

# Implications of the new LCP-BREF/BAT conclusions

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# The European Power Plant Suppliers Association



The voice, at European level, of companies supplying power plants, its components and related services.



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# Industrial Emissions Directive (2010/75/EC)

**In 2010, the European Union has adopted the IED which**

- limits emissions of polluting substances from industrial installations, including power plants.
- safeguards human health and the environment

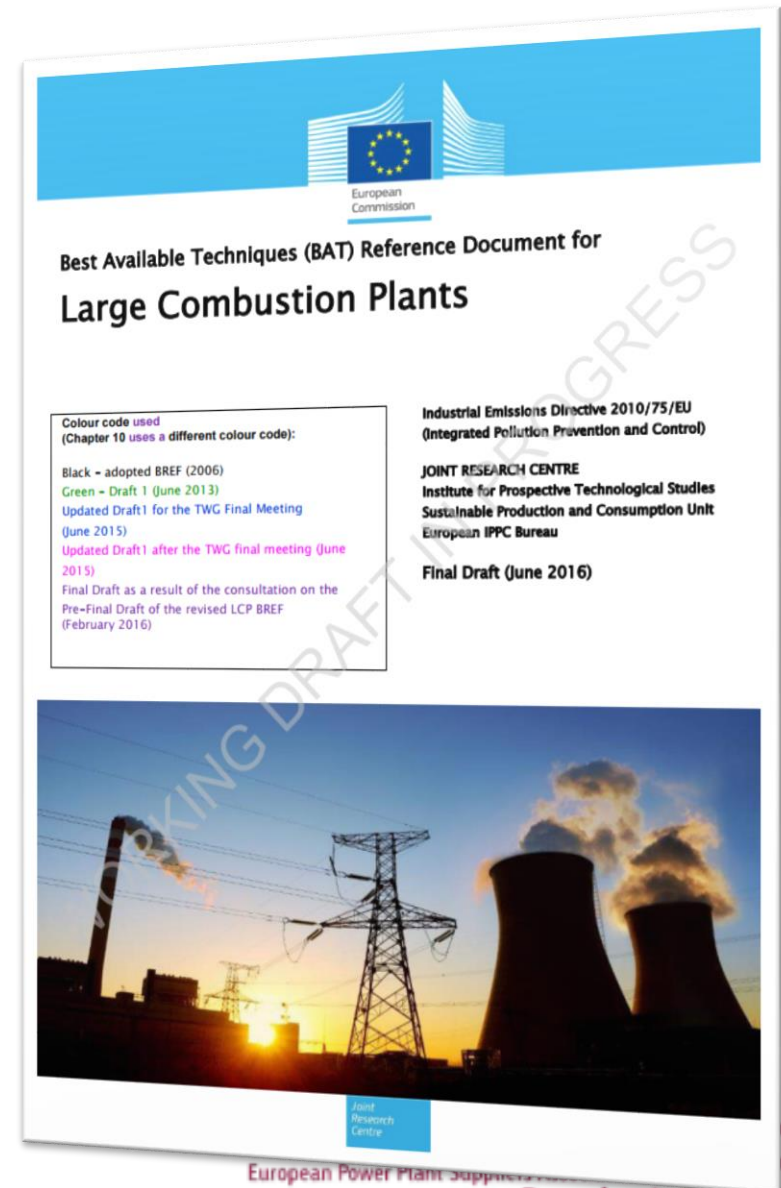
Only power plants able to fulfil EU's strictest emission requirements are granted by national authorities permits to operate

**Basis for setting permit conditions (art.15):**

- Best Available Techniques (BAT) conclusions  
referred to in the
- Best Available Techniques Reference Documents (BREFs)



- Power plants > 50 MW<sub>th</sub> covered by dedicated '**Large Combustion Plants' (LCP) BREF**
- LCP BREF defines emission levels to reach (referred to as the **BAT Associated Emission Levels** and contained in the BAT conclusions).
- **BREFs, BAT conclusions and BAT-AELs** are explicitly defined in the IED
- ALL BREFs need to be rewritten according to the IED requirements, going from **"informative"** to **"mandatory"** BREFs



# LCP BREF review – process



- **Process initiated in 2011**, organised by the European Commission and coordinated by the [European IPPC Bureau](#)
- Technical Working Group: experts from EU Member States, industry and NGOs.



