



# Workshop on Implementation of BAT Conclusions for Waste Incineration

Explanations & Guidance  
Document (E&G-d) – Proposals  
**Hubert De Chefdebien**

## Presentation of the E&G-d on WI BREF / Assessment of compliance

- The Explanatory & Guidance document (E&G-D)
- Assessment of compliance
  - BAT check-up form and proposals
- Main proposals
- Other useful documents

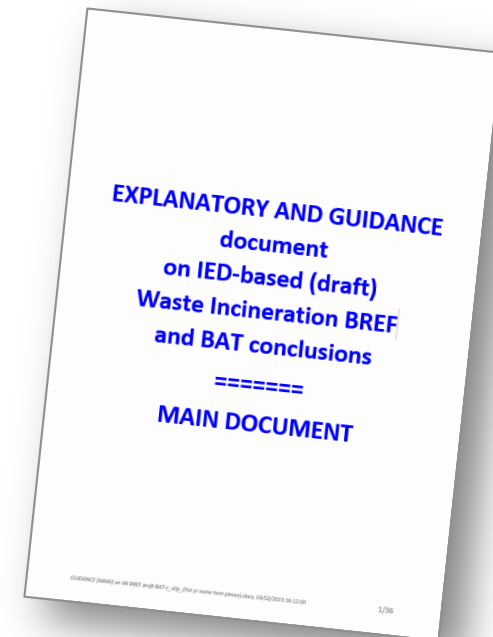
# Guidance document to explain the WI BREF BAT conclusions

- **Work in progress**
  - By CEWEP, ESWET, FEAD
  - 1<sup>st</sup> draft in 2/2019, 2<sup>nd</sup> draft in 4/2019
  - Tentative date for Pre-final draft: August 2019
- **Content**
  - Background
  - General developments and comments on main issues
  - Comments on certain BATs and BATAE(P)Ls
  - Method and form to assess BAT implementation
  - Proposals for pending issues
- **Target audience**
  - Owners // Consultants // Advisors // Operators // Suppliers // Designers //
  - And ... Competent authorities



# Structure of the draft Explanatory and Guidance document (E&G-d) on IED-based Waste Incineration BREF and BAT conclusions

- Explanatory and guidance: Main document
- Annex 1: Abbreviations & TEF
- Annexes 2: NOC/OTNOC/EOT
  - a) The NOC/OTNOC/EOT issue
  - 2) NOC-OTNOC identification
  - 3) OTNOC situations linked to alarms
- Annexes 3: Monitoring and uncertainties (air emissions)
  - a) The uncertainty issue
  - b) About the INERIS study and standards requirements
  - c) QAL2 calibration examples
  - d) Upcoming standards
- Annex 4: Calculation of energy efficiency according to BAT conclusions
- Annex 5: Comments on some BAT conclusions
- Annexes 6: Form to assess the implementation of BAT in a plant
  - a) For W-t-E lines
  - b) For IBA treatment facilities
- Annex 7: Frequently Asked Questions

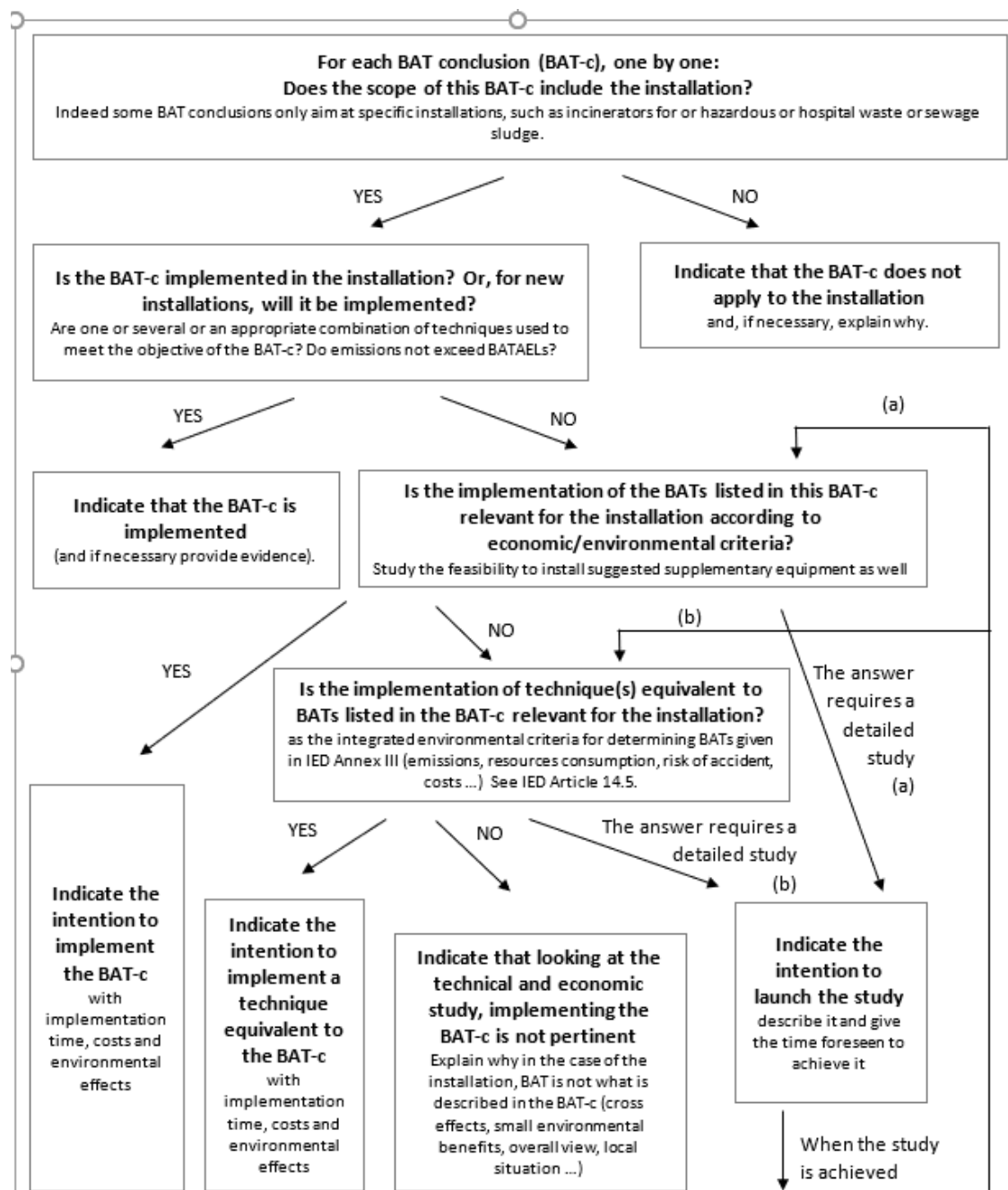


# PROPOSALS review

# Assessment of compliance - Principle

For each BAT conclusion, this decision tree can be used

(See E&G-d, Main document, § 5)



# Assessment of compliance

- Example: BAT 11, monitoring of waste deliveries

**BAT 11.** In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures (see BAT 9 c) including, depending on the risk posed by the incoming waste, the elements given below.

Waste type	Waste delivery monitoring
Municipal solid waste and other non-hazardous waste	<ul style="list-style-type: none"><li>• Radioactivity detection</li><li>• Weighing of the waste deliveries</li><li>• Visual inspection</li><li>• Periodic sampling of waste deliveries and analysis of key properties/substances (e.g. calorific value, content of halogens and metals/metalloids). For municipal solid waste, this involves separate unloading.</li></ul>

## Assessment of compliance – Forms proposed in Annexes 6.a & 6.b to summarise the situation in respect of the BAT-c

Example: BAT 11, monitoring of waste deliveries

Excerpt of Annex 6.a

Municipal waste and other non-hazardous waste	Applied technique	
Not applicable (no municipal wastes or other non-hazardous waste treated)	<input type="checkbox"/>	
Radioactivity detection	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Weighing of the waste deliveries	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Visual inspection of the wastes received in the bunker (for example through the control room window, a video surveillance, ...)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Analysis (for example annually) of a sample of received waste : NCV, content of halogens and metals/metalloids	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Installation compliant with BAT-c 11 (if all the above answers are Yes or not applicable ticked)	Yes <input type="checkbox"/>	No <input type="checkbox"/>



# NOC-OTNOC-EOT

# Identification of OTNOC situations

# Proposals in respect to NOC

- **Definition of OTNOCs**
  - To use the list given in the IED and in the BREF drawing up Guidance (Decision 2012/119/EU)
  - To use the same rules as EIPPCB when filtering out the reported data
  - To define end of start-up as when reaching stable state (as for LCPs)
  - To use control system signals (alarms) to automatically identify OTNOCs and NOC for both:
    - Calculating average values in NOC
    - OTNOC Management Plan (see BAT-c 18)
- **Calculation of daily average values in NOC**
  - Use the same rules as EIPPCB when processing the reported data

