

# Appendix 1

## LCPD Emission Limit Values

3 Pages

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The LCPD emission limit values for existing and new plants are shown in Tables 1 and 2 respectively. Refer to the LCPD itself for the full details and notes associated with these ELVs.

**Table 1 Emission limit values for existing plants**

Pollutant	Fuel type	ELVs (figures in mg/Nm <sup>3</sup> ) (Note 1)			
		50 to 100 MWth	100 to 300 MWth	300 to 500 MWth	>500 MWth
SO <sub>2</sub>	Solid (Notes 2, 3)	2000	2000 to 400 (sliding scale)		400
	Liquid	1700		1700 to 400 (sliding scale)	400
	Gaseous	35 – in general 5 – liquefied gas 800 – low calorific gases from gasification of refinery residues, coke oven gas & blast furnace gas			
NO <sub>x</sub>	Solid (Notes 4, 5)	600			500 From 1 Jan 2016: 200
	Liquid	450			400
	Gaseous	300			200
Dust	Solid	100			50 (Note 6)
	Liquid	50 (Note 7)			
	Gaseous	5 – as a rule 10 – blast furnace gas 50 – steel industry gases that can be used elsewhere			
SO <sub>2</sub> , NO <sub>x</sub> and dust	Multi-firing units using two or more fuels	See Note 8			

**Notes**

- The ELVs for existing plants are calendar monthly mean values, see Art 14. The reference oxygen contents are 6% for solid fuels and 3% for liquid and gaseous fuels.
- Plants greater or equal to 400MWth, which do not operate more than the following number of hours a year (rolling average over a period of 5 years), shall be subject to an ELV for SO<sub>2</sub> of 800mg/m<sup>3</sup>:
  - until 31 December 2015, 2000 hours; and
  - from 1 January 2016, 1500 hours.
- Where the ELVs cannot be met due to the characteristics of the fuel, a rate of desulphurisation of at least 60% shall be achieved in the case of plants with a rated thermal input of <= 100MWth, 75% for plants > 100MWth and <= 300MWth and 90% for plants > 300MWth. For plants > 500MWth, a desulphurisation rate of at least 94% shall

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- apply or of at least 92% where a contract for the fitting of FGD or lime injection equipment has been entered into, and work on its installation has commenced, before 1 January 2001.
4. Until 31 December 2015 plants >500MWth which from 2008 do not operate more than 2000 hours per year (rolling average over a period of 5 years) shall, in the case of plant subject to a National Plan, have their contribution to the National Plan assessed on the basis of an ELV of 600mg/Nm<sup>3</sup>. From 1 January 2016 such plants, which do not operate more than 1500 hours per year (rolling average over a period of 5 years), shall be subject to an ELV for NO<sub>x</sub> of 450mg/Nm<sup>3</sup>.
  5. Until 1 January 2018 in the case of plants that in the 12 month period ending on 1 January 2001 operated on, and continue to operate on, solid fuels whose volatile content is <10%, 1200mg/Nm<sup>3</sup> shall apply.
  6. An ELV of 100mg/Nm<sup>3</sup> may be applied to existing plants >= 500MWth burning solid fuel with a heat content of less than 5800kJ/kg, a moisture content > 45% by weight, a combined moisture and ash content > 60% by weight and a calcium oxide content > 10%.
  7. An ELV of 100mg/Nm<sup>3</sup> may be applied to plants <500MWth burning liquid fuel with an ash content > 0.06%.
  8. Special provisions apply to multi-firing units using two or more fuels as detailed in Art 8. These are briefly summarised as follows:
    - i. In the case of plants with a multi-firing unit involving the simultaneous use of two or more fuels (Art 8(1)), ELVs shall be set firstly by taking the ELV of each fuel and pollutant; secondly by determining the fuel-weighted ELVs, obtained by multiplying the individual ELV by the thermal input delivered by each fuel, the product of multiplication being divided by the sum of the thermal inputs delivered by all fuels; and thirdly by aggregating the fuel-weighted ELVs.
    - ii. In multi-firing units using the distillation and conversion residues from crude-oil refining for own consumption, alone or with other fuels (Art 8(2)), the provisions for the fuel with the highest ELV (the determinative fuel) shall apply, notwithstanding point (i) above, if during the operation of the combustion plant the proportion contributed by that fuel to the sum of the thermal inputs delivered by all fuels is at least 50%. Where the proportion of the determinative fuel is lower than 50%, the ELV is determined as described in Art 8(2), second paragraph.
    - iii. As an alternative to point (ii), an average ELV for SO<sub>2</sub> may be applied (irrespective of the fuel combination used) of 1,000mg/Nm<sup>3</sup>, averaged over all existing plants within the refinery (Art 8(3)).
    - iv. In the case of plants with a multi-firing unit involving the alternative use of two or more fuels (Art 8(4)), the ELVs corresponding to each fuel used shall be applied.

**Table 2 Emission limit values for new plants**

Pollutant	Fuel type	ELVs (figures in mg/Nm <sup>3</sup> ) (Note 1)		
		50 to 100 MWth	100 to 300 MWth	>300 MWth
SO <sub>2</sub>	Biomass (Note 2)	200	200	200
	General case (Note 2)	850	200	200
	Liquid	850	400 to 200 (linear decrease)	200
	Gaseous	35 – in general 5 – liquefied gas 400 – low calorific gases from coke oven 200 – low calorific gases from blast furnace		
NO <sub>x</sub>	Solid – biomass	400	300	200
	Solid – general case	400	200	200
	Liquid	400	200	200
	Gaseous fuels – natural gas	150		100
	Gaseous fuels – other gases	200		200
	Gas turbines – natural gas (Note 3)	50 (Note 4)		
	Gas turbines – liquid fuels (Note 3)	120		
	Gas turbines – gaseous fuels other than natural gas (Note 3)	120		
Dust	Solid	50	30	
	Liquid	50	30	
	Gaseous	5 – as a rule 10 – blast furnace gas 30 – steel industry gases that can be used elsewhere		

Notes

1. The ELVs for new plants are daily mean values, see Art 14. The reference oxygen contents are 6% for solid fuels and 3% for liquid and gaseous fuels.
2. Where the ELVs cannot be met due to the characteristics of the fuel, installations shall achieve 300 mg/m<sup>3</sup> SO<sub>2</sub>, or a rate of desulphurisation of at least 92% shall be achieved in the case of plants with a rated thermal input of ≤ 300MWth, and 95% for plants > 300MWth, together with a maximum permissible ELV of 400mg/m<sup>3</sup>.
3. Gas turbines licensed before 27 November 2002 are excluded from the scope of the LCPD
4. 75mg/Nm<sup>3</sup> for gas turbines used in combined heat and power systems having an overall efficiency greater than 75%; gas turbines used in combined cycle plants having an electrical efficiency greater than 55% and gas turbines for mechanical drives. For single gas turbines not falling into any of the above categories, but having an efficiency greater than 35% the ELV shall be 50\*(gas turbine efficiency)/35.



## **Appendix 2**

# **Details of Best Available Techniques from BAT Reference Documents**

9 Pages

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# 1. BAT for LCPs in General

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The Reference Document on Best Available Techniques for Large Combustion Plants (Draft – November 2004) is the main BREF document of relevance to the LCP sector. At the time of writing, this BREF remains at the draft stage. As such, a summary of BAT as detailed in this document is not reproduced in this report. If necessary, details can be found in the report itself, accessible at <http://eippcb.jrc.es/pages/FActivities.htm>

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## 2. BAT for LCPs at Petroleum Refineries

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BAT for energy systems at petroleum refineries, as detailed in the Reference Document on Best Available Techniques for Mineral Oil and Gas Refineries (February 2003), involves:

- use clean refinery fuel gas (RFG) and, if necessary to supply the rest of the refinery energy demand, liquid fuel combined with control and abatement techniques or other fuel gases such as natural gas or LPG. Where gaseous fuels replace liquid fuels, the reduction of SO<sub>2</sub> and NO<sub>x</sub> emissions as a result of the fuel switch is not complicated to calculate for single processing units and for the refinery as a whole.
- Increase the proportion of clean fuels used. This can be achieved by a suitable combination of:
  - Maximisation of the use of RFG with low H<sub>2</sub>S content (20-150 mg/Nm<sup>3</sup> by amine treating). One Member State claims that for existing refineries the range should be <500 - 1000 ppm because the H<sub>2</sub>S content in RFG is negligible if the bubble limit is respected;
  - Balance and control of the RFG system between suitable pressure limits to give system flexibility, with make-up available from sulphur-free sources such as LPG or imported gas;
  - Use state-of-the-art controls to optimise the performance of the RFG system;
  - Use flaring of RFG only during start-up/shutdown/upset/emergency conditions. During normal operation give a constructive use to the RFG, including sale;
  - Upgrading and cleaning heavy fuel oil used in the refinery to low-sulphur liquid fuel. As mentioned in the SO<sub>2</sub> emission section below, the abatement of emissions after firing liquid fuels is also considered BAT.
- Reduce NO<sub>x</sub> emissions (general):
  - By reducing fuel consumption (increase the energy efficiency);
  - By replacing existing burners with low-NO<sub>x</sub> types during major outages. The lowest-NO<sub>x</sub> burners suitable for individual applications should be used;
- Reduce NO<sub>x</sub> emissions from boilers and heating using gas fuel to 20-150 mg/Nm<sup>3</sup> (lower levels for natural gas and higher ones for small heaters with primary measures. Two Member States claim that the upper value should be 100 because it can be reached with the implementation of primary measures and SCR) by a combination of:
  - Higher thermal efficiency heater/boiler designs with good control systems (e.g. oxygen trim);
  - Low-NO<sub>x</sub> burner techniques;
  - Flue gas circulation in boilers;

- Reburning technique;
- SCR/SNCR. Ammonia slip considered associated with the use of SCR is 2-5 mg/Nm<sup>3</sup>. The lower value is achievable with new catalysts and ammonia slip typically increases with catalyst life.
- Reduce NO<sub>x</sub> emissions from boilers and heaters using liquid fuel to 55-300 mg/Nm<sup>3</sup> (the lower levels relate only to boilers with SCR and the higher levels only to small heaters with primary measures. One Member State claims that small heater (<50MW) can reach 200 and with the big heaters and boilers (>50MW) the installation of SCR is justified and consequently values of less than 100 can be reached. One Member State claims a level from 200-400 because of the nitrogen content in the fuel) by applying a suitable combination of:
  - Fuels with low nitrogen content (related to low sulphur content);
  - Low-NO<sub>x</sub> burner techniques;
  - Flue gas circulation in boilers;
  - Reburning technique;
  - SCR/SNCR to liquid fuels heavier than gas oil. Ammonia slip considered associated with BAT is 2-5 mg/Nm<sup>3</sup>. The lower value is achievable with new catalysts and ammonia slip typically increases with catalyst life.
- Reduce NO<sub>x</sub> emissions from gas turbines to 20-75 mg/Nm<sup>3</sup> at 15% oxygen (lower levels for natural gas and higher levels for small gas turbines and RFG. One Member State claims that the upper value should be 35 based on primary measures and SCR) by applying a suitable combination of:
  - Diluent injection;
  - Dry low-NO<sub>x</sub> combustors;
  - SCR. Ammonia slip considered associated to BAT is 2-5 mg/Nm<sup>3</sup>. The lower value is achievable with new catalysts and ammonia slip typically increases with catalyst life.
- Reduce particulate emissions (particulates from liquid firing contain Ni, V) to 5-20 mg/Nm<sup>3</sup> by applying a suitable combination of:
  - Reducing the fuel consumption (increasing the energy efficiency);
  - Maximising the use of gas and low ash content liquid fuels;
  - Steam atomisation on the liquid fuels;
  - ESP or filters in the flue gas of furnaces and boilers when heavy liquid fuel is used.

