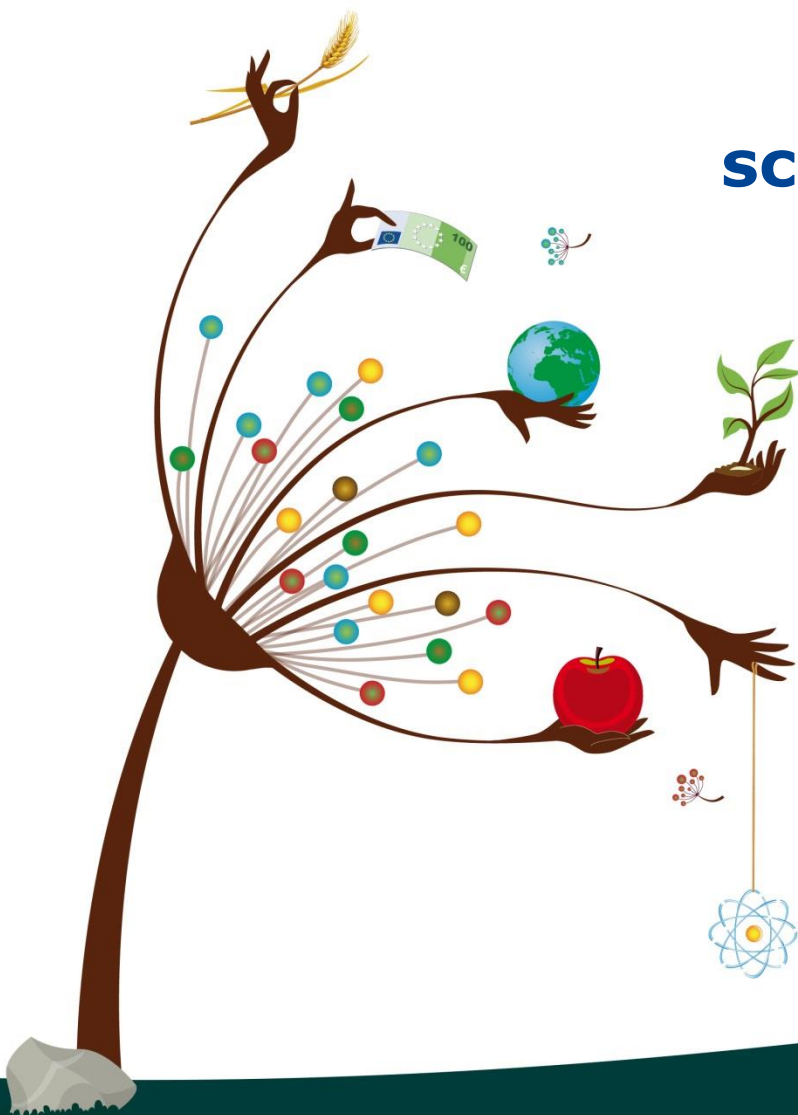


The European Commission's science and knowledge service

Joint Research Centre

The collection and analysis of
plant-specific emission data
for the review of
the Waste Incineration BREF

