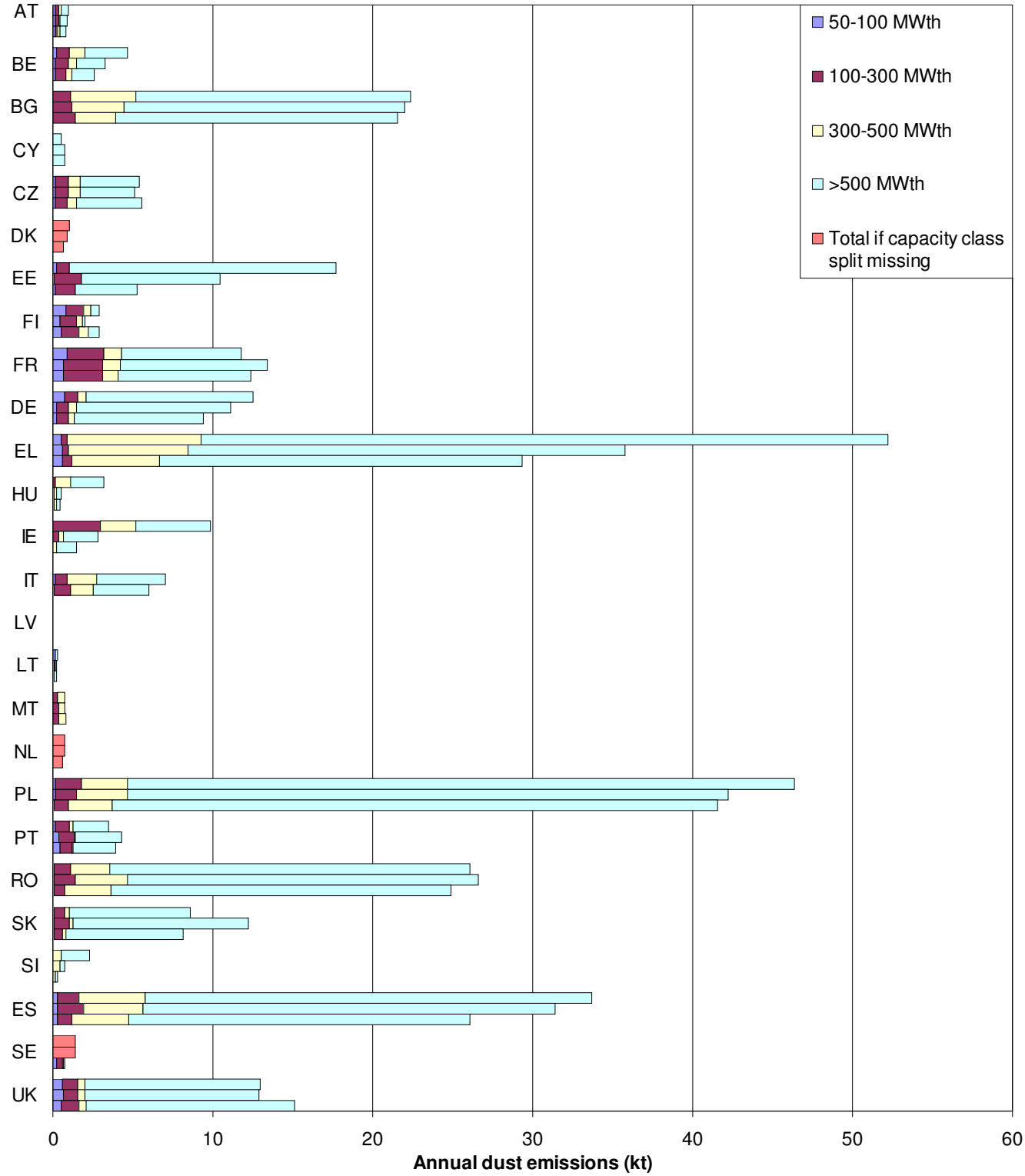
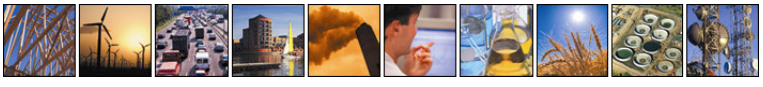


Figure 4.10 Total reported LCP dust emissions (in kt) from each MS for 2004, 2005 and 2006. Emissions are split by capacity class where possible. Three bars per MS: top: 2004, middle: 2005, bottom: 2006.





MS with highest total emissions

Using the 2004-2006 averages of the data presented graphically in the above three Figures, Table 4.15 lists the top five MS emitters of each of the pollutants SO_2, NO_X and dust, their average annual emissions in kilotonnes and as a percentage of the EU total. Included in this table is a broad indication of the trend that each of these MS is following for that pollutant. The trend is calculated based on the percentage change of 2006 reported emissions compared to the 2004 reported emissions. It must be noted though that this indication is only based on three years of reported data and as such cannot be taken as a long-term trend; emissions can fluctuate up and down from year to year, and where this occurs it is stated.

Table 4.15 shows that two MS feature in the top five for all three pollutants (SO_2, NO_X and dust): Spain and Poland. Three MS feature in the top five for two pollutants: Bulgaria, Romania and the United Kingdom. Although most of the MS have broadly decreasing emission trends, fluctuation exists and some show increases.

Table 4.15 The five highest emitting MS for annual emissions of SO_2, NO_X and dust, showing average annual emissions (in kt), the fraction of EU LCP emissions this MS emits and an indicative 2004-2006 trend.

Member State	Average total annual (2004-2006) SO_2 emissions			Member State	Average total annual (2004-2006) NO_X emissions			Member State	Average total annual (2004-2006) dust emissions		
	kt	% of EU	% change '04-'06		kt	% of EU	% change '04-'06		kt	% of EU	% change '04-'06
1. Spain	949	18.5%	-13.0%	1. UK	385	17.9%	+8.4%	1. Poland	43.4	17.2%	-10.4%
2. Bulgaria	776	15.1%	-2.5%	2. Spain	287	13.3%	fluctuates	2. Greece	39.1	15.5%	-43.8%
3. Poland	754	14.7%	fluctuates	3. Germany	271	12.6%	-5.3%	3. Spain	30.4	12.0%	-22.7%
4. Romania	526	10.3%	+14.6%	4. Poland	266	12.3%	+4.8%	4. Romania	25.8	10.2%	fluctuates
5. UK	450	8.8%	-28.2%	5. Italy	128	5.9%	-3.4% (Note 1)	5. Bulgaria	22.0	8.7%	-3.9%

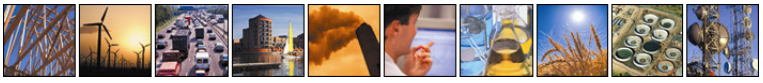
Note 1: This trend is based on % change 2005 to 2006.

At the plant level, it is possible to identify the LCPs with highest emissions. This could be further sorted to find the ten highest emitting LCPs per pollutant, per MS, per sector, per capacity class or per existing/new classification. For this analysis, due to unfilled data gaps, only some permutations of this categorisation will be performed.

It is possible to identify the ten highest emitters for each pollutant by one of the following:

i. Total emissions of the pollutant from 2004, 2005 and 2006;

ii. Average annual emissions of the pollutant for the period 2004-2006; and



iii. Emission factor.

The next section highlights the highest emitters at the plant level, according to method (ii), although for most cases, methods (i) and (ii) produce identical lists. Highest and lowest emission factors are dealt with in section 4.2.5.

LCPs with highest total emissions

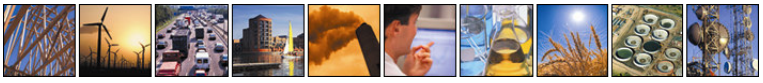
The ten LCPs with highest average annual SO_2 emissions are presented in Table 4.16. None of the LCPs listed in this table are refineries. The refinery LCP with highest average annual SO_2 emissions has emissions of 25.5kt, much less than those LCPs listed in Table 4.16. The primary fuel type of all these LCPs is 'other solid fuels'. The total average annual SO_2 emissions from these ten plants sums to 1519 kt, which represents 29.6% of the total 5137 kt from all EU LCPs.

Table 4.16 The ten LCPs with highest average annual emissions of SO_2.

Number	Member State	LCP Name	LCP Location	Thermal capacity (MWth)	Average annual SO_2 emissions 2004-2006 (kt)	Remarks
1.	Bulgaria	TPP "Maritsa Iztok 2"	Kovachevo	4,312	310.2	
2.	Spain	CT AS Pontes	La Coruña (Galicia)	3800	295.0	
3.	Bulgaria	TPP "Maritsa Iztok 3"	Mednikarovo	2,420	183.7	
4.	Spain	CT Teruel I-II-III	Andorra-Teruel (Aragon)	3300	156.2	
5.	Poland	BOT Elektrownia Bełchatów S.A.	Rogowiec, ul. Energetyczna 7, 97-406 Bełchatów	11,892	128.2	Note 1
6.	Greece	Megalopoli III	Megalopoli, Arcadia	839	112.4	
7.	Poland	Elektrownia Pątnów	ul. Kazimierska 45, 62-510 Konin	3,624	100.0	
8.	Bulgaria	TPP "Bobov dol"	Golemo selo	1,950	84.5	Note 2
9.	Bulgaria	TPP "Brikel"	Galabovo	1,020	77.4	Opted out
10.	Romania	S.C. Complexul Energetic Rovinari S.A. No. 2	Rovinari, str. Energeticianului nr.25	1,756	71.3	Note 3

Note 1: The 2003 Accession Treaty states that, by way of derogation from Article 4(3) and part A of Annexes III and IV of the LCPD, the emission limit values for SO_2 shall not apply until 31 December 2015 at the latest to El. Bełchatów, while during this transition period the total SO_2 emissions from all Polish LCPs are subject to an overall ceiling – see section 4.3.3.

Note 2: The 2005 Accession Treaty states that, by way of derogation from Article 4(3) and part A of Annexes III, IV and VII of the LCPD, the emission limit values for SO_2 shall not apply until the date indicated for each unit of the plant 'Bobov dol': unit 2 (until 31 December 2011); unit 3 (until 31 December 2014). During this transition period the total SO_2 emissions from all Bulgarian LCPs are subject to an overall ceiling – see section 4.3.3.



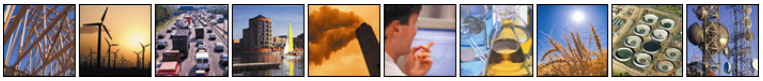
Note 3: The 2005 Accession Treaty states that, by way of derogation from Article 4(3) and part A of Annexes III and IV of the LCPD, the emission limit values for SO_2 shall not apply to S.C. Complexul Energetic Rovinari SA No. 2 until 31 Dec 2011. During this transition period the total SO_2 emissions from all Romanian LCPs are subject to an overall ceiling –see section 4.3.3.

The ten LCPs with highest average annual NO_X emissions are presented in Table 4.17. None of the LCPs listed in this table are part of refineries; all are public electricity generation. The primary fuel type of all these LCPs is 'other solid fuels'. The total average annual NO_X emissions from these ten plants sums to 285 kt, which represents 13.2% of the total 2156 kt from all EU LCPs.

Table 4.17 The ten LCPs with highest average annual emissions of NO_X.

Number	Member State	LCP Name	LCP Location	Thermal capacity (MWth)	Average annual NO_X emissions 2004-2006 (kt)	Remarks
1.	United Kingdom	Drax	Drax Power, Drax P Stn, Selby	10,800	58.3	
2.	Poland	BOT Elektrownia Bełchatów S.A.	Rogowiec, ul. Energetyczna 7, 97-406 Bełchatów	11,892	42.0	
3.	Spain	CT Teruel I-II-III	Andorra-Teruel (Aragon)	3,300	31.1	
4.	United Kingdom	Aberthaw	RWE nPower - Aberthaw P Stn	4,200	24.5	
5.	Poland	Elektrownia "Kozienice" S.A.	Świerże Górne, gm. Kozienice, 26-900 Kozienice	6,812	22.3	Note 1
6.	United Kingdom	Cottam	EDF Energy, Cottam P Stn	5,500	22.0	
7.	Spain	CT Compostilla II (G 3 and 4)	Leon (Castilla y Leon)	1,675	21.5	
8.	United Kingdom	Ratcliffe	E.On UK, Ratcliffe-on-Soar P Stn, Nottingham	5,500	21.5	
9.	United Kingdom	Kingsnorth	E.On UK, Kingsnorth P Stn, Kent	5,500	21.4	Opted out
10.	United Kingdom	Scottish Power plc	Longannet Power Station	6,400	20.4	

Note 1: The 2003 Accession Treaty states that, by way of derogation from Article 4(3) and part A of Annex VI of the LCPD, the emission limit values for NO_X that would be applicable from 1 January 2016 shall not apply until 31 December 2017 to El. Kozienice. During this transition period the total NO_X emissions from all Polish LCPs are subject to an overall ceiling – see section 4.3.3.



The ten LCPs with highest average annual dust emissions are presented in Table 4.18. None of the LCPs listed in this table are part of refineries; they are all public electricity generation. The primary fuel type of all these LCPs is 'other solid fuels'. The total average annual dust emissions from these ten LCPs sums to 52.3 kt, which represents 20.7% of the total 253 kt from all EU LCPs.

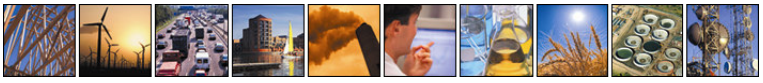
Table 4.18 The ten LCPs with highest average annual emissions of dust.

Number	Member State	LCP Name	LCP Location	Thermal capacity (MWth)	Average annual dust emissions 2004-2006 (kt)	Remarks
1.	Greece	Ag. Dimitrios III-IV	Ag. Dimitrios, Kozani	1574	8.81	
2.	Greece	Ag. Dimitrios I-II	Ag. Dimitrios, Kozani	1524	7.88	
3.	Slovakia	Slov.elektrárne, Vojany, EVO	Vojany	1844	7.58	Part opted out (Note 1)
4.	Estonia	Narva Elektrijaamad AS, Balti Elektrijaam	Elektrijaama tee 59, Narva	2400	6.26	Opted out Note 2
5.	Bulgaria	TPP "Maritsa Iztok 3"	Mednikarovo	2,420	4.56	
6.	Poland	Elektrownia "Kozienice" S.A.	Świerże Górne, gm. Kozienice, 26-900 Kozienice 1	6,812	3.69	
7.	Romania	S.C. Complexul Energetic Rovinari S.A. No. 2	Rovinari, str. Energeticianului nr.25	1,756	3.55	Note 3
8.	Estonia	Narva Elektrijaamad AS, Eesti Elektrijaam	Auvere, Ida-Virumaa	4445	3.46	Note 2
9.	Poland	BOT Elektrownia Bełchatów S.A.	Rogowiec, ul. Energetyczna 7, 97-406 Bełchatów	11,892	3.46	
10.	Bulgaria	TPP "Maritsa Iztok 2"	Kovachevo	4,312	3.03	

Note 1: 656MW opted out (boilers K13 and K14). Opting out part of an LCP is not considered permissible by the Commission.

Note 2: The 2003 Accession Treaty states that, by way of derogation from Article 4(3) and part A of Annexes III and VII of the LCPD, the emission limit values for dust shall not apply until 31 December 2015 for the combustion plants at Narva (Eesti and Balti). However, at Narva (Eesti and Balti) 4 boilers shall be in compliance with the Directive by 31 December 2004 and a further 4 boilers by 31 December 2010. By 1 January 2008, all boilers of type "TP-17" of the Balti power plant shall be closed. During the transitional period, the emission limit values for dust shall not exceed 200 mg/Nm^3.

Note 3: The 2005 Accession Treaty states that, by way of derogation from Article 4(3) and part A of Annex VII of the LCPD, the emission limit values for dust shall not apply until 31 December 2011 to S.C. Complex Energetic Rovinari SA No. 2. During this transition period the total dust emissions from all Romanian LCPs are subject to an overall ceiling – see section 4.3.3.



Refinery LCPs with highest total emissions

Equivalent top ten lists of refinery LCPs have not been presented because their emissions are much lower than from power plants. The top refinery LCP for each pollutant are presented, in order to set their emissions into context of power plants.

The refinery LCP with highest annual average SO_2 emissions is 'Zakład Elektrociepłowni Polskiego Koncernu Naftowego Orlen S.A.' (location: ul. Chemików 7, 09-411 Płock) in Poland. Its annual average 2004-2006 SO_2 emissions were 25.5 kt. This places it 39th highest of all EU LCPs for SO_2 emissions. This LCP is part opted out (boiler OO-220)[8] and it has a derogation from the LCPD as part of the Accession Treaty 2003.[9]

The refinery LCP with highest annual average NO_X emissions is also 'Zakład Elektrociepłowni Polskiego Koncernu Naftowego Orlen S.A.' (location: ul. Chemików 7, 09-411 Płock) in Poland. Its annual average 2004-2006 NO_X emissions were 5.00 kt. This is the 97th highest of all EU LCPs. As mentioned above, this LCP is part opted out.

The refinery LCP with highest annual average dust emissions is '2590 Raffinerie de Normandie', in Harfleur, France. Its annual average 2004-2006 dust emissions were 0.69 kt. This is the 92nd highest of all LCPs.

4.2.5 Emissions per unit energy (emission factors)

Calculating an emission factor (EF) of mass of pollutant emitted per unit energy input allows for an assessment of the environmental performance of LCPs. This can be done at the MS-level, if total emissions are divided by total energy input, or at the individual LCP-level. When looking at this statistic at an EU-level, two variations exist:

i. By first calculating an average emission factor for each MS, and then averaging these factors across the EU, provides a direct mean of all MS LCP environmental performance, attaching equal weighting to those MS with 100 LCPs and those with 10. This is the 'EU average of MSs' emission factors'.

ii. Alternatively, the total EU emissions can be divided by the total EU energy input to provide an 'average EU emission factor', which adds weight to those MS with more heavily polluting LCPs, and which provides an indication of the performance of the EU as a whole.

This analysis interprets the EU average emission factor as method ii. Table 4.19 compares the MS and EU SO_2, NOx and dust emission factors for 2004, 2005 and 2006. Factors could not be calculated for the Netherlands, Sweden (2004, 2005) and Italy (2004). The table shows considerable variation between MS.

[8] Opting out part of an LCP is not considered permissible by the Commission.

[9] "*By way of derogation from Article 4(3) and part A of Annexes III and IV of Directive 2001/80/EC, the emission limit values for sulphur dioxide shall not apply until 31 December 2015 at the latest to (…) Zakład Elektrociepłowni, Polskiego Koncernu Naftowego "Orlen" S.A., 1 x OO 220 power boiler, 3 x OO-320 power boilers, 4 x OO-420 power boilers.*"

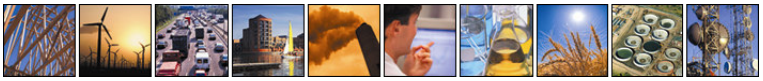
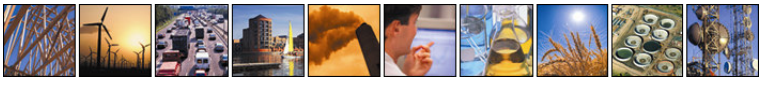


Table 4.19 **Calculated MS and EU emission factors (g/GJ) over time (2004, 2005 and 2006) for each pollutant. Highest five MS emission factors for each pollutant and year are highlighted in red.**

Member State	SO_2 emission factor (g [SO_2]/GJ)			NO_X emission factor (g [NO_X]/GJ)			Dust emission factor (g [dust]/GJ)		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
Austria	30	29	31	54	53	51	3.7	3.4	3.3
Belgium	136	108	98	114	100	88	12.8	8.8	7.2
Bulgaria	2543	2592	2509	193	198	202	72.6	73.3	70.6
Cyprus	719	736	577	150	150	150	11.5	15.8	15.8
Czech Republic	223	212	221	163	142	156	7.6	6.9	7.9
Denmark	43	31	29	118	135	111	4.0	4.2	2.2
Estonia	636	576	545	100	92	85	144.9	90.1	47.6
Finland	89	73	81	113	97	112	6.4	6.3	6.5
France	289	274	271	146	163	159	15.9	17.1	17.2
Germany	54	50	48	65	64	63	2.9	2.6	2.2
Greece	853	900	824	168	178	166	119.6	81.4	68.9
Hungary	435	44	40	93	84	75	14.2	2.3	2.1
Ireland	352	318	253	224	213	182	71.2	18.8	9.5
Italy		87	85		59	57		3.2	2.7
Latvia	56	57	24	90	92	74	1.3	1.2	0.5
Lithuania	209	205	185	83	86	80	3.6	3.1	2.9
Malta	453	459	461	209	208	207	29.2	29.5	29.6
Netherlands									
Poland	462	452	465	161	163	162	28.7	26.1	24.7
Portugal	402	382	361	197	199	204	13.5	14.5	15.6
Romania	1057	1100	1166	201	202	208	55.9	56.4	51.3
Slovakia	418	407	424	169	172	163	48.7	73.9	52.7
Slovenia	666	530	145	206	203	203	38.6	12.8	4.9
Spain	827	697	646	247	217	191	27.8	22.5	19.3
Sweden			39			53			3.7
United Kingdom	219	177	155	152	156	162	5.3	5.4	6.0
Average EU	**348**	**298**	**284**	**137**	**126**	**123**	**18.9**	**14.5**	**12.8**



Two striking evaluations can be explained by additional information received from the MS involved. The dust emission factor for Estonia drops sharply between years due to the largest dust emitter in Estonia (an opted-out oil shale-fired power station) significantly abating its emissions of SO_2, NO_X and dust. The dust emission factor for Ireland drops significantly between 2004 and 2006: this is because the three highest dust emitters, which were all peat-fired power stations, closed between 2004 and 2006.

Equivalent emission factors disaggregated by fuel type are presented in section 4.6.

In order to present more clearly the performance over time of each MS and the EU, the percentage difference between the 2004 and 2006 emission factors for SO_2, NO_X and dust have been calculated.[10] These percentage changes can be either positive or negative: negative values indicate decreasing LCP emissions per unit of energy input between 2004 and 2006; positive values indicate deteriorating environmental performance between 2004 and 2006. Figure 4.11, Figure 4.12 and Figure 4.13 display these 2004-2006 trends for each MS and the EU as a whole (method ii) for the three pollutants SO_2, NO_X and dust respectively. The figures exclude the Netherlands (due to erroneous energy data) and Sweden (no trends available from just 2006 plant-by-plant inventory).

Figure 4.11 indicates that the average mass of SO_2 emitted per unit of energy input is following a declining trend for most MS and for the EU as a whole over the period 2004 to 2006. In five MS, the LCP SO_2 emission factor increased over this period, with increases ranging from 0.7% to 10.3% (Romania). In 19 MS, the LCP SO_2 emission factor decreased over this period, with decreases ranging from 0.7% to 90.7% (Hungary). This last figure of a 90.7% decrease for Hungary appears very high but the underlying data suggest that significant environmental investment in desulphurisation and fuel switching in large brown coal power stations occurred between 2004 and 2005, in-line with Hungary's NEC submission.[11]

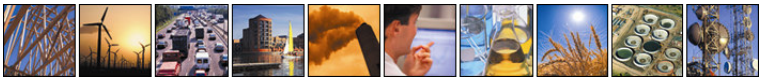
The average SO_2 environmental performance of EU LCPs was therefore improving – EU LCPs in 2006 emitted on average 82% of the SO_2 emitted per unit of energy input that they emitted in 2004.

Figure 4.12 indicates that the average mass of NO_X emitted per unit of energy input is following a declining trend for most MS and for the EU as a whole over the period 2004 to 2006, although it is declining less than the SO_2 factors. Six MS increased their LCP NO_X emission factor over this period, with increases ranging from 0.7% to 8.8% (France). 19 MS decreased their LCP NO_X emission factor over this period, with decreases ranging from 0.1% to 23.2% (Belgium).

