

## Technical ANNEX

### Proposed improvements to the Draft 1 for coal/lignite fired LCPs in the category >300MWth

*The EEB proposals are derived from real plant data collected in the LCP BREF revision Technical Working Group survey. This data has been verified by the EIPPCB and presented on graphs depicting the emissions of those plants relevant to the BAT-AEL in question and related relevant technical information. Each plant is represented by a unique identifying number. Where relevant, additional supporting information has been collated and presented by the EEB. It is worth reminding that the operator would have to comply at earliest within 4 years after the publication of the BAT conclusion in the Official Journal of the European Union, thus probably not prior to 2020. The operators may even obtain a derogation from those levels through the application of a derogation procedure foreseen under the IED (Article 15(4)) on the basis of disproportionality of costs compared to the benefits due to local conditions (see point II).*

*Background for tightening: Coal/lignite fired LCPs are the top industrial source emitters of greenhouse gases, SO<sub>x</sub>, NO<sub>x</sub>, dust, mercury and other heavy metals. According to the EEA 2014 report, the damage costs due to air pollution accounted for the sole period 2008-2012 to 329–1,053 billion Euros. Out of the 14,325 installations assessed, 11% (1,529) are responsible for 90% of the total damage costs. An annual death toll of about 22,000 EU citizens and about 5 million lost working days due to health related problems due to air pollution but also negative impact on water quality and climate change is attributed to the operation of coal/lignite fired LCPs. Yet the hypothetical emission reduction potential for NO<sub>x</sub>, SO<sub>x</sub> and dust by simply applying the stricter BAT performance range of the 2006 LCP BREF would have resulted in an annual 55.4 billion € benefit, without considering wider eco-system damage<sup>1</sup>. For some daily averaged BAT-AEL, the EIPPCB is proposing an alignment to minimum binding emission levels that would be required by 2016 under the IED, but not what BAT can achieve. Worse, the proposed NO<sub>x</sub> BAT ranges are even weaker than current permit limits already met in certain Member States. E-PRTR data indicate that about 85% of the existing plants already meet the proposed mercury to air emission levels proposed.*

#### **General issues (horizontal to all BREFs)**

##### **I. Inclusive governance issue**

A high number of Member States have nominated operators in their official Member States delegation of the Technical Working Group (TWG), contrary to the intentions of the IED<sup>2</sup> to establish an information exchange between 4 clearly distinct stakeholder groups (Industry concerned, Member States, E.NGO and the European Commission). The Commission has already provided a response to a parliamentary question alerting on this issue which is unsatisfactory<sup>3</sup>. Experience from recent Final TWG meetings has demonstrated a clear unbalance of representation between these stakeholder groups. In order to considerably facilitate the holding of TWG meetings in a more balanced and fair manner, to reduce costs linked to organising the meetings because of excessive industry representation and in particular to enable a more time-efficient discussion<sup>4</sup> between the 4 stakeholder groups we propose the following way forward, to be tested in the upcoming Final LCP BREF TWG meeting (to be scheduled this June), requiring amendment of the BREF review rules (Commission Implementing Decision 2012/119/EU of 10 February 2012):

- the number of the stakeholder group “industry concerned” present (seats) cannot exceed 50% of the number of Member States delegation present (seats) at any TWG meeting;
- the number of seats for the stakeholder group “industry concerned” should be split equally amongst experts representing “technique suppliers”, “operators” and other industry concerned;
- the E.NGO stakeholder group should have a guaranteed number of seats equalling to at least 50% of the seats of the Member States delegation, but not inferior to 12;
- the EIPPCB should not allow any “operator” to officially represent any Member State.

