Final Meeting of the Technical Working Group (TWG) for the review of the BAT reference document for Large Combustion Plants (LCP BREF)

Preliminary draft conclusions – Day 4

Solid biomass and/or peat

BAT 26/27 in Revised Draft 1

Techniques to reduce NO_X and CO emissions (1/4) – BP 1.4.3.1

- The decision on the SCR technique is not supported by IE, UK.

Solid biomass and/or peat

BAT 26 in Revised Draft 1

Techniques to reduce NO_X and CO emissions (2/4) – BP 1.4.3.1

BAT 26. In order to prevent and/or reduce NO_X emissions to air while limiting CO and N_2O emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.

Technique		Description	Applicability
a	Combustion optimisation	See description in Section 10.8.	Generally applicable
b	Low-NO_X burners (LNB)		Generally applicable
c	Air staging		Generally applicable
d	Fuel staging		Generally applicable
e	Flue-gas recirculation		Generally applicable

Solid biomass and/or peat

BAT 26 in Revised Draft 1

Techniques to reduce NO_X and CO emissions (3/4) – BP 1.4.3.1

Technique		Description	Applicability
f	Selective catalytic reduction (SCR)	See description in Section 10.8. The use of high-alkali fuels (e.g. straw) may require installing SCR after the dust abatement system	Not applicable in the case of plants operated in emergency-load mode. There may be ~~technical and~~ economic restrictions for retrofitting existing plants of < 300 MW_{th} ~~operated in peak-load mode~~. Not generally applicable to existing plants of < 100 MW_{th}

Solid biomass and/or peat

BAT 26 in Revised Draft 1

Techniques to reduce NO_x and CO emissions (4/4) – BP 1.4.3.1

	Technique	Description	Applicability
g	Selective non-catalytic reduction (SNCR)	See description in Section 10.8. Can be applied with a 'slip' SCR system.	Not applicable to combustion plants operated in emergency-load mode with highly variable loads. The applicability may be limited in the case of combustion plants operated in peak-load mode with highly variable boiler loads. For existing plants, applicable within the constraints given by the requirements of the temperature window and the residence time to be reached by the reactants' injection

Solid biomass and/or peat

Table 10.11 in Revised Draft 1

BAT-AELs for NO_X and CO (1/5) – BP 1.4.3.2.1–1.4.3.2.5

- Add in the chapter on 'Concluding remarks and recommendations for future work that information on the combustion of biomass with high alkaline content should be collected during the next BREF review.
- Define high alkaline content as > 2000 mg/kg dry for K and/or > 300 mg/kg dry for Na.
- The decision on the BAT-AELs for NO_X is not supported by BE, DK, IE, FI, PT, UK, EEB, Euracoal, Eurelectric, Euroheat & Power, CEPI.
- To be revisited: alignment with IED for plants put into operation later than 7 January 2014.

Solid biomass and/or peat

Table 10.11 in Revised Draft 1

BAT-AELs for NO_X and CO (2/5) – BP 1.4.3.2.1–1.4.3.2.5

Table 10.11: BAT-associated emission levels (BAT-AELs) for NO_X and CO emissions to air from the combustion of solid biomass and/or peat

Combustion plant total rated thermal input (MW_{th})	BAT-AELs (mg/Nm^3)				
	NO_X				CO ~~(2)~~
	Yearly average		Daily average or average over the sampling period		Yearly average
	New plant	Existing plant (2)	New plant	Existing plant	New or existing plant (2)

(2) These BAT-AELs do not apply ~~when~~ to existing plants operated in peak- or emergency-load modes.