# General List of OTNOC as given in the IED and the Commission Decision as well as used by the EIPPCB to filter out operators' reported data

- **ELVs:** Emission LIMIT Values
- **OTNOC:** Other Than Normal Operating Conditions
- **R-EOT:** Relevant-Effective Operating Time

Compliance with BATAEL-based ELVs not required in

## OTNOCs

According to IED, Articles 14.1.f and 47

1. Start-up & Shut-down periods
2. Leaks
3. Malfunctions  
- of process equipment including abatement system  
- of measuring equipment
4. Momentary stoppages
5. Definitive cessation of operations
6. Breakdown
7. Bypassing of abatement systems
8. Regular maintenance
9. Exceptional conditions

According to Guidelines (Decision 2012/119/EU) in § 4.6.2.2.3.ii and § 5.4.7.2.6

Compliance with continuous Annex VI ELVs required for incinerators as well in

## R-EOT

1. Start-up (ONLY 2<sup>nd</sup> phase, with waste) & Shut-down (ONLY 1<sup>st</sup> phase)
2. Leaks
3. Malfunctions  
- of process equipment including abatement system  
- of measuring equipment
4. Momentary stoppages
5. Definitive cessation of operations
6. Breakdown
7. Bypassing of abatement systems
8. Regular maintenance
9. Exceptional conditions

# Proposals for Start-up periods

(See E&G-d, Annex 2.b, § 2.3)

- **Start-up phase 1**

(OTNOC, Not-Relevant EOT – Both Anx VI ELVs and **BATAEL-based ELVs do not apply**)

- **Begins** when the burner is started;
- **Finishes** when waste begins to be fed into the furnace:
  - Normally at 850°C\* for non-hazardous waste incinerators and co-incinerators;
  - As an option the criterion could be that the O<sub>2</sub> level is as low as 13% as in the Netherlands, 15% as in France or 16% as in Germany.

- **Start-up phase 2**

(OTNOC, Relevant EOT - Anx VI continuous ELVs apply (but not periodic), **BATAEL-based ELVs do not apply**)

- **Begins** at the end of phase 1; (at that time, the burner is still running);
- **Finishes** when the grate, if any, is fully covered with waste and stable combustion and steam conditions are reached. The criterion, for instance, can be:
  - EITHER defined by a specific period of time (pragmatic approach), e.g. 1,5 hour after the introduction of waste into the furnace;
  - OR, O<sub>2</sub> concentration is the operational one and steam/hot water generation is at least 80% or the operation rating if the line should be operated at lower rating.  
NB: Strictly speaking, the line is not yet in steady state before it reaches 100% rating.

\* *At 1100°C for hazardous waste if more than 1 % of halogenated organic substances.  
Possibly at lower temperature in case of derogation on this temperature (in accordance with IED Article 51)*

# Proposals for Shutdown periods

(See E&G-d, Annex 2.b, § 2.3)

- **Shutdown phase 1**

(OTNOC, Relevant EOT - Anx VI continuous ELVs apply (but not periodic), **BATAEL-based ELVs do not apply**)

- **Begins** when the incineration line ceases to be fed with waste
- **Finishes** when there is no more waste combusted in the furnace, which in practice can be either when:
  - Waste feed is stopped for more than a certain time, e.g. 1,5 hour;
  - OR energy of produced steam = energy to the burner(s) +/- 10%;
  - OR high level of O<sub>2</sub> in raw flue gas at boiler outlet: e.g. 13% as in the Netherlands, 15% as in France or 16% as in Germany

- **Shutdown phase 2**

(OTNOC, Not-Relevant EOT – Both Anx VI ELVs and **BATAEL-based ELVs do not apply**)

- **Begins** at the end of phase 1; this is the time when the auxiliary burner maintaining the 850°C-2s condition can be stopped;
- **Finishes** when O<sub>2</sub> in raw flue gas at boiler outlet reaches 20% and the furnace is at a temperature of 40°C.
  - After the shutdown phase, some pieces of equipment may still be kept running (e.g. fans during maintenance periods) but this is excluded from the relevant EOT.

- **Unplanned shutdown**

- In case of emergency shut down or of a trip, the line is instantaneously in OTNOC (if it was not already in due to the cause of the emergency shut down) and therefore compliance with BATAEL-based ELVs is not required
- ~~NB: In some MSs, compliance with IED Annex VI ELVs is not requested in case of emergency shut down (i.e. when there is a risk for people or equipment),~~

# How to identify the OTNOC periods?

- Most OTNOC situations
  - Induce a change in some of the monitored operation parameters
  - Generate an alarm signal
- It is therefore possible to use the control system to identify the switches from NOC to OTNOC and *vice versa*
  - No intervention of the operator
    - He can concentrate on solving the cause of the OTNOC
    - Reassuring for the competent authority
- An example of control system signals that are linked to OTNOCs on air emissions is proposed in E&G-d Annex 2.c (Excel file)
  - As said the EIPPCB *“the definition of OTNOC is case-specific and it is not possible to compile a complete list of possible cases.”*  
The proposal must obviously be adapted to each plant.

# Using the control system to identify the OTNOC periods

- Example of the proposal made in E&G-d Annex 2.c (Excel file)

N°	Functional subset	Function / Element	Flow	Failures	Possible causes	Consequences	Feared consequences	Frequency	Type of OTNOC
<b>(18) FLY ASH EVACUATION</b>									
<b>(20) WASTE WATER TREATMENT</b>									
<b>(21) BUILDING DEDUSTING</b>									
<b>(23) BUILDING</b>									
<b>(19) REAGENTS STORAGE &amp; DISTRIBUTION</b>									
<b>Adsorbent (active carbon, Lignite coke, dioxorb, minsorb ...)</b>									
<b>19.AD.0 3</b>	Reagents storage and distribution	Receive, storage / Delivery	Adsorbent	Defective adsorbent	Change of supplier or product Supplier failure	Degraded treatment	Long duration dioxins & metals exceedance 2 << 10xELV	0,1 << 0,5 times/year	Exceptional conditions
<b>19.AD.0 4</b>	Reagents storage and distribution	Distribute / Distribution hopper	Adsorbent	Adsorbent supply fault or dose failure	Caking in big bag / silos Screw lock or extraction problem Broken / worn screw Procurement Leakage on pneumatic conveying pipe Clogging of pipe (wet compressed air: quality) Electrical fault Air fault Preferred circuit Flow regulation failure Wrong setting (wrong calibration) Vaulting Circuit error when passing on backup screws Product quality (impurity, humidity ...)	Absence or degradation of the treatment of fumes / dioxins, metals	Average duration dioxins & metals exceedance (short or long with or without flow measurement of active carbon) without treatment	0,5 << 2 times/year	Malfunctions
<b>19.AD.0 7</b>	Reagents storage and distribution	Distribute lime + activated carbon mixture / Pneumatic	Lime + activated carbon	Clogging	Clogging (product quality, humidity)	Absence injection lime + activated carbon Degradation treatment of acid gases Degradation treatment of dioxins & metals	Short duration acid gas exceedance between 2 and 10xELV	0,5 << 2 times/year	Malfunctions
<b>19.AD.0 8</b>	Reagents storage and distribution	Distribute lime + activated carbon mixture / Pneumatic	Lime + activated carbon	Pneumatic transport fan failure	Mechanical failure Electrical failure	Absence injection lime + activated carbon Degradation treatment of acid gases Degradation treatment of dioxins & metals	Short duration acid gas exceedance between 2 and 10xELV	0,5 << 2 times/year	Breakdown



## **Continuously monitored data**

# How to proceed with continuous data in OTNOC periods?

- Filter out the continuous emission values in OTNOC (“reportable mode”<sup>\*</sup> = NOC)
  - At the level of FLD (First Level Data<sup>\*</sup>), e.g. the minute average
  - Using the EIPPCB "Daily fine" combination of filters, i.e. values obtained during the series of OTNOC above (See E&G-d Annex 2.a, § 3)
- Calculate ½-hr average values in NOC (STA, “Short Term Average”<sup>\*</sup>)
  - Block<sup>\*</sup> (fixed<sup>\*</sup>) averages preferable to rolling averages (see next slide)
  - Discard ½-hr periods when less than 20 minutes were in NOC (“reportable mode”<sup>\*</sup>)
    - 2/3<sup>rd</sup> rule given in the draft standards on DAHS, FprEN 17255-1. (See Annex 3.d to this E&G-d)
  - Calculate the average over the minutes in NOC (e.g. over 23 min. if only 23 min. in NOC during the ½-hr)
  - Standardise (P, T, O<sub>2</sub>, H<sub>2</sub>O) with these data in NOC (or substitute peripheral values<sup>\*</sup>)
  - Subtract the uncertainty (95% CI) to get the VSTA (“Validated Short Term Average”<sup>\*</sup>)
- Calculate the daily average in NOC
  - LTA (“Long Term Average”<sup>\*</sup>) = arithmetic mean of all VSTA (i.e. not weighted vs. time)
  - At least 6hr in a day<sup>\*</sup>. To be consistent with EIPPCB "Daily Fine" filter combination, filter out days when less than 43 ½-hr averages have been validated in NOC
- Compare with the BATAEL range / BATAEL-based ELV
- Note that the current calculations of the ½-hr and daily averages should be performed as well and compared in parallel to the IED Annex VI ELVs