##### **II. Cost/benefit considerations**

Techniques agreed by the TWG as BAT and emission levels associated with these techniques have to fulfil, among others, the criterion of economic viability. However, this is a general judgement of the TWG, mainly derived from conditions of plants having installed these techniques. The EEB strongly insist that **the individual question of disproportionality of costs compared to the benefits in upgrading to BAT standards for existing plants shall not be negotiated in a closed setting (i.e. the Final Sevilla Technical Working Groups)** but should be done on a case-by-case basis in accordance to the agreed

<sup>1</sup> EEA technical report No 9/2013

<sup>2</sup> Art 13(1) of the IED

<sup>3</sup> Answer of 23 April 2014 by the Commission on Parliamentary Question E-002813/2014

<sup>4</sup> The European Commission is 2 years behind schedule for this BREF set in the IED / BREF review rules

procedure under the Industrial Emissions Directive<sup>5</sup>. The question of proportionality of costs compared to the benefits cannot be looked at solely from the operator's (polluter) point of view, but needs to be carefully balanced with the benefits of avoided pollution and needs to consider social acceptability from the public concerned on what is considered as "proportionate" action during the permit review procedure. This will take place at the permitting level at the compliance deadline for implementing the updated BAT Conclusions, i.e. not earlier than 2020. The fact that validated questionnaires demonstrate compliance with the proposed BAT-AEL for more than a year of commercial operation without indication to the contrary that the operator is bankrupt or received public subsidies for operation shall generally constitute a sufficient proof that the technique and associated emission levels passed the "economic and technical viability test". Emission levels achieved due to permit requirements set in a Member State which goes beyond the politically agreed Annex V EU Safety net of the IED should also constitute a sufficient proof that plants are able to operate below those levels. *All plants that have been cited in the rationale below are still operating. If operation would be uneconomic under these performance levels, these plants would be closed already.*

**I. New-existing plant and compliance implications:**

**Proposal:** Reconsider in Section VII Glossary, Acronyms and Definitions: "new plant"

- Consider to change in Section VII: "new plant": "*a combustion plant first permitted after 7 January 2013 or that submitted a complete permit application provided it went into operation after 7 January 2014 or a complete replacement of a combustion plant on the existing foundations of the installation, or replacement of an installation on the same site which has a technical connection and which could have an effect on emissions and pollution following the publication of these BAT conclusions.*"
- The above clarifications should be discussed at the IED Forum level. The BREF review rules should be clarified in order to make sure BAT conclusions reflect latest "state of the art" benchmarks.

**Rationale:**

As it stands, the standards for "new plants" will only apply as from 2020 to combustion plants that have been permitted after the publication of the BAT conclusions i.e. not likely prior to 2016. Yet the data basis for these installations date back to combustion plants built and that started operation in 2008-2010 in many cases, meaning that currently projected plants or those that went into operation prior to the publication could be subject to the "existing" plants standards. The legal definition of the IED with a clear cut off date of 7 January 2013 should be used instead. Significant emission reductions can also be achieved without boiler change e.g. in case of replacement of abatement installations such as FGD units / new dust filter types which are not themselves defined as "combustion plant" according to the currently used definition but significantly affect environmental performance of the LCP. In order to prevent legal uncertainty and potential abuses in permit conditions updates, the cases on when the "new plant" standards should be considered by permit writers need to be clearly specified.

**I: Dust table 10.7, >300MWth**

Fuel / boiler type	Draft 1 EIPPC Proposal	EEB Proposal
Lignite and hardcoal 300-1000 MWth (existing)	1-15 (yearly) 4-20 (daily)	1- 6 <sup>1</sup> (yearly) <5-8 (daily)
Lignite and hardcoal >1000 MWth (existing)	<1-10 (yearly) 4-20 (daily)	<1- 3 <sup>2</sup> (yearly) <5 (daily)
Lignite and hardcoal 300-1000 MWth (new)	<5 (yearly)	<1 <sup>3</sup> (yearly)
Lignite and hardcoal >1000 MWth (new)	<3 (Yearly)	<1 <sup>4</sup> (yearly)

**Rationale:**

**6<sup>1</sup> : 300-1000 MWth/existing/yearly/upper: (Graph D1 Fig 5.26)**

- The D1 proposal is set by plant 386-2
- However, setting the BAT-AEL at plant 386-3 equally includes all relevant types of FGD and dust abatement (ESP alone cannot be BAT for plants of this size, which require FGD)
- It does not explicitly include lignite plants, but its fuel ash content (23.4 wt % raw) is the same as plant 386-2, and greater than all the lignite plants (Plant 389 = 9.6 wt % raw; plant 137 = 5.1 wt % raw; plant 170 = 18.83 wt % raw)
- The upper BAT-AEL should therefore not exceed 6 mg/Nm<sup>3</sup>.