The average NO_X environmental performance of EU LCPs was therefore improving – EU LCPs in 2006 emitted on average 90% of the NO_X emitted per unit of energy input that they emitted in 2004. One reason that the NO_X emission factors have declined less compared to the other pollutants is because some of the largest NO_X emitters (e.g. coal power stations) will not be making additional improvements to comply with the 2008 LCPD NO_X ELV, as this can be achieved by business-as-usual abatement measures. Reductions are mainly being made by those MS

[10] For Italy, the percentage difference is 2005 to 2006.

[11] http://cdr.eionet.europa.eu/hu/eu/nec/envrbtcyq/HU_NECsummary__2_.doc



that are implementing selective catalytic reduction (SCR) as the Best Available Technique (BAT) under the IPPC Directive, in-line with the BREF BAT-AELs at plants which haven't already fitted SCR. Large further reductions in NO_X would be expected in advance of the tighter 2016 NO_X ELV in the LCPD.

Figure 4.13 indicates that the average mass of dust emitted per unit of energy input is following a declining trend for most MS and for the EU as a whole over the period 2004 to 2006, declining even more sharply than the SO_2 factors. Eight MS increased their LCP dust emission factor over this period, with increases ranging from 1.6% to 37.4% (Cyprus). 17 MS decreased their LCP SO_2 emission factor over this period, with decreases ranging from 2.8% to 87.4% (Slovenia). Three MS exhibited decreases of 85% or more: Ireland, Hungary and Slovenia. The underlying data shows that three highest dust emitters in Ireland (peat-fired power stations) closed between 2004 and 2006; Hungary's installation of desulphurisation equipment (described above) indirectly abated dust emissions; the underlying data for Slovenia indicates a similar large environmental investment in large (>300MW) brown coal power stations.

The average dust environmental performance of EU LCPs was therefore improving – EU LCPs in 2006 emitted on average 68% of the dust emitted per unit of energy input that they emitted in 2004. The fact that the EU dust emission factor has decreased more sharply than other pollutants' emission factors may reflect two processes: fuel switching to cleaner fuels (e.g. natural gas) or the high reduction efficiencies of dust abatement measures, such as fabric filters, electrostatic precipitators or (indirectly) flue gas desulphurisation (FGD).

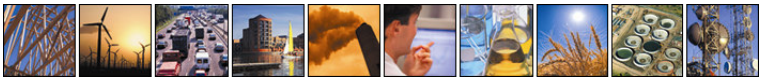
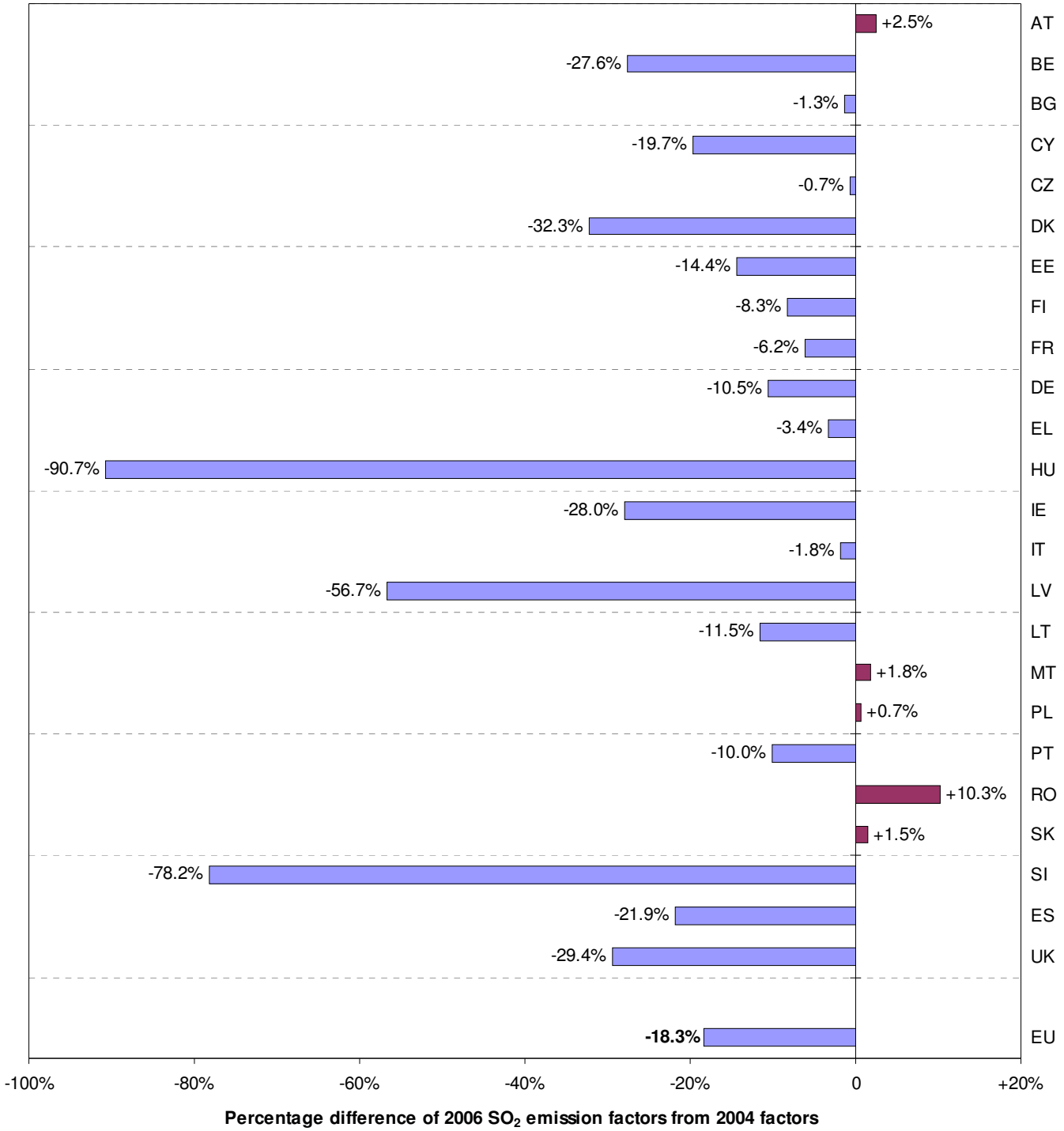


Figure 4.11 Percentage difference between 2004 and 2006 SO_2 emission factors (Note 1). Negative values indicate environmental performance improvement between 2004 and 2006; positive values indicate increasing LCP SO_2 emissions per unit energy input between 2004 and 2006



Note 1: For Italy the figure shown is the percentage difference between 2005 and 2006.

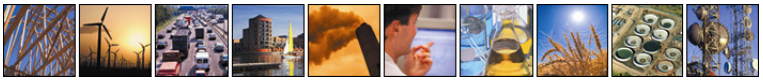
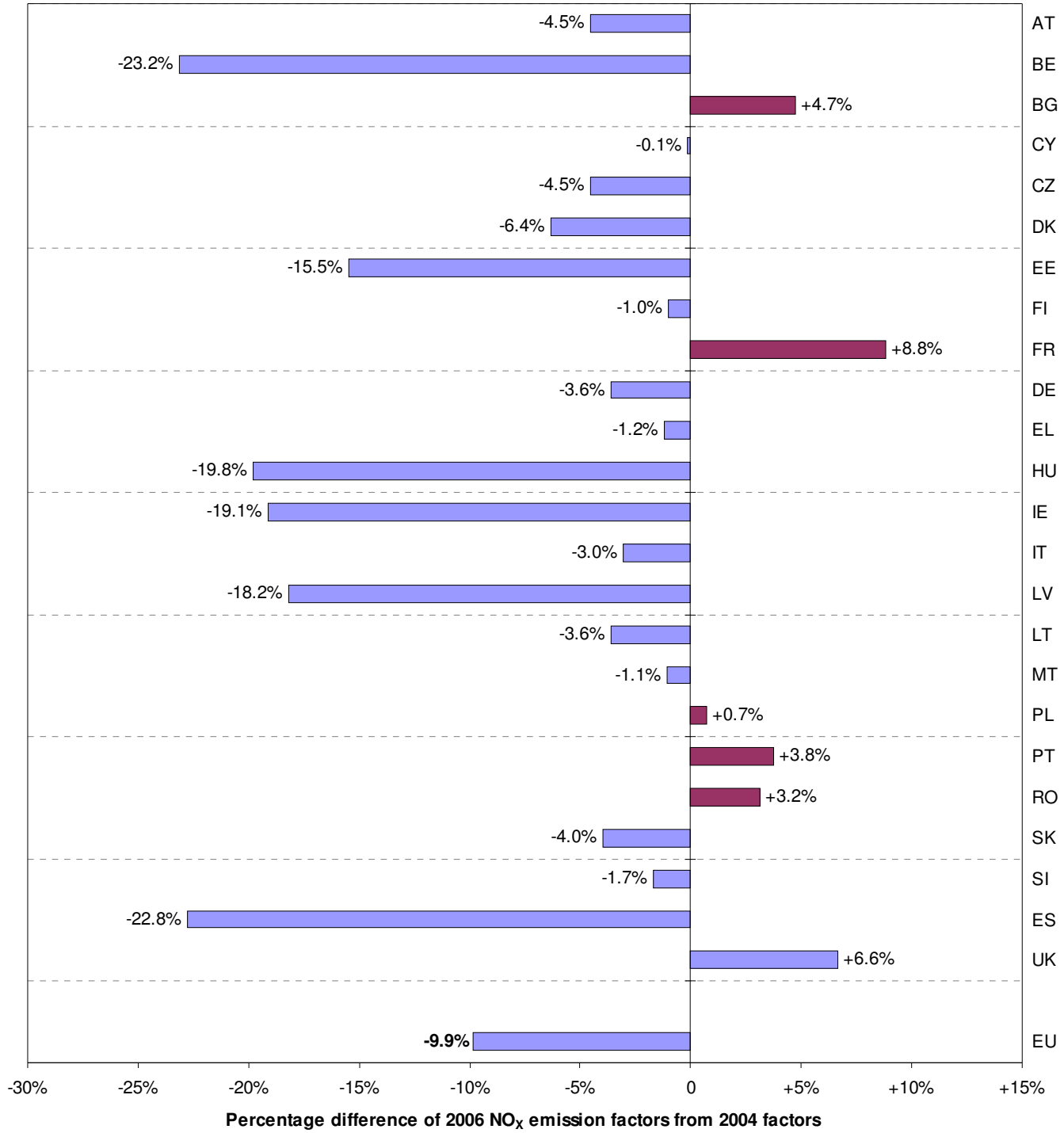


Figure 4.12 Percentage difference between 2004 and 2006 NO_X emission factors (Note 1). Negative values indicate environmental performance improvement between 2004 and 2006; positive values indicate increasing LCP NO_X emissions per unit energy input between 2004 and 2006



Note 1: For Italy the figure shown is the percentage difference between 2005 and 2006.

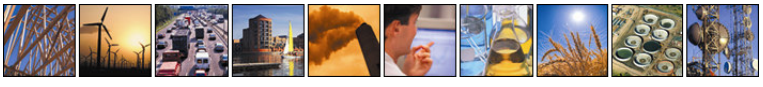
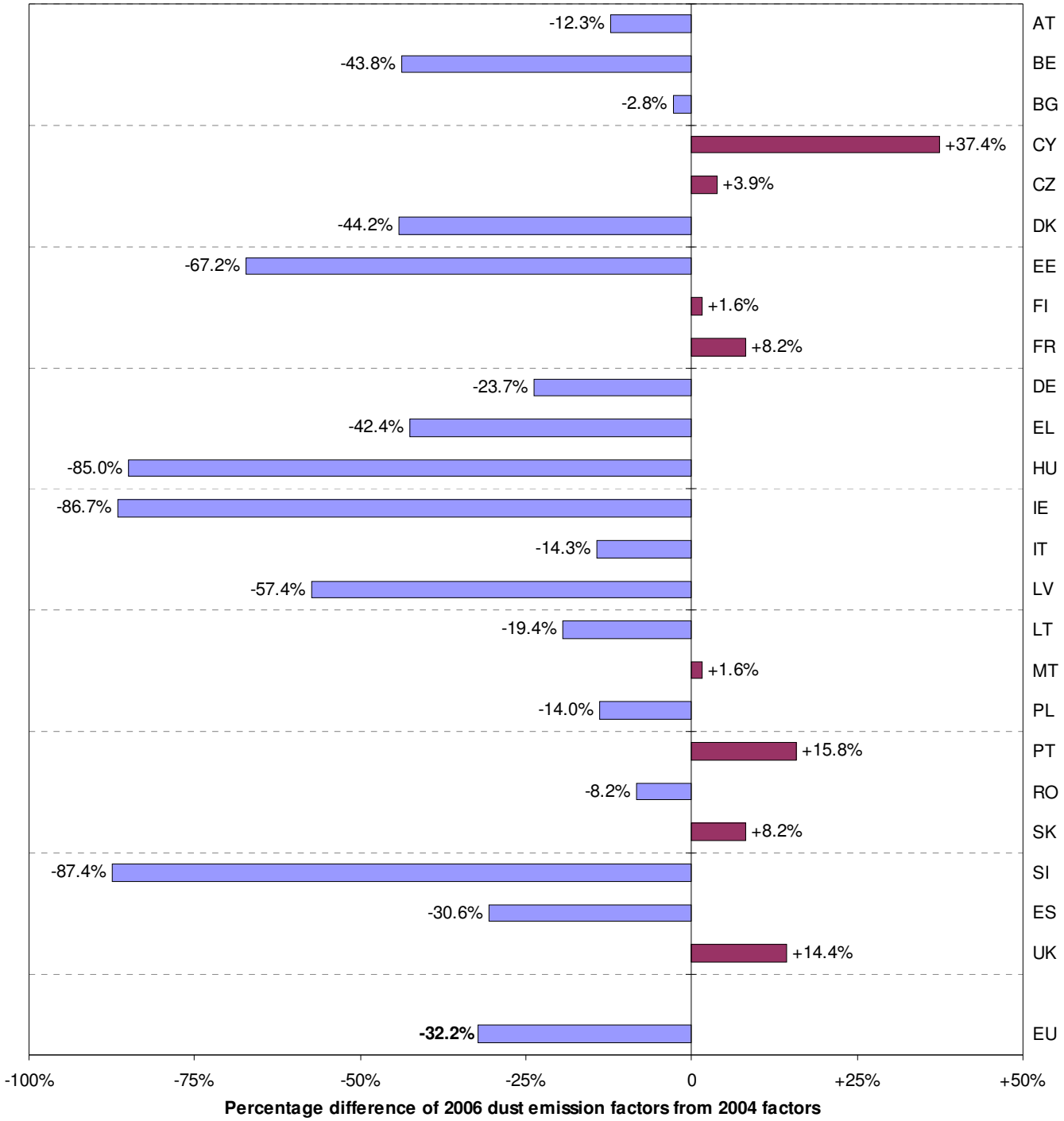
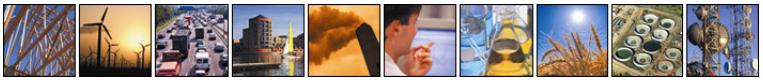


Figure 4.13 Percentage difference between 2004 and 2006 dust emission factors (Note 1). Negative values indicate environmental performance improvement between 2004 and 2006; positive values indicate increasing LCP dust emissions per unit energy input between 2004 and 2006



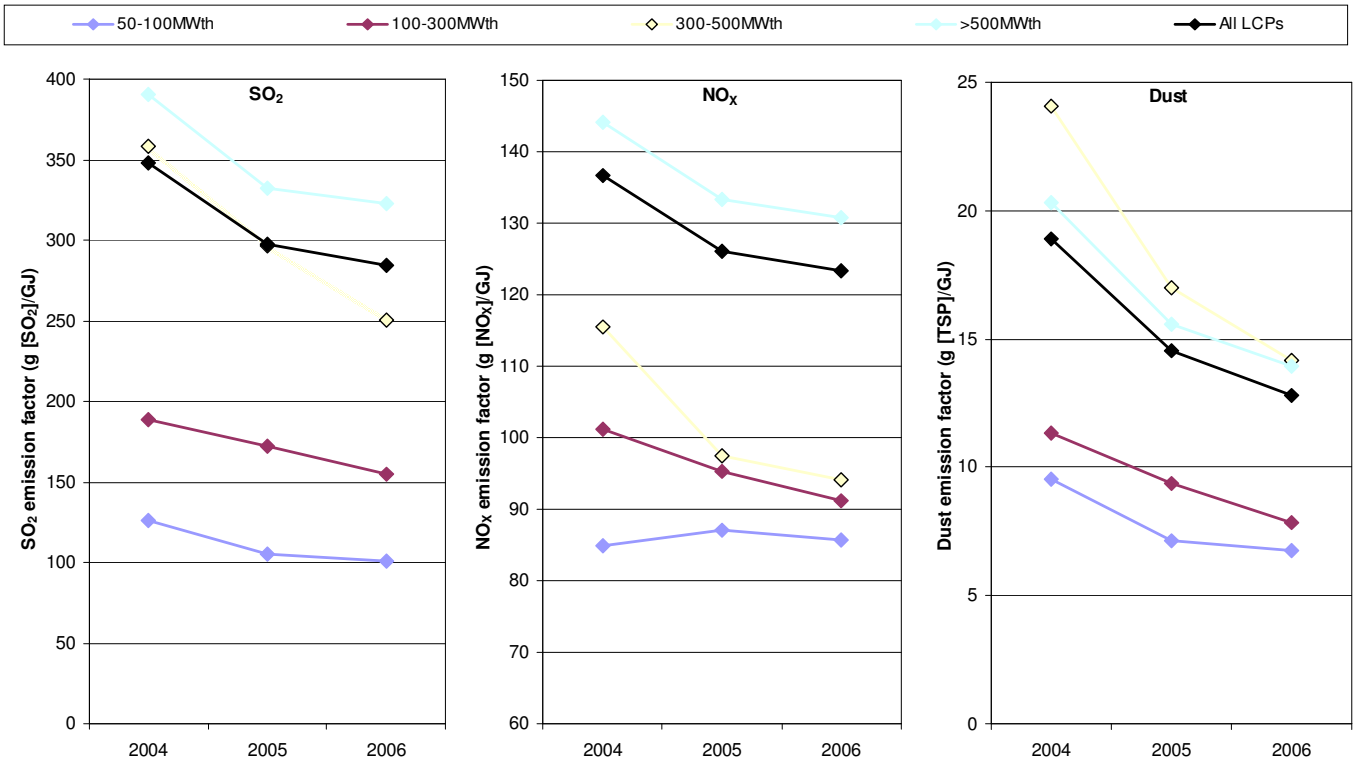
Note 1: For Italy the figure shown is the percentage difference between 2005 and 2006.



It is possible to further analyse the EU emission factors for each pollutant, split by capacity class. Figure 4.14 plots the EU SO_2, NO_X and dust emission factors for each capacity class, for the years 2004, 2005 and 2006. Alongside the capacity class splits are EU emission factors for all LCPs.

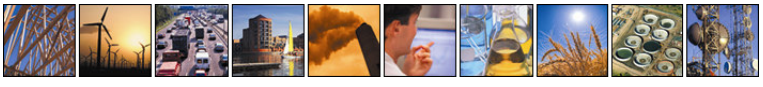
The SO_2 plot shows that the previously described trend of declining average mass of SO_2 emitted per unit of energy input across the EU over the period 2004 to 2006 is true for all capacity classes, with the 300-500 MWth capacity class emission factors decreasing the most. The plot also shows that smaller capacity classes have lower SO_2 emission factors. This reflects the higher proportion of LCPs in these capacity classes that are natural gas fired, as illustrated in Figure 4.6. Averaged over 2004-2006 the natural gas fraction of total energy input is 46% for the 50-100MWth capacity class, and 32% for the 100-300MWth class. This compares to 31% for 300-500MWth and 24% for >500MWth.

Figure 4.14 Average EU SO_2, NO_X and dust emission factors for each year from 2004 to 2006, split by capacity class.



The NO_X plot[12] in Figure 4.14 shows that the previously described trend of declining average mass of NO_X emitted per unit of energy input across the EU over the period 2004 to 2006 is true for all but one capacity class: the smallest capacity class (50-100 MWth) exhibits a small increase in EU average of MS NO_X emission factor over

[12] Note the scale of the y-axis does not begin at zero.



the period 2004 to 2006. It is not clear why this trend appears. The plot also indicates that the EU emission factor for (not split by capacity) is skewed by the class of LCPs >500 MWth.

The dust plot in Figure 4.14 shows that the previously described trend of declining average mass of dust emitted per unit of energy input across the EU over the period 2004 to 2006 is true for all capacity classes, with the largest drop between 2004 and 2005. Contrary to the SO_2 and NO_X plot, the dust plot does not confirm the trend that larger capacity classes exhibit higher emission factors: the 300-500MWth capacity class has a higher average dust emission factor than the >500MWth class over all years 2004-2006.

MS with highest emission factors

The SO_2, NO_X and dust emission factors for each MS, split by year and capacity class, that were used to produce Figure 4.14 are provided on the following pages in Table 4.20, Table 4.21 and Table 4.22 respectively. Within these tables the five MS showing the highest emission factors of pollutant emitted per unit of energy input in each capacity class and for each year have been highlighted in red. Please note that if any inventories included entries with incorrect units for either energy input or emissions that have not been identified and corrected, then they could be erroneously listed and highlighted in these tables.

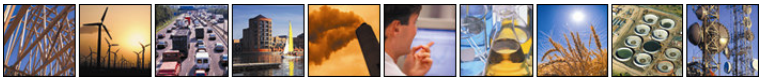
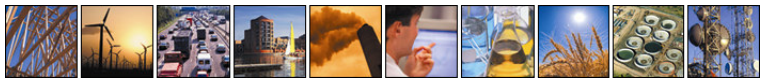


Table 4.20 Average SO_2 emission factor (g [SO_2]/GJ) for each MS, split by year and sub-split by capacity class. The MS with the five highest emission factors for each capacity class are highlighted in red

Member State	50-100MWth			100-300MWth			300-500MWth			>500MWth		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Austria	11	8	11	24	21	24	95	146	148	20	22	19
Belgium	53	62	51	95	64	59	180	139	105	155	124	122
Bulgaria	301	269	676	2171	2205	2094	1362	1260	1395	2684	2738	2617
Cyprus		(No LCPs)			(No LCPs)			(No LCPs)		719	736	577
Czech Republic	354	364	305	341	339	334	302	329	297	180	167	182
Estonia	147	79	66	1628	1678	1548	0	13	0	598	523	489
Finland	76	72	67	77	70	68	105	80	105	101	73	90
France	127	140	136	243	230	227	227	215	213	355	321	327
Germany	71	65	59	61	49	47	42	44	35	53	50	49
Greece	855	840	816	445	422	324	2624	2938	2303	637	656	673
Hungary	12	7	2	220	53	45	745	101	117	447	38	35
Ireland		(No LCPs)		219	88	88	301	234	137	386	384	316
Italy		33	39		108	101		149	155		66	66
Latvia	274	144	159	244	187	50		(No LCPs)		0	5	0
Lithuania	131	136	111	283	286	242	127	186	118	211	199	189



Member State	50-100MWth			100-300MWth			300-500MWth			>500MWth		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Malta		(No LCPs)		435	443	443	490	491	498		(No LCPs)	
Poland	211	303	119	262	275	261	449	433	432	467	456	471
Portugal	46	54	27	517	461	482	268	239	175	407	390	369
Romania	134	125	113	335	410	343	767	707	800	1232	1280	1327
Slovakia	99	38	27	574	636	709	153	147	121	465	440	462
Slovenia		(No LCPs)		504	899	660	2020	1379	168	163	190	109
Spain	299	228	211	402	357	284	874	910	631	878	730	694
Sweden			61			30			31			45
United Kingdom	74	55	52	68	72	68	59	53	53	263	210	180
EU	**126**	**105**	**101**	**189**	**172**	**154**	**359**	**297**	**250**	**390**	**332**	**323**

Excluded MS: Denmark (no capacities provided) and Netherlands (incorrect units of energy).