One Member State claims that the range for particulates should be 30-50 because those values are consistent with a 95% abatement. Industry rationale for

the range 5 to 50 mg/Nm<sup>3</sup> is that this is consistent with the whole range reported.

- Reduce sulphur dioxide emissions (general) by reducing the fuel consumption (increasing energy efficiency)
- Reduce sulphur dioxide emissions from combustion processes (boilers, heaters and gas turbines):
  - By increasing the proportion of clean fuels used (to low-sulphur residual fuel, to gas oil, ultimately to gas);
  - To 5-20 mg SO<sub>2</sub>/Nm<sup>3</sup> when using fuel gas by cleaning refinery fuel gas (20 to 150 mg H<sub>2</sub>S/Nm<sup>3</sup>) including monitoring of the sulphur content of the refinery fuel gas. Refer to split views given on the H<sub>2</sub>S concentration in BAT for refinery fuel gas;
  - To achieve an average emission value of 50-850 mg SO<sub>2</sub>/Nm<sup>3</sup> (lower end of the range is for the implementation of FGD and deep hydrodesulphurisation to all liquid fuels) for the total refinery liquid fuel pool by applying a suitable combination of:
    - \* hydrodesulphurising the necessary amount of liquid fuel; or
    - \* applying the flue gas desulphurisation. This technique is more cost effective in large boilers and furnaces.

One Member State claims that the use of FGD is always possible and that the upper value should therefore be 200. One Member State and Industry claim that the limit should be no lower than 1700 mg SO<sub>2</sub>/Nm<sup>3</sup> which is equivalent to a 1% sulphur level in fuel oil with no abatement.

The Commission has noted the divergent views of the TWG concerning the average sulphur dioxide emission levels when burning liquid fuels, associated with the use of BAT. The Commission further notes that Council Directive 1999/32/EC on the sulphur content of certain liquid fuels prescribes a maximum emission limit value of 1700 mg/Nm, which equates to a 1% sulphur in heavy fuel oil, as a monthly mean value averaged over all plants in the refinery from 1 January 2003. In addition, the more recently adopted Directive 2001/80/EC on large combustion plants provides for emission limit values in the range of 200 to 1700 mg/Nm<sup>3</sup> depending on the characteristics of plants covered by that directive.

In this perspective, the Commission believes the range of 50 to 850 mg/Nm<sup>3</sup>, as average sulphur dioxide emission levels when burning liquid fuels to be consistent with BAT. In many cases, achieving the lower end of this range would incur costs and cause other environmental effects which outweigh the environmental benefit of the lower sulphur dioxide emission. A driver towards the lower end could be the national emission ceiling for sulphur dioxide as fixed in Directive 2001/891/EC on national emission ceilings for certain atmospheric pollutants or if the installation is location in a sulphur sensitive area.

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### 3. BAT for LCPs in the Iron and Steel Sector

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BAT for combustion plants in the iron and steel sector, as detailed in the Best Available Techniques Reference Document on the Production of Iron and Steel (December 2001), involves:

#### 3.1.1 General BAT

##### Waste gas de-dusting by application of:

- Advanced electrostatic precipitation (ESP) (moving electrode ESP, ESP pulse system, high voltage operation of ESP ...) *or*
- electrostatic precipitation plus fabric filter *or*
- pre-dedusting (e.g. ESP or cyclones) plus high pressure wet scrubbing system.

Using these techniques dust emission concentrations  $< 50 \text{ mg/Nm}^3$  are achieved in normal operation. In case of application of a fabric filter, emissions of  $10\text{-}20 \text{ mg/Nm}^3$  are achieved.

##### Minimisation of SO<sub>2</sub> emissions by, for example:

- Lowering the sulphur input (use of coke breeze with low sulphur content and minimisation of coke breeze consumption, use of iron ore with low sulphur content); with these measures emission concentrations  $< 500 \text{ mg SO}_2/\text{Nm}^3$  can be achieved.
- With wet waste gas desulphurisation, reduction of SO<sub>2</sub> emissions  $> 98\%$  and SO<sub>2</sub> emission concentrations  $< 100 \text{ mg SO}_2/\text{Nm}^3$  are achievable. Due to the high cost wet waste gas desulphurisation should only be required in circumstances where environmental quality standards are not likely to be met.

##### Minimisation of NO<sub>x</sub> emissions by, for example:

- waste gas recirculation
- waste gas denitrification, applying
- regenerative activated carbon process
- selective catalytic reduction

Due to the high cost waste gas denitrification is not applied except in circumstances where environmental quality standards are not likely to be met.

### 3.1.2 Process based BAT

#### **Lowering the sulphur content of the sinter feed**

The use of coke breeze and iron ores with lower sulphur content (0.8% S) directly correlate with lower SO<sub>2</sub> emissions. However, minimisation of the specific coke breeze consumption is also very important. During the last 15 years consumption at many sinter plants in the EU has been reduced from about 80 kg/t sinter to 38 – 55 kg/t sinter.

**Applicability:** Minimising sulphur inputs into the sinter feed (use of low sulphur coke breeze and iron ore and minimising specific coke breeze consumption) can be applied both at new and existing plants. However, it should be noted that the availability of low sulphur breeze and ore might be a constraint.

#### **Emission Optimised Sintering (EOS)**

Resulting in lower volume of emissions, with implied capital and operational cost savings. The recycling rate of the sintering waste gas is of the order of 40-45 %, corresponding to a 14-15 % oxygen concentration in the wet gas/air mixture in the hood and resulting in a 45-50 % decrease in waste gas flow emitted to the atmosphere. The waste gas is de-dusted in a cyclone before recycling. Under these conditions, strand productivity remains unchanged and coke breeze consumption is reduced by 10-15 % compared with conventional practice.

**Applicability:** EOS can be applied at both new and existing plants although it is recognised that investment costs are lower in the case of new plant incorporating the system from the planning stage and at some existing plants costs may be considerably high due to plant arrangement.

#### **Sectional waste gas recirculation**

The concept of selective recycling technology is based on local suction of the sintering waste gas under the strand and its local recycling above the sinter bed. This selective suction and recycling is the main difference between this and the EOS process. Shows reductions in SO<sub>x</sub>, NO<sub>x</sub> and particulate matter and net energy consumption.

**Applicability:** Sectional waste gas recirculation can be applied at both new and existing plants although it is recognised that investment costs are lower for a new plant incorporating the system from the planning stage and at some existing plants costs may be considerably high due to plant arrangement.



## 4. BAT for LCPs in the Paper Sector

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BAT for combustion plants in the paper sector, as detailed in the Reference Document on Best Available Techniques in the Pulp and Paper Industry (December 2001), involves:

### 4.1.1 BAT for kraft pulp and paper mills

#### Measures for reducing of emissions to air

1. Collection and incineration of concentrated malodorous gases from the fibre line, cooking plant, evaporation plant, condensate stripper, and control of the resulting SO<sub>2</sub>. The strong gases can be burnt in the recovery boiler, the lime kiln or a separate, low NO<sub>x</sub> furnace. The flue gases of the latter have a high concentration of SO<sub>2</sub> that is recovered in a scrubber.
2. Collection and incineration of diluted malodorous gases from e.g. the fibre line, various sources as tanks, chip bins, smelt dissolver etc. The weak malodorous gases can be burnt in e.g. the recovery boiler mixed with combustion air or in an auxiliary boiler depending on the volume.
3. Mitigation of the TRS emissions of the recovery boiler by computerised combustion control and CO measurement and in the case of the lime kiln by controlling the excess oxygen, by using low S-fuel, and by controlling the residual soluble sodium from the lime mud fed to the kiln.
4. Control of SO<sub>2</sub> emissions from the recovery boilers by firing high dry solids concentration black liquor in the recovery boiler to mitigate SO<sub>2</sub> formation and/or by using a flue gas scrubber.
5. Control of NO<sub>x</sub> emissions from the recovery boilers and lime kiln by controlling the firing conditions and by ensuring proper mixing and division of air in the boiler, and for new or altered installations also by appropriate design;
6. Control of NO<sub>x</sub> emissions from auxiliary boilers by controlling firing conditions and for new or altered installations also by appropriate design.
7. Reducing SO<sub>2</sub> emissions from auxiliary boilers by using bark, gas, low sulphur oil and coal or controlling S emissions with a scrubber.
8. Cleaning of the recovery boilers, auxiliary boilers (in which other biofuels and/or fossil fuels are incinerated) and lime kiln flue gases with efficient electrostatic precipitators to mitigate dust emissions.

**Dust emissions:** In kraft pulp mills, emission of particulates are controlled by electrostatic precipitators and sometimes also in SO<sub>2</sub> scrubbers. TSP emissions for recovery boilers between 30 - 50 mg/Nm<sup>3</sup> or 0.2 - 0.5 kg TSP/ADt (with a gas flow of 7000 - 9000 m<sup>3</sup>/ADt) are considered as BAT. This level can generally be achieved by more modern recovery boilers by use of ESP only. Old recovery boilers achieve this levels when they apply ESP and scrubbers.

However, scrubbers are mainly applied for removal of SO<sub>2</sub>. 100-150 mg dust/m<sup>3</sup> is achievable at many existing mills, which do not have a scrubber. With an SO<sub>2</sub>-scrubber after the ESP, emissions at about 15 mg/Nm<sup>3</sup> are achievable.

For lime kilns 30 - 50 mg/Nm<sup>3</sup> or 0.03 - 0.05 kg/ADt (with a gas flow of 1000 m<sup>3</sup>/ADt) can generally be achieved when using an ESP.

**SO<sub>2</sub> emissions:** If changes in the fuel or the operation do not give enough reduction of SO<sub>2</sub> emission, removing sulphur oxides from flue gases by absorption in alkaline liquid is considered BAT. The removal efficiency for SO<sub>2</sub> is usually well above 90%.

- From recovery boilers equipped with a scrubber SO<sub>2</sub> emissions between 10 - 50 mg S/Nm<sup>3</sup> or 0.1 - 0.4 kg S/ADt are achieved. Recovery boilers operating with high dry solid content of black liquor release very low SO<sub>2</sub> emissions normally below 0.1 kg S/ADt or down to 5 - 10 mg S/Nm<sup>3</sup>.

- The SO<sub>2</sub> emission levels of the lime kiln depend mainly on the fuel used, sulphur in the lime mud and whether NCG are also fed to the kiln. Oil fired kiln without NCG incineration achieves 5 - 30 mg SO<sub>2</sub>/Nm<sup>3</sup> or 0.005 - 0.03 kg SO<sub>2</sub>/ADt. Oil fired kiln with NCG incineration achieve 150 - 300 mg SO<sub>2</sub>/Nm<sup>3</sup> or 0.1 - 0.3 kg SO<sub>2</sub>/ADt. Depending on the amount of sulphur (NCG) applied to the lime kiln a scrubber may be required. Another option for SO<sub>2</sub> reduction would be to choose another location for incineration of NCG than the lime kiln or use less sulphur containing oil burned as fuel.