<sup>\*</sup> Terms and rules given in the draft standards on DAHS, FprEN 17255-1. (See Annex 3.d to this E&G-d)

# Fixed averages to be probably preferred

- The draft standards on DAHS, FprEN 17255-1, allows for block (fixed) or rolling averages

**Table 1 — Starting times of block averages**

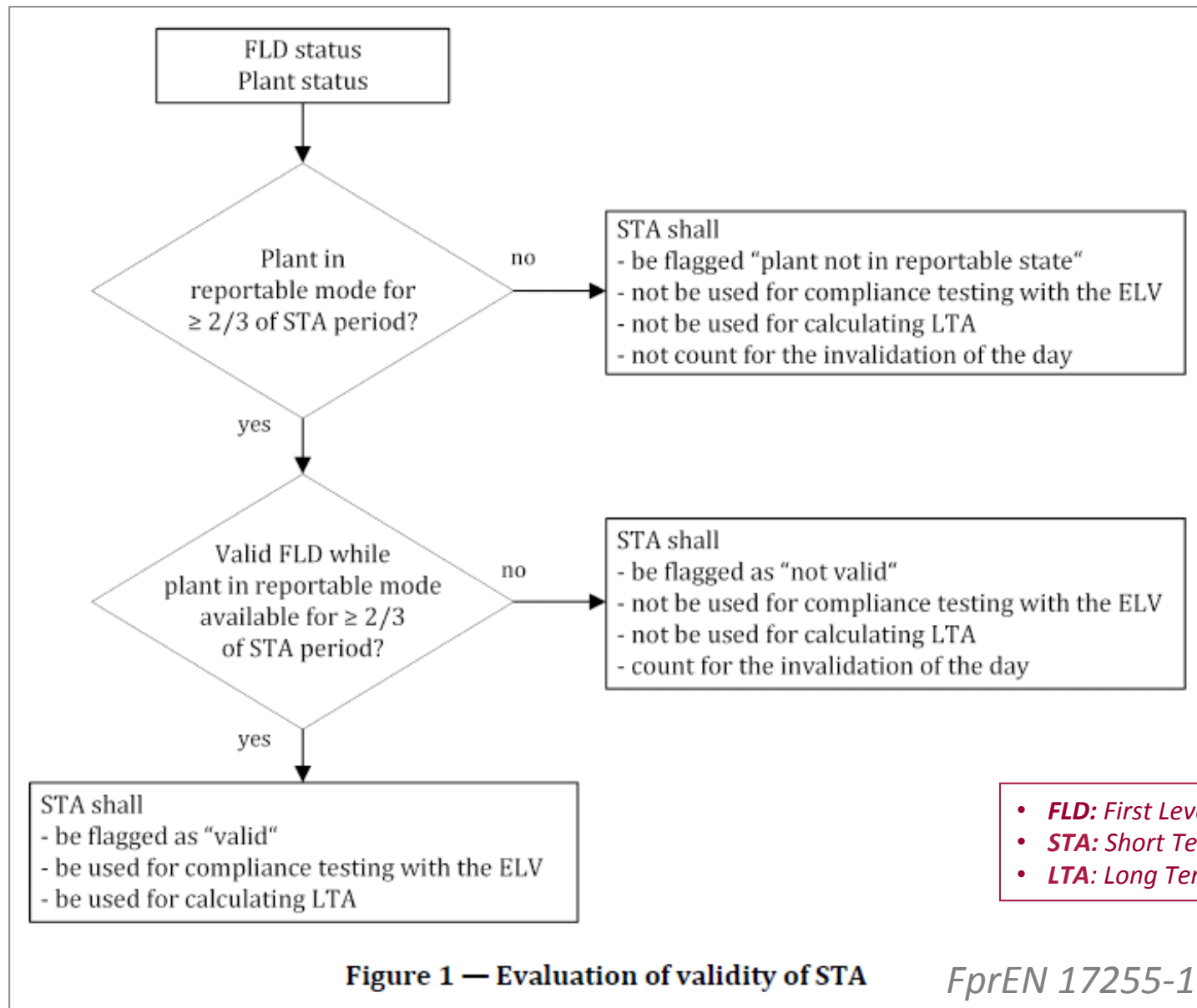
Averaging period	Starting time
≤ 1 h for STA	Hourly averages start at the beginning of the first minute of the hour. Averages less than 1 h start at the beginning of the first minute of the hour and subsequent intervals, e.g. for a 10 min period at 0 min, 10 min, 20 min etc.
24 h	Daily averages start at 00:00:00 of the day.
1 month	Monthly averages start at 00:00:00 on the first day of the calendar month.
1 year	Annual averages start at 00:00:00 on the first day of the calendar year

**Table 2 — Calculation frequency of rolling averages**

Averaging period	Calculation frequency
Multiples of periods less than 1 h, i.e. 10 min	every FLD period
1 h	every FLD period
1 day	every STA period
48 h	every STA period
1 month	daily
1 year	daily or monthly

- If FLD = minute, rolling ⇒
  - 30 STA per ½-hr
  - 48 daily averages per day
- The rolling averages include the block averages
  - ⇒ Higher risk of breach with rolling averages

# The 2/3<sup>rd</sup> rule – Validity of STA & Validity of FLD



- Was the line in NOC during at least 20 min out of 30?
- Valid minute data while line in NOC during at least 20 min out of 30?

- **FLD:** First Level Data (minute ?)
- **STA:** Short Term Average (1/2-hr)
- **LTA:** Long Term Average (day)

# OTNOCs influencing water emissions from WI & IBA plants

- **Proposed list of OTNOCs potentially influencing water emissions**

(See E&G-d, Annex 2.a, § 5.3)

- Some OTNOCs situation in the WWT plant may occur, e.g. in the following situations:
  - Malfunction in preceding dust abatement
  - Malfunction in media pumps
  - Malfunction in dosing pumps for cleaning chemicals
  - Malfunction in pH control
  - Wrong quality in flocculation chemical due to unannounced quality change from supplier
  - Plug in sludge draining valve
  - Wrong quality in sulphide precipitator for mercury capture
  - Plug in ion exchanger
  - Channelled flow inside ion exchanger
  - Wrong temperature in ion exchanger
  - Safety shut down of the water treatment due to too high temperature of ingoing water
  - Sintering of sand bed in sand filter due to malfunction in the decarbonisation process of ingoing water
  - Disturbances due to bacterial growth inside process equipment
  - Overload of the plant (flow rate or pollutant load)
- Questions
  - How to proceed when waste water is treated in batch?
  - How to proceed since the results of analyses is only known after weeks?