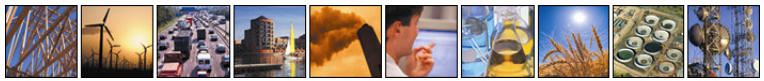
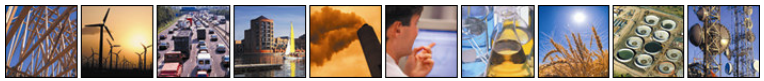


Table 4.21 **Average NO_X emission factor (g [NO_X]/GJ) for each MS, split by year and sub-split by capacity class. The MS with the five highest emission factors for each capacity class are highlighted in red**

Member State	50-100MWth			100-300MWth			300-500MWth			>500MWth		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Austria	37	26	33	60	50	60	102	138	126	40	49	37
Belgium	87	89	88	94	74	68	153	104	82	117	113	100
Bulgaria	118	111	96	231	228	216	204	205	193	190	197	202
Cyprus	(No LCPs)			(No LCPs)			(No LCPs)			150	150	150
Czech Republic	123	119	105	150	146	147	162	135	119	168	143	166
Estonia	232	202	210	54	64	61	43	45	38	104	94	87
Finland	103	96	113	92	90	88	140	113	134	133	102	136
France	94	109	101	121	119	123	98	109	104	180	197	197
Germany	75	75	77	76	68	67	63	60	53	63	63	62
Greece	122	123	124	130	139	133	128	124	138	178	189	174
Hungary	90	107	88	82	80	86	164	119	136	88	81	68
Ireland	43	65	62	141	116	106	130	111	67	265	267	232
Italy		98	100		83	77		81	86		44	42
Latvia	90	77	91	61	62	41	48	45	62	118	113	88
Lithuania	66	69	56	170	172	153	52	50	49	71	76	73
Malta	(No LCPs)			213	212	209	203	201	203	(No LCPs)		



Member State	50-100MWth			100-300MWth			300-500MWth			>500MWth		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Poland	154	140	113	114	126	115	169	165	139	161	164	164
Portugal	66	68	73	237	187	197	135	131	113	199	206	213
Romania	128	139	110	142	153	167	165	134	124	217	219	224
Slovakia	96	93	93	143	149	150	111	111	125	196	196	180
Slovenia	(No LCPs)			146	182	173	216	196	201	205	207	205
Spain	109	112	108	131	130	121	258	240	191	261	227	200
Sweden			59			60			38			42
United Kingdom	74	74	67	73	79	76	51	45	42	177	183	189
EU	**85**	**87**	**86**	**101**	**95**	**91**	**115**	**98**	**94**	**144**	**133**	**131**

Excluded MS: Denmark (no capacities provided) and the Netherlands (incorrect units of energy).

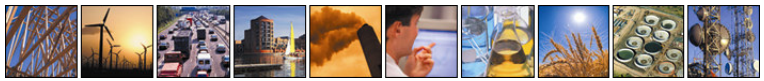
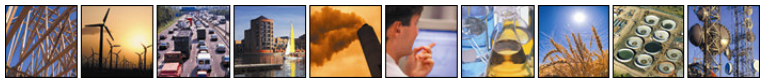


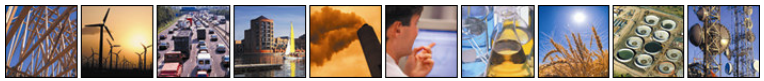
Table 4.22 **Average dust emission factor (g [dust]/GJ) for each MS, split by year and sub-split by capacity class. The MS with the five highest emission factors for each capacity class are highlighted in red**

Member State	50-100MWth			100-300MWth			300-500MWth			>500MWth		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Austria	4.0	3.1	3.5	3.7	2.7	2.8	2.9	4.1	3.6	3.9	3.8	3.4
Belgium	7.3	6.7	6.0	8.8	8.7	7.4	18.3	8.7	5.7	14.0	9.1	7.8
Bulgaria	14.5	11.4	21.4	66.5	66.6	64.9	177.2	161.3	153.5	64.3	67.2	66.0
Cyprus		(No LCPs)			(No LCPs)			(No LCPs)		11.5	15.8	15.8
Czech Republic	6.4	6.9	7.6	7.8	7.8	7.0	8.8	10.3	7.8	7.5	6.2	8.2
Estonia	309.0	77.1	107.2	118.9	229.2	161.4	0.0	1.8	0.0	149.6	83.4	39.3
Finland	18.0	11.1	11.4	5.6	6.2	5.8	5.1	5.0	6.3	4.6	3.7	6.0
France	11.8	10.2	9.5	16.0	16.5	17.2	9.5	10.5	8.6	18.6	19.8	20.9
Germany	4.8	1.8	1.8	1.9	1.6	1.6	1.7	1.8	1.4	3.1	2.9	2.4
Greece	30.4	30.8	32.4	25.1	25.9	28.4	178.1	157.8	131.4	120.3	76.4	65.6
Hungary	7.4	0.7	1.5	4.5	1.4	1.4	59.1	12.5	13.0	11.6	1.6	1.4
Ireland		(No LCPs)		292.6	30.8	2.2	72.4	8.4	6.1	48.4	21.6	11.6
Italy		1.9	1.2		2.6	3.3		4.0	3.7		3.1	2.4
Latvia	9.1	4.9	6.2	4.5	3.0	0.5		(No LCPs)		0.0	0.1	0.0
Lithuania	19.9	13.5	11.0	3.6	3.9	3.5	0.5	0.5	1.3	2.2	2.3	2.2
Malta		(No LCPs)		19.0	19.5	19.3	50.4	49.6	50.7		(No LCPs)	



Member State	50-100MWth			100-300MWth			300-500MWth			>500MWth		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Poland	120.3	85.1	49.8	50.6	44.8	29.1	43.2	45.5	34.6	27.5	24.7	24.1
Portugal	19.4	41.8	42.1	32.9	35.9	34.9	37.1	22.8	16.3	10.4	11.2	12.4
Romania	6.0	4.7	4.3	20.1	28.5	16.2	57.3	69.7	72.5	62.8	60.4	54.5
Slovakia	5.4	5.7	3.8	22.5	38.9	25.1	14.2	10.9	10.2	67.1	100.1	72.2
Slovenia	(No LCPs)			15.5	10.9	6.6	29.3	28.0	8.9	43.4	7.3	3.3
Spain	10.2	10.7	7.6	14.3	13.2	9.0	45.6	50.7	34.9	28.0	21.9	19.2
Sweden			5.6			4.2			1.4			2.8
United Kingdom	5.9	7.4	5.2	4.4	3.9	5.1	2.0	1.9	2.3	5.7	5.8	6.6
EU	**9.5**	**7.2**	**6.7**	**11.3**	**9.3**	**7.8**	**24.1**	**17.0**	**14.2**	**20.3**	**15.6**	**13.9**

Excluded MS: Denmark (no capacities provided) and the Netherlands (incorrect units of energy),



LCPs with highest emission factor

Emission factors for each pollutant in each inventory year for each LCP have been calculated from the reported inventories. Erroneous emission factors allow for the easy identification of either erroneous energy input or emissions data, e.g. order of magnitude errors. This identification was carried out; erroneous entries that could not be corrected have been subsequently excluded from the following lists.

The calculation of emission factors can also be used to assess the possibility that an operator or competent authority may have estimated reported emissions not through measurement but through calculation or estimation using emission factors. However, although no formal checking on a plant by plant basis has been undertaken, it has not been apparent that this approach has been frequently adopted.

Table 4.23 lists the ten LCPs in the EU with highest SO_2 emission factors, as calculated by total mass of pollutant emitted over the period 2004 to 2006 divided by the total energy input combusted over the period 2004 to 2006. They are all public power plants, and five of them are 'opted out'.

Table 4.23 The ten LCPs with highest SO_2 emission factors (Note 1).

No.	Member State	Plant Name	Plant Location	Thermal capacity (MWth)	Primary fuel type	SO_2 emission factor, overall 2004-2006 (g [SO_2]/GJ)	Remarks
1.	Greece	Megalopoli I	Megalopoli, Arcadia	360	Other solid fuels	5,701	Opted out
2.	Greece	Megalopoli III	Megalopoli, Arcadia	839	Other solid fuels	5,645	
3.	Greece	Megalopoli II	Megalopoli, Arcadia	360	Other solid fuels	5,618	Opted out
4.	Bulgaria	TPP "Maritsa Iztok 3"	Mednikarovo	2,420	Other solid fuels	4,457	
5.	Bulgaria	TPP "Brikel"	Galabovo	1,020	Other solid fuels	4,160	Opted out
6.	Bulgaria	TPP "Maritsa Iztok 2"	Kovachevo	4,312	Other solid fuels	4,157	
7.	Spain	C.T. Escucha	Escucha-Teruel (Aragón)	485	Other solid fuels	4,063	Opted out
8.	Estonia	VKG Energia OÜ, Lõunajaam	Keemia tee 2a, Kohtla-Järve	236	Other gases	3,908	
9.	Bulgaria	TPP "Maritsa 3"	Dimitrovgrad	300	Other solid fuels	3,841	Opted out
10.	Bulgaria	TPP "Sliven"	Sliven	256	Other solid fuels	3,656	

Note 1: A top ten list of non-opted out LCPs without Accession Treaty derogations would append the following LCPs to the LCPs numbered 2, 4, 6, 8 and 10 above:

14. Spain;	CT AS Pontes, La Coruña (Galicia);	3,020 g [SO_2]/GJ
18. Slovenia;	TET F, Trbovlje;	2,516 g [SO_2]/GJ
19. Romania;	SC ELCEN Bucuresti Vest No.7, Bucuresti, bd. Timisoara nr.106, sector 6;	2,434 g [SO_2]/GJ
21. Bulgaria;	TPP "Republika", Pernik;	2,287 g [SO_2]/GJ
22. Spain;	CT Teruel I-II-III, Andorra-Teruel (Aragon);	2,265 g [SO_2]/GJ

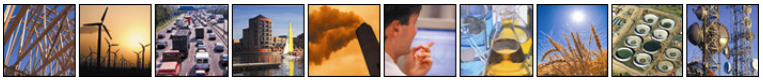


Table 4.24 lists the ten LCPs in the EU with highest NO_X emission factors, as calculated by total mass of pollutant emitted divided by the total energy input combusted over the period 2004 to 2006. Without excluding some LCPs, this list would otherwise include a number of LCPs with average annual energy input <50,000 GJ and annual NO_X emissions <1 kt. The irregular use of a combustion plant, for example a single operational start-up and shut-down, can lead to high emission factors and bring such plants to the top of this list even though their emissions are low.

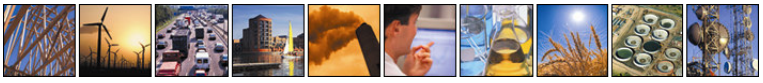
Table 4.24 The ten LCPs with highest NO_X emission factors.

No.	Member State	LCP Name	LCP Location	Thermal capacity (MWth)	Primary fuel type	NO_X emission factor, 2004-2006 (g [NO_X]/GJ)	Remarks
1.	United Kingdom	Cockenzie Power Station	Scottish Power PLC, Cockenzie Power Station	3,200	Coal	1,060	Opted out
2.	United Kingdom	BASF 2	BASF, Seal Sands, Middlesbrough	130	Natural gas	703.7	
3.	United Kingdom	BASF 3	BASF, Seal Sands, Middlesbrough	130	Natural gas	700.7	
4.	Denmark	Energi E2 Kyndbyværket	Jægerspris	Not reported	Liquid fuels	676.4	
5.	Spain	CT Velilla 2	Velilla del Rio Carrión – Palencia (Castilla y Leon)	1,093	Other solid fuels	660.1	
6.	Spain	CT Robla II	La Robla (León)	1,050	Other solid fuels	590.7	
7.	Spain	CT Anllares (100%)	Palacios del Sil (león)	1,032	Other solid fuels	579.6	
8.	Spain	CT Velilla 1	Velilla del Rio Carrión - Palencia (Castilla y Leon)	470	Other solid fuels	534.7	
9.	Italy	Enel Produzione S.p.A.	Larino (CB)	430	Natural gas	527.5	
10.	Italy	Enel Produzione S.p.A.	Larino (CB)	430	Natural gas	524.3	

Table 4.25 lists the ten LCPs in the EU with highest dust emission factors, as calculated by total mass of pollutant emitted over the period 2004 to 2006 divided by the total energy input combusted over the period 2004 to 2006. Two LCPs have been excluded from this list. The first[13] is due to small size (58MWth), irregular use (only in operation in 2004) and small natural gas energy input in 2004 (15,433 GJ). The second[14] is again due to small size (65.3MWth), but also because it was only included in the 2004 inventory and may have been subsequently derated

[13] 'Dalkia Poznań ZEC S.A. ECI Garbary', ul. Gdyńska 54, 60-960 Poznań (Poland)

[14] 'Heizkraftwerk', Gernsbach (Germany)



to below 50MWth (not confirmed by CA). The list in Table 4.25 contains a number of LCPs that are either now closed, opted out or have derogations under the Accession Treaties.

Table 4.25 The ten LCPs with highest dust emission factors.

No.	Member State	Plant Name	Plant Location	Thermal capacity (MWth)	Primary fuel type	Dust emission factor '04-'06 (g [dust]/GJ)	Remarks (Note 1)
1.	Ireland	Shannonbridge 1, 2 & 3	Shannonbridge, Co. Westmeath	431	Peat	1,032.8	Closed
2.	Ireland	Bellacorrick 1 & 2	Bellacorrick, Co. Mayo	144	Peat	1,031.3	Closed
3.	Ireland	Lanesboro 2	Lanesboro, Co. Longford	145	Peat	831.8	Closed
4.	Estonia	Kohtla-Järve Soojus AS, Ahtme Elektrijaam	Ritsika 1, Kohtla-Järve	268	Oil shale	496.9	Opted out (Note 2)
5.	Romania	S.C. Termoelectrica SE Doicesti No.1	loc.Doicesti, aleea Sinaia nr.18	470	Other solid fuels	476.6	Opted out (Note 3)
6.	Slovakia	DNV Energo, Ilava	Ilava	149	Other solid fuels/natural gas	464.9	Not in operation in '05-'06
7.	Romania	S.C. Termoelectrica SE Doicesti No.2	loc.Doicesti, aleea Sinaia nr.18	470	Other solid fuels	437.8	
8.	France	Smurfit	Labouheyre	100	Biomass	418.3	
9.	Poland	Przedsiębiorstwo Energetyczne "Energetyka - Rokita" Sp. zoo	ul. Sienkiewicza 4, 56-120 Brzeg Dolny	312	Other solid fuels	356.6	Fully/part opted out (Note 4)
10.	Greece	Megalopoli II	Megalopoli, Arcadia	360	Other solid fuels	337.4	Opted out

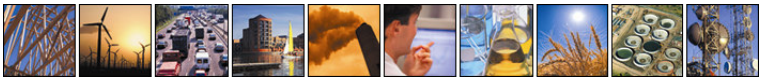
Note 1: To find the top ten list of non-opted out LCPs without specific Accession Treaty derogations and which haven't closed, the following LCPs would be appended (to the LCPs numbered 6, 7 and 8 above):

12. Estonia	Pärnu Soojus AS, Suur-Jõe 52, Pärnu	315.2 g [dust]/GJ
14. Slovakia	Kvartet, Partizánske, Partizánske	303.0 g [dust]/GJ
15. Bulgaria	TPP "Republika", Pernik	302.8 g [dust]/GJ
19. Romania	CET ARAD No.8, Arad, str. Iuliu Maniu nr.65	237.8 g [dust]/GJ
20. Romania	CET ARAD No.9, Arad, str. Iuliu Maniu nr.65	226.8 g [dust]/GJ
22. Poland	Zakład Elektroenergetyczny Elsen, ul. Kucelińska 22, 42-200 Częstochowa	217.5 g [dust]/GJ
24. Greece	Ag. Dimitrios III-IV, Ag. Dimitrios, Kozani	202.9 g [dust]/GJ

Note 2: The Accession Treaty 2003 states that, by way of derogation from Article 4(3) and part A of Annexes III and VII of the LCPD, the emission limit values for (…) dust shall not apply until 31 December 2010 for the combustion plant at Ahtme.

Note 3: The Accession Treaty 2005 states that, by way of derogation from Article 4(3) and part A of Annex VII of the LCPD, the emission limit values for dust emissions shall not apply (…) until 31 December 2010 [for] S.C. Termoelectrica Doiceşti No 1.

Note 4: Boilers OSR-25 K-1, OSR-25 K-2, OSR-25 K-3 and OP-100 opted out. Opting out part of an LCP is not considered permissible by the Commission.



4.3 Comparison with other data sources

The reported LCP inventories that have been collated can be critically compared and reviewed at e.g. the MS level to other sources of information. Other data sources include the European Pollutant Emission Register (EPER) and MS inventories submitted under the National Emission Ceilings Directive 2001/81/EC. Additionally, LCP emission totals from the inventories can also be used to compare with the requirements included in the Accession Treaty Annexes for those MS which have recently acceded the EU.

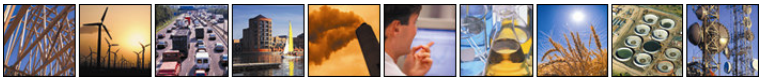
4.3.1 EPER

The European Pollutant Emission Register (EPER)[15] has a 2004 database of emissions to air as reported by Member States that includes data for sulphur dioxides (SO_X), NO_X and PM_{10} (particulate matter, or dust, less than 10µm in diameter). This online database has been used to compare the total emissions from each MS for each pollutant with the results of the 2004 LCP inventory.

However, there are a number of differences between the two datasets which may limit the comparison. These are:

- For emissions of sulphur oxides, EPER lists SO_X emissions, whereas the LCP inventories list only sulphur dioxide (SO_2) emissions;
- For emissions of particulates, EPER lists PM_{10} emissions, whereas the LCPD indicates that dust should be reported as total suspended particles (PM_{TSP});
- The EPER database includes many more facilities than just combustion plants, and its listed activity comparable to LCPs is 'combustion installations >50MW' (main activity 1.1). This definition could include combustion plants which are excluded from the scope of the LCPD, such as existing gas turbines;
- LCPs which are part of industrial installations (e.g. iron and steel, pulp, refineries) may have been reported in EPER under a different activity classification from 'combustion installations >50MW', as the EPER reporting is done at the facility level (covering the various plants which are part of that facility);
- The LCPD adopts the stack approach (although some MS may not have followed this when compiling their inventories, see section 3), while EPER data are reported at the level of 'facilities', which refers to industrial complexes with one or more installations on the same site, where one operator carries out one or more IPPC Annex I activities, so the number of LCPs and EPER facilities may not match;

[15] http://eper.eea.europa.eu/eper



- EPER operates thresholds for reporting emissions[16], so low emission figures of certain pollutants will not have been included (it also means that for the combustion installations reported on in EPER emissions are not always reported for all three LCPD pollutants); and

- Although EPER has a separate category for petroleum refineries (main activity 1.2: mineral oil and gas refineries) initial queries for refineries at selected MS identified that some MS have refineries reported under activity 1.1, some under 1.2, and some under both. As such, the comparison between EPER activity 1.1 and the LCP inventories is limited by this inconsistency.

Table 4.26 lists the total MS SO_2, NO_X and dust emissions from the 2004 LCP inventory, and the number of LCPs from each MS, alongside the 2004 EPER database entries for SO_X, NO_X and PM_{10} emissions from each MS from combustion plants >50MW (EPER facilities with main activity 1.1), and the number of EPER facilities with main activity 1.1. The number of EPER facilities is the number of combustion installations >50MW which have EPER entries of emissions to air.

Because of the reasons set out above, the number of LCPs and facilities may not match and there may be discrepancies between the emissions reported in EPER and in the LCP inventories.

Table 4.26 shows that – beside Luxembourg, which reported no LCPs – there is only one MS (Poland) with reported LCP numbers lower than the reported number of EPER facilities (with main activity 1.1). This is in-line with the fact that EPER reports facilities, which can comprise several LCPs.

Table 4.26 also indicates that Luxembourg has one combustion installation greater than 50MW (at facility level). EPER reports this installation as being a gas turbine, so if it was licensed before 2002 it would be excluded from the LCPD. No comparison is available for the newest EU Member States – Bulgaria and Romania – because they didn't need to report EPER 2004 data.

[16] SO_X as SO_2: 0.15 kt. NO_X as NO_2: 0.1 kt. PM_{10}: 0.05 kt.

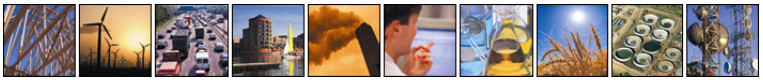
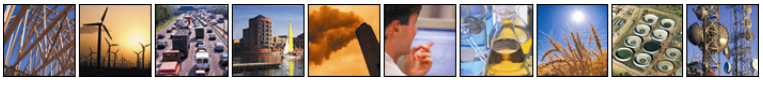


Table 4.26 Comparison of 2004 emissions data from LCP inventory with EPER database (combustion plants >50MW).

Member State	2004 LCP inventory				2004 EPER – main activity 1.1			
	No. of LCPs	SO_2 (kt)	NO_X (kt)	Dust (kt)	No. of facilities	SO_X (kt)	NO_X (kt)	PM_{10} (kt)
Austria	80	8.0	14	0.98	17	1.9	7.0	0.23
Belgium	99	49	41	4.64	33	37	32	1.6
Bulgaria	29	785	60	22.4	(no data, Note 1)			
Cyprus	3	31	6.6	0.50	3	31	7.0	0.37
Czech Republic	123	159	116	5.43	59	135	103	0.25
Denmark	31	11	31	1.04	26	8.0	33	0.36
Estonia	13	78	12	17.7	10	78	12	7.6
Finland	189	40	51	2.91	54	36	45	2.1
France	268	214	108	11.8	135	142	121	7.0
Germany	606	230	279	12.5	178	184	230	8.0
Greece	37	372	73	52.2	25	390	117	39.0
Hungary	45	97	21	3.16	20	113	19	3.1
Ireland	18	49	31	9.83	15	43	32	3.3
Italy (Note 2)	401	193	130	7.02	129	185	126	1.1
Latvia	22	2.0	3.3	0.05	10	2.0	2.5	(no data)
Lithuania	37	16	6.5	0.28	9	8.4	3.0	(no data)
Luxembourg	0	0	0	0.00	1	(no data)	0.6	(no data)
Malta	10	12	5.4	0.75	2	17	5.3	0.39
Netherlands	143	31	51	0.74	33	11	44	0.51
Poland	94	747	260	46.4	168	723	245	21.1
Portugal	23	103	51	3.47	16	95	59	2.1
Romania	176	493	94	26.1	(no data, Note 1)			
Slovakia	73	73	30	8.56	17	54	19	(no data)
Slovenia	8	40	12	2.31	3	40	12	0.79
Spain	124	1,002	300	33.7	87	936	303	22.6
Sweden (Note 3)	156	7.6	10	0.7	23	1.6	3.0	0.06
United Kingdom	241	539	374	13.0	191	516	416	7.6
EU total	**3,049**	**5,381**	**2,171**	**288**	**-**	**-**	**-**	**-**
EU total (excl. MS with no data)	**2,844**	**4,102**	**2,017**	**231**	**1,264**	**3,788**	**1,998**	**129**



Note 1: MS not included in EPER list: database was compiled before Bulgaria and Romania acceded to the EU.
Note 2: The 2005 LCP inventory has been used
Note 3: The 2006 plant-by-plant LCP inventory has been used.

The data contained in Table 4.26 for the pollutants SO_2, NO_X and dust are plotted separately in Figure 4.15, Figure 4.16 and Figure 4.17 respectively as absolute emissions, alongside the percentage difference of the LCP data from the EPER data (such that a figure of 0% indicates no difference between the two sources). These Figures provide a good indication of how well the two data sources match.

Although Table 4.26 indicates that overall for the EU the LCP inventory-reported SO_2 emissions are 8.3% higher than the EPER equivalent (only summing those MS for which there are EPER data), Figure 4.15 indicates that there are ten MS for which the relative emission data from the LCP inventory is greater than 25% different from the EPER database.