#### **4.1.2 BAT for sulphite pulp and paper mills**

##### **Measures for reducing of emissions to air**

1. Collection of concentrated SO<sub>2</sub> releases and recovery in tanks with different pressure levels
2. SO<sub>2</sub> releases from washing and screening operations and from vents of the evaporators can be recovered by collecting the gases and introducing them in the recovery boiler as combustion air.
3. Control of SO<sub>2</sub> emissions from the recovery boiler by use of electrostatic precipitators and multi-stage scrubbers for abatement of flue gases and collection and scrubbing of various vents.
4. Reduction of odorous gases by efficient collection systems. This gases can be either burned in the recovery boiler or washed in a separate washer (back-up system)
5. Emission optimised recovery boiler by controlling the firing conditions
6. Reducing SO<sub>2</sub> emissions from auxiliary boilers by using bark, gas, low sulphur oil and coal or controlling S emissions
7. Installation of low-NO<sub>x</sub> auxiliary boilers (bark, oil, coal) and controlling combustion conditions
8. Cleaning of the auxiliary boilers (in which other biofuels and/or fossil fuels are incinerated) flue gases with efficient electrostatic precipitators to mitigate dust emissions.
9. Emission optimised incineration of residues (sludge from wastewater treatment, bark) with energy recovery

A combination of these techniques result in a range of emissions for the major source, the recovery boiler. Not all examples stand for European sulphite pulp mills that are well performing in sulphur or NO<sub>x</sub> reduction, or both. However, some of the mills have implemented a reasonable set of these techniques. In all mill cases the gaseous emissions are cleaned with

modern gas cleaning equipment as electrostatic precipitators and multi-stage scrubbers (4 to 6 stages). Process related emissions cover recovery boiler and fugitive emissions as far as they are collected and burned in the recovery boiler.

**Dust emissions:** In sulphite pulp mills, emission of particulates is controlled by electrostatic precipitators and multi-stage scrubbers. Dust emissions for recovery boilers between 5 - 20 mg/Nm<sup>3</sup> or 0.02 - 0.15 kg TSP/ADt (with a gas flow of 6000 - 7000 m<sup>3</sup>/ADt) can generally be achieved by use of ESP and scrubbers.

**SO<sub>2</sub> emissions:** Reduction of SO<sub>2</sub> emission from flue gases by absorption in alkaline liquid is considered BAT. A removal efficiency for SO<sub>2</sub> of 95 + % is achievable. From recovery boilers equipped with multi-stage scrubber SO<sub>2</sub> emissions between 50 - 150 mg S/Nm<sup>3</sup> or 0.3 - 1.0 kg S/ADt are achievable.

**NO<sub>x</sub> emissions:** The emission of nitrogen oxides can be controlled by burner design (low NO<sub>x</sub> burners) and modified combustion conditions (primary methods). The design of the recovery boiler (staged air feed systems) can result in relatively low NO<sub>x</sub> concentrations. Achievable emission levels are in the range of 200 - 300 mg NO<sub>x</sub>/Nm<sup>3</sup> or 1.0 - 2.0 kg NO<sub>x</sub>/ADt respectively.

Secondary methods as selective non-catalytic reduction (SNCR) are usually not in operation. However, they are available.

**Auxiliary boilers:** It has to be noted that auxiliary boilers within the pulp and paper industry are of a very variable size (from 10 to above 200 MW). For the smaller only the use of low sulphur fuel and combustion techniques can be applied at reasonable costs while for the larger also control measures.



# Appendix 3

## Mercury Contents of Coals

4 Pages

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This appendix presents various data on the mercury content of coals.

The following table is related to Polish coal and lignite. Investigations found that this type of data is quite sparse, with measurements of heavy metal content not included in scope of routine technical measurements of fuels. As such the data obtained from this investigation should be treated as a preliminary assessment.

**Mercury content of Polish hard coal and lignite**

Fuel	Source of fuel (Note 1)	Mercury	
		Av content (ppm)	Range of content (ppm)
Hard coal	Coal mine 1	0,066	0,018-0,198
	Coal mine 2	0,049	0,006-0,113
	Coal mine 3	0,132	0,018-0,339
	Coal mine 4	0,106	0,007-0,324
	Coal mine 5	0,013	0,005-0,021
	Coal mine 6	0,073	0,011-0,518
	Coal mine 7	0,113	0,001-0,758
	Coal mine 8	0,037	0,005-0,123
	Coal mine 9	0,020	0,001-0,083
	Coal mine 10	0,029	0,010-0,113
	Coal mine 11	0,053	0,004-0,139
	Coal mine 12	0,399	0,081-0,967
Lignite	Coal mine 11	0,105	0,018-0,561
	All hard coal samples	0,085	0,001-0,967
	Group of coal mines A	no data	< 0,200
	Group of coal mines B	0,15	0,32
	Open pit 1	0,401	0,081-0,947
	Open pit 2	0,216	0,085-0,412
	Open pit 3	0,202	0,104-0,343
	Open pit 4	0,199	0,169-0,268
	Open pit 5	0,416	0,111-1,030
	Open pit 6	0,225	0,105-0,953
Lignite	All lignite samples	0,322	0,081-1,030
	All lignite samples – assessment for lignite humidity 50 %	0,18	0,05-0,56
	Open pit A	0,385	0,015 – 4,595
	Open pit B - exploited deposit	0,215	0,111-0,436
	Open pit B Non-exploited deposit	0,129	0,091-0,176

Source: Energoprojekt, 2004

**Note**

1. Data for the numbered coal mines and open pits is from Energoprojekt, based on data from National Geological Institute (Bulletin of National Geological Institute No394, 5-54, 2001). Mercury content data from hard coal and lignite sampled in the year 1998. Data represents fuels as delivered to the lab. In the case of lignite there is an important difference between natural and analytical humidity. Natural humidity of lignite delivered to power plants is about 50 %. Data for the coal mines and open pits marked 'A' and 'B' are from specific mines data.

The following tables are from Eurelectric's comments on the EC's consultation document on the development of the EU mercury strategy.

Country of origin (concentrations are in mg/kg)	Number	Mean	Standar Dev.
Australia	17	0.08	0.06
Colombia	7	0.06	0.03
China	2	0.15	-
Egypt	1	0.10	-
Germany (Ruhr area)	1	0.16	-
Indonesia	7	0.04	-
New Zealand	1	0.05	-
Poland	10	0.35	0.55
Russia (Kuzbass)	1	0.06	-
South Africa	12	0.09	0.02
Spitsbergen (Norway)	2	0.14	0.12
United States (Eastern)	15	0.14	0.12
Venezuela	2	0.08	-
Blend	36	0.09	0.07
Total	109	0.12	0.19
Weighted averaged in the Netherlands in 1999		0.11	0.20

**Table 1.** Mercury concentrations in bituminous steam coal as imported in the Netherlands (9)



**Mercury concentrations in bituminous steam coal as imported to Denmark**

Country of origin (concentrations are in mg/kg)	Number	Mean	Standard Dev.
Australia	23	0.05	0.02
Colombia	21	0.07	0.02
Poland	13	0.09	0.02
Russia	20	0.12	0.07
South Africa	52	0.13	0.07
United States	32	0.11	0.05

**Mercury concentrations in bituminous steam coal as imported to Ireland (2002)**

Country of origin (concentrations are in mg/kg)	Number	Mean	Analysis by
Colombia - Interco El Cerrejon	1	0.050 ppm	KEMA
USA Consol (Bailey)	1	0.116 ppm	KEMA
Indonesia - Pinang	1	0.03 ppm	KEMA
S African -	1	0.141 ppm	KEMA
Australia Bengalla	1	0.03 ppm	SGS Australia Lab
Australia - Bengalla – NSW	1	0.063 ppm	KEMA analysis
Australia - Queensland	1	0.02 ppm	CCI Australia
Australia NSW Lemington	1	0.10 ppm	CCI Australia

**Mercury concentrations in bituminous steam coal as imported to UK (2002)**

Country of origin (concentrations are in mg/kg)	Number	Mean	Standard Dev.
Indonesia	2	0.025	0.007
Colombia	12	0.050	0.025
South Africa	19	0.074	0.046
USA (Eastern)	4	0.065	0.017
Australia	3	0.097	0.006
Polish	3	0.070	0.020
Russian	3	0.070	0.036
UK	120	0.111	0.057
<b>Weighted average (2002)</b>		0.07	-

**Mercury concentrations in bituminous steam coal as imported to Austria (1992-2004)**

<b>Coal Mine</b>	<b>Country</b>	<b>Hg [mg/kg]</b>
Rydultowy	Poland	0,06 - 0,1
Powstancow	Poland	0,06 - 0,2
Murcki	Poland	0,15
Debiensko	Poland	< 0,1
Bobrek	Poland	0,07
Stewarton	Scotland	0,05
Datong	China	0,08
Cerrejon	Colombia	0,05
South Blackwater	Australia	0,05
Arthur Taylor	South Africa	0,08

# Appendix 4

## Emissions Data from RAINS Model

24 Pages

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## Final Report

SO2 emissions from EU25 power plants in 2000 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

		Existing Power Plants & District Heat Plants (kt)						New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
<b>EU-15</b>	<b>Austria</b>	1.6	1.2	0.4	0.9	0.0	4			0.4		0.1		1	5	38	
	<b>Belgium</b>		35.1	1.9	4.5	0.1	2.1	44						0	44	187	
	<b>Denmark</b>		5.7	2.1	3.5	0.1	11			0.1	1.3			1	13	28	
	<b>Finland</b>	9.7	8.4	3.1	6.6		28			1.0		0.1		1	29	77	
	<b>France</b>	5.0	128.9	6.0	23.6	0.2	164								164	654	
	<b>Germany</b>	83.7	101.3	7.1	2.7	0.2	195	38.0	2.7	0.2		1.5		42	237	643	
	<b>Greece</b>	155.6	100.3		118.2	1.2	375	2.0	0.3		2.1	0.3		5	380	481	
	<b>Ireland</b>	5.7	39.0		30.4	0.1	75			0.1	5.0			5	80	132	
	<b>Italy</b>	0.1	42.7	0.6	288.5	0.7	333		0.8	1.9		2.3		5	338	747	
	<b>Luxembourg</b>			0.1	0.0		0			0.0				0	0	4	
	<b>Netherlands</b>		13.7	0.8	0.8		15	0.0		0.5				1	16	85	
	<b>Portugal</b>		51.5	3.4	86.9	0.1	0.0	142		5.1	1.1		0.2	6	148	230	
	<b>Spain</b>	356.0	425.1	1.1	125.3	0.3	908		9.0	0.2	39.9	0.2		49	957	1489	
	<b>Sweden</b>	0.3	0.9	5.1	1.1	0.2	8			1.3				1	9	58	
	<b>UK</b>		803.1	2.6	6.4	0.1	812			2.4		0.5		3	815	1186	
	<b>Sub-total</b>	<b>618</b>	<b>1757</b>	<b>34</b>	<b>699</b>	<b>3</b>	<b>2</b>	<b>3114</b>	<b>40</b>	<b>18</b>	<b>9</b>	<b>48</b>	<b>5</b>	<b>0</b>	<b>121</b>	<b>3234</b>	<b>6040</b>