- Data collection process
- LCP BREF Draft 1 release, June 2013
- Comments to D1 by September 2013
- Additional data collection for averaging periods and energy efficiency



- Final Technical Working Group Meeting, June 2015, Seville
- June 2016: Final draft BREF sent to IED Article 13 Forum, for opinion.
- Article 13 Forum meeting on 20 October 2016
- **2017: expected adoption of final LCP BREF** with revised BAT conclusions



- **IED Article 21:** Once new BAT Conclusions have been adopted, EU Member States' competent authorities have **four years** to ensure that:
- All permit conditions have been updated to reflect the new BAT Conclusions
- All installations comply with the new permit conditions

# Final Draft of LCP BREF

🔖 PREFACE

🔖 SCOPE

## 🔖 10 BEST AVAILABLE TECHNIQUES (BAT) CONCLUSIONS

🔖 Scope

### 🔖 10.2 BAT conclusions for the combustion of solid fuels

#### 🔖 10.2.1 BAT conclusions for the combustion of coal and/or lignite

🔖 10.2.1.1 General environmental performance

🔖 10.2.1.2 Energy efficiency

🔖 10.2.1.3 NO<sub>x</sub>, N<sub>2</sub>O and CO emissions to air

🔖 10.2.1.4 SO<sub>x</sub>, HCl and HF emissions to air

🔖 10.2.1.5 Dust and particulate-bound metal emissions to air

🔖 10.2.1.6 Mercury emissions to air

#### 🔖 10.2.2 BAT conclusions for the combustion of solid biomass and/or peat

🔖 10.6 BAT conclusions for the co-incineration of waste

🔖 10.7 BAT conclusions for gasification

🔖 10.8 Description of techniques

RECOMMENDATIONS FOR FUTURE WORK

🔖 13 ANNEXES

🔖 GLOSSARY

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# BAT-associated energy efficiency levels for coal / lignite

Type of combustion unit	BAT-AEELs <sup>(7) (12)</sup>		
	Net electrical efficiency (%) <sup>(1)</sup>		Net total fuel utilisation (%) <sup>(1) (6) (13)</sup>
	New unit <sup>(2) (4)</sup>	Existing unit <sup>(2) (3)</sup>	New or existing unit
Coal-fired, ≥ 1000 MWth	45–46	33.5–44	75–97
Lignite-fired, ≥ 1000 MWth	42–44 <sup>(5)</sup>	33.5–42.5	75–97
Coal-fired, < 1000 MWth	36.5–41.5 <sup>(10)</sup>	32.5–41.5	75–97
Lignite-fired, < 1000 MWth	36.5–40 <sup>(11)</sup>	31.5–39.5	75–97

## Footnotes consider

- (1) ...the **type of cooling system** used or the geographical location...
- (2) ...**unfavourable climatic conditions**, low-grade lignite, age of the units...
- (3) ...an **increase of more than 3 % points** associated with the use of BAT for existing units, depending on the original design of the unit and on the retrofits already performed.

**Most of the existing plants match this BAT-AEEL range**



# BAT-AELs for the combustion of coal and/or lignite

## NOx emissions to air

Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> )			
	Yearly average		Daily average or average over the sampling period	
	New plant	Existing plant <sup>(4)</sup>	New plant	Existing plant <sup>(7) (11)</sup>
≥ 300, FBC boiler combusting coal and/or lignite and lignite-fired PC boiler	50–85	< 85–150 <sup>(8)(9)</sup>	80–125	140–165 <sup>(10)</sup>
≥ 300, coal-fired PC boiler	65–85	65–150	80–125	< 85–165 <sup>(6)</sup>

Important footnotes for plants put in operation no later than 7 January 2014

**(6) the higher end of the range is 200 mg/Nm<sup>3</sup>**

**(9) The higher end of the range is 175 mg/Nm<sup>3</sup> for FBC boilers put in operation no later than 7 January 2014 and for lignite-fired PC boilers.**

**(10) The higher end of the range is 220 mg/Nm<sup>3</sup> for FBC boilers put in operation no later than 7 January 2014 and for lignite-fired PC boilers.**



# CO emission for the combustion of coal and/or lignite

As an indication: CO emissions to air

Combustion plants above 300 MW rated thermal input ( $MW_{th}$ )	CO indicative emission level (mg/Nm <sup>3</sup> ) yearly average
FBC boiler combusting coal and/or lignite and lignite-fired PC boiler	< 30–100 <sup>(1)</sup>
Coal-fired PC boiler	< 5–100 <sup>(1)</sup>

(1) The higher end of the range may be up to 140 mg/Nm<sup>3</sup> in the case of

- limitations due to boiler design, and/or
- fluidised bed boilers not fitted with secondary abatement techniques for NO<sub>x</sub> emissions reduction.