<sup>5</sup> The so called Article 15(4) derogation, allowing operators to derogate from BAT-AEL if they can demonstrate that there is indeed a disproportionate higher cost compared to the benefit to apply the revised BAT. That process is subject to transparent scrutiny by NGOs and assessed on a case-by case basis

**3<sup>2</sup>: >1000 MWth/existing/yearly/upper: (Graph D1 Fig 5.27)**

- There is no reference plant at 10 mg/Nm<sup>3</sup> – the plant with the highest emissions within that range is plant 493 at ~8 mg/Nm<sup>3</sup>
- Plant 493 uniquely uses SWFGD, but its own permit application does not judge this to be distinctive with regards to dust abatement. Instead it refers to what 'typically' wet FGD systems achieve, therefore setting the BAT-AEL at plant 387 covers all relevant types of FGD and dust abatement
- It also covers both coal and lignite plants across the full age range.
- The upper BAT-AEL should therefore not exceed 3 mg/Nm<sup>3</sup>.

**<1<sup>3</sup>: 300-1000 MWth/new/yearly/upper: (Graph D1 Fig 5.26)**

- The D1 proposed new plant upper BAT-AEL covers 5 reference plants, 4 of which pre-date 2000, with 2 being in the early 1980s
- The other plant (141) was retrofitted in 2005 and is representative of the dataset in terms of fuel ash content and operating hours.
- Therefore the upper limit of the yearly dust BAT-AEL for new plants 300-1000 MWth should not exceed 1 mg/Nm<sup>3</sup>.

**<1<sup>4</sup>: 1000 MWth/new/yearly/upper: (Graph D1 Fig 5.27)**

- The D1 proposal is set at plant 387, commissioned in 2009
- Plant 387 performs worse than 8 plants that are older and/or retrofitted and it cannot therefore be BAT for new plants
- Of these 8 plants, 3 are lignite, but all 3 have fuel ash contents lower than the top performing plant 122a
- Plant 122a is representative in terms of size and operating hours.
- The BAT-AEL should therefore be set by plant 122a at <1 mg/Nm<sup>3</sup>

**II. 1 SOx: table 10.5, >300MWth**

Fuel / boiler type <sup>6</sup>	Draft 1 EIPPC Proposal	EEB Proposal
Lignite (existing)	10-130 (annual) for plants burning fuel up to 3.0% S 25-220 (daily)	10- 120 <sup>1</sup> (yearly) for plants burning lignite with sulphur content of 1% up to 3.25% S (dry) subject to Article 15(4) of the IED <10-40 (yearly) for lignite with sulphur content <1%S (dry) <i>Daily BAT-AEL to be determined</i>
Hardcoal (existing)	20-180 (annual)	<10-40 <sup>2</sup> (yearly)
Lignite (new)	20-150	<20 <sup>3</sup>
Hardcoal (new)	10 to 75	<10 - 20 <sup>4</sup>

**Rationale:**

**120<sup>1</sup> for plants burning lignite fuel with S content 1-3.25% S(dry) /existing/yearly/upper and 40 (default) BAT-AEL if lignite with S content <1% S (dry): (Graph D1 Fig 5.32)**

- The D1 proposed BAT-AEL of 130 mg/Nm<sup>3</sup> already includes coal and lignite plants with S-content up to 3.22% (dry, plant 170), the full age and capacity ranges, operating hours, WFGD and SWFGD. Plant 170 reaches daily average SOx emissions of 122 mg/Nm<sup>3</sup> with S content of 3.22% (dry)
- It currently excludes plants 117-1 and 117-2 but compared to plant 170, these have lower fuel S (3.14%) and ash contents but have a lower S-removal efficiency (95.6% and 94.5%, compared with 98.49%). The minimum legally binding desulphurisation rates are >96% as from 2016. Further, the plants are newer and could therefore operate at a higher rate of desulphurisation
- The EEB's Domestic Fuels Initiative Paper 2 used non-reference plant data to show that an upper BAT-AEL limit of 130 mg/NM<sup>3</sup> could also be achieved by plants burning up to 3.5% S. Plant #23 meets an annual average of 106mg/Nm<sup>3</sup> with 2.89% S (a tightening of the range is thus justified)
- Plant 137 is an old plant achieving average SOx emissions of 14,9mg/Nm<sup>3</sup> with 0.9% S. Plant 116 achieves an average 76,6 mg/Nm<sup>3</sup> but with a low desulphurisation rate of 94,4%. The proposed high upper ranges will exert a relaxation of existing plants burning lignite fuels with lower S content, which is not technically justified. Operators choosing to burn dirtier input fuels need to abate more.
- Operators combusting inherently dirtier fuels (>1%S) need to obtain an Article 15(4) IED derogation demonstrating that higher pollution levels >40mg/Nm<sup>3</sup> are justified on cost/benefit grounds.