## Final Report

		Existing Power Plants & District Heat Plants (kt)						New Power Plants & District Heat Plants (kt)									
	Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources
	<b>% of total emissions from all sources</b>	10%	29%	1%	12%	0%	0%	52%	1%	0%	0%	1%	0%	0%	2%	54%	100%
<b>ACC-10</b>	<b>Cyprus</b>				29.7			30								30	46
	<b>Czech Republic</b>	96.7	28.0	0.5	16.2	0.0		141								141	250
	<b>Estonia</b>	74.8	0.4	0.2	5.2	0.2		81								81	91
	<b>Hungary</b>	332.0	2.4	0.1	58.3			393								393	487
	<b>Latvia</b>	1.3		0.4	2.9	0.0		5								5	16
	<b>Lithuania</b>	0.1	0.4	0.1	15.9	0.0		16								16	43
	<b>Malta</b>				23.6	0.6		24								24	26
	<b>Poland</b>	368.9	549.7	0.3	16.9	0.3		936								936	1515
	<b>Slovakia</b>	29.2	36.5		5.7			71								71	124
	<b>Slovenia</b>	79.1	3.4	0.0	0.6	0.0		83	0.0	0.0	0.0	0.0		0	83	97	
	<b>Sub-total</b>	982	621	2	175	1	0	1780	0	0	0	0	0	0	0	1781	2696
	<b>% of total emissions from all sources</b>	36%	23%	0%	6%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	66%	100%
<b>EU-25</b>	<b>Total</b>	1600	2378	36	874	5	2	4894	40	18	9	48	5	0	121	5015	8736
	<b>%</b>	18%	27%	0%	10%	0%	0%	56%	0%	0%	0%	1%	0%	0%	1%	57%	100%

## Final Report

SO2 emissions from EU25 power plants in 2010 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.7	1.1	0.4	0.2	0.0	2			0.7	0.0	0.1		1	3	29	
	<b>Belgium</b>		0.1	1.7	1.6	0.1	0.0	4	0.0	1.7	0.7	0.0		2	6	89	
	<b>Denmark</b>		5.7	2.1	0.1	0.1	0.0	8	0.1	1.2		0.1		1	9	19	
	<b>Finland</b>	2.1	1.4	3.1	0.0		7	0.4	0.3	7.8	0.0	0.1		9	15	61	
	<b>France</b>	3.5	21.2	3.1	2.9	0.0	31	0.1		8.2	1.1	0.2		10	40	375	
	<b>Germany</b>	11.7	60.0	7.1	2.2	0.6	82	36.6	16.1	3.6	0.1	0.0		56	138	387	
	<b>Greece</b>	37.3	20.4		6.6	0.5	65	4.5	0.7	0.7	0.3	0.3		6	71	152	
	<b>Ireland</b>	0.7	4.9		0.9	0.0	7	0.2		0.8		0.0		1	8	29	
	<b>Italy</b>		5.3	0.6	11.7	0.4	18		2.6	5.9		0.3		9	27	270	
	<b>Luxembourg</b>		0.0	0.1	0.0		0		0.0	0.0	0.0			0	0	2	
	<b>Netherlands</b>		1.3	0.8	0.0	0.0	2	0.0		0.6	0.0	0.0		1	3	59	
	<b>Portugal</b>		12.1	0.4	10.6	0.0	0.0	23		2.0	0.8		0.2	3	26	89	
	<b>Spain</b>		75.3	1.1		0.2		77	2.2	5.5	2.4	0.1		10	87	403	
	<b>Sweden</b>		1.3	4.6	0.0	0.1	6		0.2	3.4	0.0	0.2		4	10	54	
	<b>UK</b>		200.4	2.7	3.5	0.1	207		0.3	4.1	0.1	0.3		5	211	403	
	<b>Sub-total</b>	56	411	28	40	2	0	537	42	23	46	5	2	0	118	655	2422

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Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
	<b>% of total emissions from all sources</b>	2%	17%	1%	2%	0%	0%	22%	2%	1%	2%	0%	0%	5%	27%	100%	
<b>ACC-10</b>	<b>Cyprus</b>			0.3			0			0.1	8.7			9	9	14	
	<b>Czech Republic</b>	50.8	9.8	0.5	4.9	0.0	66	5.7		0.2	0.0	0.1		6	72	120	
	<b>Estonia</b>	30.3	0.1	0.2	3.0	0.0	34	0.4	0.1	0.1	0.8	0.0		1	35	43	
	<b>Hungary</b>	102.1	80.0	0.1	0.3		182			0.4	0.8			1	184	240	
	<b>Latvia</b>	0.0		0.4	2.4	0.0	3	0.0	0.5	0.2		0.0		1	4	10	
	<b>Lithuania</b>	0.0	0.4	0.1	4.3		5	0.0	1.5	0.4	7.5	0.0		9	14	36	
	<b>Malta</b>				6.5		7			0.0	1.6	0.2		2	8	9	
	<b>Poland</b>	258.8	275.5	0.3	1.3	0.1	536	6.6	6.7	7.7	9.9	0.6		31	567	927	
	<b>Slovakia</b>	3.5	13.5		1.9		19	2.9	1.3	0.5	3.9	0.0		9	27	49	
	<b>Slovenia</b>	1.3	3.4	0.0	0.2	0.0	5		0.2	0.3	0.0	0.0		1	6	19	
	<b>Sub-total</b>	447	383	2	25	0	856	16	10	10	33	1	0	70	926	1468	
	<b>% of total emissions from all sources</b>	30%	26%	0%	2%	0%	58%	1%	1%	1%	2%	0%	0%	5%	63%	100%	
<b>EU-25</b>	<b>Total</b>	503	793	29	65	2	1393	57	33	56	39	3	0	188	1581	3890	
	<b>%</b>	13%	20%	1%	2%	0%	36%	1%	1%	1%	1%	0%	0%	5%	41%	100%	



## Final Report

SO2 emissions from EU25 power plants in 2020 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total (New & Existing)	Total all sources	
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)			
<b>EU-15</b>	<b>Austria</b>	0.1	0.4	0.3	0.1	0.0	1	0.0		0.8	0.0	0.1		1	2	26	
	<b>Belgium</b>			1.4	1.3	0.1	3		0.0	2.1	0.2	0.0		2	5	83	
	<b>Denmark</b>		1.7	1.6	0.0	0.1	3		0.0	1.9	0.0	0.1		2	6	13	
	<b>Finland</b>	0.7	0.6	3.1	0.0		4	1.4	1.2	8.0	0.1	0.1		11	15	62	
	<b>France</b>	0.9	0.0	1.7	0.3	0.0	3	0.0	5.8	13.6	0.6	0.1		20	23	345	
	<b>Germany</b>		37.7	7.1		0.2	45	19.5	24.5	7.8		0.4		52	97	332	
	<b>Greece</b>	2.9	1.6		3.4	0.0	8	16.5	2.5	0.8	0.4	0.9		21	29	110	
	<b>Ireland</b>	0.5	0.9		0.1	0.0	1	0.1		0.9		0.0		1	2	19	
	<b>Italy</b>		4.5	0.6	24.0	0.4	30		2.7	12.6	0.0	0.5		16	45	281	
	<b>Luxembourg</b>			0.1			0		0.0	0.1	0.0	0.0		0	0	2	
	<b>Netherlands</b>		0.6	0.8	0.0	0.0	1	0.0		1.4	0.0	0.0		1	3	65	
	<b>Portugal</b>		2.4	0.4	0.1	0.0	3			2.4	0.5	0.0	0.5	3	6	81	
	<b>Spain</b>		0.9	1.1			2		6.7	11.7		0.7		19	21	335	
	<b>Sweden</b>		0.7	0.6	0.0	0.0	1		0.1	7.1	0.0	0.3		7	9	50	
	<b>UK</b>		11.2	2.3	1.5	0.1	15		0.4	17.4	0.1	0.6		18	34	209	
	<b>Sub-total</b>	<b>5</b>	<b>63</b>	<b>21</b>	<b>31</b>	<b>1</b>	<b>0</b>	<b>121</b>	<b>38</b>	<b>44</b>	<b>89</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>176</b>	<b>298</b>	<b>2013</b>

## Final Report

		Existing Power Plants & District Heat Plants (kt)						New Power Plants & District Heat Plants (kt)									
Country		Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources
	<b>% of total emissions from all sources</b>	0%	3%	1%	2%	0%	0%	6%	2%	2%	4%	0%	0%	0%	9%	15%	100%
<b>ACC-10</b>	<b>Cyprus</b>				0.6			1			0.2	2.0			2	3	8
	<b>Czech Republic</b>	0.0	5.6	0.4	0.1			6	8.7	1.1	0.8	1.4	0.1		12	18	53
	<b>Estonia</b>	0.2	0.0	0.0				0	0.3	2.6	0.5	0.0	0.0		4	4	10
	<b>Hungary</b>	17.2	10.1	0.1	0.2			28	6.5	0.5	0.5	0.2	0.0		8	35	88
	<b>Latvia</b>								0.0		0.8	1.3	0.0		2	2	8
	<b>Lithuania</b>	0.0	0.4		0.3			1	0.0	1.5	0.7	0.8	0.0		3	4	22
	<b>Malta</b>				0.6			1			0.1	1.2	0.2		1	2	2
	<b>Poland</b>	107.1	70.8	0.3	0.3	0.1		179	10.8	29.5	6.3	0.3	0.5		47	226	554
	<b>Slovakia</b>	0.4	2.0					2	3.3	4.7	1.1	1.1	0.1		10	13	33
	<b>Slovenia</b>	1.4		0.0	0.0	0.0		1			0.5	0.1	0.0		1	2	16
	<b>Sub-total</b>	126	89	1	2	0	0	218	30	40	12	8	1	0	91	309	793
	<b>% of total emissions from all sources</b>	16%	11%	0%	0%	0%	0%	28%	4%	5%	1%	1%	0%	0%	11%	39%	100%
<b>EU-25</b>	<b>Total</b>	131	152	22	33	1	0	339	67	84	100	10	5	1	267	606	2806
	<b>%</b>	5%	5%	1%	1%	0%	0%	12%	2%	3%	4%	0%	0%	0%	10%	22%	100%