Solid biomass and/or peat

Table 10.11 in Revised Draft 1

BAT-AELs for NO_X and CO (3/5) – BP 1.4.3.2.1–1.4.3.2.5

Combustion plant total rated thermal input (MW_{th})	BAT-AELs (mg/Nm^3)				
	NO_X				CO (2)
	Yearly average		Daily average or average over the sampling period		Yearly average
	New plant	Existing plant (2)	New plant	Existing plant	
< 100	70–150	70–225	120–200	120–275	< 30–250
< 100 (high alkali)	Up to 200	Up to 250	Up to 260	Up to 310	
100–300	50–140	50–180	100–200	100–220	< 30–160
≥ 300	40–140	40–160	65–150	95–200	< 30–80

~~(3) For plants put into operation no later than 7 January 2014, the upper end of the BAT-AEL range is 310 mg/Nm3.~~

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for NO_X and CO (4/5) – BP 1.4.3.2.1–1.4.3.2.5

Substance/ Parameter	Fuel/ Process	Combustion plant total rated thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
NO_X CO	Solid biomass and/or peat	All sizes	Generic EN standards	Continuous (2)	BAT 26

(2) In the case of plants with a rated thermal input of < 100 MW_{th} operated in emergency-load mode, the monitoring frequency may be reduced to at least once every year. In the case of plants with a rated thermal input of < 100 MW_{th} operated in peak-load mode, the monitoring frequency may be reduced to at least once every six months.

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for NO_X and CO (5/5) – BP 1.4.3.2.1–1.4.3.2.5

Substance/ Parameter	Fuel/ Process	… rated thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
N_2O	Solid biomass and/or peat in circulating fluidised bed boilers	All sizes	EN 21258	At least once every year (6)	BAT 26
(6) The measurement is performed with a combustion plant load of > 70 %.					

Solid biomass and/or peat

BAT 28 in Revised Draft 1

Techniques to reduce SO_X, HCl, HF emissions (1/4) – BP 1.4.4.1

- The decision on the technique duct sorbent injection is not supported by FI.

Solid biomass and/or peat

BAT 28 in Revised Draft 1

Techniques to reduce SO_X, HCl, HF emissions (2/4) – BP 1.4.4.1

BAT 28. In order to prevent and/or reduce SO_X, HCl and HF emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.

Technique		Description	Applicability
a	Fuel choice	By switching to a different biomass fuel (e.g. lower sulphur, fluorine and/or chlorine fuel), the corresponding emissions are reduced	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State

Solid biomass and/or peat

BAT 28 in Revised Draft 1

Techniques to reduce SO_X, HCl, HF emissions (3/4) – BP 1.4.4.1

	Technique	Description	Applicability
b	Flue-gas condenser	See description in Section 10.8	Generally applicable
c	Wet flue-gas desulphurisation (Wet FGD)		Not applicable to combustion plants operated in emergency-load mode. There may be technical and economic restrictions for retrofitting existing plants operated in peak-load mode
d	Boiler sorbent injection (in-furnace or in-bed)		Generally applicable

Solid biomass and/or peat

BAT 28 in Revised Draft 1

Techniques to reduce SO_X, HCl, HF emissions (4/4) – BP 1.4.4.1

Technique		Description	Applicability
e	Duct sorbent injection (DSI)	See descriptions in Section 10.8. The technique is used in combination with a dust abatement technique	Generally applicable
f	Spray-dry absorber (SDA)	See descriptions in Section 10.8.	Generally applicable
g	Wet scrubbing	See descriptions in Section 10.8.	Generally applicable
h	CFB dry scrubber	See descriptions in Section 10.8.	Generally applicable

Solid biomass and/or peat

Table 10.12 in Revised Draft 1

BAT-AELs for SO_2 (1/4) – BP 1.4.4.2.1

- Add in the chapter on 'Concluding remarks and recommendations for future work that more information on the combustion of straw and peat should be collected during the next BREF review.
- The decision on the BAT-AELs is not supported by CEPI, Eurelectric, FI, IE, NL, EEB, Euroheat & Power.