<sup>6</sup> The D1 proposal in Table 10.3 is proposing further differentiation for boiler types PC/FBC, which the EEB does not support

#### 40<sup>2</sup>: hardcoal/existing/yearly/upper: (Graph D1 Fig 5.32)

- There are several existing reference plants that currently achieve emissions below this level including plant 124B which achieves emissions of 36,3mg/Nm<sup>3</sup> and dates back to 1968 without major retrofits
- Setting the BAT-AEL at plant 123 (40,3mg/Nm<sup>3</sup>, half hourly average) is representative of the sampled plant size and load factor and the full age range.

#### 20<sup>3</sup>: lignite/new/yearly/upper: (Graph D1 Fig 5.32)

- The D1 upper BAT-AEL is set by plant 116
- There are 2 lignite plants performing better than this, all of them burning lignite with a S-content of 0,9% dry
- Compared to setting the BAT-AEL at plant 137, extending it to include plant 116 adds nothing in terms of fuels and their S-contents, plant capacity and operating hours relevant to new plant operation
- Plant 137 (Retrofitted 2007) should therefore provide the basis of the upper BAT-AEL i.e. 20 mg/Nm<sup>3</sup>

#### 20<sup>4</sup>: hardcoal/new/yearly/upper: (Graph D1 Fig 5.32)

- This BAT-AEL is based on Plant (34), achieving emissions at 9,08mg/Nm<sup>3</sup> with a maximum single measurement of 25 mg/Nm<sup>3</sup>. It is an existing plant in accordance to the IED definition. There is therefore no basis for challenging it.

### II.2 SOx Adaptation of heading of the table and clarification

- Adapt the heading of BAT 21, Table 10.5: *"BAT-associated emission levels for SOx emissions to air from the combustion of coal and lignite with S content <or equal to 3.5% (wt/dry basis) "*
- Add under BAT 21, Table 10.5: *"The above mentioned BAT-associated emission levels for SOx emissions are also to be met in case of use of coal and lignite with S content >3.5%(wt/dry basis). However if the use of those fuels can lead to sub-optimal operation of the abatement techniques or deviated from the original plant design parameters, the combustion of those fuels in that plant are not BAT under any circumstances."*

#### Rationale:

As it stands there is a regulatory gap in the BREF in regards to combustion of lignite with >3 S% and a lack of precision to what basis the sulphur content refers to (dry/wet). These fuels have the worst environmental profile, in particular for SOx emissions. There are quite some LCPs in the EU that still use those fuels and that would not be affected by the BAT-AEL table. The EEB has provided technical clarifications that in fact the proposed BAT-AEL is met by reference plants firing these fuels with an S content up to 3,5% (dry basis) <sup>7</sup>. Design parameters denote the ranges within which plant will operate effectively. If plant operation is challenging these parameters then, by definition, it is sub-optimal and does not comply with the requirement to represent the most effective means of operation in accordance to the IED BAT definition. Therefore the burning of fuels with S-content >3.5 % cannot be BAT and these fuels should not be burned.