## Final Report

NOx emissions from EU25 power plants in 2000 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.7	2.6	1.7	0.9	0.0	0.4	6			1.6		0.0	2.4	4	10	191.747
	<b>Belgium</b>		30.8	2.7	1.6	0.1	3.6	39						4.2	4	43	333.252
	<b>Denmark</b>		24.3	6.5	8.1	0.1	9.1	48			0.3	0.8		1.4	2	51	207.026
	<b>Finland</b>	4.3	12.7	6.7	2.4		3.8	30			1.2		0.1	0.8	2	32	212.419
	<b>France</b>	1.2	81.9	9.9	11.7	0.2	7.6	113						3.4	3	116	1447.006
	<b>Germany</b>	92.1	77.2	4.7	1.3	0.2	23.8	199	11.4	2.4	0.3		1.1	2.2	17	217	1645.396
	<b>Greece</b>	5.5	43.4		20.4	1.0	1.0	71	1.2	0.9		0.4	0.2	1.4	4	75	321.512
	<b>Ireland</b>	3.7	21.9	0.0	4.0	0.1	7.2	37			0.1	1.7		0.8	3	39	129.45
	<b>Italy</b>	0.0	18.8	1.0	55.3	0.6	31.1	107		1.0	1.5		1.2	12.8	17	123	1388.833
	<b>Luxembourg</b>			0.1	0.0		0.1	0			0.0				0	0	33.031
	<b>Netherlands</b>		23.0	1.6	0.5		22.7	48	0.0		1.8			1.7	4	51	401.583
	<b>Portugal</b>		23.5	2.9	30.6	0.5	0.3	58		1.8	0.7			1.8	4	62	262.524
	<b>Spain</b>	18.2	205.2	2.9	15.8	0.3	9.5	252		37.6	0.3	3.6	0.1	2.4	44	296	1335.172
	<b>Sweden</b>	0.8	1.9	15.6	1.9	0.4	1.0	22			2.2			0.0	2	24	251.361
	<b>UK</b>		291.5	4.7	2.1	0.1	44.7	343			2.2		0.3	16.6	19	362	1752.509
	<b>Sub-total</b>	127	859	61	157	4	166	1372	13	44	12	6	3	52	130	1502	9913

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# Entec

## Final Report

Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
	<b>% of total emissions from all sources</b>	1%	9%	1%	2%	0%	2%	14%	0%	0%	0%	0%	0%	1%	1%	15%	100%
<b>ACC-10</b>	<b>Cyprus</b>			5.3			5								5	25.908	
	<b>Czech Republic</b>	77.6	18.0	1.2	1.8	0.0	8.0	107							107	318.254	
	<b>Estonia</b>	10.2	0.1	0.5	0.9	0.0	2.8	15							15	37.382	
	<b>Hungary</b>	18.4	0.2	0.1	5.8		14.3	39							39	187.653	
	<b>Latvia</b>	0.5		1.1	1.1	0.0	4.6	7							7	35.107	
	<b>Lithuania</b>	0.0	0.1	0.2	3.0	0.0	6.2	10							10	49.054	
	<b>Malta</b>				3.8	0.2	4								4	9.283	
	<b>Poland</b>	83.5	242.3	0.5	1.6	0.2	6.4	334							334	843.479	
	<b>Slovakia</b>	10.6	12.9		0.7		3.3	27							27	106.396	
	<b>Slovenia</b>	12.3	1.5	0.1	0.1	0.0	0.8	15	0.0	0.0		0.0		0	15	57.892	
	<b>Sub-total</b>	213	275	4	24	0	46	562	0	0	0	0	0	0	563	1670	
	<b>% of total emissions from all sources</b>	13%	16%	0%	1%	0%	3%	34%	0%	0%	0%	0%	0%	0%	34%	100%	
<b>EU-25</b>	<b>Total</b>	340	1134	65	181	4	212	1935	13	44	12	6	3	52	130	2065	11583
	<b>%</b>	3%	10%	1%	2%	0%	2%	17%	0%	0%	0%	0%	0%	1%	18%	100%	

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NOx emissions from EU25 power plants in 2010 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.3	1.5	1.7	0.2	0.0	4			3.8	0.0	0.1	6.1	10	14	156.593	
	<b>Belgium</b>		0.1	2.5	0.5	0.1	0.0	3	0.0	1.0	0.0	0.0	8.9	10	13	215.972	
	<b>Denmark</b>		24.4	6.5	0.1	0.1	5.7	37	0.1	2.9		0.1	3.4	7	43	150.592	
	<b>Finland</b>	2.4	3.6	6.7	0.0		3.4	16	0.3	0.3	10.1	0.0	0.1	2.5	13	29	149.653
	<b>France</b>	0.6	17.7	5.4	2.0	0.0	0.9	27	0.0		4.5	0.9	0.3	13.0	19	45	1027.721
	<b>Germany</b>	25.0	45.6	4.7	0.9	1.0	2.9	80	10.9	14.1	6.0	0.1	0.0	23.6	55	135	1071.227
	<b>Greece</b>	2.4	26.0	0.0	9.8	0.9		39	1.9	1.1	0.5	0.5	0.4	4.2	9	48	256.779
	<b>Ireland</b>	1.0	6.9	0.0	0.7	0.1	3.3	12	0.7		0.5		0.0	2.9	4	16	93.553
	<b>Italy</b>		8.9	1.0	3.0	0.6	3.6	17		3.4	4.3		0.3	36.2	44	61	922.28
	<b>Luxembourg</b>			0.1	0.0		0.0	0	0.0	0.0	0.0		0.4	0	1	25.121	
	<b>Netherlands</b>		1.5	1.6	0.0	0.1	12.9	16	0.0		2.4	0.0	0.0	13.7	16	32	283.219
	<b>Portugal</b>		21.4	1.0	4.6	0.7	0.1	28			2.6	0.8		2.9	6	34	188.058
	<b>Spain</b>		101.8	2.9		0.3	1.7	107		4.8	8.4	0.9	0.1	19.1	33	140	964.04
	<b>Sweden</b>		2.4	12.0	0.0	0.3	1.0	16	0.3	5.6	0.0	0.2	2.0	8	24	192.393	
	<b>UK</b>		132.7	4.7	4.6	0.1	18.5	161	0.4	3.8	0.1	0.6	45.4	50	211	1104.543	
	<b>Sub-total</b>	32	394	51	26	4	54	562	14	25	56	3	2	184	285	846	6802

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Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)								Total all sources	
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)		
	<b>% of total emissions from all sources</b>	0%	6%	1%	0%	0%	1%	8%	0%	0%	1%	0%	0%	3%	4%	12%	100%
<b>ACC-10</b>	<b>Cyprus</b>			0.1				0			0.2	3.5		0.0	4	4	19.545
	<b>Czech Republic</b>	31.1	10.5	1.2	1.4	0.0	1.6	46	10.6		0.3	0.0	0.1	1.6	13	58	184.286
	<b>Estonia</b>	4.6	0.0	0.5	0.3	0.0	0.1	6	0.6	0.2	0.1	0.9	0.0	0.7	2	8	28.022
	<b>Hungary</b>	11.7	8.3	0.1	0.1		0.2	20			0.2	0.8		3.1	4	25	131.288
	<b>Latvia</b>	0.0		1.1	0.6	0.0	1.1	3	0.1	0.5	0.2		0.0	0.3	1	4	30.69
	<b>Lithuania</b>	0.0	0.1	0.2	1.0		0.7	2	0.0	1.6	0.3	0.8	0.0	1.6	4	6	43.711
	<b>Malta</b>				1.4			1			0.1	0.5	0.1		1	2	4.905
	<b>Poland</b>	68.1	128.9	0.5	0.3	0.2		198	7.9	9.9	12.8	1.2	0.6	5.0	37	235	567.259
	<b>Slovakia</b>	1.7	5.6		0.5		1.3	9	2.1	1.8	0.3	0.8	0.0	2.0	7	16	69.766
	<b>Slovenia</b>	2.5	1.1	0.1	0.0	0.0	0.1	4		0.4	0.4	0.0	0.0	0.6	1	5	33.888
	<b>Sub-total</b>	120	154	4	6	0	5	289	21	14	15	8	1	15	75	364	1113
	<b>% of total emissions from all sources</b>	11%	14%	0%	1%	0%	0%	26%	2%	1%	1%	1%	0%	1%	7%	33%	100%
<b>EU-25</b>	<b>Total</b>	151	549	54	32	5	59	851	35	39	71	12	3	199	359	1210	7915
	<b>%</b>	2%	7%	1%	0%	0%	1%	11%	0%	0%	1%	0%	0%	3%	5%	15%	100%

Final Report

NOx emissions from EU25 power plants in 2020 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.0	0.6	1.4	0.1	0.0	2	0.0		3.6	0.0	0.1	9.1	13	15	127	
	<b>Belgium</b>			2.2	0.3	0.1	3		0.0	1.5	0.0	0.0	13.9	15	18	190	
	<b>Denmark</b>		3.2	4.7	0.1	0.1	3.4	11		0.0	5.4	0.0	0.2	7.2	13	24	105
	<b>Finland</b>	0.6	0.6	6.7	0.0		1.6	9	1.0	1.3	10.2	0.0	0.1	5.0	18	27	117
	<b>France</b>	0.1	0.0	3.7	0.4	0.0	0.4	5	0.0	8.5	9.5	0.4	0.1	22.5	41	46	819
	<b>Germany</b>		28.8	4.7		0.4	1.1	35	5.8	21.5	16.4		0.4	38.7	83	118	808
	<b>Greece</b>	0.7	3.2	0.0	6.7	0.0		11	6.9	3.7	0.8	0.7	1.0	5.1	18	29	209
	<b>Ireland</b>	0.2	2.0	0.0	0.1	0.0	1.0	3	0.4		0.7		0.0	4.4	6	9	63
	<b>Italy</b>		7.7	1.0	6.2	0.6	7.4	23		2.5	12.6	0.0	0.5	44.2	60	83	663
	<b>Luxembourg</b>			0.0			0.0	0		0.0	0.1	0.0	0.0	0.6	1	1	18
	<b>Netherlands</b>		0.7	1.6	0.0	0.0	6.1	9	0.0		4.5	0.0	0.0	23.3	28	36	241
	<b>Portugal</b>		8.6	1.0	0.1	0.8		11			3.9	0.5	0.0	6.0	10	21	156
	<b>Spain</b>		1.5	2.9			1.1	6		12.3	16.4		0.8	26.2	56	61	681
	<b>Sweden</b>		1.3	1.6	0.0	0.1	0.3	3		0.1	12.2	0.0	0.3	6.5	19	22	150
	<b>UK</b>		8.2	4.1	3.7	0.1	7.9	24		0.4	16.0	0.1	0.7	68.9	86	110	817
	<b>Sub-total</b>	2	66	36	18	2	30	154	14	50	114	2	4	282	466	620	5165