## Other issues in respect of BATAEL-based ELVs

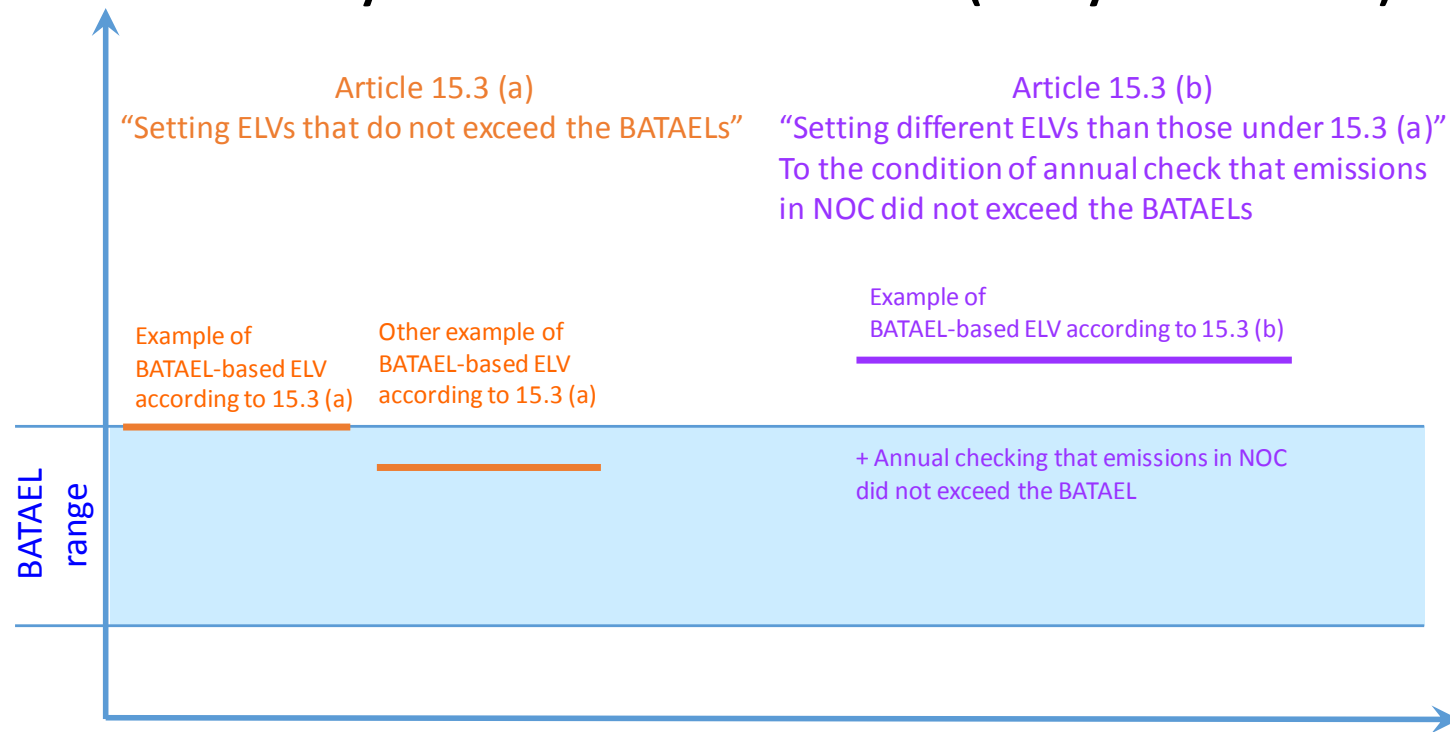
- No ½-hr BATAEL-based ELVs
  - The 2006 WI BREF ½-hr BATAELs defined under IPPCC are of a different nature than the 2019 IED-based BATAELs
  - The EIPPCB said 1/2-hr BATAELs are not necessary under IED for WI because the IED Anx VI ½-hr ELVs act as a safety net
- Long term sampling of PCDD/F and DL-PCB
  - Coherent to be performed in R-EOT (overall flow)
  - However BATAELs defined in NOC
  - Tolerance?
- ½-hr indicative value benchmarking
  - If a benchmarking were to be done on ½-hr indicative value for Hg, the 60 highest values of the year in NOC should be filtered out as it was done for values reported by operators to EIPPCB.

# **Assessment of compliance with BATAEL ranges for existing plants**

# BATAEL-based ELVs setting and checking

- Using Article 15.3 (b) for assessment of capacity to meet BAT performances, including non exceedance of daily and periodic BATAELs

## Two ways to set BATAEL-based ELVs (always under NOC)





# Assessment of compliance (existing plants, continuously monitored substances)

## BATAELs – Compliance check in NOC

IED Article 15.3 requires that emissions do not exceed BATAEL values in NOC. However, up to now, the operators have no indication provided by the control system telling if the line is in NOC or in OTNOC.

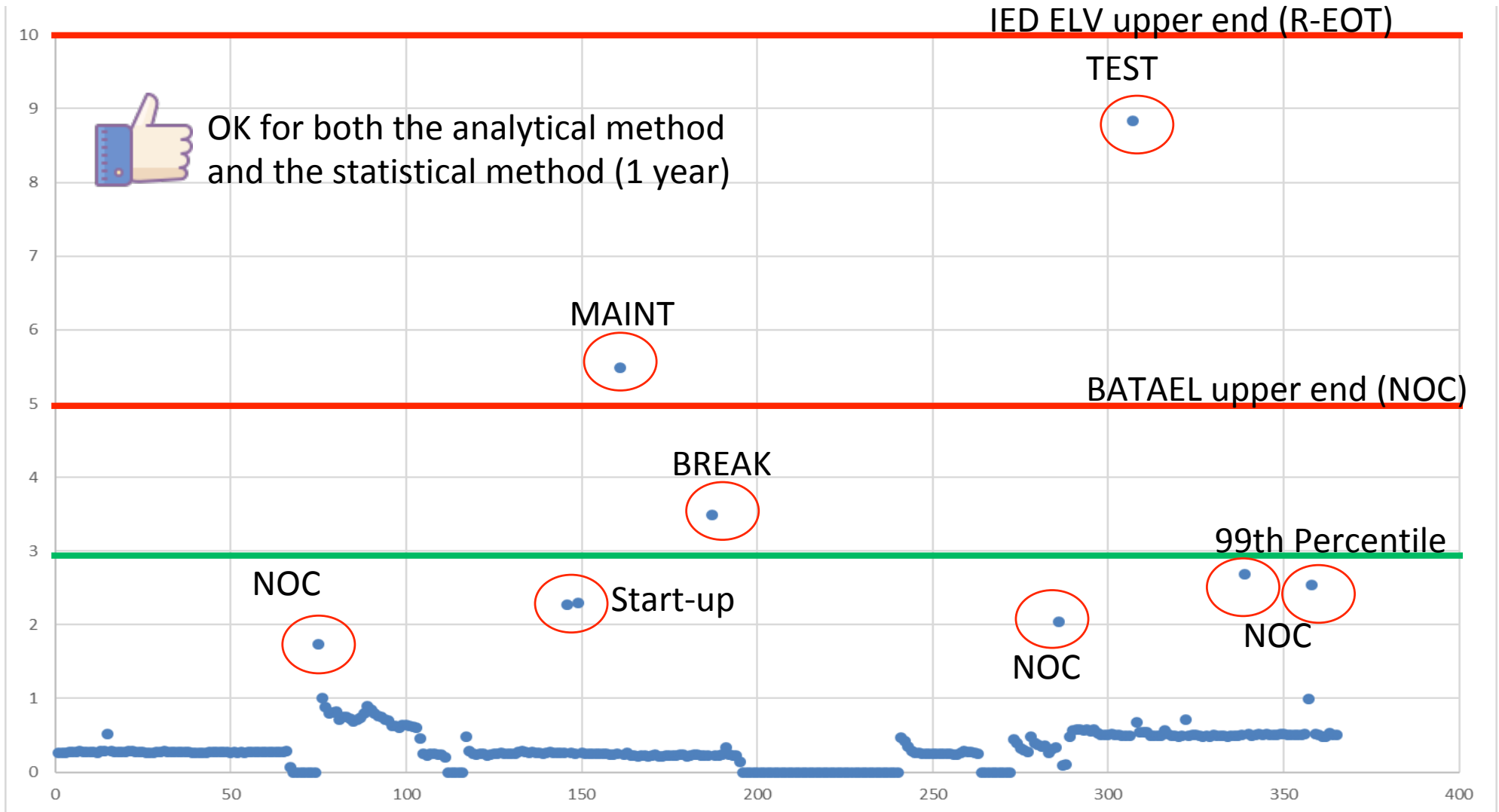
In order to assess if the emissions of an existing line do not exceed the BATAELs, it is proposed\* to check the emissions over the 3 last years (or over the available years for recent plants), with these 2 options:

- **Analytical method:** to check for each continuously monitored substance if all the daily average values do not exceed the BATAEL upper end. If some do, check if the corresponding ½-hr values are in an OTNOC (R-EOT), and, in such case, exclude them and recalculate the daily average on the basis of the NOC ½-hr values (if at least 43).
- **Statistical method:** to check for each continuously monitored substance if the 97<sup>th</sup> - 99<sup>th</sup> centile of the valid daily averages over this period of time do not exceed the BATAEL upper end. (The assumption being made here is that OTNOC situations do not occur more than in 2% of the days)

(\*) These proposals are *de facto* an application of IED Article 15.3(b). See the drawing about Article 15,3(a) and 15,3(b) at the end of session 5

# Assessment of compliance - example

BATAELs – Compliance check in NOC – example Dust. NB: The OTNOC points have been found as OTNOC and not set as OTNOC because higher than the BATAEL



## Assessment that emissions do not exceed BATAELs in NOC - New plants - Periodically and long term monitored Existing - (See E&G-d Main, §5.1.2)

- For **new lines** or plants, the assessment can be made on the basis of the emissions **expected** in NOC.
- For **existing** lines
  - For **periodically** monitored air emissions, the proposal is to check that **all values over 3 years** are within the BATAEL range.
  - For **long term** monitored substances, the proposal is to check that **all values over 3 years** are in the BATAEL range. **However**, in this case the measurements having usually been made **up to now in R-EOT**, an adjustment may be needed.
  - For **water** emissions, the proposal is to check that **over 3 years all daily averages for TSS** and, **for other substances, all monthly daily average values but one** (as stated by IED) are in the BATAELs ranges. If not, it should be checked if some OTNOC situations relevant for water emissions occurred on the corresponding period. (See Section 6.3 of Annex 2.a to the E&G-d).  
NB: BATAEL values being very low, it may be useful to check the concentration in input water
- Compliance rule similar to the one in IED Annex VI Part 8, Point 2. See Annex 5 to this E&G-d, comments on BAT-c 34.