### III. NOx: table 10.3, >300MWth

Fuel / boiler type <sup>8</sup>	Draft 1 EIPPC Proposal	EEB proposal
Lignite (existing)	50-180 (yearly) 140-220 (daily)	40-80 <sup>1</sup> (yearly) <100 (daily)
Hardcoal (existing)	65-180 (yearly) 80-220 (daily)	65-80 <sup>2</sup> (yearly) <100 (daily)
Lignite (new)	50-150 (yearly)	1-70 <sup>3</sup> (yearly)
Hardcoal (new)	65-100 (yearly)	<65 <sup>4</sup> (yearly)

#### Rationale:

#### 80<sup>1</sup>: lignite PC and FBC/existing/upper: (Graph D1 Fig 5.36 + US data)

- The D1 NOx BAT-AEL is set at Plant 23
- The plants covered by the D1 proposed BAT-AEL all have combinations of primary measures, either LNB + air staging or other combinations, with the former performing better overall and achieving NOx emissions of ~ 125 mg/Nm<sup>3</sup> at Plants 127-1 and -2
- Plants 127-1 and -2 are representative of the other plants included in the D1 BAT-AEL in terms of

<sup>7</sup> See EEB input (second paper) to Domestic Fuels Initiative uploaded on BATIS

<sup>8</sup>The D1 proposal in Table 10.3 is proposing further differentiation for boiler types PC/FBC, which the EEB does not support

- size, age and operating hours
- However the PC lignite plants on D1 graph 5.36 do not have any secondary abatement
- US data provided by the EEB shows that this is commercially operating on lignite PC plants
- Sandow Unit 4 (LNBs, OFA and SCR) achieved yearly NO<sub>x</sub> emissions of 72.5 mg/Nm<sup>3</sup> in 2011
- Oak Grove Units 1 and 2 achieved NO<sub>x</sub> emissions of 65.8 and 69 mg/Nm<sup>3</sup> respectively in 2011
- BAT can be based on plants anywhere in the world, so these units should form the basis of the upper BAT-AEL for lignite not to be exceeded i.e. 80 mg/Nm<sup>3</sup>

**80<sup>2</sup>: hardcoal/existing/yearly/upper: (Graph D1 Fig 5.35)**

- The D1 proposed BAT-AEL is set by plants 131 and 197
- This includes 14 reference plants, 11 of which are SCR in combination with at least 2 primary measures, whilst the other 3 have SCR in combination with just 1 primary measure
- Reference to D1 BAT Conclusion 19 for plants >300 MWth shows that the use of primary measures as BAT is in combination – either on their own or in further combination with SCR. Therefore these 3 plants cannot be part of BAT
- An upper BAT-AEL set at Plant 141 is fully representative of the 11 plants in terms of size, operating hours and age (a 2005 upgrade to this 1975 plant did not include NO<sub>x</sub> upgrades)
- The upper BAT-AEL should therefore not exceed 80 mg/Nm<sup>3</sup>.

**70<sup>3</sup>: lignite/new/yearly/upper: (Graph D1 Fig 5.36 + US data)**

- Oak Grove started operation in 2010 and its Units 1 and 2 achieved NO<sub>x</sub> emissions of 65.8 and 69 mg/Nm<sup>3</sup> respectively in 2011
- These should therefore provide the basis for the new plant standard i.e. 70 mg/Nm<sup>3</sup>.

**<65<sup>4</sup>: hardcoal /new/yearly/upper: (Graph D1 Fig 5.35)**

- The top performing plant (34) on graph 5.35 is older and smaller than the next best performer (253) which is more within the usually recognised age range for determining new plant standards, although plant (253) is an “existing plant” according to the IED
- If an older and smaller plant can achieve a particular standard, it is reasonable to expect all new plants to do so.
- Plant 34 should therefore provide the basis of the BAT-AEL i.e. 65mg/Nm<sup>3</sup>.

**IV: Mercury table 10.8 and 10.9, both >300MWth**

Fuel / boiler type	Draft 1 EIPPC Proposal (µg/Nm <sup>3</sup> )	EEB Proposal (µg/Nm <sup>3</sup> )
Lignite + sub bit coal (existing)	0.5- 10 (annual)	0.5 – (3)/1 <sup>1</sup> (annual)
Hardcoal (existing)	0.2-6 (annual)	0.2- 1.5 <sup>2</sup> (annual)
Lignite + sub bit coal (new)	0.5-5 (annual)	0.5-1 <sup>3</sup> (annual)
Hardcoal (new)	0.2 – 2 (annual)	0.2 – 0.5 <sup>4</sup> (annual)