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		Existing Power Plants & District Heat Plants (kt)						New Power Plants & District Heat Plants (kt)									
Country		Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources
	<b>% of total emissions from all sources</b>	0%	1%	1%	0%	0%	1%	3%	0%	1%	2%	0%	0%	5%	9%	12%	100%
<b>ACC-10</b>	<b>Cyprus</b>				0.1			0			0.3	3.4		0.0	4	4	18
	<b>Czech Republic</b>	0.0	3.5	1.0	0.0	0.0		5	16.4	2.7	1.3	0.3	0.1	3.2	24	29	113
	<b>Estonia</b>	0.0	0.0					0	0.5	2.7	0.6	0.0	0.0	1.2	5	5	15
	<b>Hungary</b>	0.9	0.3	0.1	0.1		0.1	1	2.1	0.3	0.3	0.2	0.0	5.2	8	10	83
	<b>Latvia</b>								0.1		0.9	0.2	0.0	0.8	2	2	15
	<b>Lithuania</b>	0.0	0.1		0.1		0.3	0	0.0	1.6	0.7	0.1	0.0	2.4	5	5	27
	<b>Malta</b>				0.2			0			0.1	1.6	0.1		2	2	4
	<b>Poland</b>	15.2	13.2	0.5	0.1	0.1		29	12.9	40.5	10.6	0.3	0.5	13.9	79	108	364
	<b>Slovakia</b>	0.1	0.3				0.0	0	2.3	5.9	1.1	0.2	0.1	3.3	13	13	60
	<b>Slovenia</b>	1.9		0.0	0.0	0.0		2			0.6	0.1	0.0	1.5	2	4	24
	<b>Sub-total</b>	18	17	2	0	0	0	38	34	54	16	6	1	32	143	181	724
	<b>% of total emissions from all sources</b>	3%	2%	0%	0%	0%	0%	5%	5%	7%	2%	1%	0%	4%	20%	25%	100%
<b>EU-25</b>	<b>Total</b>	20	84	37	18	2	31	192	49	104	130	8	5	313	609	801	5890
	<b>%</b>	0%	1%	1%	0%	0%	1%	3%	1%	2%	2%	0%	0%	5%	10%	14%	100%



Final Report

PM10 emissions from EU25 power plants in 2000 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.2	0.1	0.2	0.1		0.0	1			0.0		0.0	0.0	0	1	49
	<b>Belgium</b>		3.4	0.0	0.1	0.0	0.0	4					0.0	0	4	70	
	<b>Denmark</b>		0.8	0.2	0.4	0.0	0.0	1		0.0	0.1		0.0	0	2	33	
	<b>Finland</b>	0.2	0.2	0.0	0.1		0.0	1		0.0		0.0	0.0	0	1	44	
	<b>France</b>	0.2	9.6	0.2	0.6	0.0	0.0	11					0.0	0	11	373	
	<b>Germany</b>	10.9	4.1	0.1	0.3	0.0	0.1	15	3.6	0.2	0.0		0.0	4	19	260	
	<b>Greece</b>	2.1	11.7		0.6	0.0	0.0	14	0.6	0.5		0.0	0.0	1	16	66	
	<b>Ireland</b>	1.0	0.5		0.2	0.0	0.0	2			0.0	0.2	0.0	0	2	22	
	<b>Italy</b>	0.0	4.5	0.0	8.0	0.0	0.0	13		0.2	0.1		0.0	0	13	273	
	<b>Luxembourg</b>			0.0				0							0	4	
	<b>Netherlands</b>		0.5	0.0	0.0		0.0	1	0.0		0.0		0.0	0	1	58	
	<b>Portugal</b>		2.4	0.1	1.0	0.0		4		0.1	0.0		0.0	0	4	59	
	<b>Spain</b>	5.0	13.4	0.3	0.8	0.0	0.0	19		3.7	0.0	0.3	0.0	4	24	234	
	<b>Sweden</b>	0.2	0.1	0.1	0.2	0.0	0.0	1			0.0			0	1	79	
	<b>UK</b>		16.1	0.1	0.1	0.0	0.1	16			0.1		0.0	0	17	202	
	<b>Sub-total</b>	20	68	1	13	0	0	101	4	5	0	1	0	10	111	1823	

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Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
	<b>% of total emissions from all sources</b>	1%	4%	0%	0	0	0	6%	0%	0%	0%	0%	0%	0%	1%	6%	100%
<b>ACC-10</b>	<b>Cyprus</b>			0.4			0								0	3	
	<b>Czech Republic</b>	42.3	4.0	0.1	0.1		0.0	47							47	104	
	<b>Estonia</b>	30.2	0.0	0.0	0.1	0.0	0.0	30							30	42	
	<b>Hungary</b>	13.4	0.0	0.0	0.6		0.0	14							14	87	
	<b>Latvia</b>	0.5	0.0	0.1	0.1		0.0	1							1	10	
	<b>Lithuania</b>	0.0	0.0	0.0	0.2		0.0	0							0	21	
	<b>Malta</b>				0.2	0.0		0							0	1	
	<b>Poland</b>	15.7	13.4	0.0	0.2	0.0	0.0	29							29	305	
	<b>Slovakia</b>	6.3	1.3		0.0		0.0	8							8	29	
	<b>Slovenia</b>	7.5	0.4	0.0	0.0		0.0	8	0.0	0.0	0.0			0	8	21	
	<b>Sub-total</b>	116	19	0	2	0	0	137	0	0	0	0	0	0	137	622	
	<b>% of total emissions from all sources</b>	19%	3%	0%	0%	0%	0%	22%	0%	0%	0%	0%	0%	0%	22%	100%	
<b>EU-25</b>	<b>Total</b>	136	87	1	14	0	0	239	4	5	0	1	0	0	10	249	2445
	<b>%</b>	6%	4%	0%	1%	0%	0%	10%	0%	0%	0%	0%	0%	0%	10%	100%	

## Final Report

PM10 emissions from EU25 power plants in 2010 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total (New & Existing)	Total all sources
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		
<b>EU-15</b>	<b>Austria</b>	0.1	0.1	0.2	0.0		0			0.1		0.0	0.0	0	0	43
	<b>Belgium</b>		0.0	0.0	0.0	0.0	0		0.0	0.0	0.0		0.0	0	0	44
	<b>Denmark</b>		0.9	0.2	0.0	0.0	1		0.0	0.1		0.0	0.0	0	1	27
	<b>Finland</b>	0.1	0.1	0.0	0.0		0	0.0	0.0	0.1	0.0	0.0	0.0	0	0	38
	<b>France</b>	0.2	4.1	0.1	0.2	0.0	5	0.0		0.1	0.1	0.0	0.0	0	5	276
	<b>Germany</b>	2.6	2.4	0.1	0.2	0.0	5	3.4	1.3	0.1	0.0	0.0	0.1	5	10	208
	<b>Greece</b>	1.8	10.4		0.5	0.0	13	1.4	1.1	0.0	0.0	0.0	0.0	3	15	64
	<b>Ireland</b>	0.2	0.2		0.1	0.0	0	0.6		0.0			0.0	1	1	18
	<b>Italy</b>		0.8	0.0	0.4	0.0	1		0.5	0.2		0.0	0.1	1	2	179
	<b>Luxembourg</b>			0.0	0.0		0		0.0	0.0	0.0		0.0	0	0	3
	<b>Netherlands</b>		0.1	0.0		0.0	0	0.0		0.0	0.0		0.0	0	0	50
	<b>Portugal</b>		0.8	0.1	0.2	0.0	1			0.1	0.1		0.0	0	1	45
	<b>Spain</b>		6.6	0.2		0.0	7		0.9	0.5	0.1	0.0	0.1	2	8	164
	<b>Sweden</b>		0.0	0.1		0.0	0		0.0	0.0	0.0	0.0	0.0	0	0	58
	<b>UK</b>		7.7	0.1	0.3	0.0	8		0.1	0.1	0.0	0.0	0.2	0	8	136
	<b>Sub-total</b>	5	34	1	2	0	42	5	4	1	0	0	1	12	54	1352

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Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
	<b>% of total emissions from all sources</b>	0%	3%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	1%	4%	100%
<b>ACC-10</b>	<b>Cyprus</b>			0.0			0				0.0	0.4		0.0	0	0	3
	<b>Czech Republic</b>	7.7	2.5	0.1	0.1		10	3.7			0.0	0.0	0.0	0.0	4	14	47
	<b>Estonia</b>	7.4	0.0	0.0	0.0	0.0	7	1.4	0.1		0.0	0.1		0.0	2	9	18
	<b>Hungary</b>	3.6	1.0	0.0	0.0		5				0.0	0.1		0.0	0	5	38
	<b>Latvia</b>	0.0		0.1	0.1		0	0.2	0.2				0.0	0.0	0	1	8
	<b>Lithuania</b>	0.0	0.0	0.0	0.1		0	0.0	0.7		0.0	0.1		0.0	1	1	19
	<b>Malta</b>				0.1		0				0.0	0.1	0.0		0	0	1
	<b>Poland</b>	11.3	5.0	0.0	0.0	0.0	16	1.6	1.2	1.1	0.2	0.0	0.0	4	20	207	
	<b>Slovakia</b>	1.2	0.7		0.0		2	3.9	0.6	0.0	0.2		0.0	5	7	22	
	<b>Slovenia</b>	1.5	0.2	0.0	0.0	0.0	2		0.2	0.0	0.0		0.0	0	2	11	
	<b>Sub-total</b>	33	9	0	1	0	43	11	3	1	1	0	0	16	59	374	
	<b>% of total emissions from all sources</b>	9%	3%	0%	0%	0%	11%	3%	1%	0%	0%	0%	0%	4%	16%	100%	
<b>EU-25</b>	<b>Total</b>	37	44	1	2	0	85	16	7	3	2	0	1	28	113	1726	
	<b>%</b>	2%	3%	0%	0%	0%	5%	1%	0%	0%	0%	0%	0%	2%	7%	100%	

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PM10 emissions from EU25 power plants in 2020 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.0	0.0	0.1	0.0			0	0.0		0.0		0.0	0.0	0	0	39
	<b>Belgium</b>			0.0	0.0	0.0		0		0.0	0.0	0.0	0.0	0.0	0	0	41
	<b>Denmark</b>		0.3	0.1	0.0	0.0	0.0	0		0.0	0.2	0.0	0.0	0.0	0	1	23
	<b>Finland</b>	0.0	0.0	0.0	0.0		0.0	0	0.1	0.1	0.1	0.0	0.0	0.0	0	0	34
	<b>France</b>	0.0	0.0	0.1	0.0	0.0		0	0.0	8.4	0.3	0.1	0.0	0.1	9	9	247
	<b>Germany</b>		1.5	0.1		0.0	0.0	2	1.8	2.0	0.3		0.0	0.2	4	6	192
	<b>Greece</b>	0.7	3.9		0.4			5	4.9	3.9	0.0	0.0	0.0	0.0	9	14	58
	<b>Ireland</b>	0.1	0.2		0.0		0.0	0	0.3		0.0		0.0	0.0	0	1	16
	<b>Italy</b>		0.8	0.0	0.7	0.0	0.0	2		0.6	0.6	0.0	0.0	0.1	1	3	152
	<b>Luxembourg</b>							0		0.0	0.0			0.0	0	0	3
	<b>Netherlands</b>		0.0	0.0			0.0	0	0.0		0.1	0.0	0.0	0.1	0	0	49
	<b>Portugal</b>		0.7	0.1	0.0	0.0		1			0.1	0.1		0.0	0	1	48
	<b>Spain</b>		0.3	0.2			0.0	1		2.8	1.0		0.0	0.1	4	4	143
	<b>Sweden</b>		0.0	0.0		0.0		0		0.0	0.1	0.0	0.0	0.0	0	0	50
	<b>UK</b>		1.4	0.1	0.2	0.0	0.0	2		0.1	0.8	0.0	0.0	0.2	1	3	116
	<b>Sub-total</b>	1	9	1	1	0	0	13	7	18	4	0	0	1	30	43	1211