Frederik Neuwahl
European IPPC Bureau

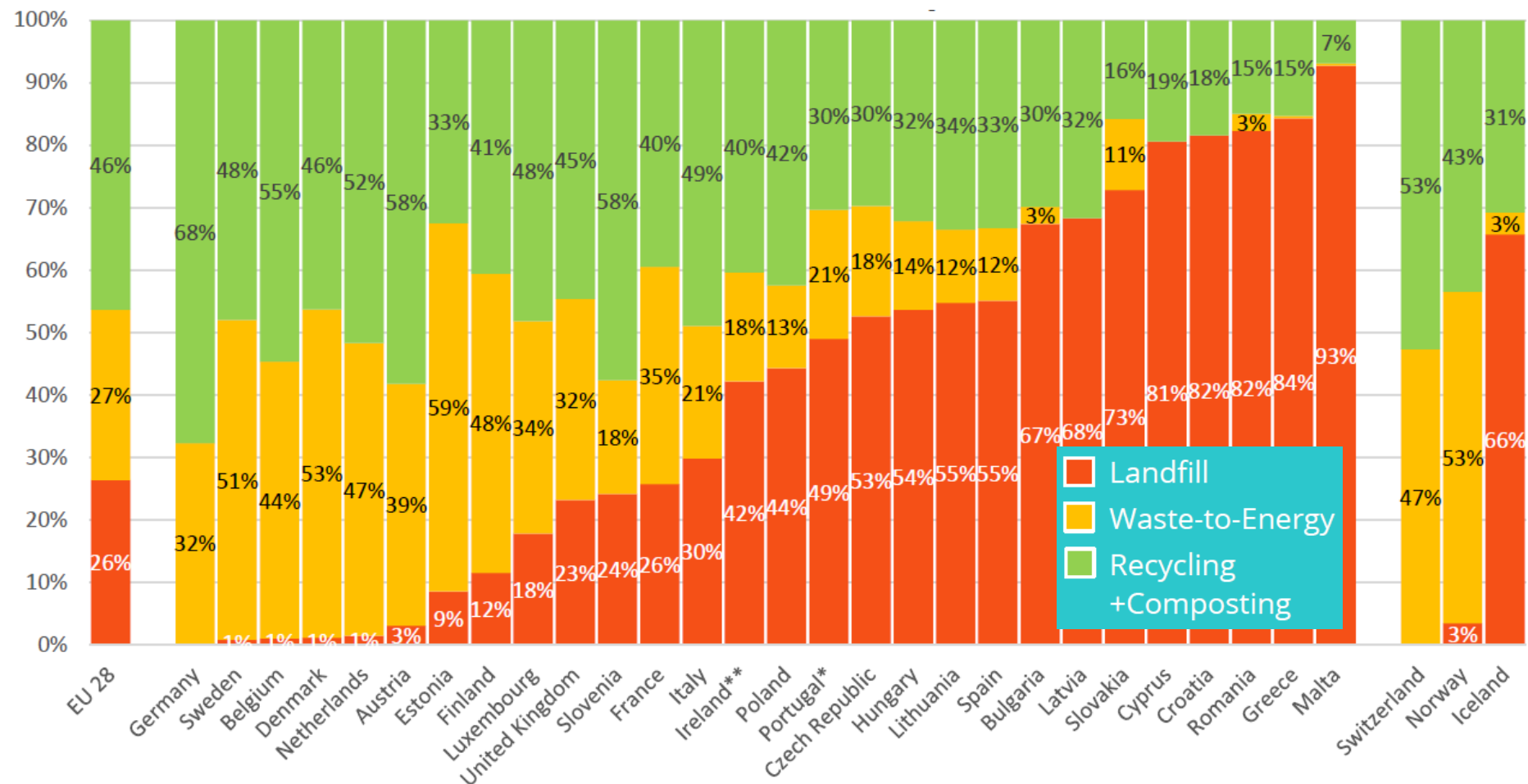




Outline

1. The Waste Incineration (WI) sector in Europe: general aspects and applicable EU legislation
2. The WI BREF review
3. Highlights of the WI data collection compared to other examples
4. Highlights of the data analysis: determination of BAT and BAT-AELs
5. Conclusions: advantages and pitfalls of an increased level of data intensity

WI Sector: a cornerstone of municipal waste management in EU



Graph by CEWEP, Source:
EUROSTAT 2017

The WI Sector: Waste-to-Energy Plants in Europe 2015

- WtE Plants operating in Europe
(not including hazardous waste incineration plants)
- Waste thermally treated in WtE plants
(in million tonnes)