**No CO emission limit values in current IED 2010/75/EU**

# BAT-AELs for the combustion of coal and/or lignite

## SO<sub>2</sub> emissions to air

Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> )			
	Yearly average		Daily average	Daily average or average over the sampling period
	New plant	Existing plant <sup>(3)</sup>	New plant	Existing plant <sup>(7)</sup>
≥ 300, PC boiler	10–75	10–130 <sup>(6)</sup>	25–110	25–165 <sup>(4)</sup>
≥ 300, Fluidised bed boiler <sup>(1)</sup>	20–75	20–180	25–110	50–220

Important **footnote (4)** for plants put in operation no later than 7 January 2014

- The higher end of range is **220 mg/Nm<sup>3</sup>** in case of < **1500 h/yr**.
- In case of ≥ **1500 h/yr** the higher end of range is **205 mg/Nm<sup>3</sup>**.

Exemptions for indigenous lignite apply for combustion plants > 300 MW<sub>th</sub>

# BAT-AELs for the combustion of coal and/or lignite

## Dust emission to air

Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> )			
	Yearly average		Daily average or average over the sampling period	
	New plant	Existing plant <sup>(1)</sup>	New plant	Existing plant <sup>(7)</sup>
300–1000	2–5	2–10 <sup>(4)</sup>	3–10	3–11 <sup>(5)</sup>
≥ 1000	2–5	2–8	3–10	3–11 <sup>(6)</sup>

Important footnotes for plants put in operation no later than 7 January 2014

(4) The higher end of range is 12 mg/Nm<sup>3</sup>

(5) The higher end of range is 20 mg/Nm<sup>3</sup>.

(6) The higher end of range is 14 mg/Nm<sup>3</sup>.

**Existing ELVs for dust emission:**

**< 10 mg/Nm<sup>3</sup> for new plants**

**< 20 mg/Nm<sup>3</sup> for existing plants**

# BAT-AELs for the combustion of coal and/or lignite

## HCl and HF emissions to air

Pollutant	Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> )	
		Yearly average or average of samples obtained during one year	
		New plant	Existing plant <sup>(1)</sup>
HCl	< 100	1–6	2–10 <sup>(2)</sup>
	≥ 100	1–3	1–5 <sup>(2)(4)</sup>
HF	< 100	< 1–3	< 1–6 <sup>(3)</sup>
	≥ 100	< 1–2	< 1–3 <sup>(3)</sup>

**HCL and HF separated in FGD systems**  
**BAT-AELs for coal and lignite achieved without additional systems**

## Mercury emissions to air

Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (µg/Nm <sup>3</sup> )	
	Yearly average or average of samples obtained during one year	
	New plant	Existing plant
Coal < 300	< 1–3	< 1–9 <sup>(2)</sup>
Coal ≥ 300	< 1–2	< 1–4 <sup>(2)</sup>

Lignite < 300	< 1–5	< 1–10 <sup>(2)</sup>
Lignite ≥ 300	< 1–4	< 1–7 <sup>(2)</sup>

**13. BImSchV: mercury emission < 30, yearly average < 10 µg/Nm<sup>3</sup>**  
**No mercury emission limit in current IED 2010/75/EU**

# Emission reduction – modifications required

**Existing coal and lignite plants > 300 MW<sub>th</sub>**  
**Yearly average**

Pollutant	Fuel	IED ELVs mg/Nm <sup>3</sup>	New BAT-AELs mg/Nm <sup>3</sup>		PC emission reduction %
			Lower end	Higher end	
NO <sub>x</sub>	Lignite	200	< 85	175	12,5
	Hard coal	200	65	150 175 / FBC	25
SO <sub>2</sub>	Lignite/Hard coal	200	10 20 / FBC	130 180 / FBC	35
Dust	Lignite/Hard coal	20	2	> 300 MW: 12 ≥ 1000 MW: 8	40 60
Hg	Lignite	-	< 1 µg	7 µg	-
	Hard coal	-	< 1 µg	4 µg	-

# How to comply with NOx BAT–AELs and CO indications

## Options

- Modification of the combustion system
- Modification of existing SCR / SNCR or installation of such a DeNOx system
- Advanced control system for more accurate control of air ratios