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		Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)								
	Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources
	<b>% of total emissions from all sources</b>	0%	1%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	2%	4%	100%
<b>ACC-10</b>	<b>Cyprus</b>				0.0			0				0.0	0.5		0	1	3
	<b>Czech Republic</b>	0.0	2.1	0.1	0.0			2	5.8	0.4	0.1	0.1	0.0	0.0	6	9	33
	<b>Estonia</b>	0.0	0.0					0	1.2	1.3	0.1	0.0		0.0	2	3	9
	<b>Hungary</b>	0.5	0.1	0.0	0.0			1	4.0	0.2	0.0	0.0		0.0	4	5	34
	<b>Latvia</b>								0.2		0.1	0.0	0.0	0.0	0	0	6
	<b>Lithuania</b>	0.0	0.0		0.0			0	0.0	0.7	0.1	0.0		0.0	1	1	15
	<b>Malta</b>				0.0			0			0.0	0.2	0.0	0.0	0	0	1
	<b>Poland</b>	5.6	1.5	0.0	0.0	0.0		7	2.6	5.1	0.9	0.1	0.0	0.1	9	16	155
	<b>Slovakia</b>	0.1	0.1					0	4.3	2.1	0.1	0.0	0.0	0.0	7	7	22
	<b>Slovenia</b>	1.5		0.0				2			0.1	0.0	0.0	0.0	0	2	8
	<b>Sub-total</b>	8	4	0	0	0	0	12	18	10	1	1	0	0	30	42	284
	<b>% of total emissions from all sources</b>	3%	1%	0%	0%	0%	0%	4%	6%	3%	1%	0%	0%	0%	11%	15%	100%
<b>EU-25</b>	<b>Total</b>	9	13	1	2	0	0	24	25	28	5	1	0	1	60	85	1495
	<b>%</b>	1%	1%	0%	0%	0%	0%	2%	2%	2%	0%	0%	0%	0%	4%	6%	100%

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PM2.5 emissions from EU25 power plants in 2000 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.1	0.1	0.1	0.1		0.0	0					0.0	0	0	37	
	<b>Belgium</b>		1.3	0.0	0.1	0.0	0.0	1					0.0	0	1	43	
	<b>Denmark</b>		0.6	0.2	0.3	0.0	0.0	1			0.0	0.1	0.0	0	1	22	
	<b>Finland</b>	0.1	0.2	0.0	0.1		0.0	0			0.0		0.0	0	0	36	
	<b>France</b>	0.1	4.2	0.2	0.4	0.0	0.0	5					0.0	0	5	290	
	<b>Germany</b>	8.5	3.5	0.1	0.2	0.0	0.1	12	2.9	0.2	0.0		0.0	0.0	3	15	171
	<b>Greece</b>	1.5	7.7		0.4	0.0	0.0	10	0.4	0.3	0.0	0.0	0.0	0.0	1	10	49
	<b>Ireland</b>	0.6	0.3		0.2		0.0	1			0.0	0.1		0.0	0	1	14
	<b>Italy</b>	0.0	1.7	0.0	5.7	0.0	0.0	7	0.0	0.1	0.1		0.0	0.0	0	8	209
	<b>Luxembourg</b>			0.0				0							0	0	3
	<b>Netherlands</b>		0.4	0.0	0.0		0.0	0	0.0		0.0		0.0	0	0	1	36
	<b>Portugal</b>		0.9	0.1	0.7			2		0.0	0.0			0.0	0	2	46
	<b>Spain</b>	3.3	7.8	0.2	0.6	0.0	0.0	12		2.3	0.0	0.2	0.0	0.0	3	14	169
	<b>Sweden</b>	0.1	0.0	0.1	0.1	0.0	0.0	0			0.0				0	0	67
	<b>UK</b>		9.6	0.1	0.1	0.0	0.1	10			0.1		0.0	0.1	0	10	129
	<b>Sub-total</b>	14	38	1	9	0	0	63	3	3	0	0	0	0	7	70	1324
	<b>% of total emissions from all sources</b>	1%	3%	0%	0	0	0	5%	0%	0%	0%	0%	0%	0%	1%	5%	100%

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		Existing Power Plants & District Heat Plants (kt)						New Power Plants & District Heat Plants (kt)									
Country		Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources
<b>ACC-10</b>	<b>Cyprus</b>			0.0	0.3			0							0	2	
	<b>Czech Republic</b>	26.0	2.4	0.1	0.1		0.0	29							29	66	
	<b>Estonia</b>	12.3	0.0	0.0	0.0		0.0	12							12	22	
	<b>Hungary</b>	7.9	0.0	0.0	0.4		0.0	8							8	60	
	<b>Latvia</b>	0.2	0.0	0.1	0.0		0.0	0							0	7	
	<b>Lithuania</b>	0.0	0.0	0.0	0.1		0.0	0							0	17	
	<b>Malta</b>				0.1	0.0		0							0	1	
	<b>Poland</b>	10.4	8.8	0.0	0.1	0.0	0.0	19							19	215	
	<b>Slovakia</b>	3.5	0.7	0.0	0.0		0.0	4							4	18	
	<b>Slovenia</b>	4.0	0.2	0.0	0.0		0.0	4	0.0	0.0	0.0			0	4	15	
	<b>Sub-total</b>	64	12	0	1	0	0	78	0	0	0	0	0	0	78	425	
	<b>% of total emissions from all sources</b>	15%	3%	0%	0%	0%	0%	18%	0%	0%	0%	0%	0%	0%	18%	100%	
<b>EU-25</b>	<b>Total</b>	79	50	1	10	0	0	141	3	3	0	0	0	0	7	148	1749
	<b>%</b>	4%	3%	0%	1%	0%	0%	8%	0%	0%	0%	0%	0%	0%	8%	100%	



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PM2.5 emissions from EU25 power plants in 2010 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

Country	Existing Power Plants & District Heat Plants (kt)							New Power Plants & District Heat Plants (kt)							Total all sources		
	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)		Total (New & Existing)	
<b>EU-15</b>	<b>Austria</b>	0.1	0.1	0.1	0.0			0			0.1			0.0	0	0	31
	<b>Belgium</b>		0.0	0.0	0.0	0.0		0			0.0	0.0		0.0	0	0	27
	<b>Denmark</b>		0.6	0.2	0.0	0.0	0.0	1		0.0	0.1		0.0	0.0	0	1	17
	<b>Finland</b>	0.1	0.0	0.0	0.0		0.0	0	0.0	0.0	0.1	0.0		0.0	0	0	32
	<b>France</b>	0.1	1.8	0.1	0.2		0.0	2	0.0		0.1	0.1	0.0	0.0	0	2	201
	<b>Germany</b>	2.0	2.0	0.1	0.1	0.0	0.0	4	2.7	1.0	0.1	0.0		0.1	4	8	127
	<b>Greece</b>	1.2	6.6		0.3	0.0		8	0.9	0.7	0.0	0.0	0.0	0.0	2	10	47
	<b>Ireland</b>	0.1	0.1		0.0		0.0	0	0.4		0.0			0.0	0	1	12
	<b>Italy</b>		0.5	0.0	0.3	0.0	0.0	1		0.3	0.1		0.0	0.1	1	1	129
	<b>Luxembourg</b>			0.0				0		0.0	0.0	0.0		0.0	0	0	2
	<b>Netherlands</b>		0.0	0.0			0.0	0	0.0		0.0	0.0		0.0	0	0	28
	<b>Portugal</b>		0.5	0.1	0.1			1			0.1	0.1		0.0	0	1	35
	<b>Spain</b>		3.9	0.2		0.0	0.0	4		0.6	0.5	0.1		0.1	1	5	113
	<b>Sweden</b>		0.0	0.1		0.0	0.0	0		0.0	0.0	0.0	0.0	0.0	0	0	47
	<b>UK</b>		4.6	0.1	0.2	0.0	0.0	5		0.0	0.1	0.0	0.0	0.2	0	5	82
	<b>Sub-total</b>	4	21	1	1	0	0	27	4	3	1	0	0	1	9	36	930
	<b>% of total emissions from all sources</b>	0%	2%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	1%	4%	100%

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Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
<b>ACC-10</b>																	
Cyprus				0.0			0			0.0	0.3			0	0	2	
Czech Republic	5.2	1.4	0.1	0.1		0.0	7	2.5		0.0	0.0	0.0	0.0	3	9	29	
Estonia	4.4	0.0	0.0	0.0			4	0.8	0.0	0.0	0.1		0.0	1	5	13	
Hungary	2.3	0.6	0.0	0.0			3			0.0	0.1		0.0	0	3	26	
Latvia	0.0		0.1	0.0		0.0	0	0.1	0.1	0.0			0.0	0	0	6	
Lithuania	0.0	0.0	0.0	0.1		0.0	0	0.0	0.4	0.0	0.1		0.0	1	1	15	
Malta				0.1			0			0.0	0.0	0.0		0	0	0	
Poland	7.7	3.5	0.0	0.0	0.0		11	1.3	0.7	1.0	0.2	0.0	0.0	3	14	148	
Slovakia	0.7	0.4	0.0	0.0		0.0	1	2.3	0.3	0.0	0.1		0.0	3	4	14	
Slovenia	0.9	0.1	0.0	0.0			1		0.1	0.0	0.0		0.0	0	1	8	
<b>Sub-total</b>	<b>21</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>39</b>	<b>263</b>	
<b>% of total emissions from all sources</b>	<b>8%</b>	<b>2%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>11%</b>	<b>3%</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>4%</b>	<b>15%</b>	<b>100%</b>	
<b>EU-25</b>	<b>Total</b>	<b>25</b>	<b>27</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>55</b>	<b>11</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>20</b>	<b>75</b>	<b>1193</b>
	<b>%</b>	<b>2%</b>	<b>2%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>5%</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>2%</b>	<b>6%</b>	<b>100%</b>	

## Final Report

PM2.5 emissions from EU25 power plants in 2020 for the CP\_CLE\_Aug04 scenario (Source: RAINS Web)

		Existing Power Plants & District Heat Plants (kt)						New Power Plants & District Heat Plants (kt)								
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources
<b>EU-15</b>	<b>Austria</b>	0.0	0.0	0.1	0.0		0	0.0		0.0		0.0	0.0	0	0	27
	<b>Belgium</b>			0.0	0.0	0.0	0			0.0	0.0		0.0	0	0	24
	<b>Denmark</b>		0.2	0.1	0.0	0.0	0		0.0	0.2		0.0	0.0	0	0	13
	<b>Finland</b>	0.0	0.0	0.0		0.0	0	0.0	0.1	0.1	0.0		0.0	0	0	27
	<b>France</b>	0.0	0.0	0.1	0.0		0	0.0	3.2	0.3	0.1	0.0	0.1	4	4	167
	<b>Germany</b>		1.3	0.1		0.0	1	1.4	1.5	0.3		0.0	0.2	3	5	111
	<b>Greece</b>	0.4	2.4		0.3		3	3.2	2.4	0.0	0.0	0.0	0.0	6	9	41
	<b>Ireland</b>	0.1	0.1		0.0	0.0	0	0.2		0.0			0.0	0	0	9
	<b>Italy</b>	0.0	0.5	0.0	0.5	0.0	1		0.3	0.6	0.0	0.0	0.1	1	2	100
	<b>Luxembourg</b>					0.0	0		0.0	0.0	0.0	0.0	0.0	0	0	2
	<b>Netherlands</b>		0.0	0.0		0.0	0	0.0		0.1	0.0		0.1	0	0	26
	<b>Portugal</b>		0.4	0.0	0.0		0	0.0		0.1	0.1		0.0	0	1	37
	<b>Spain</b>		0.2	0.2		0.0	0	0.0	1.7	0.9		0.0	0.1	3	3	91
	<b>Sweden</b>		0.0	0.0			0		0.0	0.1	0.0	0.0	0.0	0	0	40
	<b>UK</b>		0.9	0.1	0.2	0.0	1		0.0	0.7	0.0	0.0	0.2	1	2	68
	<b>Sub-total</b>	1	6	1	1	0	9	5	9	4	0	0	1	19	27	784