Solid biomass and/or peat

Table 10.12 in Revised Draft 1

BAT-AELs for SO_2 (2/4) – BP 1.4.4.2.1

Table 10.12: BAT-associated emission levels (BAT-AELs) for SO_2 emissions to air from the combustion of solid biomass and/or peat

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for SO_2 (mg/Nm^3) (1)			
	New plant	Existing plant (2)	New plant	Existing plant
	Yearly average		Daily average or average over the sampling period	
(2) These BAT-AELs do not apply when plants operate in peak- or emergency-load modes.				

Solid biomass and/or peat

Table 10.12 in Revised Draft 1

BAT-AELs for SO_2 (3/4) – BP 1.4.4.2.1

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for SO_2 (mg/Nm^3) (1)			
	New plant	Existing plant (2)	New plant	Existing plant
	Yearly average		Daily average or average over the sampling period	
< 100	15–70	15–100	30–175	30–215
100–300	< 10–50	< 10–70	< 20–85	< 20–175
≥ 300	< 10–35	< 10–50	< 20–70	< 20–85

(1) For existing plants burning fuels where the average sulphur content is 0.1 % or higher, the higher end of the BAT-AEL range for the yearly average is 100 mg/Nm^3 and the higher end of the BAT-AEL range for the daily average is 215 mg/Nm^3.

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for SO_2 (4/4) – BP 1.4.4.2.1

Substance/ Parameter	Fuel/ Process	Combustion plant total rated thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
SO_2	Solid biomass and/or peat	All sizes	Generic EN standards	Continuous (2)	BAT 28

(2) In the case of plants with a rated thermal input of < 100 MW_{th} operated in emergency-load mode, the monitoring frequency may be reduced to at least once every year. In the case of plants with a rated thermal input of < 100 MW_{th} operated in peak-load mode, the monitoring frequency may be reduced to at least once every six months.

Solid biomass and/or peat

Table 10.12-bis in Revised Draft 1

BAT-AELs for HCl and HF (1/7) – BP 1.4.4.2.2–1.4.4.2.3

- Add in the chapter on 'Concluding remarks and recommendations for future work that more information on the combustion of straw concerning HF emissions should be collected during the next BREF review.

Solid biomass and/or peat

Table 10.12-bis in Revised Draft 1

BAT-AELs for HCl and HF (2/7) – BP 1.4.4.2.2–1.4.4.2.3

Table 10.12-bis: BAT-associated emission levels (BAT-AELs) for HCl and HF emissions to air from the combustion of solid biomass and/or peat

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for HCl (mg/Nm^3) (1)			
	New plant	Existing plant (2) (3)	New plant	Existing plant
	Yearly average or average of samples obtained during one year		Daily average or average over the sampling period	
(2) These BAT-AELs do not apply when plants operate in peak- or emergency-load modes.				

Solid biomass and/or peat

Table 10.12-bis in Revised Draft 1

BAT-AELs for HCl and HF (3/7) – BP 1.4.4.2.2–1.4.4.2.3

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for HCl (mg/Nm^3) (1)			
	New plant	Existing plant (2) (3)	New plant	Existing plant
	Yearly average or average of samples obtained during one year		Daily average or average over the sampling period	
< 100	1–7	1–15	1–12	1–35
100–300	1–5	1–9	1–12	1–12
≥ 300	1–5	1–5	1–12	1–12

(1) For existing plants burning 100 % high Cl content biomass such as straw, the higher end of the BAT-AEL range for yearly average is 20 mg/Nm^3 and the higher end of the BAT-AEL range for daily average is 35 mg/Nm^3. (to be revisited considering the CEPI proposal)

(3) The lower end of these BAT-AEL ranges may be difficult to achieve in the case of plants fitted with a wet FGD system and a downstream gas-gas heater.