# OTNOC management plan

# OTNOC periods need to be identified for the management plan

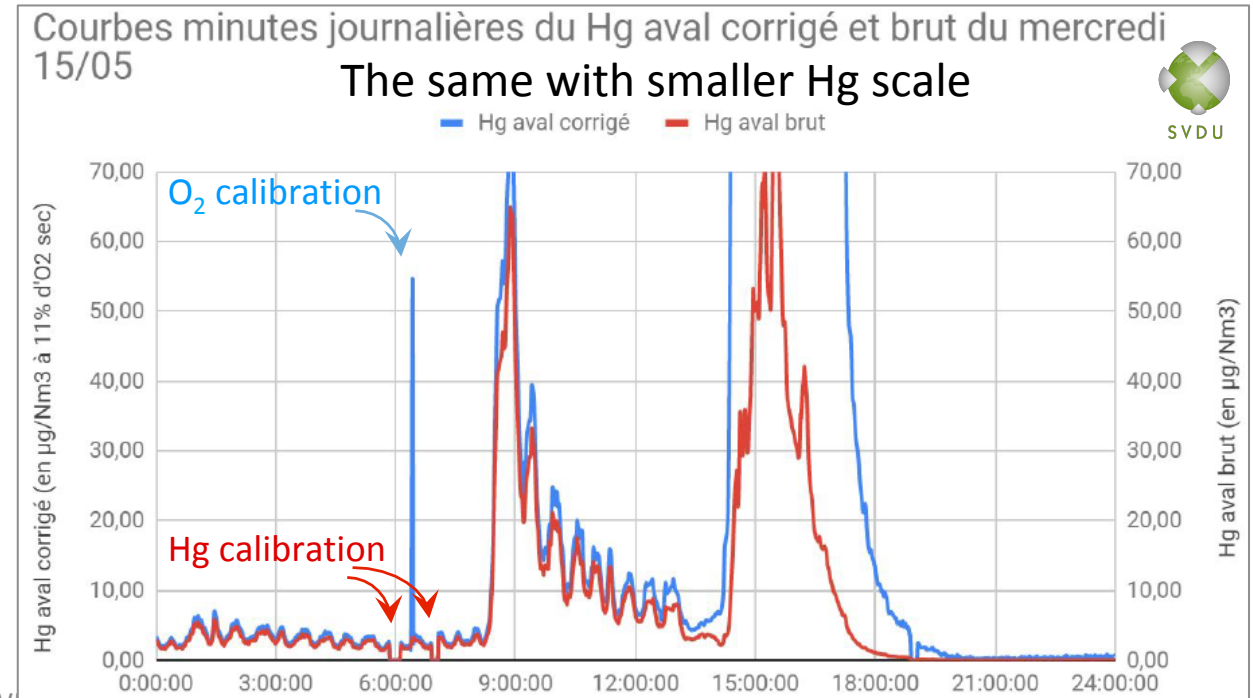
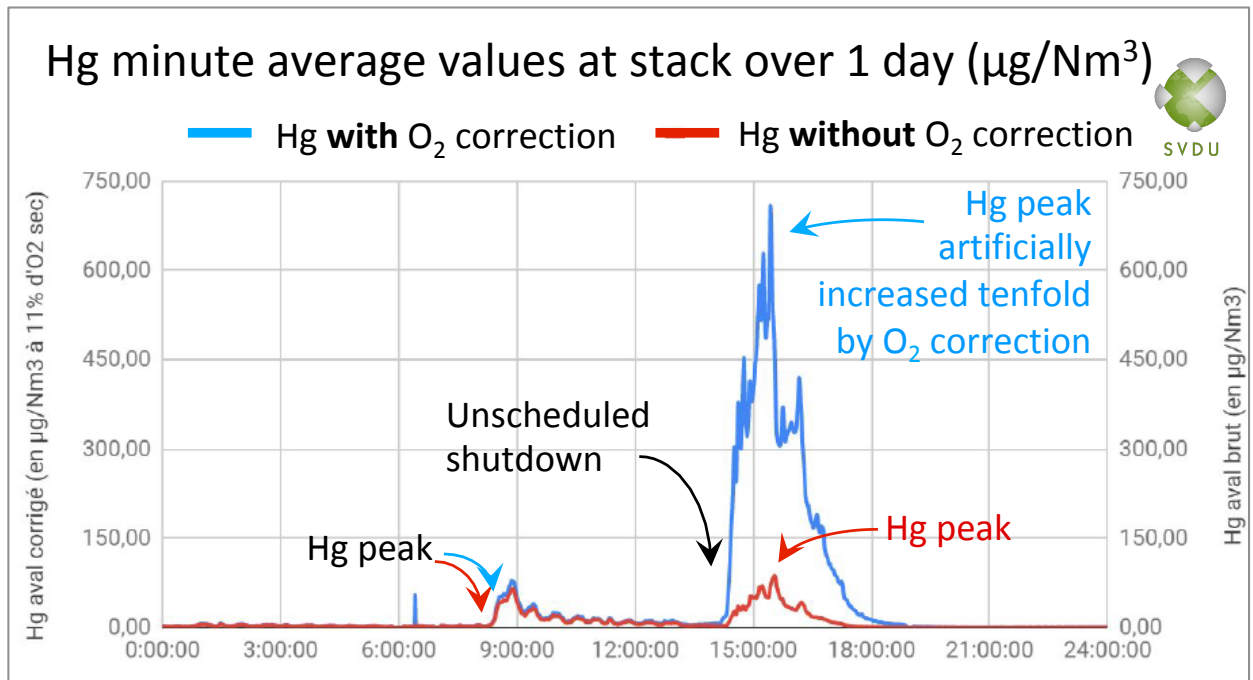
- “BAT 18. In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air and, where relevant, to water from the incineration plant during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1) that includes all of the following elements
  - *identification of potential OTNOC (e.g. failure of equipment critical to the protection of the environment ('critical equipment')), of their root causes and of their potential consequences, and regular review and update of the list of identified OTNOC following the periodic assessment below;*
  - *appropriate design of critical equipment (e.g. compartmentalisation of the bag filter, techniques to heat up the flue-gas and obviate the need to bypass the bag filter during start-up and shutdown, etc.);*
  - *set-up and implementation of a preventive maintenance plan for critical equipment (see BAT 1 xii);*
  - *monitoring and recording of emissions during OTNOC and associated circumstances (see BAT 5);*
  - *periodic assessment of the emissions occurring during OTNOC (e.g. frequency of events, duration, amount of pollutants emitted) and implementation of corrective actions if necessary.”*
- “BAT 5. BAT is to appropriately monitor channelled emissions to air from the incineration plant during OTNOC.”

# Air emission monitoring during OTNOC

- Analysis of recorded data after an OTNOC
- Possibly special measurements once every 3 years
  - However
    - Impossible to hire a control body in advance for OTNOCs other than start-up and shutdown
    - Doubtful representability of the data, e.g. because the flow rates are too low, the values are outside the ranges, the peripheral values (P, T, O<sub>2</sub>, H<sub>2</sub>O) are meaningless, etc.
  - Recommendation
    - No O<sub>2</sub> correction in OTNOC because of O<sub>2</sub> jump