Table 4.26 indicates that overall for the EU the LCP inventory-reported NO_X emissions correlate well with EPER, and are only 1.0% higher than the EPER equivalent (only summing those MS for which there are EPER data). Nevertheless, Figure 4.15 indicates that there are eight MS for which the relative emission data from the LCP inventory is greater than 25% different from the EPER database.

The picture is different for dust, with Table 4.26 indicating that overall for the EU the LCP inventory-reported dust emissions are 79% higher than the EPER equivalent (only summing those MS for which there are EPER data). Figure 4.17 reflects this discrepancy, showing that only one MS for which the relative emission data from the LCP inventory is less than 25% different from the EPER database.

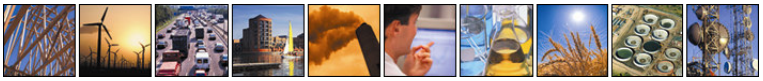
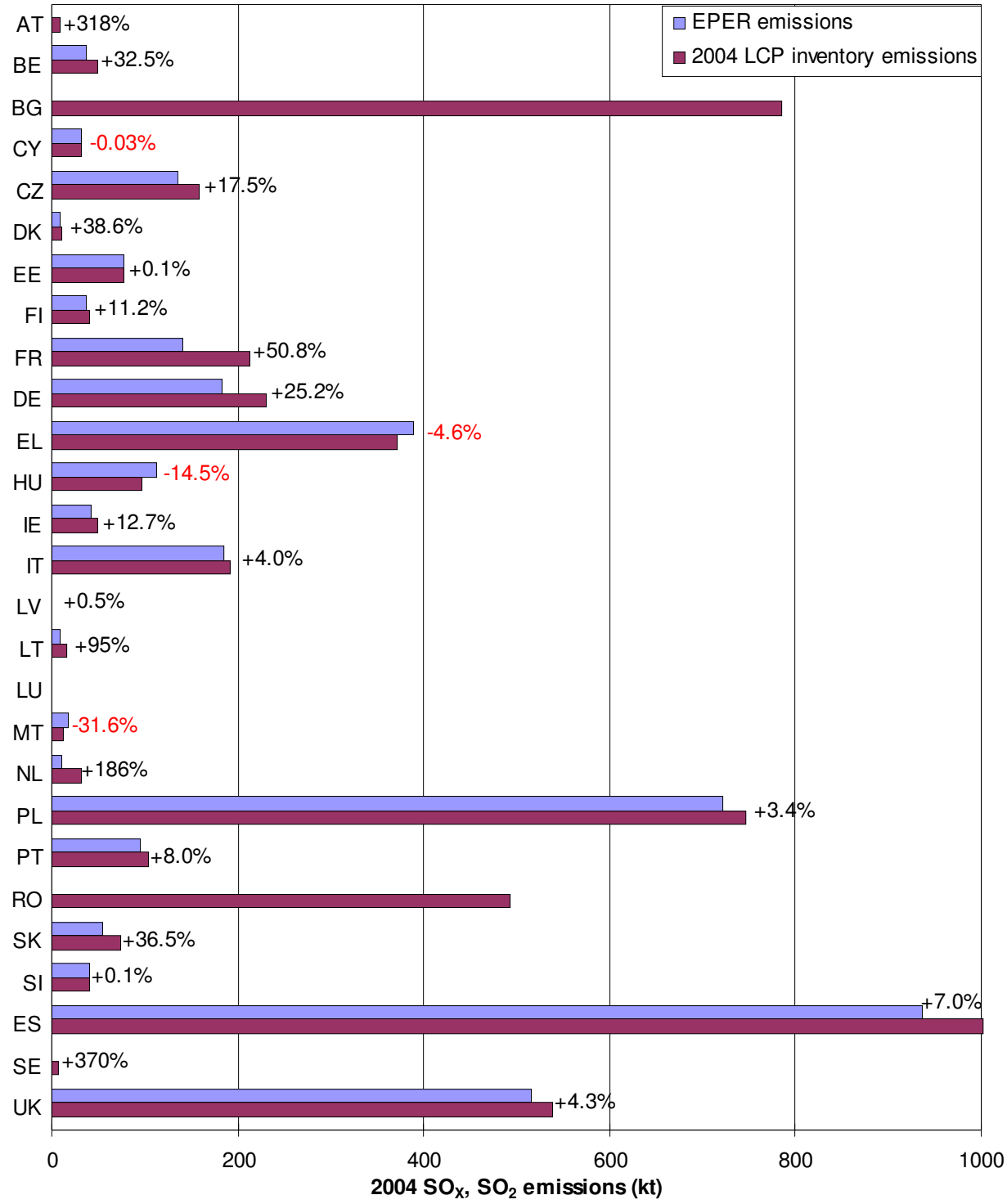


Figure 4.15 2004 SO_X emissions from EPER and SO_2 emissions from the LCP inventory for each MS (kt).



Note that the LCP inventory data for Italy is from 2005, and for Sweden is from 2006.

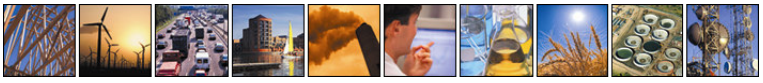
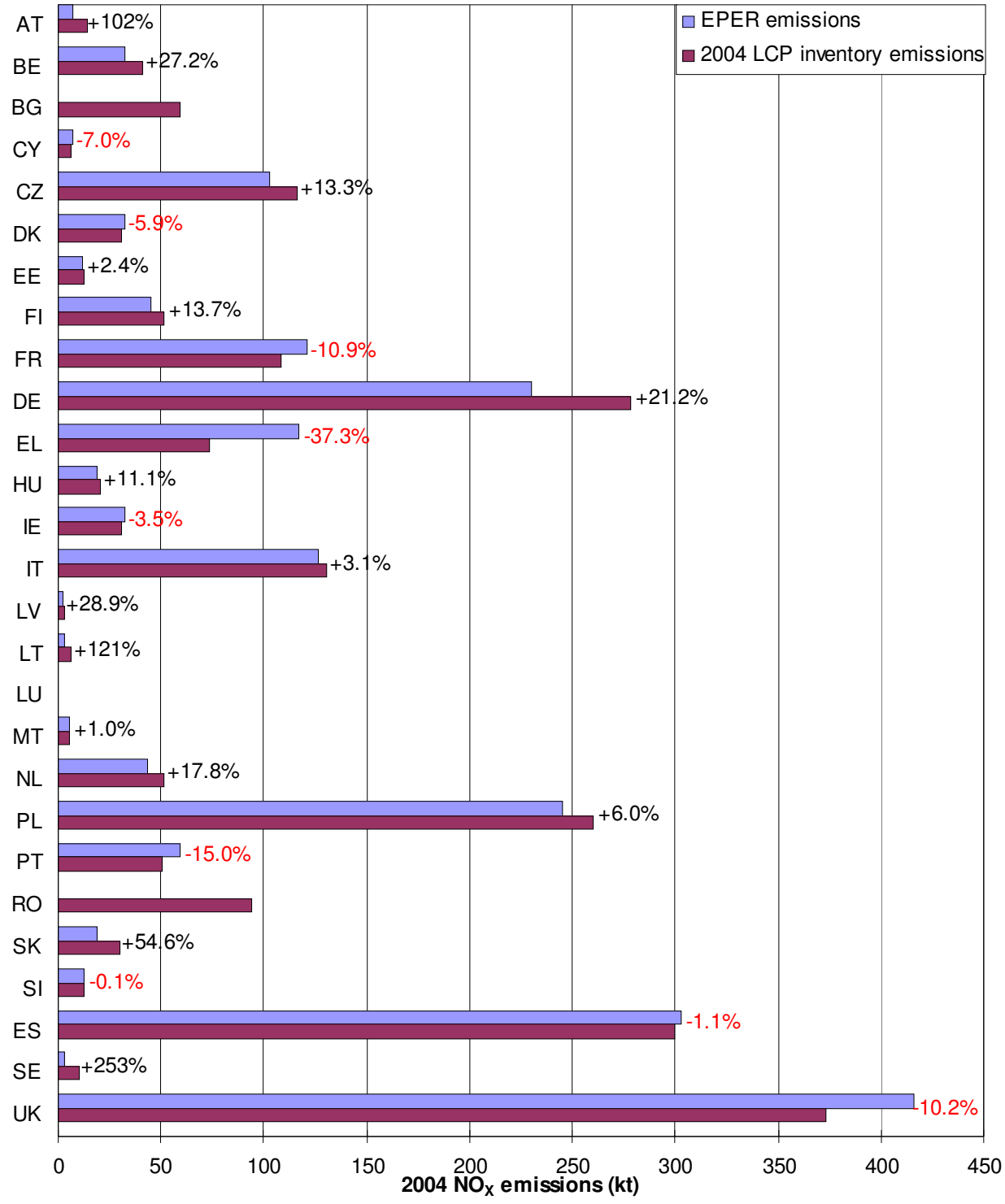


Figure 4.16 2004 NO_X emissions from EPER and NO_X emissions from the LCP inventory for each MS (kt).



Note that the LCP inventory data for Italy is from 2005, and for Sweden is from 2006.

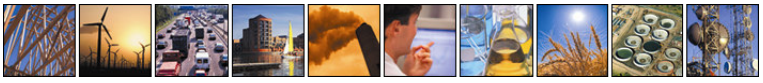
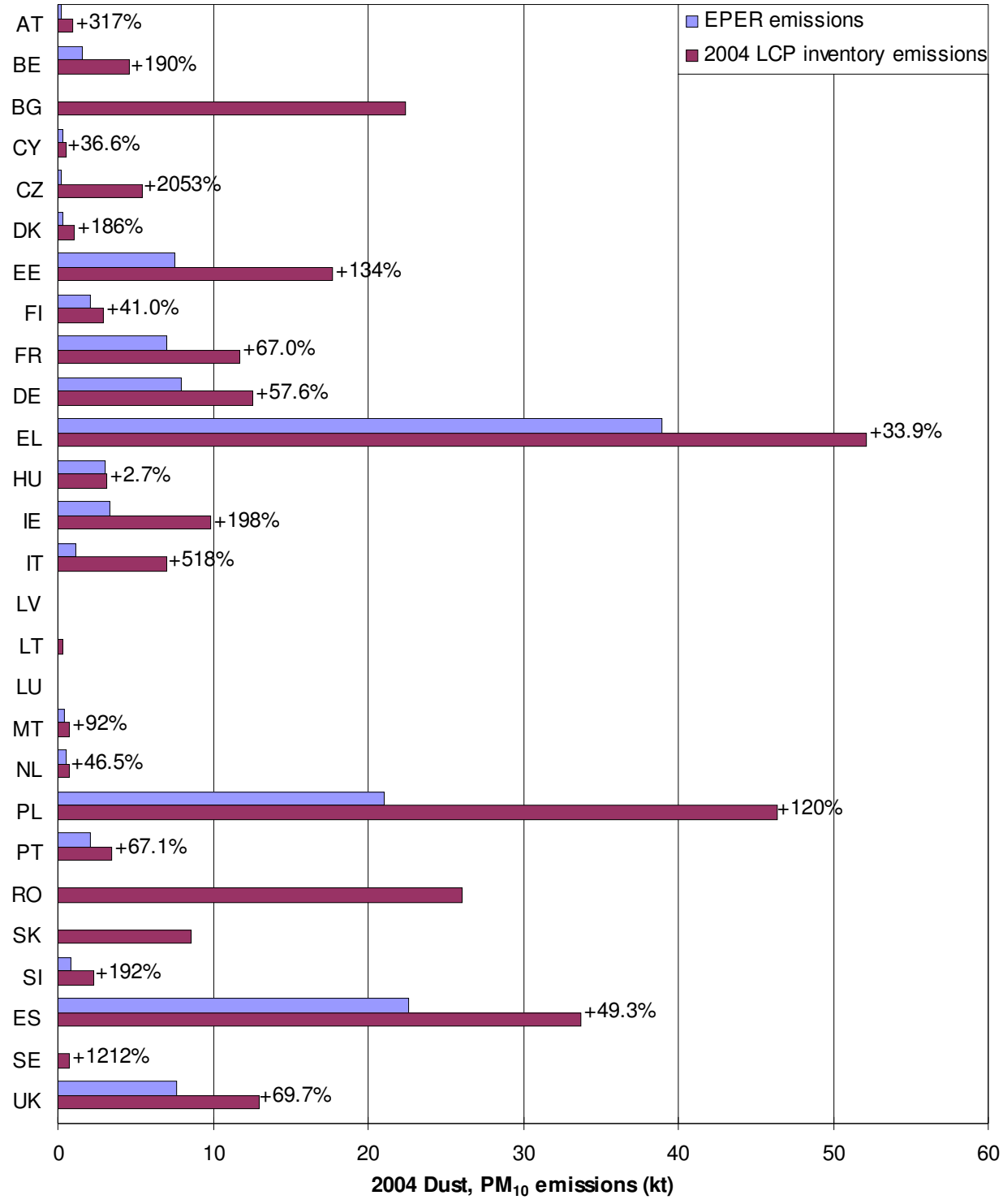
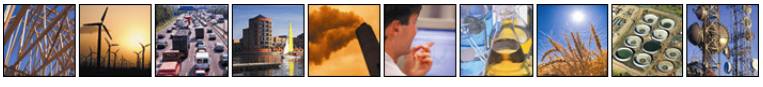


Figure 4.17 2004 PM_{10} emissions from EPER and dust emissions from the LCP inventory for each MS (kt).



Note that the LCP inventory data for Italy is from 2005, and for Sweden is from 2006.



4.3.2 National Emission Ceilings Directive 2001/81/EC (NECD)

The National Emission Ceilings Directive 2001/81/EC (NECD) sets pollutant-specific emission ceilings for each MS to be met by 2010. It also lays down the requirements for the MS to compile and report their national inventories, projections and programmes. As part of these requirements, MS prepare and annually update national emission inventories and emission projections for 2010 for four air pollutants, including SO_2 and NO_X. It is therefore possible to compare emissions reported in the LCP inventories to the MS national NECD inventories.

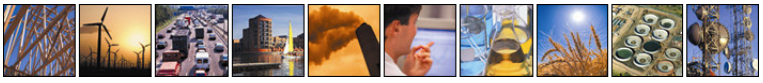
The most recent MS national inventories have been taken from the NECD status report 2006[17] Annex B[18] and are for the year 2005. The reporting categories use the IPCC classification system. The comparisons that can be made are:

- **Comparison with total emissions**: again, although not a like-for-like comparison, the total LCP reported emissions can be compared to the total NECD inventory emissions ("National Total for the entire territory (2002 Guidelines)") to show the importance of LCPs in each MS. This comparison has been undertaken;
- **Comparison with total industrial emissions**: although not a like-for-like comparison, the total LCP reported emissions can be compared to the total NECD industrial emissions to show the fraction that LCP emissions are of total industrial emissions. This comparison has been undertaken;
- **1A1a Public Electricity and Heat Production**: this is comparable to the combined emissions from the sectors ESI and District Heating. Some MS made available additional data for this analysis, but not all. This comparison has been undertaken for those MS with sufficient data;
- **1A1b Petroleum refining**: this is not directly comparable to the reported LCP refinery emissions, because petroleum refinery installations include emissions from LCPs, combustion plants smaller than 50MWth and process emissions. There can therefore be significant differences between total refinery emissions and refinery LCP emissions and so no comparison is made between reported LCP refinery emissions and NECD reported category 1A1b emissions; and
- **1A2 Manufacturing Industries and Construction**: similarly to refineries, this NECD category includes all combustion plants, not just those with combined stack thermal capacities greater than 50MW, as well as process emissions. A comparison between reported LCP emissions from the combined sectors 'Iron and Steel' and 'Industry/Other' and the total NECD emissions for category 1A2 showed that, as expected, the two sets of emissions are incomparable: the NECD emissions are significantly higher than industrial LCP emissions. This comparison is not presented.

No figures are available for Bulgaria, Hungary, Luxembourg and Romania and so no comparisons can be made for these MS.

[17] http://reports.eea.europa.eu/technical_report_2007_15/en

[18] http://reports.eea.europa.eu/technical_report_2007_15/en/AnnexB.xls



Comparison of total LCP emissions with total NEC inventory emissions

The total LCP inventory 2005 SO_2 emissions have been compared to the total 2005 NECD inventory SO_2 emissions. Figure 4.18 shows the comparison with absolute emissions of LCPs and NECD total, and a percentage is shown for each MS which indicates the LCP reported emissions as a percentage of the NECD total. This percentage varies from 19% (Sweden) to 86% (Estonia); the mean of all MS is 54% whereas for the EU as a whole (total LCP emissions/total emissions; MS included in total if data available) it is 60%. Note no comparison has been made for Bulgaria, Hungary, Luxembourg or Romania (no NECD data; Luxembourg also has no LCP inventory).

The total LCP inventory 2005 NO_X emissions have been compared to the total 2005 NECD inventory NO_X emissions. Figure 4.19 shows the comparison with absolute emissions of LCPs and NECD total, and a percentage is shown for each MS which indicates the LCP reported emissions as a percentage of the NECD total. This percentage varies from 5% (Sweden) to 46% (Malta); the mean of all MS percentages is 21% whereas for the EU as a whole (total LCP emissions/total emissions; MS included in total if data available) it is 19%. Note no comparison has been made for Bulgaria, Hungary, Luxembourg or Romania (no NECD data; Luxembourg also has no LCP inventory).

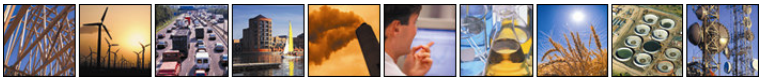
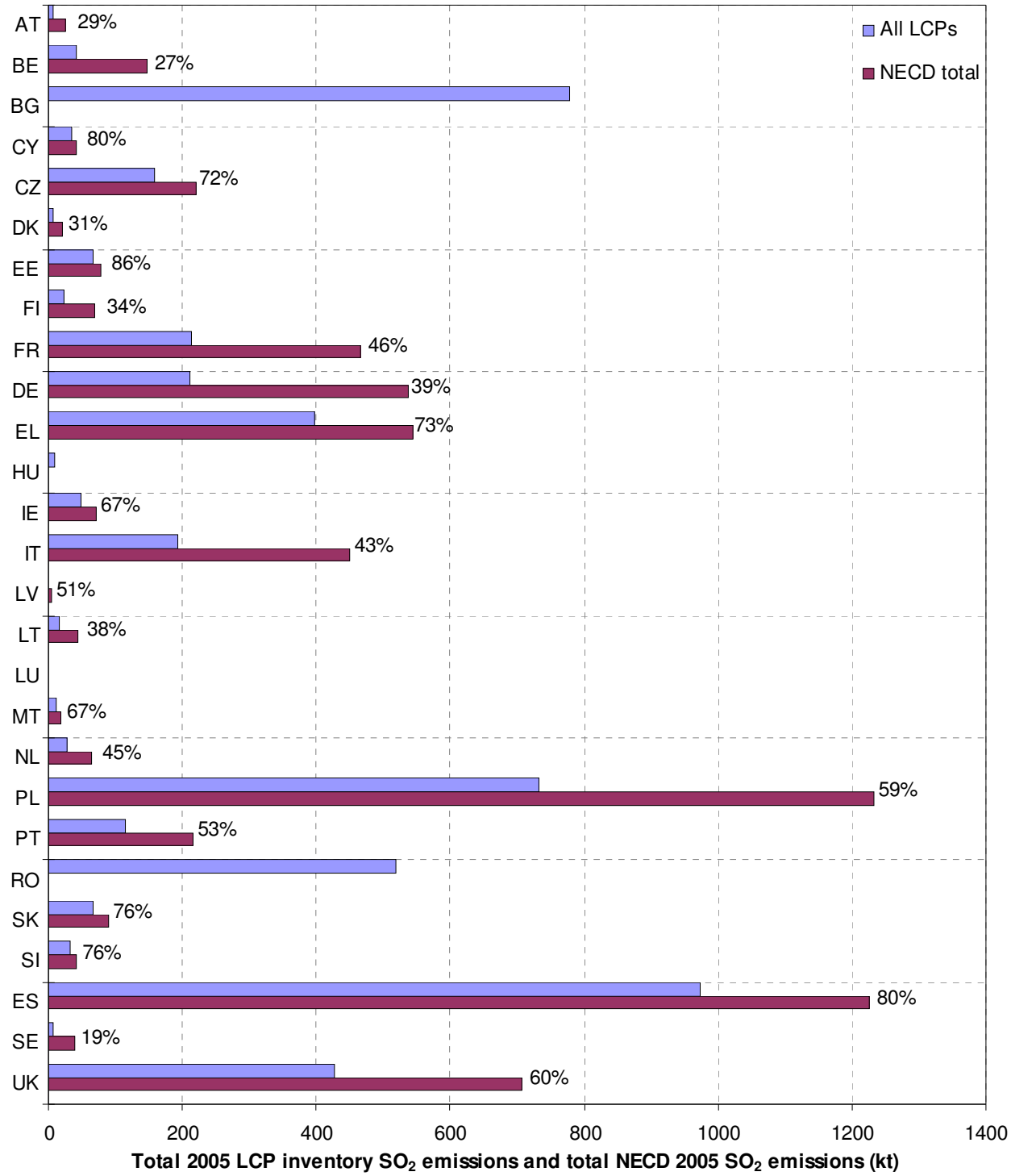


Figure 4.18 Comparison of total SO_2 emissions (kt) as reported in the 2005LCP inventory with 2005 MS NECD inventory totals. The LCP emissions are also given as a percentage of the NECD total.



Note: For Sweden the 2006 LCP inventory has been used.

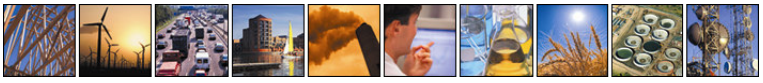
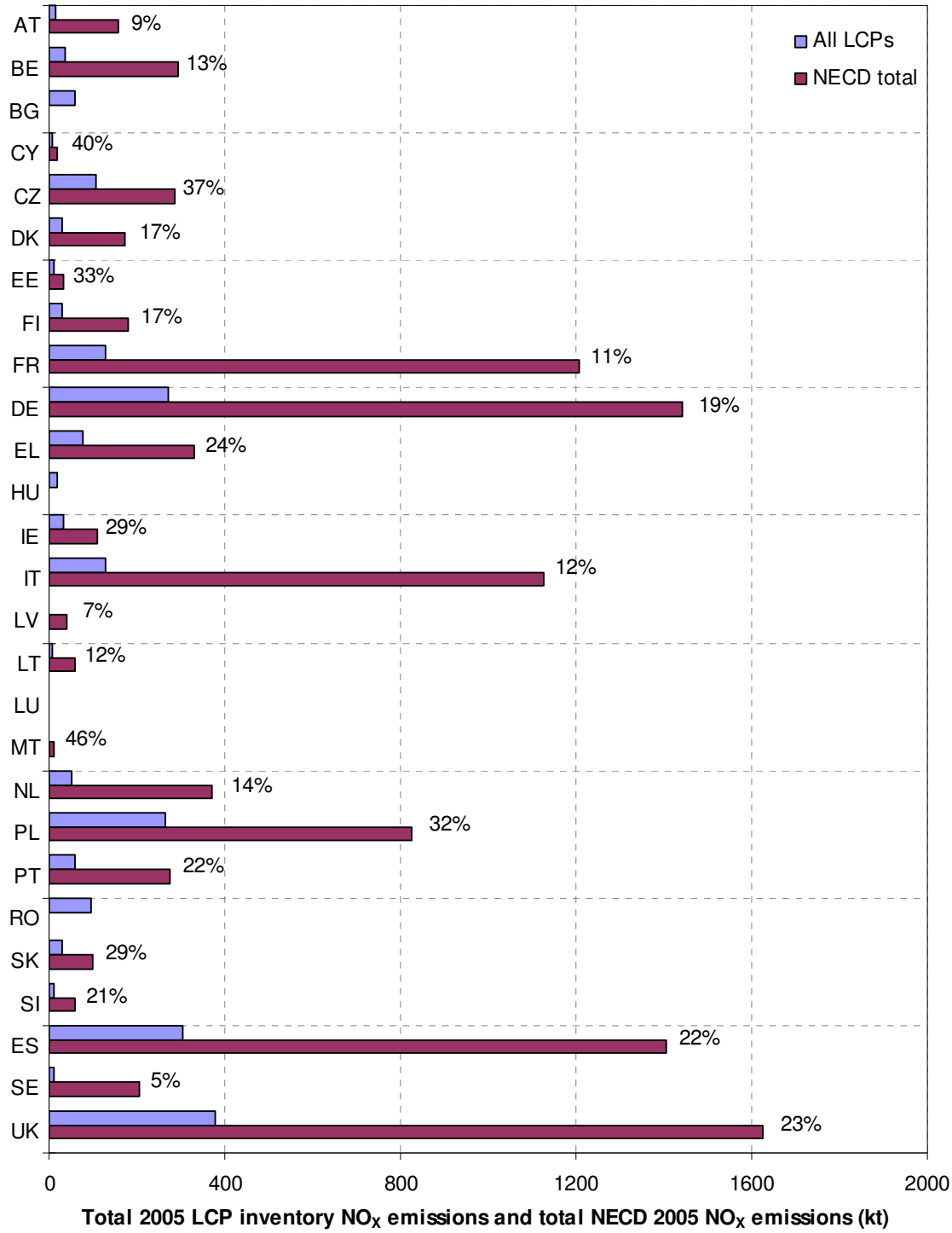
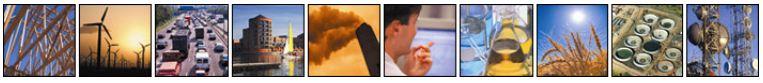


Figure 4.19 Comparison of total NO_X emissions (kt) as reported in the 2005 LCP inventory with 2005 MS NECD inventory totals. The LCP emissions are also given as a percentage of the NECD total.