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Existing Power Plants & District Heat Plants (kt)								New Power Plants & District Heat Plants (kt)									
Country	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (Existing)	Lignite	Hard Coal	Other solid fuels	Heavy fuel oil	Gas oil	Gaseous fuels	Total (New)	Total (New & Existing)	Total all sources	
	<b>% of total emissions from all sources</b>	0%	1%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	2%	4%	100%
<b>ACC-10</b>	<b>Cyprus</b>			0.0			0				0.3			0	0	2	
	<b>Czech Republic</b>	0.0	1.2	0.1	0.0		1	3.9	0.3	0.1	0.0	0.0	0.0	4	6	18	
	<b>Estonia</b>	0.0	0.0				0	0.7	0.7	0.0	0.0		0.0	1	1	6	
	<b>Hungary</b>	0.4	0.1	0.0	0.0		0	2.4	0.1	0.0	0.0		0.0	3	3	22	
	<b>Latvia</b>						0	0.1	0.0	0.1	0.0		0.0	0	0	4	
	<b>Lithuania</b>	0.0	0.0	0.0	0.0		0	0.0	0.4	0.1	0.0		0.0	0	1	12	
	<b>Malta</b>				0.0		0			0.0	0.2	0.0		0	0	0	
	<b>Poland</b>	3.8	1.1	0.0	0.0	0.0	5	2.1	3.2	0.9	0.0	0.0	0.1	6	11	102	
	<b>Slovakia</b>	0.1	0.1				0	2.6	1.2	0.1	0.0	0.0	0.0	4	4	14	
	<b>Slovenia</b>	0.9	0.0	0.0			1			0.1	0.0		0.0	0	1	6	
	<b>Sub-total</b>	5	2	0	0	0	8	12	6	1	1	0	0	20	28	187	
	<b>% of total emissions from all sources</b>	3%	1%	0%	0%	0%	4%	6%	3%	1%	0%	0%	0%	11%	15%	100%	
<b>EU-25</b>	<b>Total</b>	6	8	1	1	0	16	17	15	5	1	0	1	39	55	971	
	<b>%</b>	1%	1%	0%	0%	0%	2%	2%	2%	1%	0%	0%	0%	4%	6%	100%	

# **Appendix 5**

## **Emissions Data from Selected Plants**

4 Pages

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### Data for selected coal fired power stations

REF2	Current SO <sub>2</sub> abatement	Current NO <sub>x</sub> abatement	Current Dust abatement	SO <sub>2</sub>	NO <sub>x</sub>	Dust	SO <sub>2</sub>	NO <sub>x</sub>	Dust	Known future abatement plans	Other significant fuels
				kg/MWh	kg/MWh	kg/MWh	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>		
C01	Wet FGD	SNCR and SCR	ESP	0.23	0.83	0.00	75	280			Natural gas
C02	Spray dry FGD	SCR	ESP	0.12	0.40	0.07					Natural gas
C03	Wet FGD	SCR	FF	0.19	0.50	0.00					Natural gas
C04	Wet FGD	Primary measures (Low NO <sub>x</sub> burners)	ESP	1.25	1.81	0.05	353	512	15		Oil
C05	Wet FGD	SCR	ESP	0.64	0.60	0.05	195	184	16		Oil
C06	FGD not fitted	SCR	ESP	0.04	0.85	0.01	150	300		SCR (>80%)	Natural gas
C07	FGD	Primary measures	ESP	1.48	2.26	0.01	0	0	0		Gas oil, RFO
C08	Spray dry FGD	Primary measures (low No <sub>x</sub> burner, air staging, flue gas recirculation)	FF	0.17	1.04	0.03	155	365			Oil, natural gas, biomass
C09	FGD (not specified)	Primary measures (LNB and combined SO <sub>2</sub> /No <sub>x</sub> )	ESP (99.9%)	0.13	0.75						n/a
C10	FGD (95%)	SCR (80%)	ESP	0.17	0.82			156			n/a
C11	Sorbent injection FGD (40%)	Primary measures (Low NO <sub>x</sub> burners, 30%)	ESP	4.34	3.89						n/a
C12	Wet FGD (95%)	No information	No information	16.05	2.83						n/a
C13	FGD - MDEA (99.91%)	Primary measures (CM)	Ceramic filters and venturi scrubber	0.09			25				n/a
C14	Sorbent injection FGD (90%)	SNCR (60%)	ESP, FF (99%)	7.48	4.59			229			n/a
C15	Wet FGD (93-95%)	Primary measures (OFA, LNB, 30-40%)	ESP (3/4 fields, 99.9%)	1.13	2.04	0.17	434	534	35	SCR or upgrade of primary measures	n/a

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REF2	Current SO <sub>2</sub> abatement	Current NO <sub>x</sub> abatement	Current Dust abatement	SO <sub>2</sub>	NO <sub>x</sub>	Dust	SO <sub>2</sub>	NO <sub>x</sub>	Dust	Known future abatement plans	Other significant fuels
				kg/MWh	kg/MWh	kg/MWh	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>		
C16	Wet FGD (>95%)	Primary measures (Low Nox burners)	ESP (99%)	0.16	0.48	0.01	52	167	3		LFO
C17	Wet limestone FGD (85%)	SCR	ESP (99%)	0.56	0.70	0.04	150	190			HFO
C18	FGD not fitted	Primary measures (Low NOx burners)	No information	5.29	3.18			900		FGD (90%); SCR (80%)	Oil
C19	FGD not fitted	Primary measures	ESP	7.63	2.19	0.06	0	0	0	FGD (90%); OFA (20%)	HFO, gas oil
C20	FGD not fitted	Primary measures (Low NOx burners)	ESP	2.44	1.98	0.23	617	500	59		Oil, natural gas
C21	FGD not fitted	No information	ESP	3.80	2.80	0.16	727	535	31		Oil
C22	FGD not fitted	Primary measures	ESP	10.39	2.41	0.46	0	0	0	OFA (20%)	HFO
C23	FGD not fitted	SCR (80%)	ESP	1.02	3.07						n/a
C24	No information	Primary measures (CM)	ESP	0.31	1.05			750			n/a
C25	No information	No information	No information	1.16	0.70						n/a
C26	No information	No information	No information	4.42	4.14						Residual oil
C27	FGD not fitted	No information	ESP	18.13	2.42						n/a
C28	No information	No information	ESP	5.40	7.77						n/a
C29	FGD not fitted	Primary measures (OFA, LNB, 30-40%)	ESP (3 or 4 fields, 99.8%)	7.05	2.15	0.44	2204	553	85	Wet FGD (94-96%), SCR	n/a
C30	No information	No information	No information	2.51	2.30						n/a
C31	No information	Primary measures	ESP	35.13	1.51	0.38	10108	439	117	Wet FGD (90%)	n/a
C32	No information	Primary measures	FF	3.23	1.60	1.42	1620	619	47		n/a
C33	Wet FGD	No information	ESP	0.34	0.98	0.03	136	391	10		n/a



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### Data for selected lignite fired power stations

REF2	Current SO <sub>2</sub> abatement	Current NO <sub>x</sub> abatement	Current Dust abatement	SO <sub>2</sub>	NO <sub>x</sub>	Dust	SO <sub>2</sub>	NO <sub>x</sub>	Dust	Known future abatement plans	Other significant fuels
				kg/MWh	kg/MWh	kg/MWh	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>		
L01	Wet FGD (94.6%)	Primary measures (Low nox burner and air staging)	ESP	0.86	0.60	0.05	211	149	13.5		LFO
L02	Wet FGD	Primary measures	ESP (99%)	0.05	0.05	0.00	170	176	3		n/a
L03	Wet FGD	Primary measures	ESP	24.02	1.63	0.11		300	10		n/a
L04	Wet FGD	SCR	ESP	0.92	0.59	0.06					Oil
L05	Wet FGD (93-95%)	Primary measures (OFA, LNB, 30-40%)	ESP (3/4 step fields, 99.9%)	1.56	1.42	0.06	347	321	23	Upgrade of FGD (95-97%); Upgrade of primary measures (new LNBS, 60-70%)	n/a
L06	No information	Primary measures	ESP	49.35	1.03	1.53	11000	209	310	Wet FGD (98-99%)	Coal
L07	FGD not fitted	Primary measures	ESP	0.92	1.27	1.17	330	200	140		n/a
L08	FGD not fitted	Primary measures	ESP	0.66	0.77	0.50	340	250	180		n/a
L09	FGD not fitted	Primary measures	ESP	0.41	1.70	0.08	350	360	27		n/a
L10	No information	No information	No information	1.92	2.38	0.43					n/a
L11	No information	No information	No information	6.10	1.61						Petroleum coke, other solid fuels, residual oil, gas oil, other gaseous fuel
L12	Fluidised bed (90-93%)	Fluidised bed (30-40%)	ESP (4 fields, 99.9%)	0.45	1.53	0.13	116	350	28	Upgrade of primary measures or SNCR (50%)	n/a
L13	FGD not fitted	Primary measures (OFA, 20-30%)	ESP (3 fields, 99.8%)	10.91	1.72	0.31	2655	387	68	Wet FGD (95-97%) or decommissioning	n/a
L14	Fluidised bed	Fluidised bed	ESP	10.57	2.07	0.50	2416	473	115	OFA	Natural gas
L15	FGD not fitted	No information	ESP	31.76	2.80	1.77	6245	529	333	Flue gas recirculation	Coal, oil, natural gas,

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REF2	Current SO <sub>2</sub> abatement	Current NO <sub>x</sub> abatement	Current Dust abatement	SO <sub>2</sub>	NO <sub>x</sub>	Dust	SO <sub>2</sub>	NO <sub>x</sub>	Dust	Known future abatement plans	Other significant fuels
				kg/MWh	kg/MWh	kg/MWh	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>		
											biomass
L16	FGD not fitted	No information	ESP	24.20	4.60	1.29	3495	525	186		Oil, natural gas, biomass
L17	Sorbent injection FGD	No information	ESP	14.26	1.38	0.13	5757	555	48		n/a
L18	Wet FGD	Primary measures	ESP	1.04	1.87	0.12	255	481	30	SCR	n/a
L19	Wet FGD	No information	ESP	1.04	0.98	0.03	299	276	8		n/a
L20	Wet FGD	No information	ESP	0.75	1.33	0.14	240	418	46		n/a
L21	Wet FGD	No information	ESP	0.48	1.14	0.07	178	378	24		n/a
L22	Wet FGD	No information	ESP	0.70	1.11	0.07	232	367	25		n/a