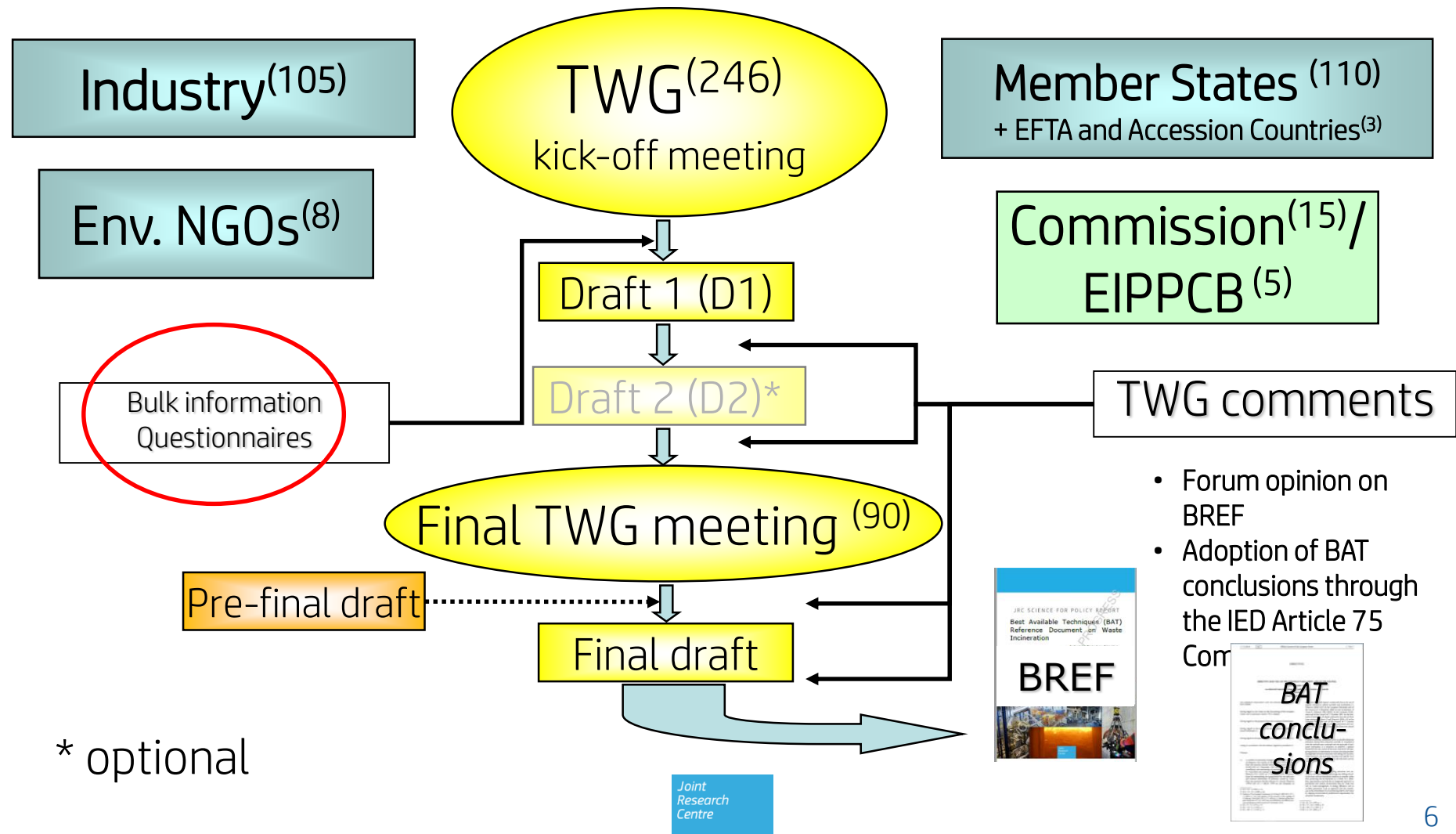
Data supplied by CEWEP members
and national sources