## In case of reduced CO emission limits in lignite plants

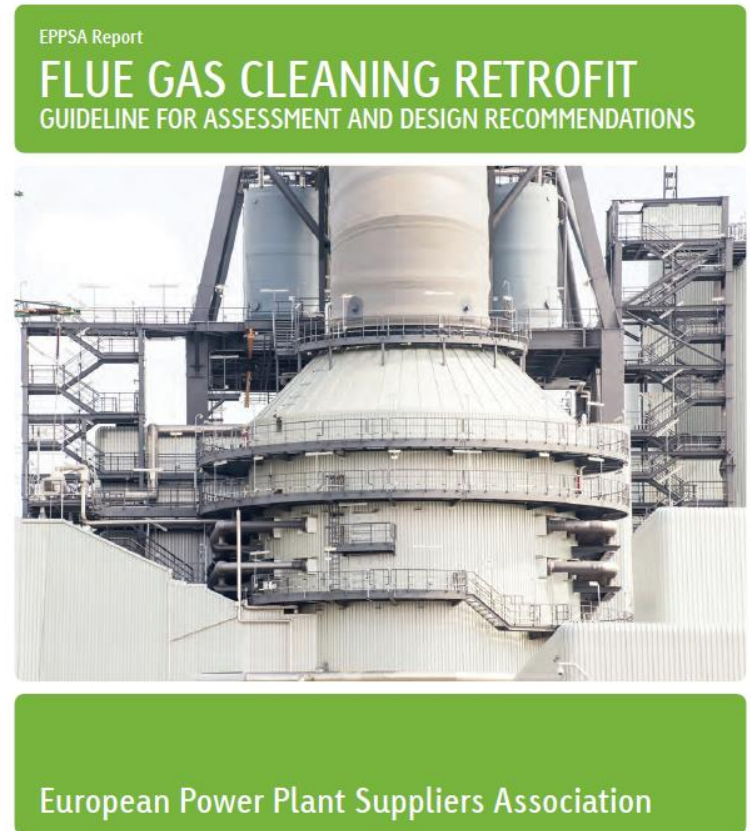
- Adjustment of the burners for higher air ratios to reduce CO
- Special emphasis on improvement of dust distribution
- NOx reduction by secondary measures to be increased: SNCR or SCR needed
- Techno-economic solutions determined by site conditions



## EPPSA reports on sector best practices

### Flue Gas Cleaning Retrofit Report

- Published & presented at the Joint Research Centre's and Energy Community Secretariat's Workshop on Energy Scenarios for South Eastern Europe, *November 2015, Vienna*
- Describes flue gas cleaning technologies
- Outlines how the performance of the flue gas cleaning system can be improved to meet the new BAT-AELs
- Available on [EPPSA website](http://www.eppsa.eu)



# How to comply with mercury BAT-AELs

## EPPSA reports on sector best practices

### Mercury Removal Report

- Published & presented at PowerGen Europe,  
*June 2015, Amsterdam*
- Describes the principles of mercury abatement and comprehensive solutions to meet the BAT-AELs
- Available on [EPPSA website](http://www.eppsa.eu)

EPPSA Report

## MERCURY REMOVAL

GUIDELINE FOR ASSESSMENT AND DESIGN RECOMMENDATIONS



European Power Plant Suppliers Association

# Reaching BAT–AEL compliance for existing plants

- Operators can check the status of the IED limited life time derogation to avoid plant modifications
- If a plant is to run longer, an investigation has to reveal:
  - which BAT-AELs can be achieved safely without or with minor modifications
  - which systems / components need a new design and / or a new operation mode.
- Uncertainty, how permitting authorities will handle the BAT-AEL ranges and the indicative figures of BAT conclusions, e.g. for CO.
- Economically feasible solutions needed under unfavorable market conditions
- IED Article 15 (4) derogations regarding disproportionately higher cost compared to the environmental benefits → less strict emission limits may be set

# Impact assessment for BAT conclusions compliance

## How to address cost analysis?

- Study ongoing by DG ENVI with Ricardo:

**“Analysis and development of methodologies for estimating potential industrial emissions reductions and compliance costs of BAT conclusions”**

- All BREF players invited to participate by DG ENVI
- Study will be finalised, methodology may be used:
  - as a basis for establishing a sectoral impact assessment of BAT Conclusions, or
  - by Member States for impact assessments for individual plants, especially in relation to granting derogation from IED art. 15(4)

# Conclusions

- **New BAT-AELs pose challenges for the power sector**
  - Tightening of some existing emission limits as well as BAT-AELs for new pollutants require design modifications in many plants
  - Compliance for all installation to be ensured within 4 years after 2017
- **Technical solutions needed to meet the new LCP BREF requirements**
  - Modification of the combustion systems combined with SCR / SNCR
  - Install efficient new flue gas cleaning systems or retrofit existing FGC systems
  - See [EPPSA reports on Flue Gas Cleaning](#) on EPPSA website
- **Comprehensive investigations of the existing plants needed**
  - Best practice?

**Efficient cooperation between suppliers & operators**

# Thank you

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