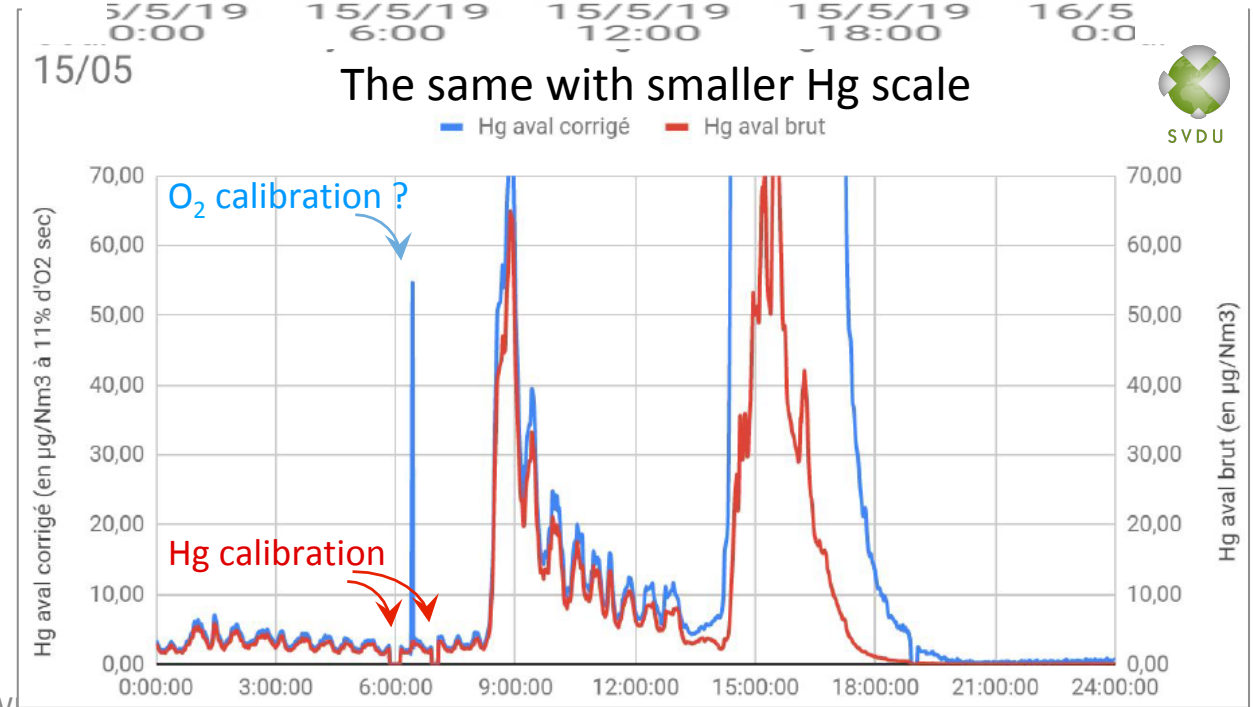
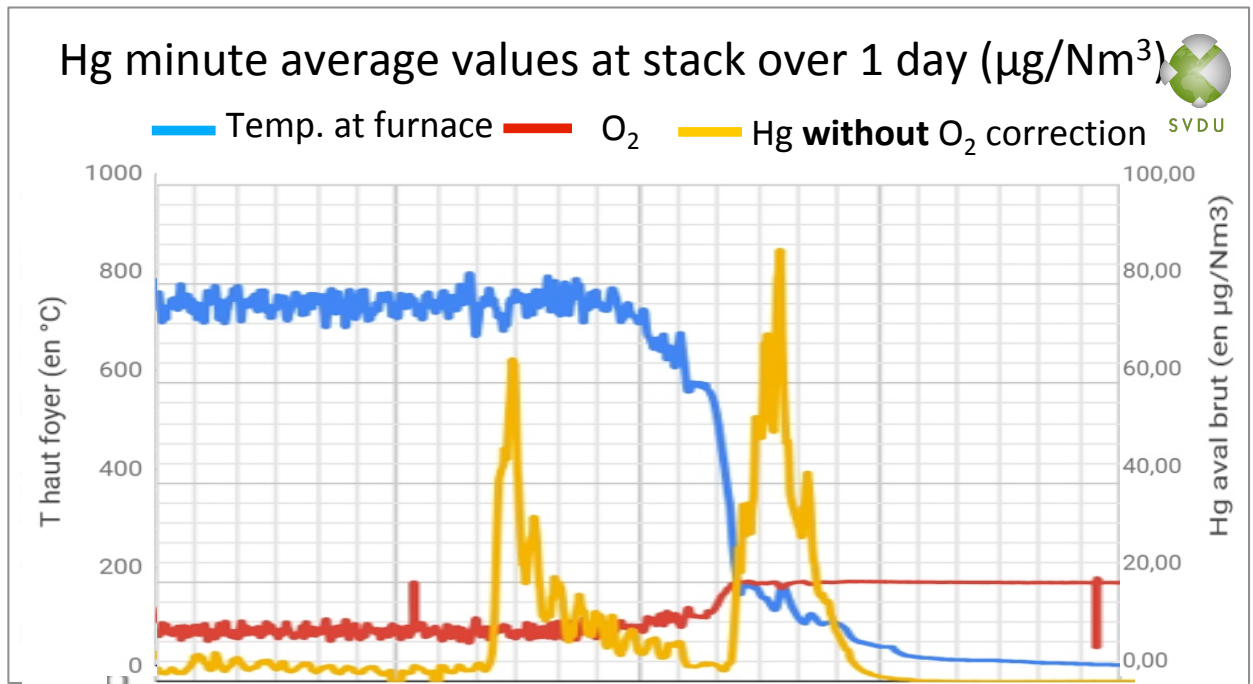
# The tricky impact of O<sub>2</sub> correction during OTNOC - Shutdown

- **Proposal for implementation of BAT-c 5**
  - In OTNOC, report data not corrected to 11%O<sub>2</sub>



# The tricky impact of O<sub>2</sub> correction during OTNOC - Shutdown

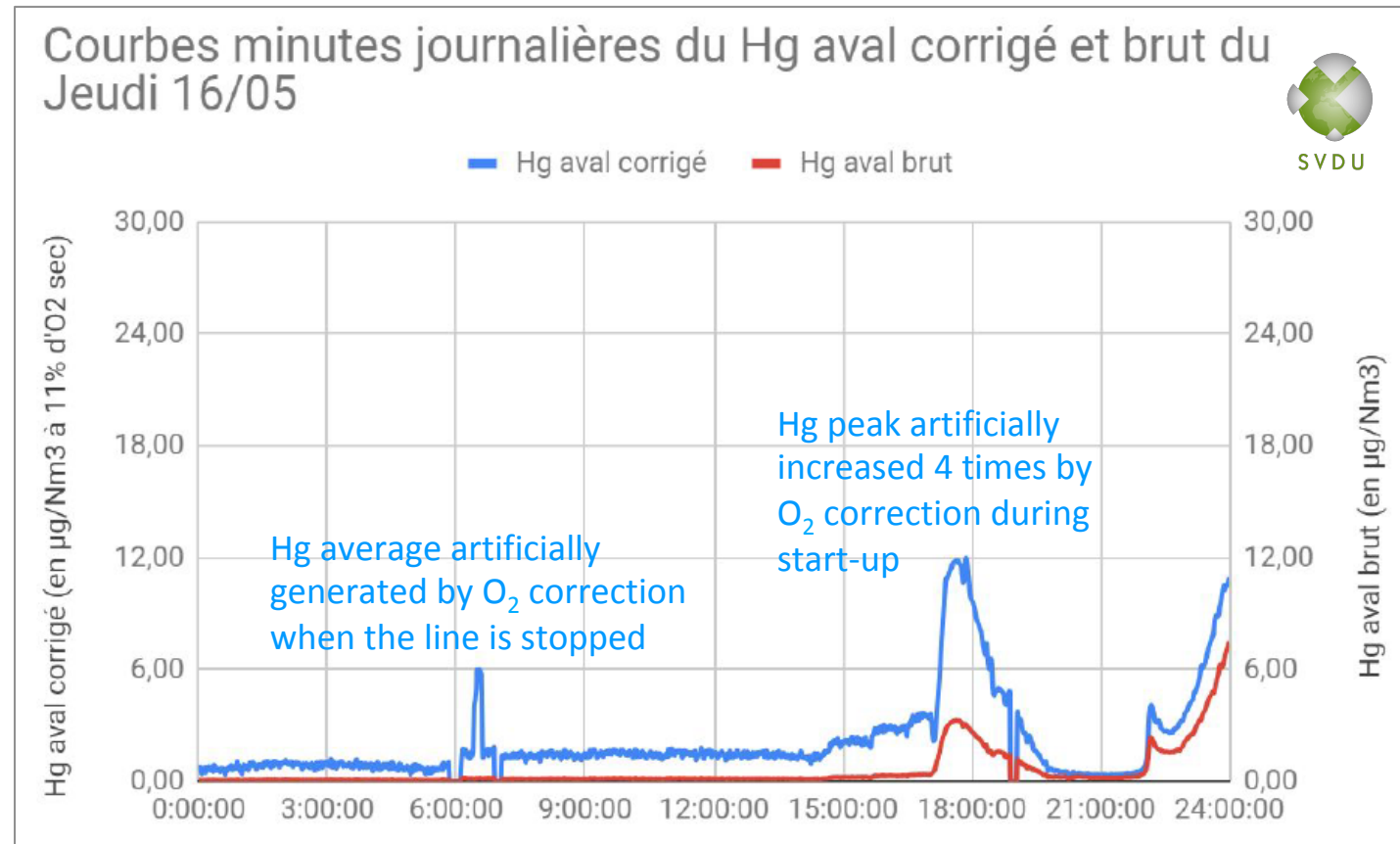
- **Proposal for implementation of BAT-c 5**
  - In OTNOC, report data not corrected to 11%O<sub>2</sub>