**(3)/1<sup>1</sup>: sub-bituminous and lignite/existing/yearly/upper: (Graph D1 Fig 5.31)**

- Plant 19 covers all ages, sizes, operating hours and abatement techniques and is achieving emissions of 3,3 micrograms/Nm<sup>3</sup> by co-benefit abatement alone
- Plants 130 and 137 are achieving emissions of 3 micrograms/ Nm<sup>3</sup> by co-benefit abatement alone, both are existing plants dating back to 1976 and 1972 respectively
- Mercury-specific abatement techniques have been accepted as BAT and are available if required
- Data submitted by the EEB on the existing lignite fired Oak Grove Units 1 and 2 show that Hg emissions are kept below 1µg/Nm<sup>3</sup>.
- The upper yearly Hg BAT-AEL for existing lignite plants >300 MWth, on the basis of EU reference plants, should not exceed 3µg/Nm<sup>3</sup>
- The upper yearly Hg BAT-AEL for existing lignite plants >300 MWth, on the basis of US data, should not exceed 1µg/Nm<sup>3</sup>.

**1.5<sup>2</sup>: Hardcoal/existing/yearly/upper: (Graph D1 Fig 5.30)**

- The data presented in the Fig 5.30 graph shows that the proposed upper yearly BAT-AEL is set by plant 141 (5.9 micrograms/Nm<sup>3</sup>), and that this plant alone is increasing the BAT-AEL by almost 50% compared with the other 15 plants sampled.
- Plant 122 dates back to 1985 and is one of the few plants that provided continuous measurement data showing that average levels of 0.79 µg/Nm<sup>3</sup> (half hourly averaged) are achieved
- Plant 156 dates back to 1992 and achieves average levels of 0.2 µg/Nm<sup>3</sup> (4 periodic measurements)

- Hg data for plant 141 was obtained by the EEB under access to document request and undermines the Hg emission of 5.9 micrograms/Nm<sup>3</sup>:
- the TWG data was submitted as a *calculation based on long time analysis*'
- the data for 2010, 2011 and 2012 is 3 micrograms/Nm<sup>3</sup> based on 1 sample per year
  - However this does not justify a BAT-AEL of 4 µg/Nm<sup>3</sup>. This should be set at Plant 122b which includes all sampled combinations of SO<sub>x</sub>/NO<sub>x</sub> and dust abatement and is representative of the whole sample in terms of plant age, size and operating hours.
  - The upper BAT-AEL should therefore not exceed 1.5µg/Nm<sup>3</sup>.

**1<sup>3</sup>: sub-bituminous and lignite/new/yearly/upper: (Graph D1 Fig 5.31)**

- Plants 130 and 137 are achieving emissions of 3 micrograms/ Nm<sup>3</sup> by co-benefit abatement alone, these plants however date from the seventies
- Plant 23 dates back to 2009 and is achieving emissions of 2.6 micrograms/Nm<sup>3</sup> by co-benefit abatement alone
- Mercury-specific abatement techniques have been accepted as BAT and are available if required
- Data submitted by the EEB on the lignite fired Oak Grove Units 1 and 2 show that Hg emissions are kept below 1µg/Nm<sup>3</sup>.
- BAT can be based on plants anywhere in the world, so the upper BAT-AEL for lignite should not exceed 1µg/Nm<sup>3</sup>.

**0.5<sup>4</sup>: Hardcoal/new/yearly/upper): (Graph D1 Fig 5.30)**

- Setting the BAT-AEL at plant 662 covers the full range of plant sizes, and despite dating back to 1986, has lower emissions than Plant 253 which dates from 2008 and has the same abatement technique constellation.
- Plant 662 should therefore provide the basis of the BAT-AEL i.e. 0.5 µg/Nm<sup>3</sup>.