* Includes plant in Andorra

The WI Sector: legal framework and current review

- **Directive 2008/98/EC on waste (Waste Framework Directive):** legal framework and basic principles for the treatment of waste in the EU
- **Directive 2000/76/EC on the incineration of waste (WID):** technical requirements on incineration and co-incineration plants. Permit obligations, emission limit values and monitoring for pollutants (repealed by the IED)
- WID became the basis of Chapter IV and Annex VI in **Directive 2010/75/EU on industrial emissions (IED)**
- **BREF for Waste Incineration** (2006, under the IPPC Directive): BAT for the sector and associated emission level ranges (BAT-AELs)
- **Current WI BREF review:** first legally binding review of the emission limits of the IED, started 2014. Final TWG meeting in April 2018

The WI BREF review: the process



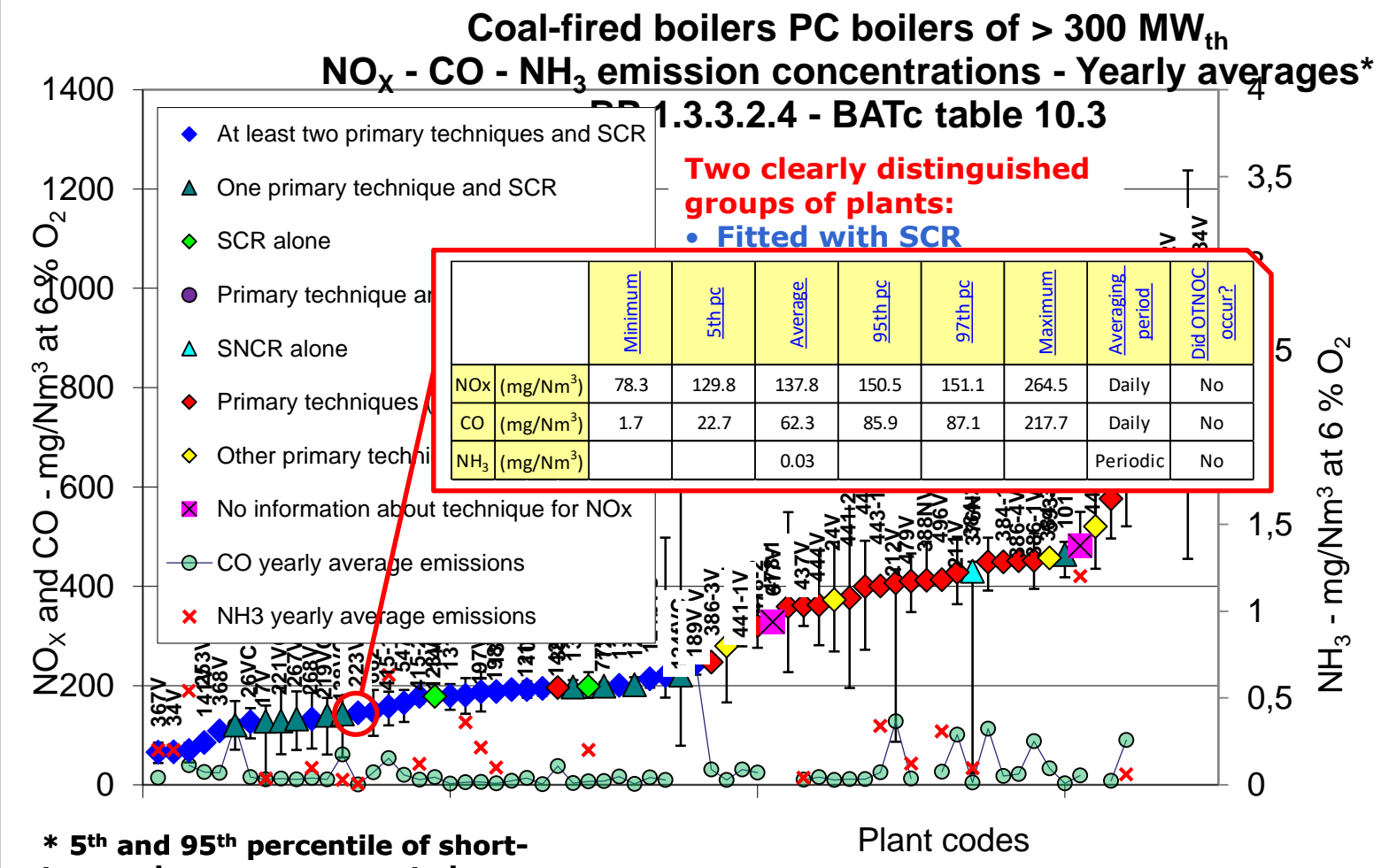
Key objectives of the plant-specific data collection