# The tricky impact of O<sub>2</sub> correction during OTNOC – Stoppage & Start-up

- Proposal for implementation of BAT-c 5
  - In OTNOC, report data not corrected to 11%O<sub>2</sub>



# **Air emissions at stack Uncertainties**

# Continuous ELVs - Subtraction of the 95%CI

- According to the EIPPCB, no information on 95%CI for daily ELVs below the ones of IED Annex VI
- IED Annex VI max 95%CI are *de facto* absolute uncertainties
  - Given as a percentage of (fixed) daily ELVs
  - INERIS study shows that (except for NO<sub>x</sub>) at concentrations lower than IED Anx VI ELVs
    - The relative uncertainties, which are more or less constant at high concentrations, increase exponentially when concentrations decrease to very low levels
    - The absolute uncertainty is quite constant at the low concentrations that are typical emission values of the waste incineration sector

# Possible solution routes

## 1 - Discussion in National standardisation committees:

To define a minimum concentration threshold ( $C_m$ ) under which the uncertainty to consider is constant:  $C_m \times U_{cm\%}$

## 2 – Before the publication of new standards:

- Keep the uncertainties CI 95% (*de facto* in absolute values) given in IED Annex VI
- For substances with no CI 95% in IED Annex VI, the 95%CI attached to them in 2 National legislation
  - 40% at 30  $\mu\text{g}/\text{Nm}^3$  for Hg, i.e. 12  $\mu\text{g}/\text{Nm}^3$
  - 40% at 30  $\text{mg}/\text{Nm}^3$  for  $\text{NH}_3$ , i.e. 12  $\text{mg}/\text{Nm}^3$

# Maximum 95% confidence intervals, in absolute values

(See E&G-d, Anx 3.a, § 5)

- IED Annex VI, for 7 substances
  - Max 95%CI
  - Daily ELV
  - Corresponding absolute uncertainty

Substance		IED Annex VI daily ELV		Max. 95% Confidence interval at IED Annex VI daily ELV
		Value (see Part 3, 1.1) (mg/Nm <sup>3</sup> )	Max 95% CI (see Part 6, 1.3) (%)	
<b>CO</b>	Carbon monoxide	50	10%	<b>5</b>
<b>SO<sub>2</sub></b>	Sulphur dioxide	50	20%	<b>10</b>
<b>NO<sub>2</sub></b>	Nitrogen dioxide	200	20%	<b>40</b>
<b>Dust</b>	Total dust	10	30%	<b>3</b>
<b>T(V)OC</b>	Total organic carbon	10	30%	<b>3</b>
<b>HCl</b>	Hydrogen chloride	10	40%	<b>4</b>
<b>HF</b>	Hydrogen fluoride	1	40%	<b>0,4</b>

- German / French values for Hg and NH<sub>3</sub>
  - Max 95%CI
  - Daily ELV
  - Corresponding absolute uncertainty

Substance		Data from 2 Member States			Proposed Max 95% interval
		Source	Daily ELV	Uncertainty (%)	<b>absolute</b>
<b>Hg</b>	Mercury	17. BimSchV*, 2/5/2013, Germany	30 µg/Nm <sup>3</sup>	40%	<b>12 µg/Nm<sup>3</sup></b>
<b>NH<sub>3</sub></b>	Ammonia	Arrêté**, 20/9/2002, France	30 mg/Nm <sup>3</sup>	40%	<b>12 mg/Nm<sup>3</sup></b>

\* See 17. BimSchV 2/5/2013: § 8 p. 7/24 for the daily ELV and Annex 4 p. 23/24 for 95%CI. No CI95% for NH<sub>3</sub>.

\*\* See Arrêté 20/9/2002: Article 18 for 95%CI and Annex 1, point e for the daily ELV.

## Periodic ELVs

- Report data with the uncertainties given In CEN standards

## Other results on uncertainty from CEN test for validation of standards on metals (EN 14385)

### Heavy metals (EN 14385) CEN

Compound	Concentrations in $\mu\text{g}/\text{m}_0^3$	U in %	Compound	Concentrations in $\mu\text{g}/\text{m}_0^3$	U in %
As	0,5-10	294	Ni	0,5-10	393
Cd	2-10	147	Pb	100-550	97
Co	0-5	253	Sb	1-25	122
Cr	1-100	447	Tl	0.05-60	385
Cu	10-100	106	V	0.01-7	270
Mn	1-20	155			

- From these CEN data, INERIS calculated for the sums:
  - Cd + Tl uncertainty is **245%** at  $20 \mu\text{g}/\text{Nm}^3$  (= **BATAEL upper end**)
  - Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V uncertainty is **81%** at  $340 \mu\text{g}/\text{Nm}^3$  (**slightly above BATAEL upper end**)
    - Without Pb, the uncertainty is 86% at  $60 \mu\text{g}/\text{Nm}^3$
- INERIS pointed out that the representability of this value is limited since it reflects the results of only one single test

## Other results on uncertainty from CEN tests for validation of standards on PCDD/F (EN 1948)

### PCDD/F (EN 1948) CEN

Concentrations in ng I-TEQ/m <sub>0</sub> <sup>3</sup>	U in %
0,035	140
12	36

- CEN calculated from its test:
  - for a PCDD/F concentration of **12 ng I-TEQ/Nm<sup>3</sup>** of PCDD/F, which is very high, the uncertainty was **36%**;
  - for a PCDD/F concentration of **0.035 ng I-TEQ/Nm<sup>3</sup>** of PCDD/F, which is **around the middle of the BATAEL range** in long term sampling and **close to the upper end** of the range in short term sampling, the uncertainty reported by CEN is **140%**.
- Again, the representability of this value is limited since it reflects the results of only two tests.



# Conditions on monitoring obligations

## Conditional Long term monitoring – PCDD/F & DL-PCB

(See E&G-d, Anx 5)

- Sufficiently stable PCDD/F and DL-PCB
  - Footnote 7 in BAT-c 4: , the **long-term sampling** monitoring “*does not apply if the emission levels are proven to be sufficiently stable*” for PCDD/F on one hand and for DL-PCB on the other hand. In such cases, short term sampling is requested every 6 months for PCDD/F as well as for DL-PCB. However, even the short term sampling does not apply to DL-PCB if the emissions “*are proven to be less than 0.01 ng<sub>WHO-TEQ</sub>/Nm<sup>3</sup>*”
  - It is **proposed** to consider that **PCDD/F** emissions are stable if over 1 year the continuous sampling result values do not vary more than in a **range of 0.03 ng<sub>I-TEQ</sub>/Nm<sup>3</sup>** and that DL-PCB emissions are stable if over 1 year the continuous sampling result values do not vary more than in a range of **0.02 ng<sub>WHO-TEQ</sub>/Nm<sup>3</sup>**..

## Conditional periodic monitoring – PBDD/F

(See E&G-d, Anx 5)

- PBDD/F periodic if incineration of waste containing brominated flame retardants or to plants using the technique with continuous injection of bromine described in BAT 31 d for Hg abatement
  - **Proposal:** measure PBDD/F **three times** along with short-term or long term periodic PCDD/F and to stop if PBDD/F are less than **0.01 ng<sub>I-TEQ</sub>/Nm<sup>3</sup>**.
  - NB: The **proposed** threshold of 0.01 ng/Nm<sup>3</sup> is the same value as given in footnote 8 to BAT-c 4 table for ceasing to monitor PCB-DL.

# Conditional continuous monitoring – HF and Hg

(See E&G-d, Anx 5)

- Stable HCl emissions

- *“HF may be replaced by periodic measurements with a minimum frequency of once every six months if the HCl emission levels are proven to be sufficiently stable”*

- **Proposed** condition: if over **1 year** the continuous measurement result values in NOC do not vary more than in a range of **6 mg/Nm<sup>3</sup>**

- Low and stable Hg content to replace continuous by long-term or periodic

- **Proposed** condition. Either, **over 1 year**:

- the continuous ½-hr Hg values in NOC do not exceed **35 µg/Nm<sup>3</sup>**, (upper end of the indicative value given in BAT-c 31);

- or the **long term sampling** results do not exceed **10 µg/Nm<sup>3</sup>**, (upper end of the BATAEL range for long term sampling).

In such case, the continuous measurement can be replaced by long term sampling every month.

- Or **6 successive short term sampling** results do not exceed **5 µg/Nm<sup>3</sup>**, (lower end of the BATAEL range for continuous monitoring in average over the short term sampling period.

NB: Note 2 associated to BAT-c 32 says that this lower end of the BATAEL range (5 µg/Nm<sup>3</sup>) **may be achieved “when incinerating wastes with a proven low and stable mercury content, (e.g. monostreams of waste of a controlled composition)”**.