**V. Energy Efficiency:**

**Proposal:**

- *Base the net energy efficiency (%) BAT-AE(P)Ls for the existing plants on the basis of the performance achieved by "new" LCPs with a maximum 3% percentage point margin of difference to be achieved by existing plants through upgrades or other retrofits as from 2020. Compliance with those levels should be demonstrated through an update of acceptance tests by 2020 at the latest*
- *Keep BAT 18 without any change (lignite pre-drying)*
- *Performance levels should be converted and expressed to net useful output (g CO<sub>2</sub>eq / kWh elect and/or Kg CO<sub>2</sub>eq / MJ useful heat)*
- *After the adoption of the BAT conclusions, the Commission should in the IED review (propose to delete) Article 9(2) of the IED, to promote energy efficiency benchmarks as a cost-effective measure supporting the EU ETS market based instrument to deliver.*

**Proposal: Amend table 10.2 "BAT-associated environmental performance levels for energy efficiency of coal and lignite combustion" as follows:**

<i>Combustion plant rated thermal input and fuel</i>	<i>New plants</i>	<i>Existing plants</i>	<i>Parameter for expression of BAT associated energy efficiency level</i>
<b>Hardcoal</b> >300MWth	<b>&gt;46<sup>1</sup>%</b> <b>mandatory CHP</b>	<b>&gt;43<sup>2</sup>%</b>	<i>Net electrical design, acceptance tests according to EN12952/15 at the latest by 2020</i>
	<b>434</b>	<b>736</b>	<b>CO<sub>2</sub> intensity</b> <i>(g CO<sub>2</sub>eq/kWh)</i>

	>87-90%	>87%	CHP mode
>300MWth <b>Lignite</b>	<b>&gt;44<sup>3</sup> %</b> <b>mandatory CHP</b>	<b>&gt;41<sup>4</sup> %</b>	Net electrical design acceptance tests according to EN12952/15 at the latest by 2020
	<b>434</b>	<b>921</b>	<b>CO2 intensity</b> (g CO2eq/KWh)
	>87-90%	>87%	CHP mode

Rationale:

**>46%<sup>1</sup> net efficiency / new / Hardcoal, (>300MWth)**

- Acceptance tests submitted to the Taskforce on Energy Efficiency indicate that all recent hardcoal plants built since 2013 meet those levels: e.g. Datteln 4, Eemshaven, Karlsruhe, Mannheim, Moorburg, Rotterdam, Walsum 10, Westfalen D/E, Wilhelmshaven
- In accordance to the cogeneration Directive new plants should be subject to mandatory heat use (industrial or district heating). This is only a matter of siting.

**>43%<sup>2</sup> net efficiency / existing / Hardcoal, (>300MWth)**

- Studies from the US EPA submitted by the EEB indicate that existing plants can reach an increase of energy performance up to 8% points, if a combination of the various techniques for improving energy efficiency are implemented
- the 2006 LCP BREF referred to standard improvement potential of "more than 3% points" which is reflected in this proposal
- The following existing plants already meet those levels: Plant (253) meets a level of 43,7% and dates back to 2008, the Shanghai Waigaoqia Units have achieved after upgrades in 2006 a level of 43,97% (data has been provided by the EEB)
- Acceptance tests should be carried out at the latest by 2020 to demonstrate those minimum performance levels have been achieved through relevant upgrades, where necessary.

**>44%<sup>3</sup> net efficiency / new / lignite, (>300MWth) (CHP obligation)**

- Acceptance tests submitted to the Taskforce on Energy Efficiency indicate that new lignite plants meet those levels: Neurath F/G (2011), Boxberg R (2012), (Plant 116) Niederaussem K (2002)
- In accordance to the cogeneration Directive new plants should be subject to mandatory heat use (industrial or district heating). This is only a matter of siting.

**>41%<sup>4</sup> net efficiency / existing / lignite, (>300MWth) (CHP obligation)**

- Studies from the US EPA submitted by the EEB indicate that existing plants can reach an increase of energy performance up to 8% points, when a combination of the various techniques for improving energy efficiency are implemented
- the 2006 LCP BREF referred to standard improvement potential of "more than 3% points" which is reflected in this proposal
- The following existing lignite plant already meet that level: Plant 116 (Niederaussem K, dating back to 2002) meets 41,6% , Lippendorf R meets a level of 41,8%, Plants 127-1/ 127-2 (KSP) both dating back to 1998 reach a level of 41,2%
- Acceptance tests should be carried out at the latest by 2020 to demonstrate those minimum performance levels have been achieved through relevant upgrades, where necessary.