Solid biomass and/or peat

Table 10.12-bis in Revised Draft 1

BAT-AELs for HCl and HF (4/7) – BP 1.4.4.2.2–1.4.4.2.3

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for HF (mg/Nm^3)	
	New plant	Existing plant ~~(3)(4)~~
	Average over the sampling period	
< 100	< 1	< 1.5
100–300	< 1	< 1
≥ 300	< 1	< 1

~~(3) The lower end of these BAT-AEL ranges may be difficult to achieve in the case of plants fitted with a wet FGD system and a downstream gas-gas heater.~~

~~(4) In the case of plants operated in peak- or emergency-load modes, the BAT-AEL range is 0.01–1.3 mg/Nm^3.~~

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for HCl and HF (5/7) – BP 1.4.4.2.2–1.4.4.2.3

Substance/ Parameter	Fuel/ Process	Combustion plant total rated thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
HCl	Solid biomass and/or peat	All sizes	Generic EN standards	Continuous (2) (9)	BAT 28

(2) In the case of plants with a rated thermal input of < 100 MW_{th} operated in emergency-load mode, the monitoring frequency may be reduced to at least once every year. In the case of plants with a rated thermal input of < 100 MW_{th} operated in peak-load mode, the monitoring frequency may be reduced to at least once every six months.

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for HCl and HF (6/7) – BP 1.4.4.2.2–1.4.4.2.3

Substance/ Parameter	Fuel/ Process	Combustion plant total rated thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
HCl	Solid biomass and/or peat	All sizes	Generic EN standards	Continuous (2) (9)	BAT 28

(9) ~~The monitoring frequency may be reduced if it is demonstrated that the emission levels are consistently within the BAT-AELs set. In these specific cases~~ If the emission levels are proven to be sufficiently stable, periodic measurements ~~could~~ may be carried out each time that a change of the fuel and/or waste characteristics may have an impact on the emissions, but in any case at least once every six months.

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for HCl and HF (7/7) – BP 1.4.4.2.2–1.4.4.2.3

Substance/ Parameter	Fuel/ Process	Combustion plant total rated thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
HF	Solid biomass and/or peat	All sizes	No EN standards available	At least once every year	BAT 28

Solid biomass and/or peat

BAT 30 in Revised Draft 1

Techniques to reduce mercury emissions (1/3) – BP 1.4.6.1

BAT 30. In order to prevent or reduce mercury emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.

	Technique	Description	Applicability
Specific techniques to reduce mercury emissions			
a	Fuel choice	See descriptions in Section 10.8	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State
b	Activated (halogenated) carbon injection	See descriptions in Section 10.8	Generally applicable

Solid biomass and/or peat

BAT 30 in Revised Draft 1

Techniques to reduce mercury emissions (2/3) – BP 1.4.6.1

	Technique	Description	Applicability
Co-benefit from techniques used to reduce emissions of other pollutants			
c	Bag filter	See descriptions in Section 10.8	Only applicable when the technique is mainly used for dust abatement
d	Electrostatic precipitator (ESP)		Only applicable when the technique is used for dust abatement
e	Use of halogenated additives …	…	…

Solid biomass and/or peat

BAT 30 in Revised Draft 1

Techniques to reduce mercury emissions (3/3) – BP 1.4.6.1

	Technique	Description	Applicability
Co-benefit from techniques used to reduce emissions of other pollutants			
e	Dry, semi-dry or wet FGD system	See descriptions in Section 10.8	Applicable when the technique is mainly used for SO_X, HCl and/or HF abatement. Not applicable to combustion plants operated in emergency-load mode. There may be technical and economic restrictions for retrofitting existing plants operated in peak-load mode

Solid biomass and/or peat

Table 10.14 in Revised Draft 1

BAT-AELs for mercury (1/3) – BP 1.4.6.2

- The decision on the BAT-AEL for mercury is not supported by ESWET, CAN Europe.