# Definitions and FAQ

# Toxic Equivalency Factors (TEFs)

- WI BREF draft BAT-c 30 requires to use
  - For **PCDD/F**, the **I-TEQ** Toxic Equivalency Factors
    - Emissions expressed in  $\text{ng}_{\text{I-TEQ}}/\text{Nm}^3$ 
      - I-TEQ, International toxic equivalent factors according to the North Atlantic Treaty Organization (NATO) schemes.
    - See in E&G-d Annex 1 the table copied and pasted from IED Annex VI Part 2
  - For **DL-PCB**, the **WHO-TEQ** Toxic Equivalency Factors
    - Emissions in  $\text{ng}_{\text{WHO-TEQ}}/\text{Nm}^3$ 
      - WHO-TEQ, Toxic equivalent factors according to the World Health Organization (WHO) scheme
    - See in E&G-d Annex 1 the table for DL-PCB
- WI BREF draft BAT-c 4 requires to monitor **PBDD/F** once every 6 months
  - if incinerated waste contain brominated flame retardants or if bromine is continuously injected for Hg abatement
  - Up to now (June 2019), TEFs have not been defined for PBDD/F. Literature suggests to use similar TEFs for both brominated and chlorinated congeners, i.e. the **I-TEQ TEFs**

## For information: Key Environmental Issues (KEIs)

- EIPPCB proposal for the prioritisation of pollutants
  - for **key pollutants**, **higher and lower ends** of proposed BAT-AEL ranges are **based on** the analysis of the collected plant-specific **data**;
  - for **non-key pollutants for which an ELV is set in the IED** (HF, TVOC, which replaces TOC, and CO\*), only **lower end** is based on **collected data**. **Higher end set** at the **IED Annex VI's ELV**;
  - for **non-key pollutants for which no ELV is set in the IED** (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PM<sub>10</sub> and PM<sub>2.5</sub>, PCBs & PAHs), **no BAT-AELs are proposed**

# Delicate definitions - 1

- “Bottom ash treatment plant”
  - *“Plant treating slags and/or bottom ashes from the incineration of waste in order to separate and recover the valuable fraction and to allow the beneficial use of the remaining fraction.  
This **does not include the sole separation of coarse metals at the incineration plant.**”*
  - *”sole separation of coarse metal”*
- “Clinical waste”
  - *“Infectious or otherwise **hazardous** waste arising from healthcare institutions (e.g. hospitals).”*
- “New plant” / “Existing plant”
  - *“A plant first permitted following the publication of these BAT conclusions or a complete replacement of a plant following the publication of these BAT conclusions.” /  
“A plant that is not a new plant.”*
  - *“complete replacement of a plant “*
- “Major plant upgrade”
  - *“A major change in the design or technology of a plant with major adjustments or replacements of the process and/or abatement technique(s) and associated equipment”*




## Delicate definitions - 2

- “Part of an incineration plant”
  - *“For the purposes of determining the gross electrical efficiency or the gross energy efficiency of an incineration plant, a part of it may refer for example to:*
    - *an incineration line and its steam system in isolation;*
    - *a part of the steam system, connected to one or more boilers, routed to a condensing turbine;*
    - *the rest of the same steam system that is used for a different purpose, e.g. the steam is directly exported.”*
- “Fly ashes”
  - *“Particles from the combustion chamber or formed within the flue-gas stream that are transported in the flue-gas”*
  - *Boiler ash, filter ash, FGC residues*
- “Valid half-hourly average”
  - *“A half-hourly average is considered valid when there is no maintenance or malfunction of the automated measuring system.”*
- “Daily average”
  - *“Average over a period of one day based on valid half-hourly averages”*

# Useful documents

Important legal notice



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### Reference documents under the IPPC Directive and the IED

The table below presents, in alphabetical order, the list of reference documents that have been drawn (or are planned to be drawn) as part of the exchange of information carried out in the framework of Article 13(1) of the Industrial Emissions Directive (IED, 2010/75/EU). The table contains the Best Available Techniques (BAT) reference documents, the so-called BREFs (as well as a few other reference documents) that have been adopted under both the IPPC Directive (2006/18/EC) and the IED. For BREFs adopted under the IED, the table shows in the column "Adopted document" also the BAT conclusions adopted according to IED Article 13(5). The "BAT conclusions" is a document containing the parts of a BAT reference document laying down the conclusions on best available techniques. According to Article 14(3) of the IED, BAT conclusions shall be the reference for setting the permit conditions to installations covered by the Directive.

For each BREF in the table below, the following information can be found:

- The latest reference document itself. In short, each document generally gives information on a specific industrial/agricultural sector in the EU, on the techniques and processes used in this sector, current emission and consumption levels, techniques to consider in the determination of the best available techniques (BAT) and emerging techniques.
- The list of references (background material) quoted in the reference document.
- Links to webpages containing relevant legislation/standards.
- Additional technical information.
- Translations of the Executive Summaries for BREFs adopted under the IPPC Directive.

For Reference documents developed under other legislative instruments/policy documents which are not a part of the information exchange under the IED/IPP Directive (i.e. Management of Tailings and Waste-Rock in Mining Activities (MTWR), Hydrocarbons exploration and extraction (HC)), please click [here](#).

Best available techniques Reference document (BREFs) developed under the IPPC Directive and the IED	Code	Adopted/Published Document	Formal draft (*)	Meeting report	Estimated review start (**)
Ceramic Manufacturing Industry	CER	BREF (08.2007)			2018/2019
Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector	CWW	BATC BREF (06.2016)			
Common Waste Gas Treatment in the Chemical Sector	WGC			MR (09.2017 and 03.2018)	Drawing up started
Emissions from Storage	EPS	BREF (07.2006)			
Energy Efficiency	ENE	BREF (02.2009)			
Ferrous Metals Processing Industry	FMP	BREF (12.2001)		MR (11.2016)	
Food, Drink and Milk Industries	FDM	BREF (08.2006)	FD (10.2018)	MR (10.2014)	
Industrial Cooling Systems	ICS	BREF (12.2001)			
Intensive Rearing of Poultry or Pigs	IRPP	BATC BREF (02.2017)			
Iron and Steel Production	IS	BATC BREF (03.2012)			
Large Combustion Plants	LCP	BATC BREF (07.2017)			
Large Volume Inorganic Chemicals - Ammonia, Acids and Fertilisers	LVIC-AAP	BREF (08.2007)			

# BREFs and BAT conclusions

Link to all BREFs and BAT conclusions:

<http://eippcb.jrc.ec.europa.eu/reference/>

Tanning of Hides and Skins	TAN	BATC BREF (02.2013)				
Textiles Industry	TXT	BREF (07.2003)		MR (06.2018)	Review started	
Waste Incineration	WI	BREF (08.2006)	FD (12.2018)	MR (01.2015)		
Waste Treatment	WT	BATC BREF (08.2018)				
Wood-based Panels Production	WBP	BATC BREF (11.2015)				
Reference Document (REFs)		Code	Adopted Document	Formal draft (*)	Meeting report	Estimated review start
Economics and Cross-media Effects	ECH		REF (07.2006)			
Monitoring of Emissions to Air and Water from IED Installations	ROM		REF (07.2018)			

(\*) Formal draft of (B)REFs have no legal value. They only reflect work in progress and are available for information only to those interested in the exchange of information under Article 13(1) of the IED.

(\*\*) For further indications, please consult the latest iteration in the EIPPCB work programme for the revision of BAT reference documents (BREF); the EIPPCB work programme updates can be found by following the works of the IED art. 13 forum.

# INERIS study on monitoring

- Available on INERIS website
  - <https://www.ineris.fr/fr/study-performances-existing-and-under-development-amss-automated-measuring-systems-and-srms-0>
- Available on CEWEP and ESWET websites
  - <http://www.eswet.eu/reports.html>
  - <http://www.cewep.eu/2017/12/01/ineris-report-on-monitoring-of-air-emissions/>



Revision November 2017

# Note to warn stakeholders on hasty use of BATAEL ranges given in WI BREF draft – European level

- By 8 European associations (sent to their members)



Available at.:

<http://www.hazardouswasteurope.eu/wp-content/uploads/sites/3/2018/02/18-02-16-WI-BREF-Note-warning-stakeholders-on-hasty-use-of-BATAELS.pdf>

# Recommendations of SN2E, Association of French consultants involved in W-t-E

- Recommendations on BATAEL-based ELVs

Available at:

[https://www.fnade.org/ressources/\\_pdf/1/2038-SN2E-recommandations-SN2E-sur-BATAE.pdf](https://www.fnade.org/ressources/_pdf/1/2038-SN2E-recommandations-SN2E-sur-BATAE.pdf)





**Thank you!**

**Questions?**