Note: For Sweden the 2006 LCP inventory has been used.



Comparison of total LCP emissions with total NEC industrial emissions

The total LCP inventory 2005 emissions have been compared to the total 2005 NECD inventory industrial emissions. The NFR sectors included in the category 'total industrial emissions' for the purposes of this comparison are: 1A1, 1A2, 1A3e(i), 1B1, 1B2a(iv), 2A1, 2A2, 2A3, 2A4, 2B, 2C, 2D, 3B, 3C and 6C. For all MS, the total SO2 and NO_x emissions from sectors 2A3, 2A4, 3B and 3C were zero.[19]

Note no comparison has been made for Bulgaria, Hungary, Luxembourg or Romania (no NECD data; Luxembourg also has no LCP inventory). The comparison for Germany has been excluded due to limited NECD data (a number of the industrial categories are missing or are null) which would otherwise erroneously indicate LCP emissions to be higher than total industrial emissions. Note for Sweden the 2006 LCP inventory has been used.

Figure 4.20 shows the comparison of total MS 2005 SO_2 LCP emissions against 2005 NECD total industrial SO_2 emissions. For each MS a percentage is shown which indicates the reported LCP emissions as a percentage of the NECD total industrial emissions. This percentage varies from 24% (Sweden) to 99% (Malta); the mean of all included MS is 67% whereas for the EU as a whole (total LCP emissions/total emissions; MS included in total only if data available) it is 74%.

Figure 4.21 shows the comparison of total MS 2005 NO_X LCP emissions against 2005 NECD total industrial NO_X emissions. For each MS a percentage is shown which indicates the reported LCP emissions as a percentage of the NECD total industrial emissions. This percentage varies from 15% (Sweden) to 99% (Malta); the mean of all included MS is 52% whereas for the EU as a whole (total LCP emissions/total emissions; MS included in total only if data available) it is 49%.

[19] 1A1: Public Electricity and Heat Production, Petroleum refining and Manufacture of Solid Fuels and Other Energy Industries; 1A2: Manufacturing Industries and Construction; 1A3e(i): Pipeline compressors; 1B1: Fugitive Emissions from Solid Fuels; 1B2a(iv) Oil Refining / Storage; 2A1: Cement Production; 2A2: Lime Production; 2A3: Limestone and Dolomite Use; 2A4 Soda Ash Production and use; 2B: Chemical Industry; 2C: Metal Production; 2D: Other Production; 3B: Degreasing and Dry Cleaning; 3C: Chemical Products, Manufacture and Processing; and 6C: Waste Incineration.

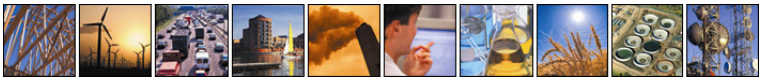
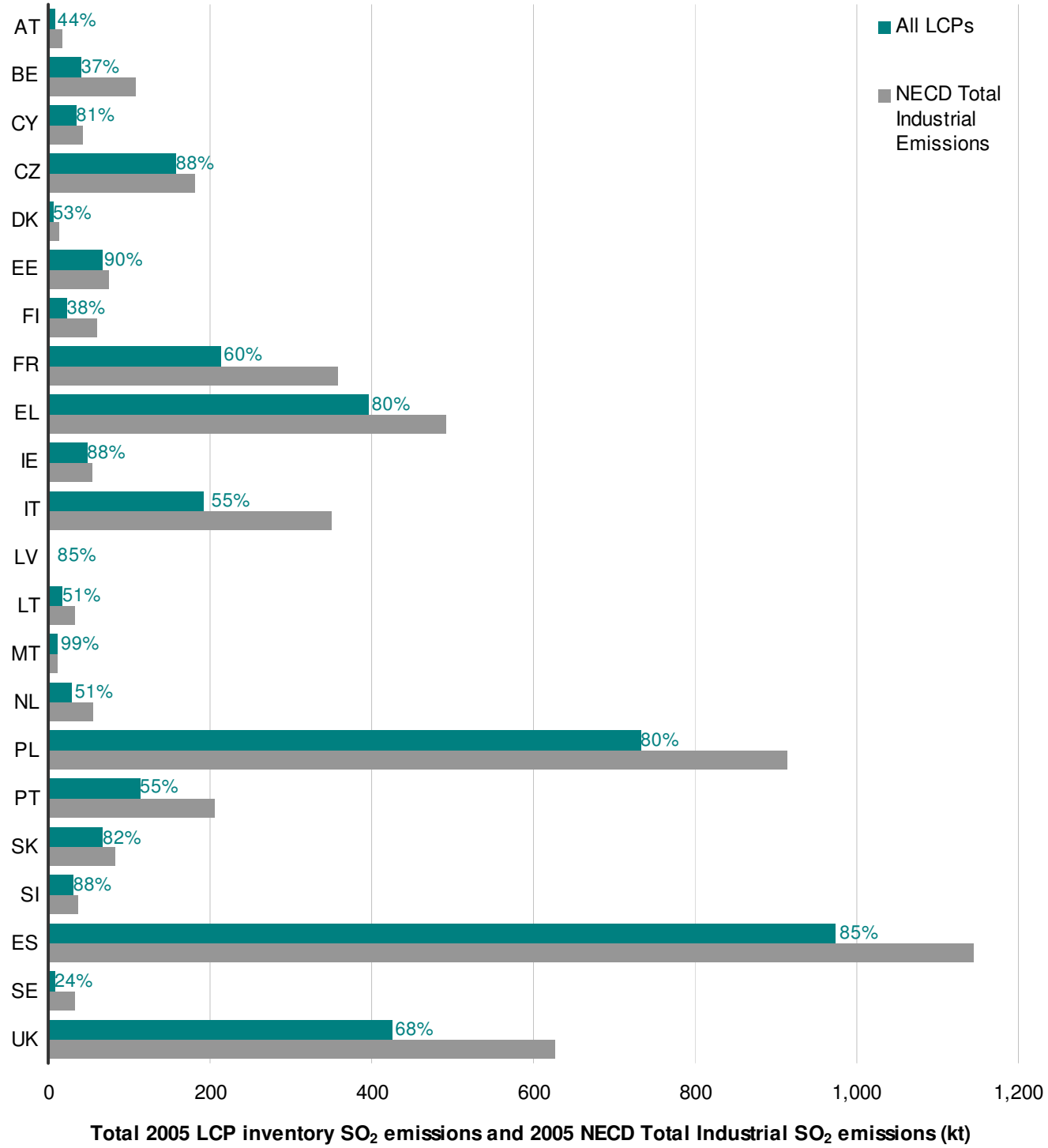


Figure 4.20 Comparison of total MS 2005 SO_2 LCP emissions against 2005 NECD total industrial SO_2 emissions



Note: For Sweden the 2006 LCP inventory has been used.

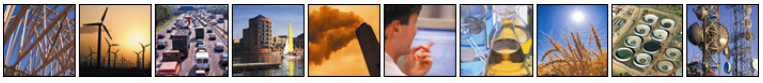
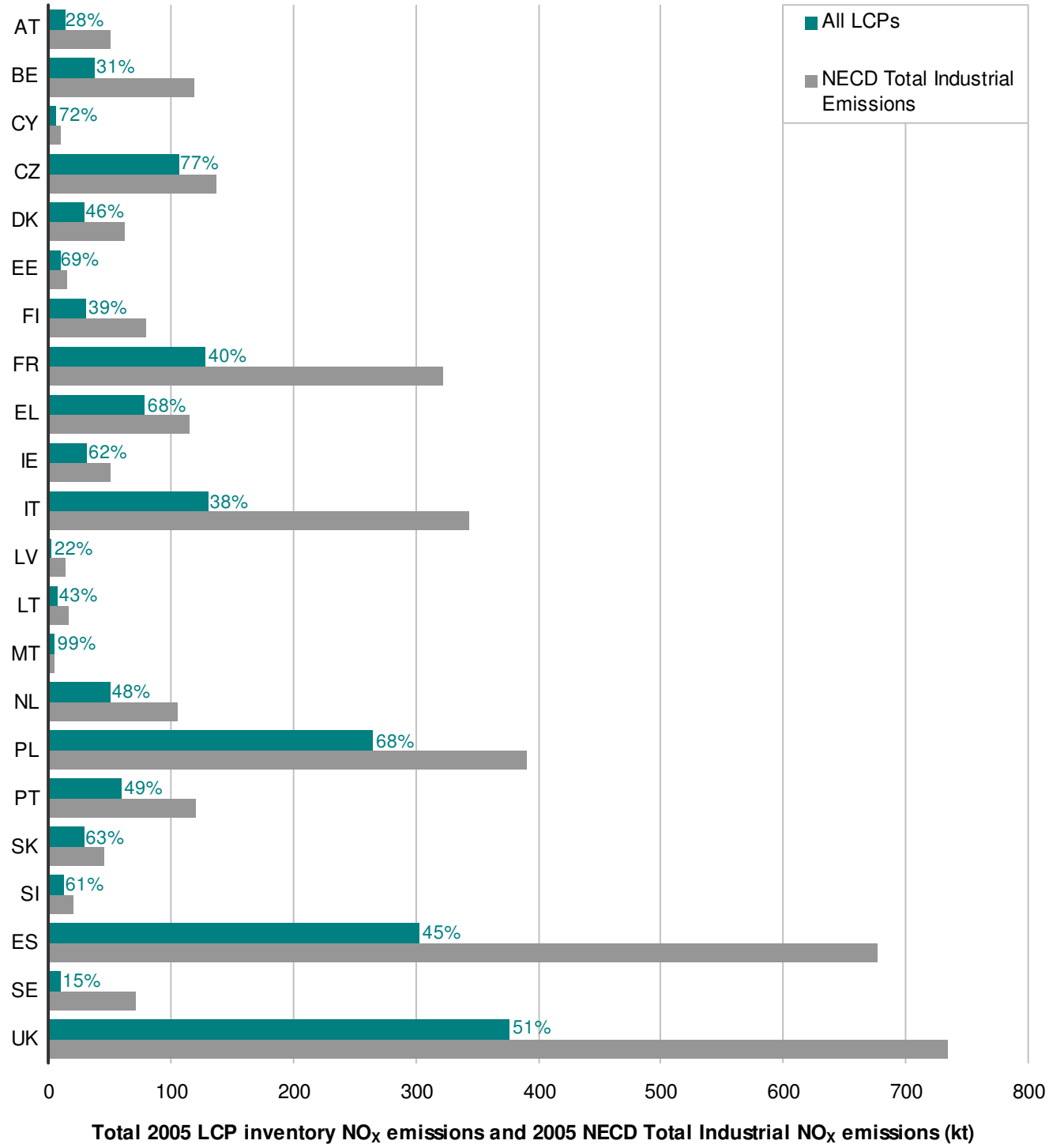
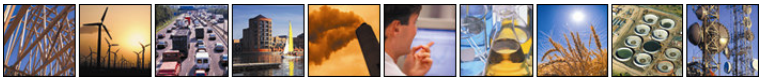


Figure 4.21 Comparison of total MS 2005 NO_X LCP emissions against 2005 NECD total industrial NO_X emissions



Note: For Sweden the 2006 LCP inventory has been used.

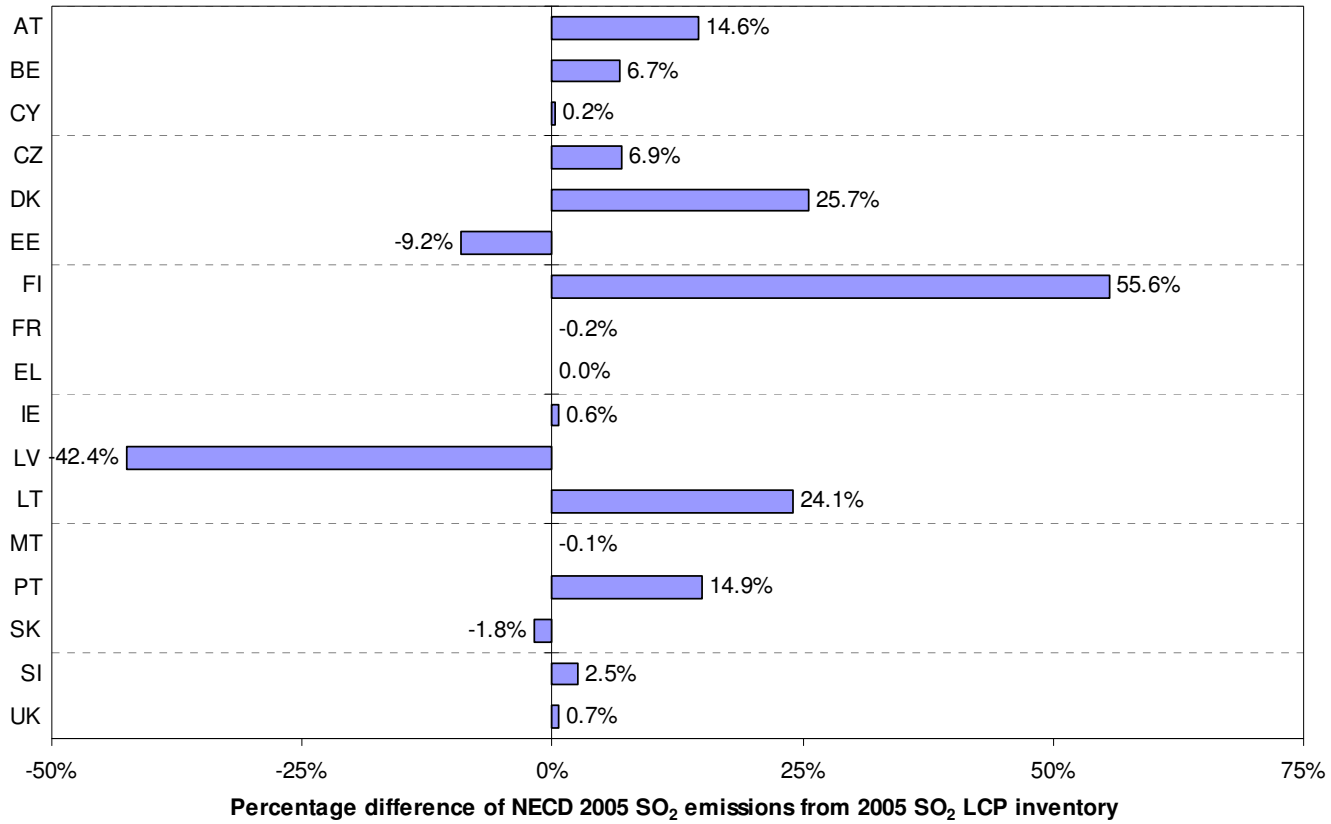


Comparison of IPCC category 1A1a (Public Electricity and Heat Production)

The comparison of emissions reported for the NECD under category 1A1a with those reported in the LCP inventories for the combined sectors electricity supply industry (ESI) and district heating is limited to those MS for which LCP sector classification is complete or close to complete. LCPs without assigned sectors lead to unassigned emissions and must therefore be excluded from this analysis. The NECD inventories (IPCC code 1A1a) have been compared to the LCP inventories (total of sectors ESI and district heating) by taking the percentage difference between NECD and the LCP inventories (relative to the LCP inventory). With this approach, a difference of 0% would indicate that the two datasets report emissions identically. Positive percentages indicate that NECD totals were greater than LCP inventory totals.

Figure 4.22 presents this NECD/LCP inventory comparison for 2005 SO_2 emissions. The following MS have significant (>2.5%) SO_2 emissions which are unassigned to a sector and have therefore been excluded from this analysis: Germany, Italy, the Netherlands, Poland, Spain and Sweden.

Figure 4.22 Percentage difference of NECD national inventories (IPCC code 1A1a) from 2005 SO_2 emissions as reported in MS LCP inventories (sectors ESI and district heating)



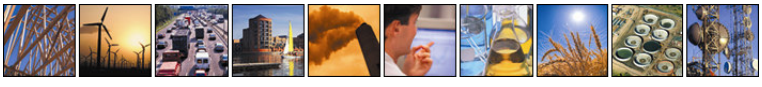
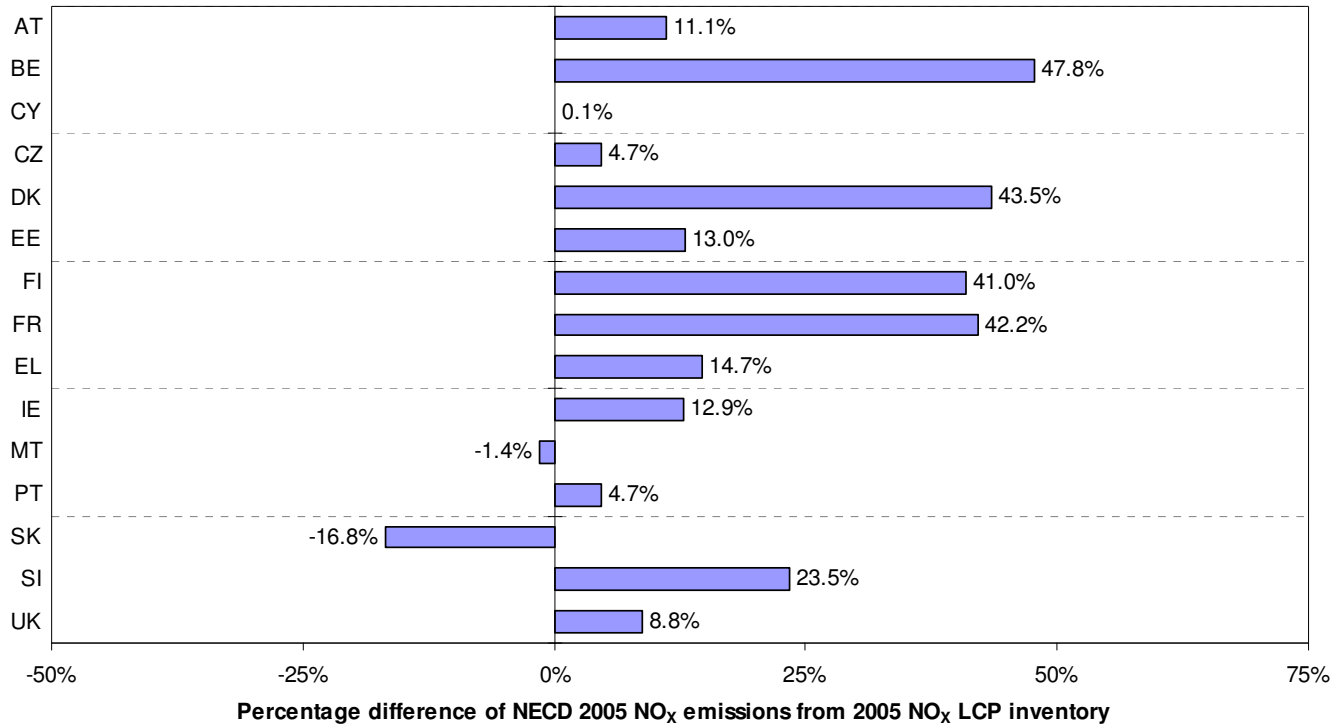
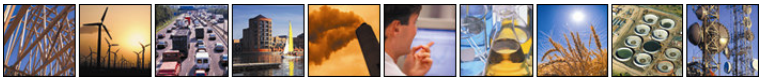


Figure 4.22 shows that, of the MS included in this analysis, the reported SO_2 emissions for IPCC sector 1A1a in the NECD inventories are on average higher than the SO_2 emissions from the equivalent categories in the LCP inventories, but with considerable variation between MS. 11 MS LCP inventories (totals for IPCC sector 1A1a) out of the 17 MS included in the analysis are within ±10% of their NECD inventories.

Figure 4.23 presents this NECD/LCP inventory comparison for 2005 NO_X emissions. Due to unassigned emissions, the following MS have significant (>2.5%) NO_X emissions which are unassigned and have therefore been excluded from this analysis: Germany, Italy, Latvia, Lithuania, the Netherlands, Poland, Spain and Sweden. It shows that, of the MS included in this analysis, the reported NO_X emissions for IPCC sector 1A1a in the NECD inventories are more consistently higher than the NO_X emissions from the equivalent categories in the LCP inventories, again with considerable variation between MS. 5 MS LCP inventories (totals for sector 1A1a) out of the 15 MS included in the analysis are within ±10% of their NECD inventories.

Figure 4.23 Percentage difference of NECD national inventories (IPCC code 1A1a) from 2005 NO_X emissions as reported in MS LCP inventories (sectors ESI and district heating)





4.3.3 Accession Treaty

The Accession Treaty of 2003[20] set out transitional measures for the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia. The Accession Treaty of 2005[21] set out transitional measures for the accession of Bulgaria and Romania. For several of the new MS, these measures included derogations for individual large combustion plants from the requirements (ELVs) of the LCP Directive. In some cases, these derogations have been made subject to meeting intermediate ceilings for emissions of SO_2, NO_X and or dust from some or all LCPs. The LCP inventory can be used to compare the actual emissions with the intermediate transition ceiling.

The comparison between the LCP inventory data and the Accession Treaty provisions is shown in Table 4.27. It shows that:

- Estonia's 2004-2006 SO_2 emissions from oil shale fired combustion plants are decreasing, but are still much higher than the 2012 target;
- Lithuania met its 2005 SO_2 and NO_X ceilings;
- Poland's 2006 SO_2 emissions were considerably higher than the 2008 target, but its NO_X emissions were much closer to the 2008 target (but still exceeding);
- Bulgaria's 2006 SO_2, NO_X and dust emissions were considerably higher than its 2008 targets; and
- Romania's 2006 SO_2 emissions were slightly higher than its 2007 target, whereas 2006 NO_X and dust emissions were meeting the 2007 targets.