- To support:
 - the determination of BAT
 - the determination of the emission levels associated with BAT (BAT-AELs) and of other environmental performance levels
- BAT:
 - Best: most effective in achieving a high level of environmental protection
 - Available: allowing economically and technically viable implementation, taking into consideration costs and advantages
 - Technique: both the technology and the way it is designed, built, maintained, operated...
- BAT-AEL:
 - the range of emission levels obtained under normal operating conditions using a BAT or a combination of BATs

Some general principles of the data collection and analysis

- For each plant, to collect data on:
 - the techniques that are in place
 - the emission levels that are achieved
 - specific conditions and driving forces
- So as to be able to establish relationships between:
 - techniques
 - emission levels
 - applicability (including possible technical and economic restrictions)

Typical data collection and analysis: an example from the LCP BREF



The WI BREF review: some key complexities (1)

Waste has variable composition, which can substantially affect emissions (peaks). How far should such peaks be reflected in the BAT-AEL ranges?

Averaging periods:

- Specific events in the operation of the plant (e.g. malfunction of the abatement system) will affect the emission levels the most in the short term, but, once normal operation has resumed, the longer the averaging period, the smaller the effect (yearly averages are usually relatively insensitive to such events)
- Under current EU legislation, the WI sector only uses daily and half-hourly ELVs, without any long-term approach. This makes the data analysis potentially very sensitive to how the data is handled.

Extreme care is necessary.

The WI BREF review: some key complexities (2)

Compliance assessment:

- BAT-based permit conditions contain ELVs that ensure that, under normal operating conditions (NOC), the emissions do not exceed the BAT-AELs
- They also contain measures for other than NOC (OTNOC)
- The IED contains some examples of OTNOC (e.g. start-up, shutdown), but no comprehensive definition. This falls to the competent authorities
- However, Chapter IV and Annex VI of the IED also contain detailed provisions for the WI sector, requiring existing ELVs to be complied with under the Effective Operating Time (EOT), as well as certain operating conditions to be respected whenever waste is being incinerated