Solid biomass and/or peat

Table 10.14 in Revised Draft 1

BAT-AELs for mercury (2/3) – BP 1.4.6.2

Table 10.14: BAT-associated emission levels (BAT-AELs) for mercury emissions to air from the combustion of solid biomass and/or peat

Pollutant	Unit	BAT-AELs for Hg (1)
		Average over the sampling period
Mercury	µg/Nm^3	< 1–5

(1) These BAT-AELs do not apply in the case of plants operated in peak- or emergency-load modes.

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for mercury (3/3) – BP 1.4.6.2

Substance/ Parameter	Fuel/ Process	… thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
Hg	Solid biomass and/or peat	All sizes	EN 13211	At least once every year ~~(13)~~(14)	BAT 30

~~(13) The monitoring frequency does not apply in the case of plants operated in peak- or emergency-load modes.~~

(14) If the emission levels are proven to be sufficiently stable due to the low mercury content in the fuel, periodic measurements may be carried out each time that a change of the fuel characteristics may have an impact on the emissions.

Solid biomass and/or peat

BAT 29 in Revised Draft 1

Techniques to reduce dust and metal emissions (1/2) – BP 1.4.5.1

BAT 29 In order to reduce dust and particulate-bound metal emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.

Technique		Description	Applicability
a	Fuel choice	By switching to a different fuel or by modulating the fuel blending (e.g. fuel with lower ash content), the corresponding emissions are reduced	Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State

Solid biomass and/or peat

BAT 29 in Revised Draft 1

Techniques to reduce dust and metal emissions (2/2) – BP 1.4.5.1

	Technique	Description	Applicability
b	Bag filter	See description in Section 10.8	Generally applicable
c	Electrostatic precipitator (ESP)	See description in Section 10.8.	Generally applicable
d	Dry, semi-dry or wet FGD system	See description in Section 10.8. The technique is mainly used for SO_X, HCl and/or HF abatement	See BAT 28 ~~Generally applicable when the technique is mainly used for SO_X, HCl and/or HF abatement~~

Solid biomass and/or peat

Table 10.13 in Revised Draft 1

BAT-AELs for dust (1/3) – BP 1.4.5.2

- The decision on the BAT-AELs for dust is not supported by DK, FI, EEB, CEPI, ESWET. Also not SE (added later).

Solid biomass and/or peat

Table 10.13 in Revised Draft 1

BAT-AELs for dust (2/3) – BP 1.4.5.2

Table 10.13: BAT-associated emission levels (BAT-AELs) for dust emissions to air from the combustion of solid biomass and/or peat

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for dust (mg/Nm^3)			
	New plant	Existing plant (1)	New plant	Existing plant
	Yearly average		Daily average or average over the sampling period	
< 100	2–5	2–15	2–10	2–22
100–300	2–5	2–12	2–10	2–18
≥ 300	2–5	2–10	2–10	2–16

(1) These BAT-AELs do not apply when plants operate in peak- or emergency-load modes.

Solid biomass and/or peat

BAT 3 ter in Revised Draft 1

BAT-AELs for dust (3/3) – BP 1.4.5.2

Substance/ Parameter	Fuel/ Process	… thermal input	Standard(s) (1)	Minimum monitoring frequency	Monitoring associated with
Dust	Solid biomass and/or peat	All sizes	Generic EN standards and EN 13284-2	Continuous (2)	BAT 29

(2) In the case of plants with a rated thermal input of < 100 MW_{th} operated in emergency-load mode, the monitoring frequency may be reduced to at least once every year. In the case of plants with a rated thermal input of < 100 MW_{th} operated in peak-load mode, the monitoring frequency may be reduced to at least once every six months.

Multi-fuel firing

Sections 10.4.2 & 10.5 in Revised Draft 1

Other multi-fuel firing issues (1/1) – BP 1.12

- Do not set specific BAT conclusions for simultaneous combustion of fuels other than for iron and steel process gases and process fuels from the chemical industry.
- Limit the scope of the section on the combustion of iron and steel process gases to those fuels mixed with other gaseous and/or liquid fuels.