[20] OJ L236 (Volume 46), of 23 September 2003

[21] OJ L157 (Volume 48), of 21 June 2005

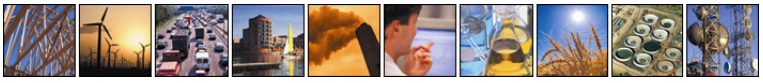
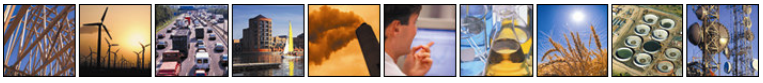


Table 4.27 Summary of intermediate pollutant ceilings from Accession Treaties

(Accession) Member State	Accession Treaty criteria/criterion			LCP inventory	
	Year	Pollutant	Emission ceiling (kt)	Year	Pollutant emissions (kt)
Estonia	2012	SO_2 emissions from oil shale fired combustion plants	25	2004	70.8 (Note 1)
				2005	59.2 (Note 1)
				2006	55.5 (Note 1)
Lithuania	2005	SO_2 emissions relating to electricity generation from the Lithuanian Thermal Power Plant, the Vilnius Combined Heat and Power Plant CHP-3, the Kaunas Combined Heat and Power Plant and the Mažeikiai Combined Heat and Power Plant	28.3	2005	7.51 (Note 2)
	2005	NO_X emissions relating to electricity generation from the Lithuanian Thermal Power Plant, the Vilnius Combined Heat and Power Plant CHP-3, the Kaunas Combined Heat and Power Plant and the Mažeikiai Combined Heat and Power Plant	4.6	2005	2.93 (Note 2)
Poland	2008	SO_2 emissions from all LCPs	454	2004	747.2
				2005	732.1
				2006	783.4
	2008	NO_X emissions from all LCPs	254	2004	260.1
				2005	264.7
				2006	272.6
Bulgaria	2008	SO_2 emissions from all LCPs	179.7	2004	785.0
				2005	777.1
				2006	765.3
	2008	NO_X emissions from all LCPs	42.9	2004	59.5
				2005	59.4
				2006	61.6
	2008	Dust emissions from all LCPs	8.9	2004	22.4
				2005	22.1
				2006	21.5
Romania	2007	SO_2 emissions from all LCPs	540	2004	493.4
				2005	517.8
				2006	565.5
	2007	NO_X emissions from all LCPs	128	2004	94.0
				2005	96.8
				2006	101.0



(Accession) Member State	Accession Treaty criteria/criterion			LCP inventory	
	Year	Pollutant	Emission ceiling (kt)	Year	Pollutant emissions (kt)
	2007	Dust emissions from all LCPs	38.6	2004	26.1
				2005	26.7
				2006	24.9

Note 1: Sum of all oil-shale fired LCPs.
Note 2: These are emissions related to electricity generation from the LCPs mentioned.

In some cases, the Accession Treaty also sets out derogations from the LCPD (until a specified date) for specific plants. These plants can be used to cross-reference the LCPs reported in the inventories; this cross referencing was undertaken. All the plants given derogations in the Accession Treaty for Estonia, Cyprus, Lithuania, Malta, Slovakia, Bulgaria and Romania were included in the MS LCP inventories. For the Czech Republic and Hungary, it was not fully clear whether the plants mentioned in the Treaty were included in the inventories, and for Poland there were 26 LCPs that were listed in the Accession Treaty, but which could not be found in the LCP inventory.

4.4 Emission trends

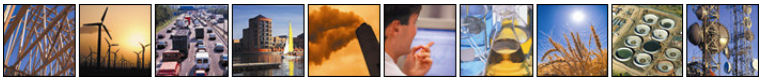
Some analysis was undertaken to assess the historic trends of MS LCP emissions by using previous years' LCP inventories (where available) combined with the most recent LCP inventories (2004-2006). Due to limited data and timescales useful conclusions could not be drawn from this analysis and so it is not presented further here. However, it might be better to repeat this analysis for the next LCPD reporting requirement in 3 years time to assess the impacts of IPPC permit conditions and LCPD ELVs coming into force for existing plants.

4.5 Opt-outs under Article 4(4) of the LCPD

One aspect of future emissions that can be assessed relates to emissions from LCPs that have chosen to opt-out of the LCPD requirements under Article 4(4) of the Directive. These LCPs must close by the end of 2015 and operate no more than 20,000 hours in total between 2008 and 2015. MS are required to report to the Commission on which LCPs have chosen to opt-out, and from 2008 the number of hours they are operating. Information was available for all but one MS (Italy) on which (if any) LCPs have chosen to opt-out.

Nine Member States have indicated that no LCPs have chosen to opt-out under Article 4(4) of the LCPD:

- Austria;



- Czech Republic;
- Germany;
- Hungary;
- Ireland;
- Lithuania;
- Luxembourg
- the Netherlands; and
- Sweden.

For those Member States which do have LCPs that have chosen to opt-out Figure 4.24 below provides an overview of the total number and capacity of these plants as a proportion of total LCP numbers and installed thermal capacity. It is important to note that some MS (France, Poland, Slovakia and Spain) have indicated that for a number of LCPs only a proportion of units at that plant have opted-out and will close by the end of 2015. According to the views of the Commission, this approach is not in line with Article 4(4) of the LCPD, as the possibility to opt out from the Directive's provisions applies to combustion plants (common stack approach).

However, insufficient detail has been provided to disaggregate these units from the remainder of the plant so the values presented in the following figures for these Member States will be slightly overestimated.

All MS which do have opted-out LCPs have included them in their inventories.

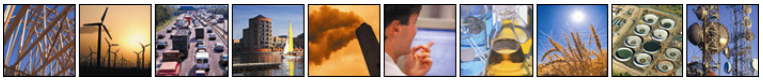
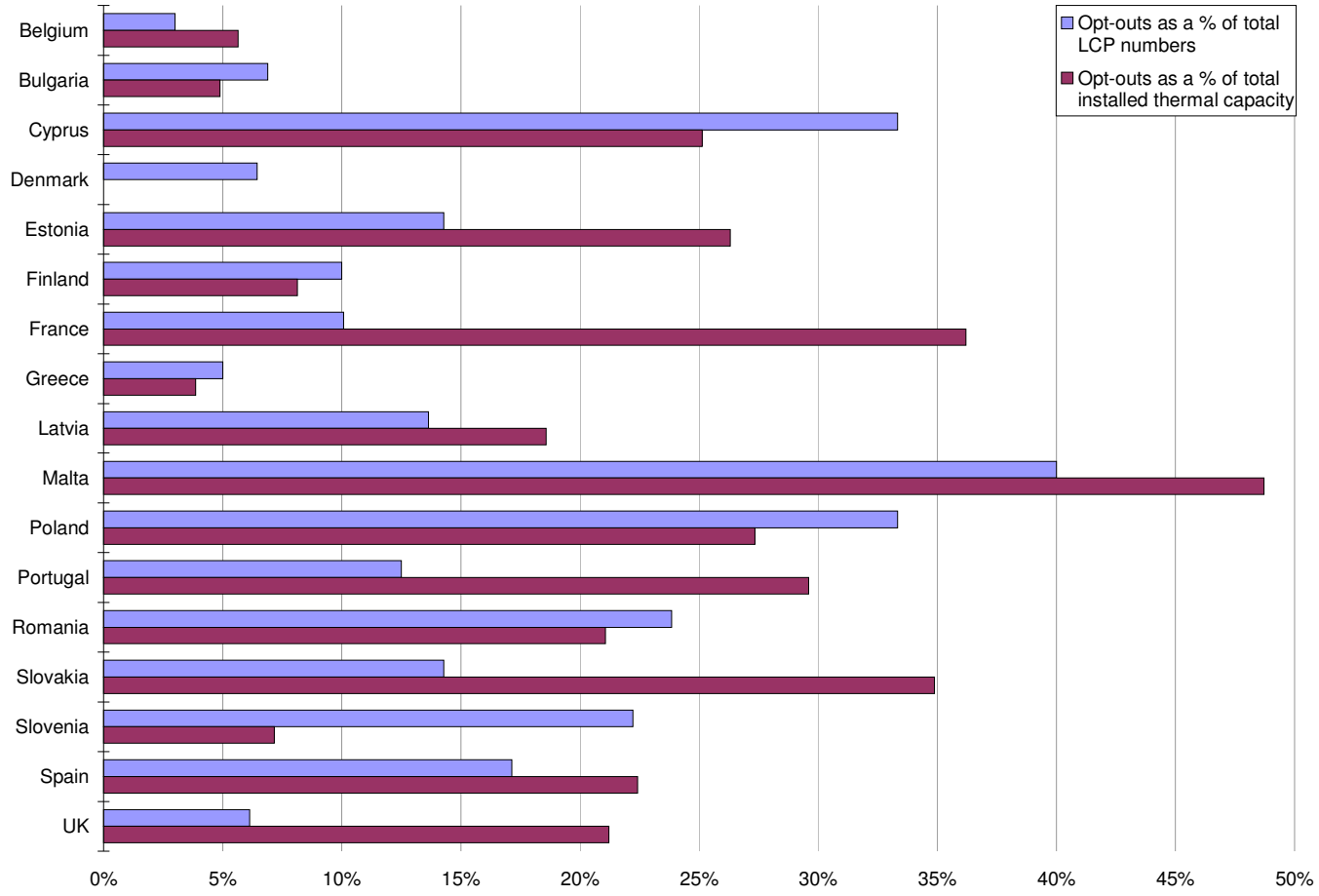


Figure 4.24 Opt-outs as a proportion of total LCP numbers and installed capacity in 2006



Note 1: Installed plant thermal capacity has not been provided for all LCPs in Denmark hence no comparison in the figure.

Figure 4.25 provides an overview of emissions from opted-out plants as a proportion of total LCP emissions based on 2006 data.

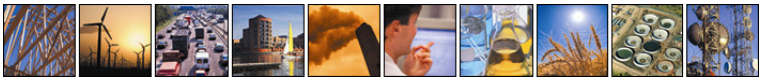
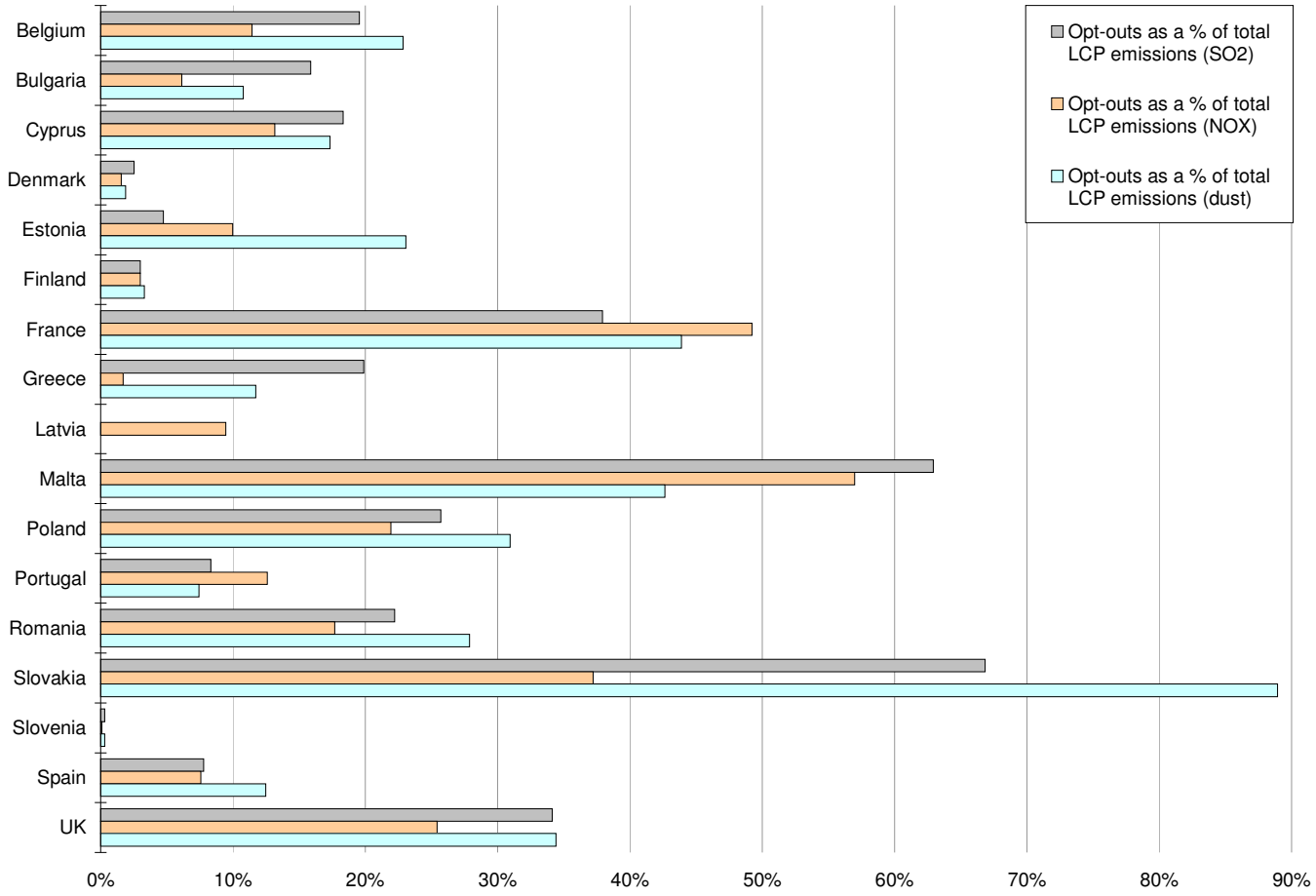


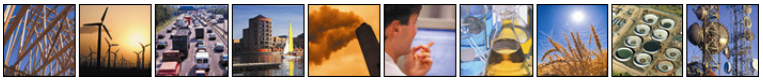
Figure 4.25 Emissions from opted-out plants as a proportion of total LCP emissions in 2006



These two figures demonstrate that for some Member States, opt-outs contribute a significant proportion to total LCP capacity and emissions. For example, for some Member States such as France, Malta, Slovakia and the UK, opted-out plants contributed at least 25% of total LCP emissions of SO_2, NO_X and dust in 2006. This contribution to total emissions is likely to be even higher (as a %) since 1 January 2008 as existing plants that have not chosen to opt-out now have to comply with LCPD ELVs or NERP requirements.

4.6 Comparison of LCP performance against LCPD ELVs & BREF BAT-AELs

This subtask compares LCP performance of each MS based on reported energy input and emissions against the LCPD emission limit values (ELVs). LCP performance derived from the inventories can also be compared to the LCP BREF BAT-AELs, which are emission levels indicating what can be achieved if an installation applies the best available techniques (BAT), as indicated in the LCP BREF document.



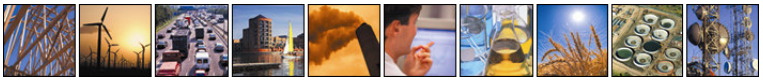
4.6.1 Approach

For single-fuelled plants a fuel specific emission factor (EF) can be calculated based on total emissions of each pollutant and total energy input (e.g. g SO_2 per GJ of coal energy input). For comparison, EFs can also be calculated based on the LCPD ELVs and BAT-AELs (upper and lower range) following a similar approach to that outlined in a recent study for the EEA (2008)[22].

The following assumptions have been applied to undertake the comparison described above:

- Data for 2006 has been used to compare performance against the LCPD ELVs and BAT-AELs from the LCP BREF;
- Performance has been compared against the LCPD ELVs for existing and new plants only (referred to in LCPD article 4(1)) as very limited information is available on which plants are 'new-new' (i.e. post-2002; likely to be relatively small proportion). 'New-new' plants have been excluded where information is available;
- For NO_X, performance has been compared against the LCPD ELVs applicable from 2008 and not the more stringent ELV for large solid fuelled plants from 2016 onwards;
- Plants not operating in 2006, opted-out plants (under Article 4(4) of the LCPD) and plants due to close in the immediate future have been excluded from the comparison (note that plants subject to derogations under the Accession Treaties for the recently acceded Member States have been included);
- Plants with no reported thermal capacity and/or energy data have been excluded from the analysis;
- Only single-fuelled plants have been considered in the analysis due to the variable plant fuel mixes and complexities in determining LCPD limit values or BREF BAT-AELs for multi-fuelled plants;
- A single-fuelled plant has been defined as one that uses >95% of a single fuel by energy input;
- The focus of the analysis has been on the main fuel types only: biomass, solid fuels (hard and brown coal), liquid fuels and natural gas. Due to the range of gases that can be included in the category 'other gases', no analysis has been undertaken on this fuel type;
- For presentation, the analysis for solid fuels has been presented combined for both hard and brown coal as there are relatively minor differences between the specific flue gas volumes and subsequent fuel specific emission factors (see Table 4.28);
- Gas turbines have been presented separately where data are available from Member States. The NO_X ELV for gas turbines is assumed to be 50 mg/Nm^3;
- No derogations contained within the LCPD have been taken into account; and

[22] EEA (2008) 'Air pollution from electricity-generating large combustion plants. An assessment of the theoretical emission reduction of SO_2 and NO_X through implementation of BAT as set out in the BREFs'. EEA Technical Report No 4/2008.



- As determined by the available data, the comparison is based on annual emissions performance. This may overestimate the degree of compliance with LCPD as in practice compliance with LCPD ELVs is required on a monthly basis for existing plants, and compliance with BAT based permit conditions may be on a shorter averaging period.

Taking into account the assumptions above, the analysis in the following sections includes approximately 55% of all plants by number reported in Member States' LCP emission inventories.

In order to convert the LCPD ELVs and LCP BREF BAT-AELs into fuel specific emission factors for comparison with actual performance the methodology adopted in EEA (2008)[22] has been employed and the fuel-specific flue gas volumes presented in Table 4.28 have been assumed. These values have been calculated in-house on a dry basis at the reference oxygen content and using the gross calorific values for each fuel.

Table 4.28 Fuel-specific flue gas volumes

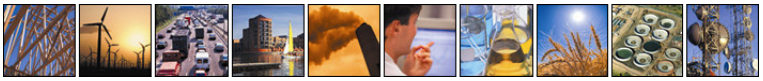
Fuel	Excess air (% O_2)	Specific flue gas volume (m^3/GJ) (Note 1)
Biomass	6	331 (Note 2)
Hard coal	6	374
Brown coal	6	366
Liquid fuels	3	279
Natural gas	3	251
Natural gas (gas turbines)	15	760

Note 1: Entec calculated figures (on a dry basis at the reference oxygen content and using gross calorific values for each fuel).
Note 2: For biomass there is a wide range of variability in terms of types of fuels and their associated combustion properties. Therefore an average has been calculated and applied in this study based on analysis of a range of common biomass fuels.

4.6.2 Results

Figure 4.26, Figure 4.27 and Figure 4.28 provide an overview of the comparison undertaken between current LCP performance and the LCPD ELVs/LCP BREF BAT-AELs for SO_2, NOx and dust respectively broken down by fuel type and capacity class. Overall the comparisons undertaken show the following patterns for each pollutant:

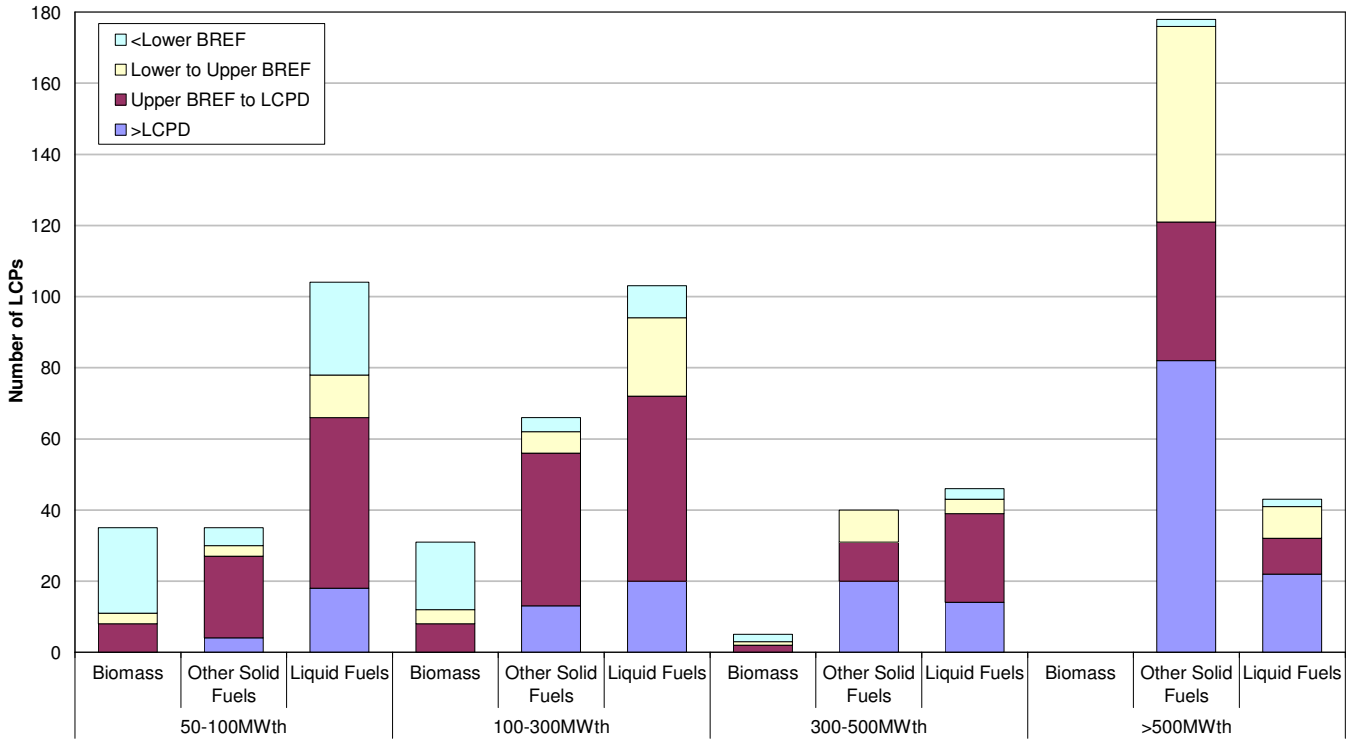
- For SO_2 almost 30% of LCPs in this analysis appear to have operated above the LCPD ELVs in 2006, approximately 40% below the LCPD ELVs but above the upper BREF BAT-AEL range and a further 20% between the lower and upper ranges. Only 10% of LCPs appear to have been operating below the lower BREF BAT-AEL range;



- For NO_X the number of LCPs (excluding gas turbines) that appear to have been operating above the LCPD ELVs in 2006 is similar to the results for SO_2. However, over 50% of LCPs appear to have been operating between the LCPD ELVs and upper BREF BAT-AEL range with a much smaller proportion operating lower (approximately 16% and 2% between the upper and lower ranges of the BREF BAT-AELs and below the lower range, respectively). For gas turbines, approximately two thirds of LCPs appear to have been operating above the LCPD ELV with the remainder below it. This may reflect the fact that some Member States appear to have reported emissions data for gas turbines which are excluded from the LCPD (those licensed before 27 November 2002); and

- For dust the situation is quite different. An approximately equal proportion of LCPs included in this analysis (between 22-28%) appear to have been operating in 2006 at each category of performance.

Figure 4.26 Overview of 2006 LCP performance vs LCPD ELVs/BAT-AELs for SO_2



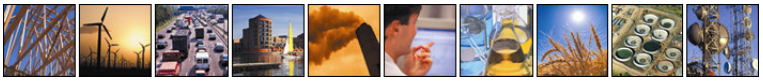
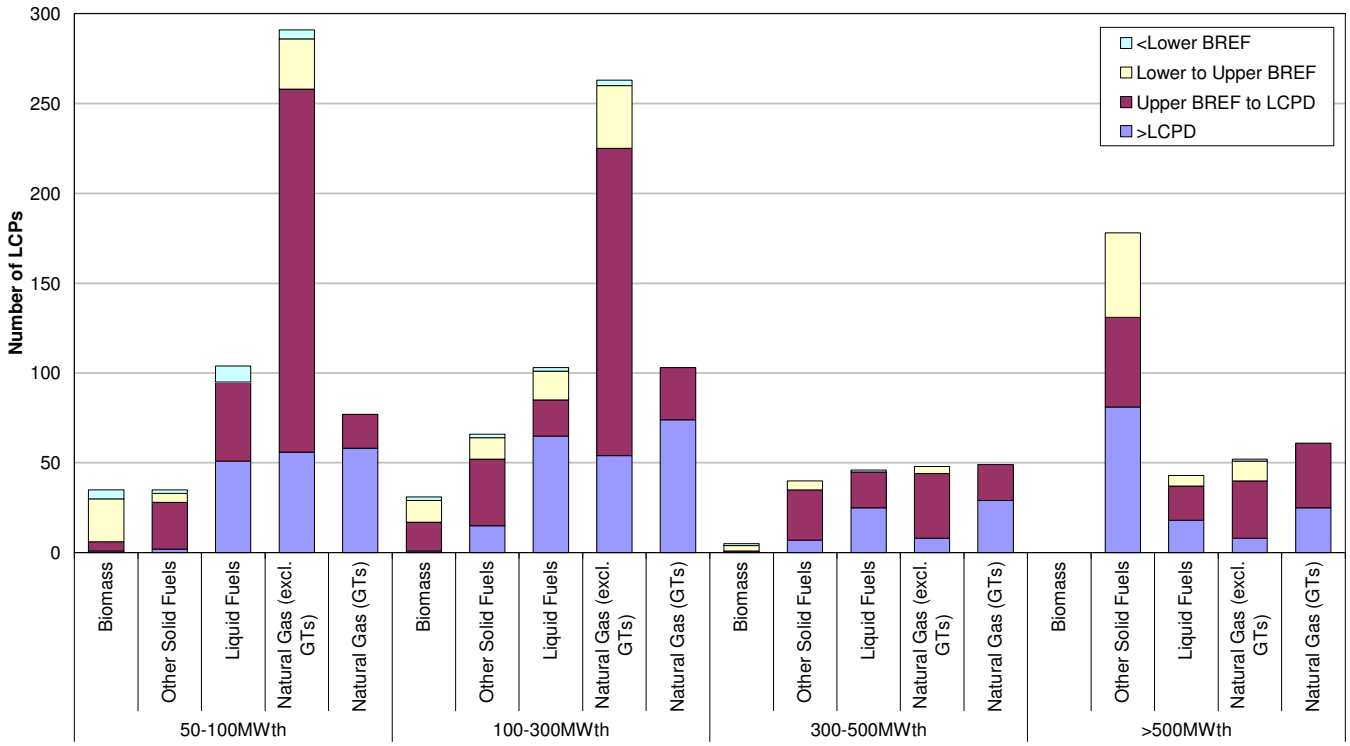


Figure 4.27 Overview of 2006 LCP performance vs LCPD ELVs/BAT-AELs for NO_X



Note: For gas turbines, 2006 EFs have only been compared against the LCPD ELVs so the figures above only relate to whether a plant is currently operating above the LCPD ELV or below it.

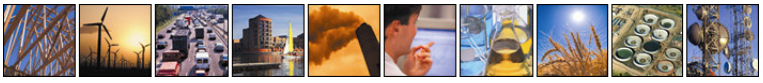
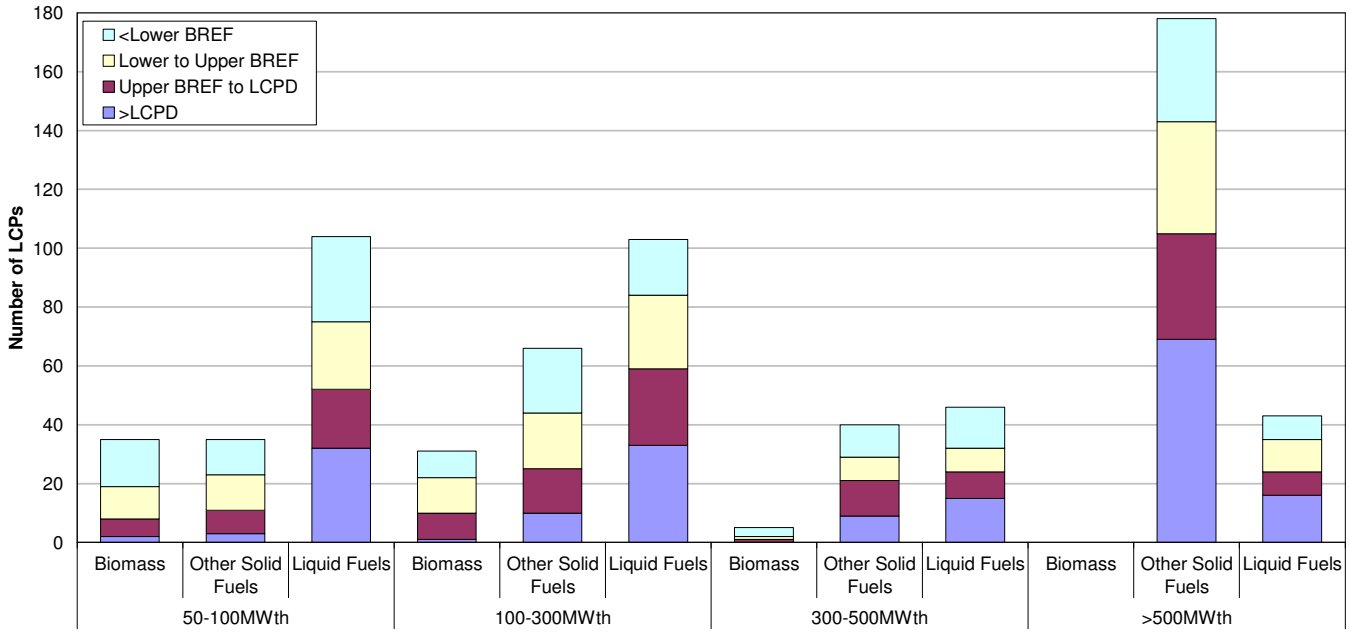
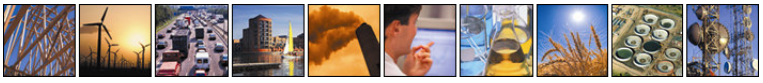


Figure 4.28 Overview of 2006 LCP performance vs LCPD ELVs/BAT-AELs for dust



The following sub-sections present the detailed results of the comparison for each fuel and pollutant based on 2006 data. The figures in each subsection plot the emission factors (in g [pollutant] / GJ [fuel type]) of all LCPs that were included in the analysis, split by Member State, against rated thermal input (capacity, in MWth). Included on the plots are the calculated equivalents (in g/GJ) of the relevant LCPD ELVs, and the lower and upper BREF BAT AELs. Note that some outliers have been excluded from the figures for presentational purposes. The results for natural gas fired plants have been split into two separate figures due to the high number of plants included in the analysis.



Biomass

Figure 4.29 BIOMASS: 2006 performance vs LCPD ELVs/BAT-AELs (SO_2)

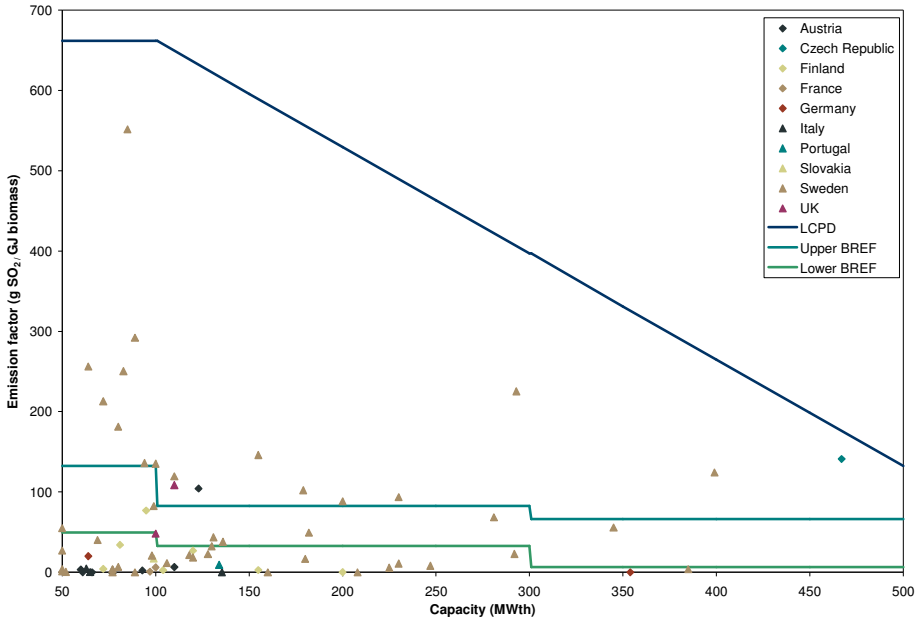
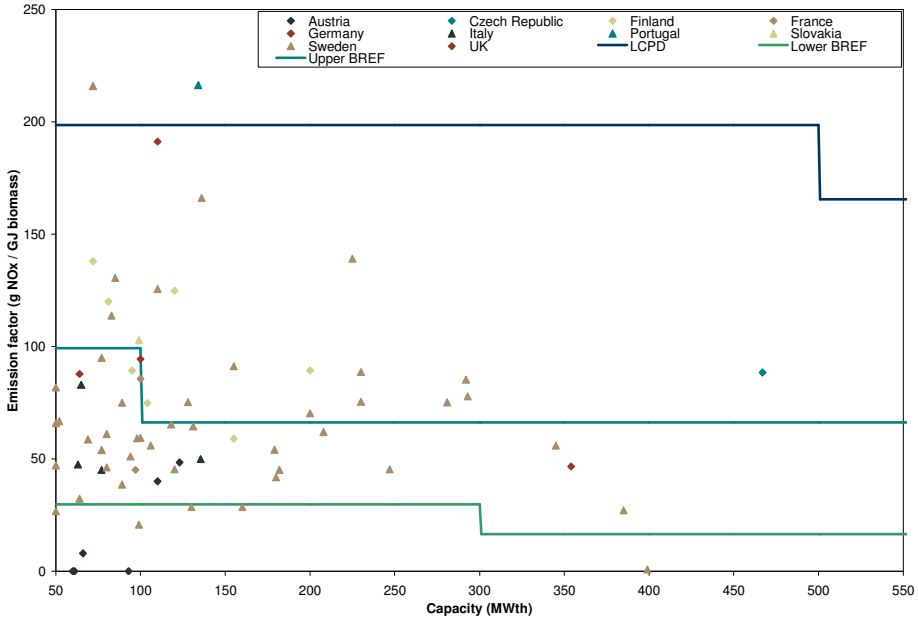


Figure 4.30 BIOMASS: Performance vs LCPD ELVs/BAT-AELs (NOx)



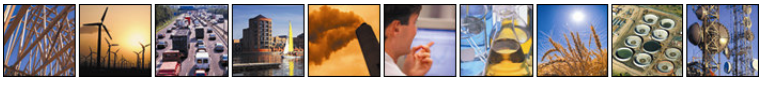
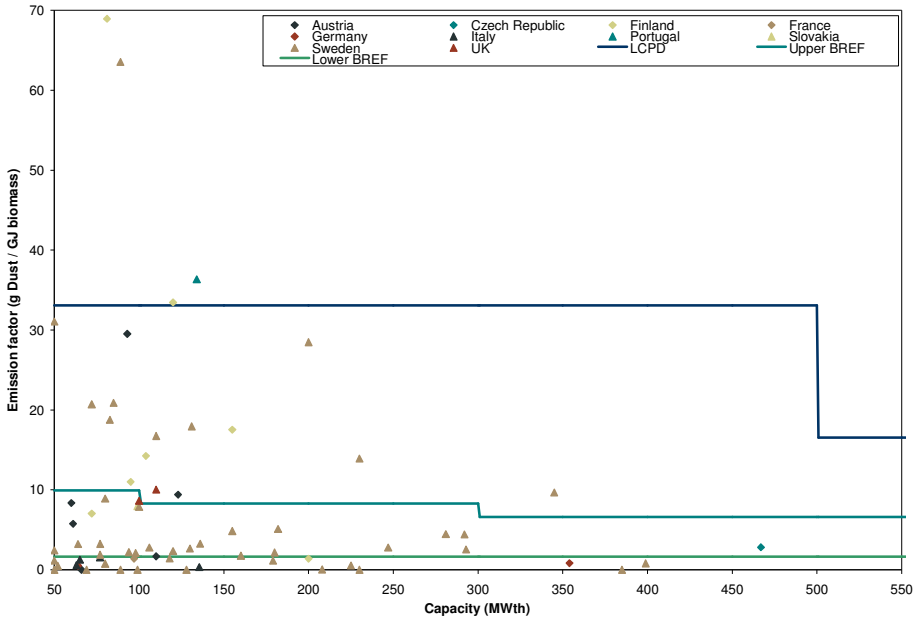
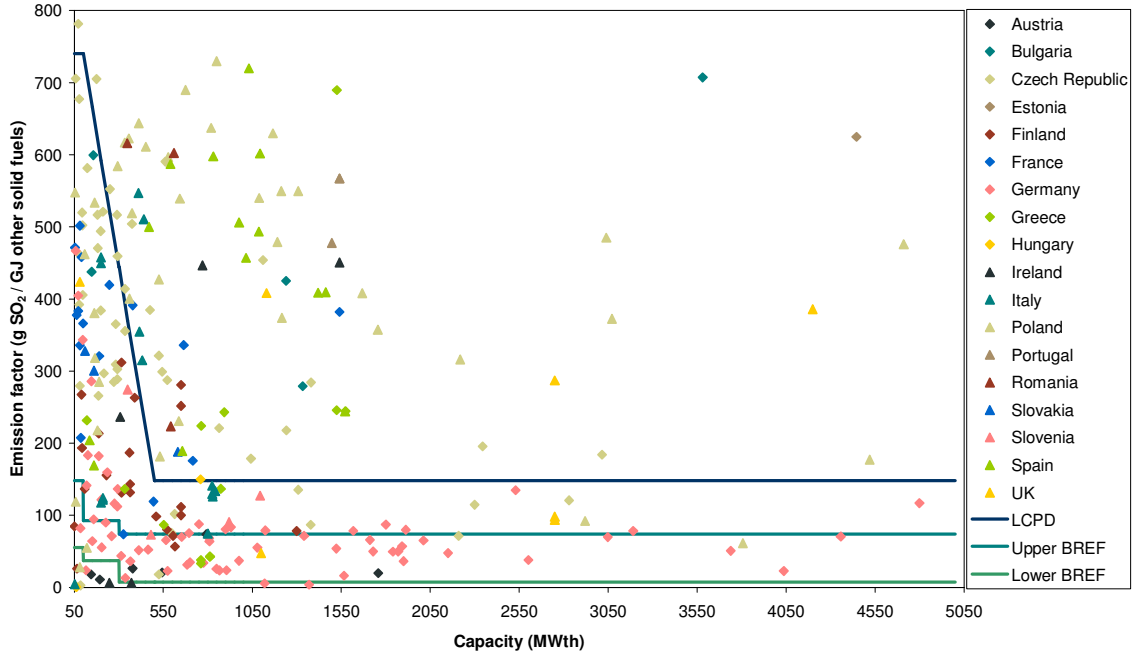


Figure 4.31 BIOMASS: Performance vs LCPD ELVs/BAT-AELs (Dust)



Other Solid Fuels

Figure 4.32 OTHER SOLID FUELS: Performance vs LCPD ELVs/BAT-AELs (SO_2)



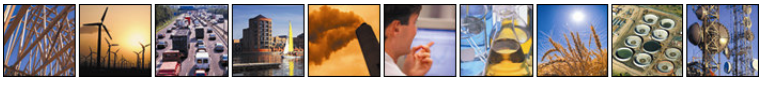


Figure 4.33 OTHER SOLID FUELS: Performance vs LCPD ELVs/BAT-AELs (NOx)

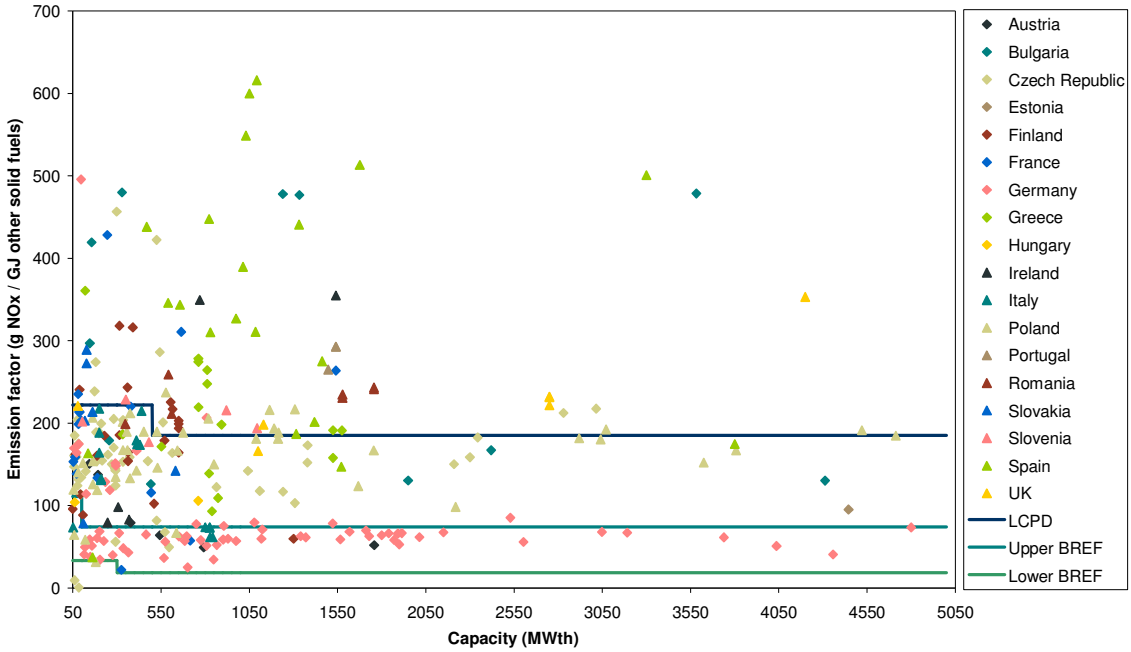
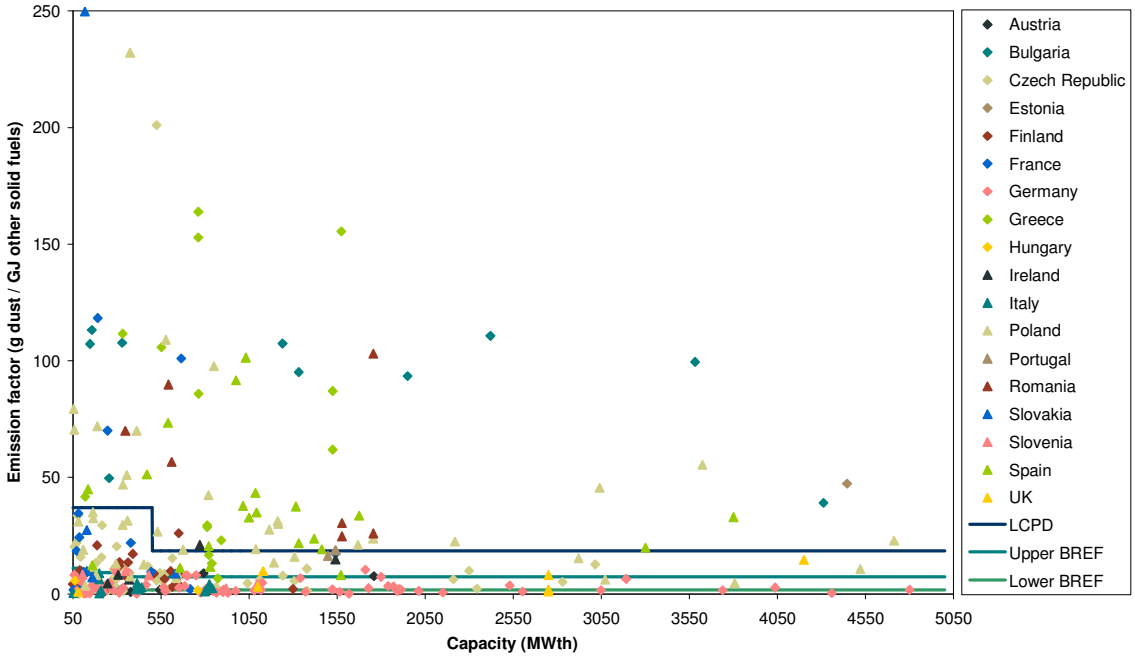
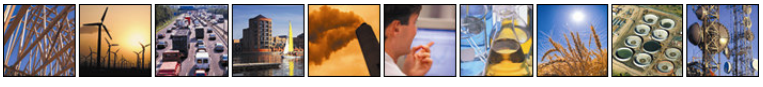


Figure 4.34 OTHER SOLID FUELS: Performance vs LCPD ELVs/BAT-AELs (Dust)





Liquid Fuels

Figure 4.35 LIQUID FUELS: Performance vs LCPD ELVs/BAT-AELs (SO_2)

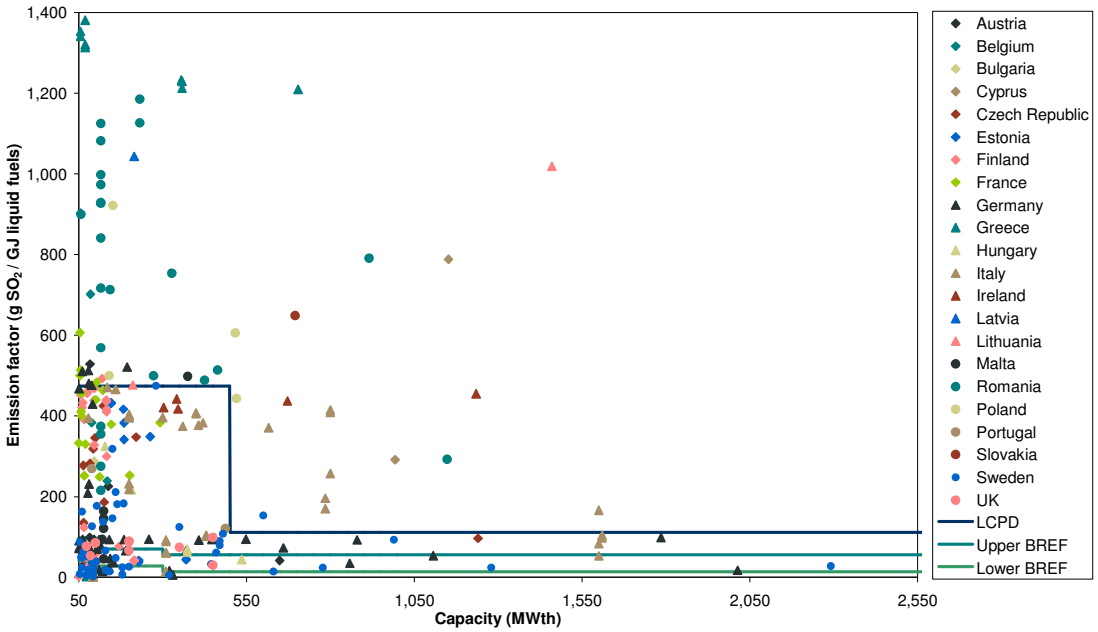
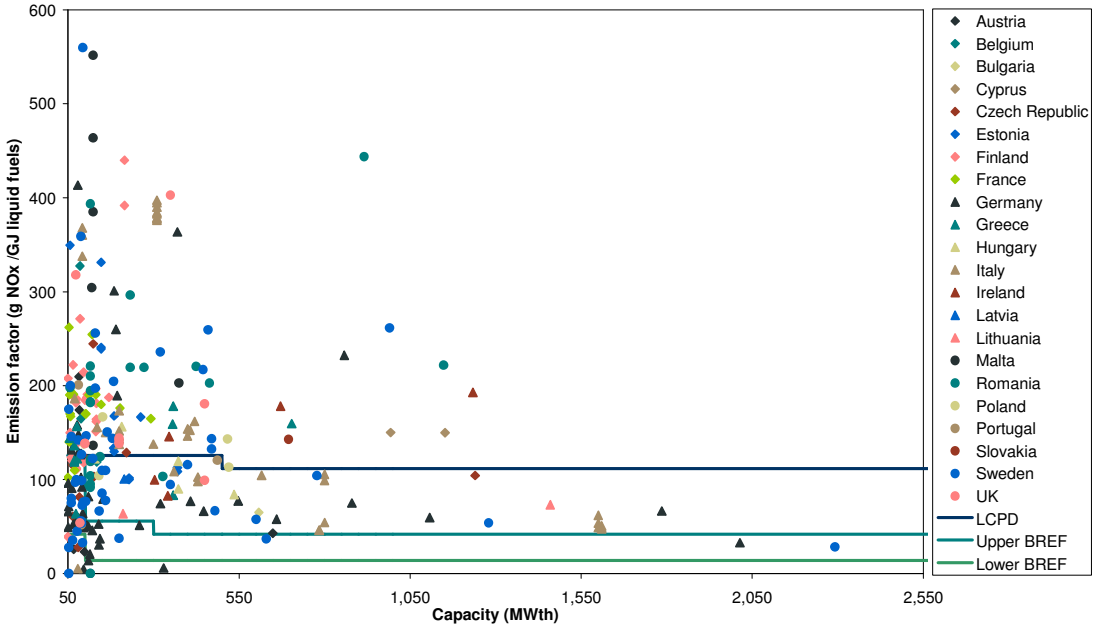


Figure 4.36 LIQUID FUELS: Performance vs LCPD ELVs/BAT-AELs (NOx)



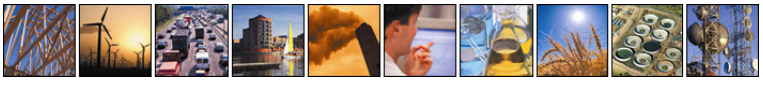
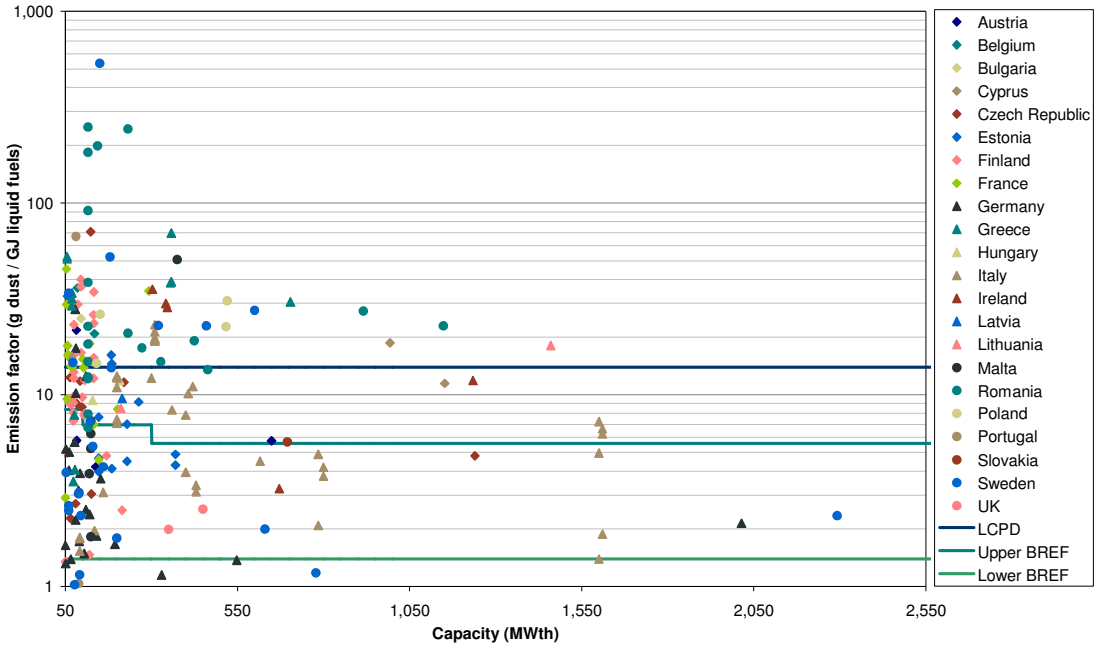
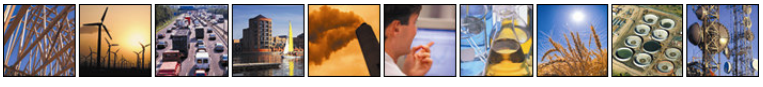


Figure 4.37 LIQUID FUELS: Performance vs LCPD ELVs/BAT-AELs (Dust)



Note: The y-axis is shown with a logarithmic scale in order to show more clearly the distribution of points.



Natural Gas (excluding gas turbines)

Figure 4.38 NATURAL GAS (excl. gas turbines): Performance vs LCPD ELVs/BAT-AELs (NOx) [Austria to Germany]

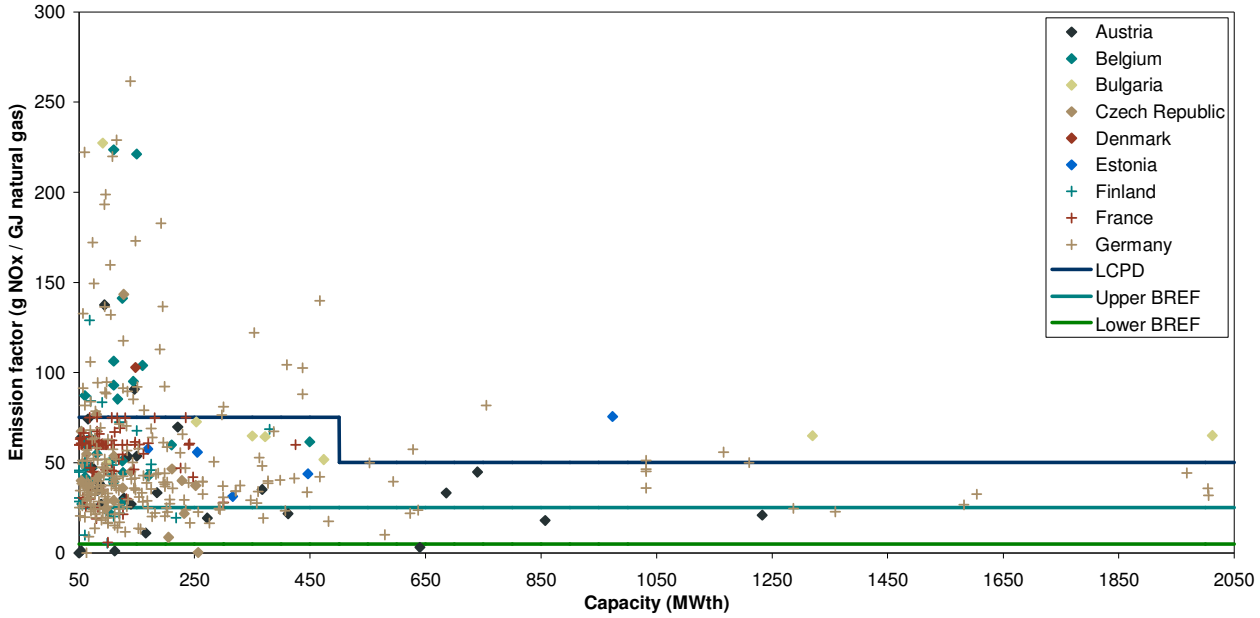
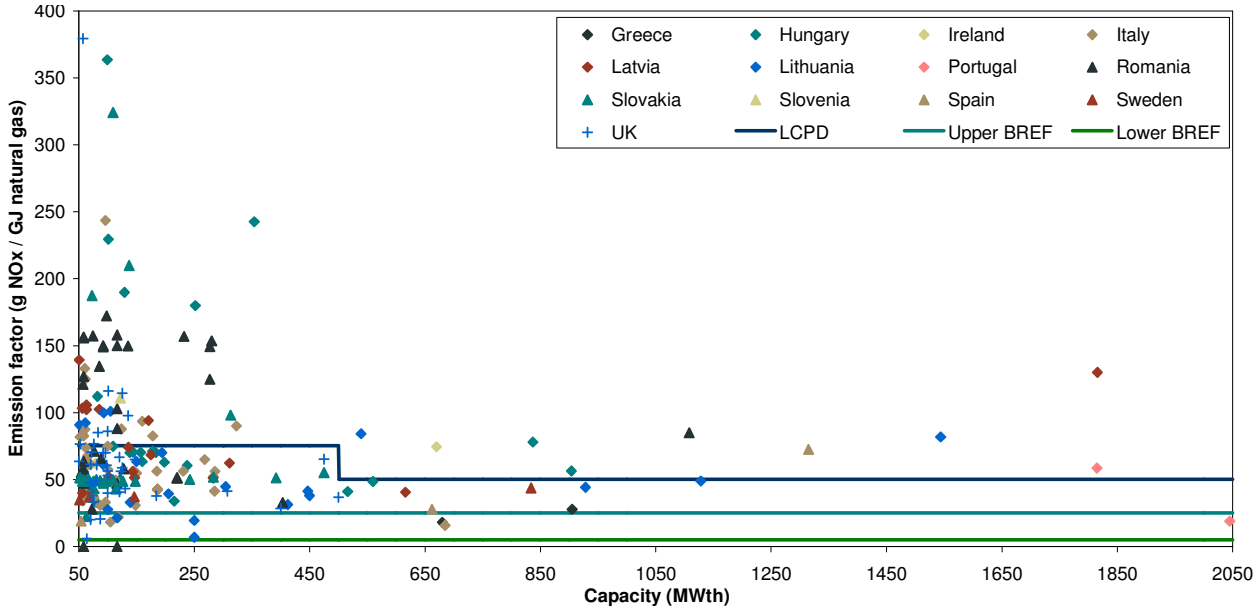
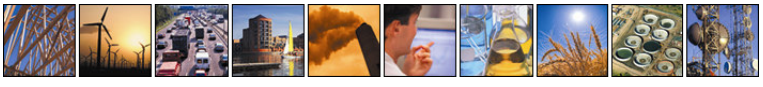


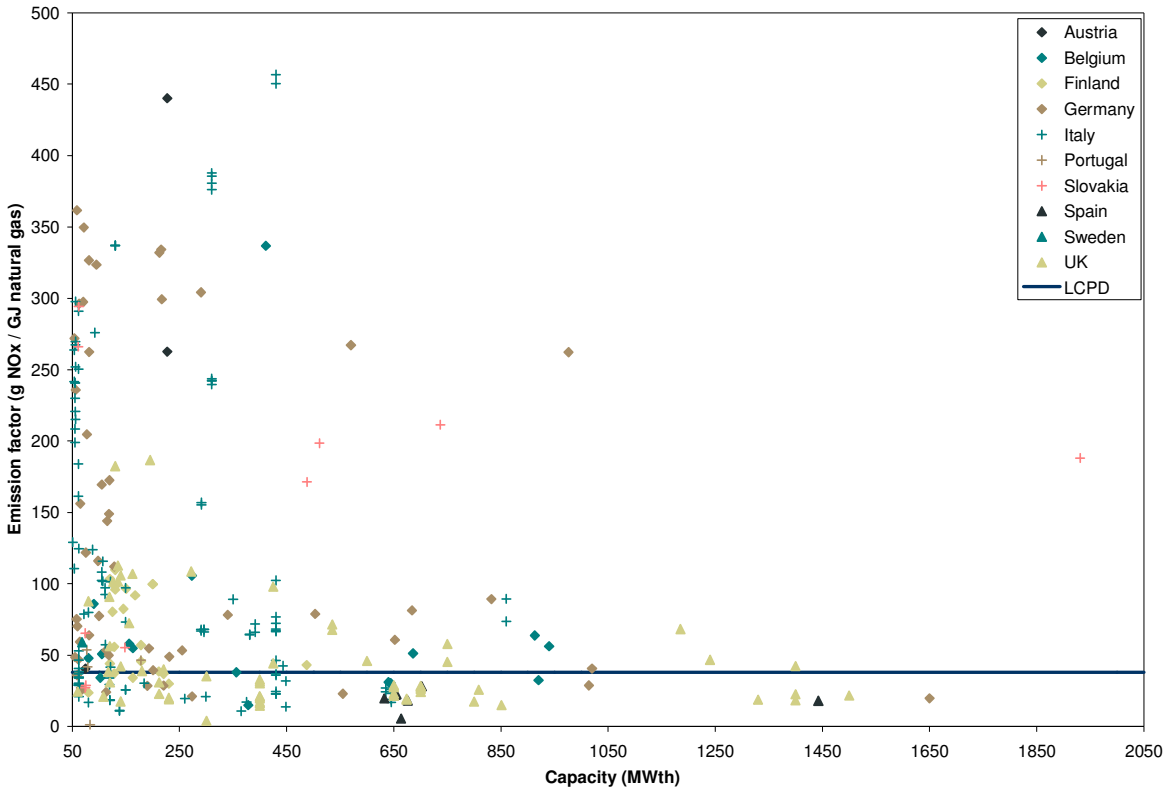
Figure 4.39 NATURAL GAS (excl. gas turbines): Performance vs LCPD ELVs/BAT-AELs (NOx) [Greece to UK]





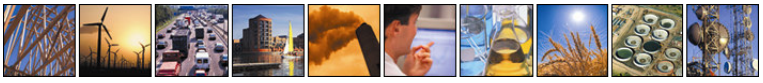
Natural Gas (gas turbines)

Figure 4.40 NATURAL GAS (gas turbines): Performance vs LCPD ELVs/BAT-AELs (NOx)



Note 1: As no information was available on the efficiency at which the gas turbines included in MS inventories are operating only the LCPD ELV of 50mg/Nm^3 for new plants has been included in the figure (i.e. assuming <75% efficiency).

Note 2: Reporting on gas turbines varied considerably between MS with some reporting on all gas turbines (i.e. new and existing) whilst others provided no information at all.



5. Task 4 - Recommendations

5.1 Member State Feedback

During the course of the study some Member States provided feedback on the reporting process under the LCPD and, in particular, suggestions for improvements to the data collection template including the following:

- Include column for 'status' of a plant i.e. whether it is operational for a specific year;
- Include column to report information on sectoral disaggregation;
- Include column to provide information on whether a plant is classified as 'existing', 'new' or 'new-new' according to the LCPD;
- Amend units required for reporting fuel consumption (currently too low – GJ) and emissions data (currently too high – kt) so that they are more appropriate for the scale of data being reported;
- Expand template so that all required information is requested upfront as some Member States have had issues with going back to regional authorities to request additional information after the submission of the inventory; and
- Consider automating the reporting process and allow for online reporting of data[23].

5.2 Proposed Recommendations

The formal reporting requirements are set out in Annex VIII of the LCPD. The recommendations presented in this section aim to improve consistency in reporting and aid the analysis of inventories.

Future reporting under the LCPD is especially important as existing plants have had to comply with IPPC permit requirements and LCPD ELVs (or NERP requirements) from 30 October 2007 and 1st January 2008, respectively.

Table 5.1 below outlines the proposed recommendations for future reporting based on the issues encountered during this study, discussions with the Commission and direct feedback from Member State representatives (as summarised above).

[23] For example, the competent authority in Germany is currently developing a web-based system for future reporting of LCP data to reduce the administrative burden on regional competent authorities.

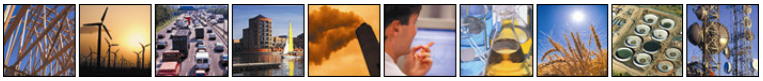
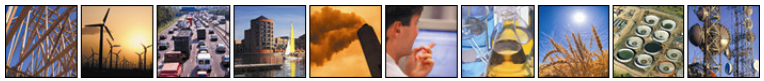
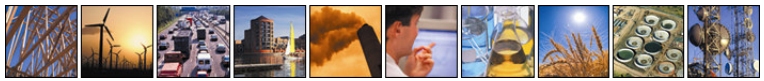


Table 5.1 Proposed recommendations for future reporting under the LCPD

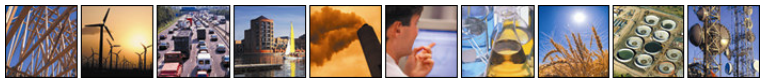
Problem	Recommendation	Discussion
P1. A number of MSs reported issues with using the data collection template provided by the Commission in that it was not clear exactly what information needed to be reported. P2. Some MSs appeared to report data according to a boiler or installation interpretation of combustion plant rather than at the common stack level.	R1. Develop revised template with interactive guidance which is more user friendly and easier to complete (see later recommendations for further details of ways in which template can be revised). R2. Develop and include guidance to support the completion of the data collection template (upfront guidance sheet as well as inbuilt user support. The guidance should take the user through the template outlining what information should be provided at each stage. Areas it should address include (but not limited to): a. Scope of reporting (e.g. common stack interpretation) b. Standardised sectoral classification (e.g. by SNAP and/or NFR categories) c. Reporting of rated thermal input (name plate rather than current operation) d. Fuel classification	Feedback provided by MSs during the data gap filling phase of this study as well as the review of the data provided indicated that there were some problems encountered with completing the data collection template. Developing a revised template with interactive guidance should benefit both the MSs providing the information as well as the Commission and its contractors by: → Reducing the amount of time it takes to complete the template as it should be easier to understand with supporting guidance; → Ensuring that the required information is reported in a consistent format between MSs; → Reducing the amount of time the Commission and its contractors need to spend reviewing the data reported and trying to chase MSs to fill data gaps; → Reducing the amount of time MSs have to spend completing data gaps after submission of their LCP inventories (i.e. additional data requests from the Commission and its contractors).



Problem	Recommendation	Discussion
P3. Some MSs reported data in the wrong units or misreported figures (e.g. missing zeroes)	R3. Modify units currently included in template for fuel consumption (from GJ to TJ) and emissions (from kt to t). R4. Include inbuilt data validation to highlight potential errors to the user (e.g. reporting of plants <50MWth) and prevent unnecessary reporting (e.g. reporting of SO_2 and dust emissions data for plants using only natural gas).	Some MSs accidentally misreported fuel and/or emissions data due to the units requested in the template e.g. missing or too many zeroes. Changing the units to suit the actual data should reduce some of this misreporting. In addition, including some in-built validation into the template should alert the user to any potential errors before they submit the inventory.
P4. Current data collection template is disaggregated by year (i.e. separate worksheets). This has resulted in a number of inconsistencies between years on a plant level (e.g. names not matching up) and required considerable effort to fill data gaps.	R5. Include single worksheet for all three years rather than disaggregated. R6. Include additional status column for each year which can be unticked if a particular plant does not operate in one or more years that the inventory covers (default = operational for all three years). If a box for a particular year is deselected then the associated cells (e.g. emissions, fuel consumption) could be shaded so that no data is entered by mistake.	Reporting data for all three years on a single sheet should reduce and hopefully prevent inconsistencies at a plant level between years. This should make reporting simpler for MSs (i.e. reporting on a single worksheet rather than three) and also reduce the amount of time and resources required to collate and review the data reported.
P5. No information was provided on sectoral disaggregation as this was not included in the original data collection template.	R7. Extend template to include separate worksheet for individual sectors: ESI, iron and steel, petroleum refineries, district heating and other industry.	This information should already be held by the MS contacts so should not require much additional effort. The information will be useful for the Commission to understand trends and current performance in the key sectors.
P6. No information was provided on age of plant (i.e. existing, new or new-new).	R8. Extend template to include additional column on age of plant (drop-down box).	This information should already be held by the MS contacts so should not require much additional effort. It will be useful for the Commission to understand trends in terms of closure of existing plants and opening of new ones. In addition, if the Commission wishes to check compliance against the LCPD ELVs then this information will be required.
P7. Current data collection template only includes the following fuels: biomass, other solid fuels, liquid fuels, natural gas and other gases.	R9. Propose to further disaggregate other solid fuels category to hard coal, brown coal (lignite) and other solid fuels (e.g. non biomass waste). Other gases could also potentially be disaggregated further to include blast furnace, coke oven, refinery process and other gases.	Although this will slightly increase the amount of information to be reported it will be useful for future analysis of the inventory data (e.g. actual performance vs LCPD ELVs/BAT-AELs. However, competent authorities are not legally required to have inventories beyond Annex VIII (B) requirements.



Problem	Recommendation	Discussion
P8. Lengthy data collection and analysis	R10. Analysis could be streamlined through automation of the data collection template i.e. data reported by MSs could be inputted into a master spreadsheet which could automatically collate and produce the relevant overview statistics. R11. Data reporting by MSs could be via the internet and linked directly to a master spreadsheet.	Automating the spreadsheet will reduce the time and resources required to collate and review the inventory data. In addition, allowing MSs to report via the internet could save them time and could be linked directly to a master spreadsheet so that the data is automatically collated.

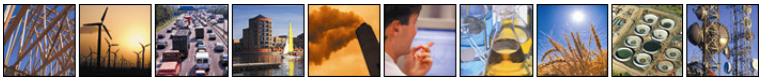


Appendix A
Status of consultation with each MS

Table A1 below summarises the status (on 25 June 2008) of consultation Entec has had with each Member State competent authority, but does not list explicitly what the data gaps were.

Table A1 Overview of status of discussions with each MS competent authority

Member State	Status of discussions
Austria	Clarifications received 11th April for all queries submitted.
Belgium	Clarifications received 7th March for all queries submitted.
Bulgaria	Clarifications received for most queries on 4th March. Some data gaps remain for 2004 and 2005. We have been advised by the competent authority that these will not be resolved because plant operators have not submitted reports.
Cyprus	Email sent on 22 February requesting existing or new classification for the three LCPs inventory. Follow up email sent 27 February. **No acknowledgement or response received**. Information from the Commission has resolved this query, which has been verified through other sources.
Czech Republic	Clarifications received 27th February for all queries submitted.
Denmark	Competent authority contact sent some answers 17th March, which suggested that the common stack approach may not have been taken. Further clarifications sought by email (contact has not provided phone number) and reminder email sent 22nd April, but no further acknowledgment or response received.
Estonia	Clarifications received 17th March. Additional clarifications on oil shale fired LCPs received 17th June.
Finland	Clarifications received 4th March for all queries submitted.
France	Clarifications received 14th March for all queries submitted.
Germany	Response to some clarifications received 7th March, and additional data received 23rd April. Further data has been promised from CA, but was not received before 25 June and thus could not be included in this report.
Greece	Clarifications received 25th February for all queries submitted.
Hungary	Clarifications received 4th March for all queries submitted.
Ireland	Clarifications received 26th February for all queries submitted.
Italy	Original inventory received 5th March; first contact with MS 8th April; acknowledgment received 17th April. Revised inventory received 6th June resolved some queries but not all. Competent authority suggested complete resolution of queries will not be complete for this report.
Latvia	Email sent on 22 February requesting corrections and clarifications. Follow up emails sent 27 February and 15 May. **No acknowledgement or response received.**
Lithuania	Email sent on 22 February requesting corrections and clarifications. Follow up email sent 27 February and 15 May. **No acknowledgement or response received.**
Luxembourg	Luxembourg has advised the Commission that there are no LCPs.
Malta	Inventory received 21st May. No clarifications required.



Member State	Status of discussions
Netherlands	Submission of the missing plant names, locations and rated thermal capacity has been discussed between the MS and the Commission.
Poland	Answers to some queries received 2nd April. Telephone call on 17th April indicated that remaining queries can be resolved. CA sent additional data clarifying most data gaps on 20th June.
Portugal	Clarifications received 2nd April for all queries submitted.
Romania	Clarifications received 25th March for all queries submitted.
Slovakia	Clarifications received 4th March for all queries submitted.
Slovenia	Clarifications received 28th February for all queries submitted.
Spain	Clarifications received 25th April and 8th May for most queries. Outstanding data have been promised, but were not received before 25 June.
Sweden	2006 plant-by-plant inventory received 13th June. It is our understanding that Sweden does not have a 2004-2005 plant-by-plant inventory available and will not be able to produce one before December 2008. Queries on plant-by-plant inventory submitted to CA 13th June but no response by 25 June in time for inclusion in this study.
United Kingdom	National CA has devolved responsibility to the regional CAs. Clarifications received for all queries submitted for England and Wales. Scotland CA (SEPA) sent clarifications for outstanding queries on 20th June.