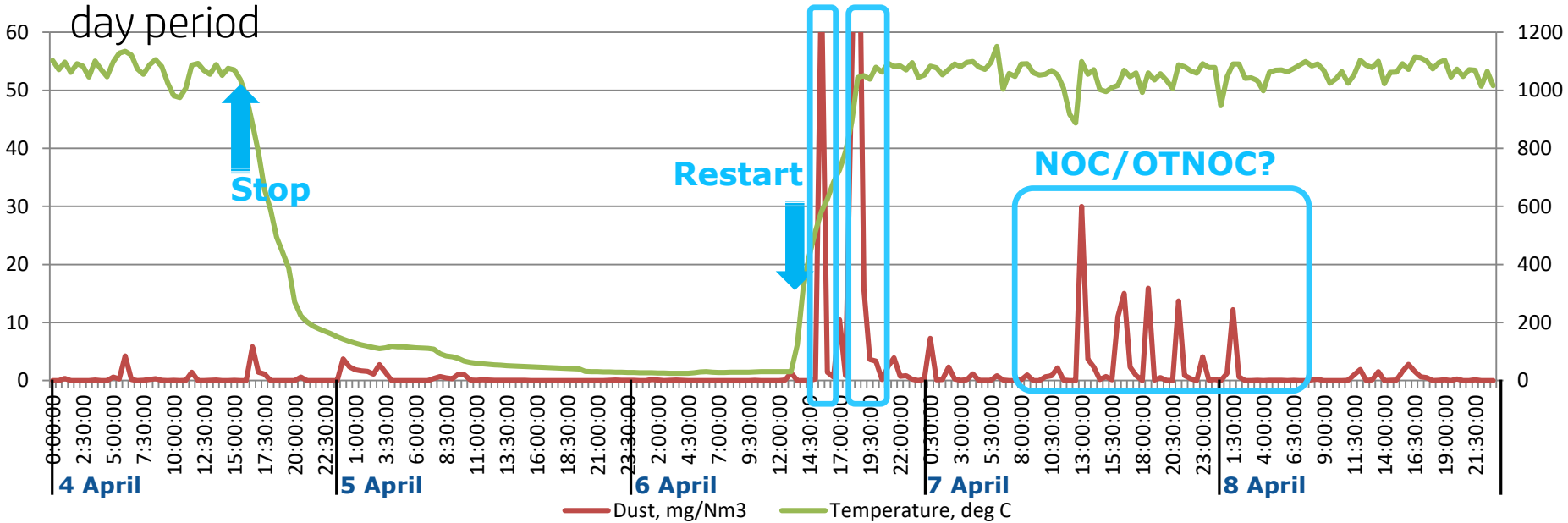
The most detailed data collection and analysis done for a BREF

Performance levels are usually derived from indicators as reported by operators

- Typical case: minimum, 5th percentile, average, 95th percentile, maximum (5 values)
- This case: half-hourly values for the entire year (17520 values) for 9 pollutants
- Including operating parameters (temperature, flow rate, waste input, fuel input) and qualitative descriptors
- For ~350 WI lines across Europe
- A data set of ~100 million data points

Analysing the performance of individual plants

Example: Dust emissions from an incinerator fitted with bag filter over a five-day period



		Flow rate	Operating Condition	Dust	TOC	HCl	HF	SO2	NOx	NH3	Hg	CO	Additional information	Temperature	Waste input	Support fuel input
Day	Hour	Nm³/h		mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³		deg C	t/h	MJ/h
29 March 2014	22:00	17092.10	STOP										analyser out of operation	94.72516683	0	0
29 March 2014	22:30	97913.37	STOP										analyser out of operation	213.0316427	0	0
29 March 2014	23:00	84035.88	AUX										analyser out of operation	184.9281031	0	234.564511
29 March 2014	23:30	64438.38	AUX										analyser out of operation	545.2173197	0	59062.1971
30 March 2014	00:00	84324.48	WSTART										analyser out of operation	644.3633016	2.6301647	74999.9928
30 March 2014	00:30	88729.74	WSTART										analyser out of operation	674.358903	8.24431529	77932.8016
30 March 2014	01:00	33517.89	WSTART										analyser out of operation	670.0787069	15.1317423	52488.9841
30 March 2014	01:30	51860.01	WSTART	0.285408	7.841046	0.623142		12.68368	72.19995	0.664078		301.4057		793.2023885	28.0297474	31850.2857
30 March 2014	02:00	74901.21	WSTART	0.306542	1.568916	0.883806		0	122.6483	0.906981		16.64876		865.8425741	42.0536385	2349.71005
30 March 2014	02:30	99655.81		1.838987	0.85715	0.823453		0	36.69942	0.842529		10.08386		855.1158936	51.2777341	0
30 March 2014	03:00	108930.87		1.110442	0.707345	0.668074		0	55.69817	0.888425		8.937527		854.012736	57.7825713	0
30 March 2014	03:30	111107.95		0.588161	0.643348	0.581129		0	75.17733	0.862429		8.790571		842.0087118	51.3124092	0

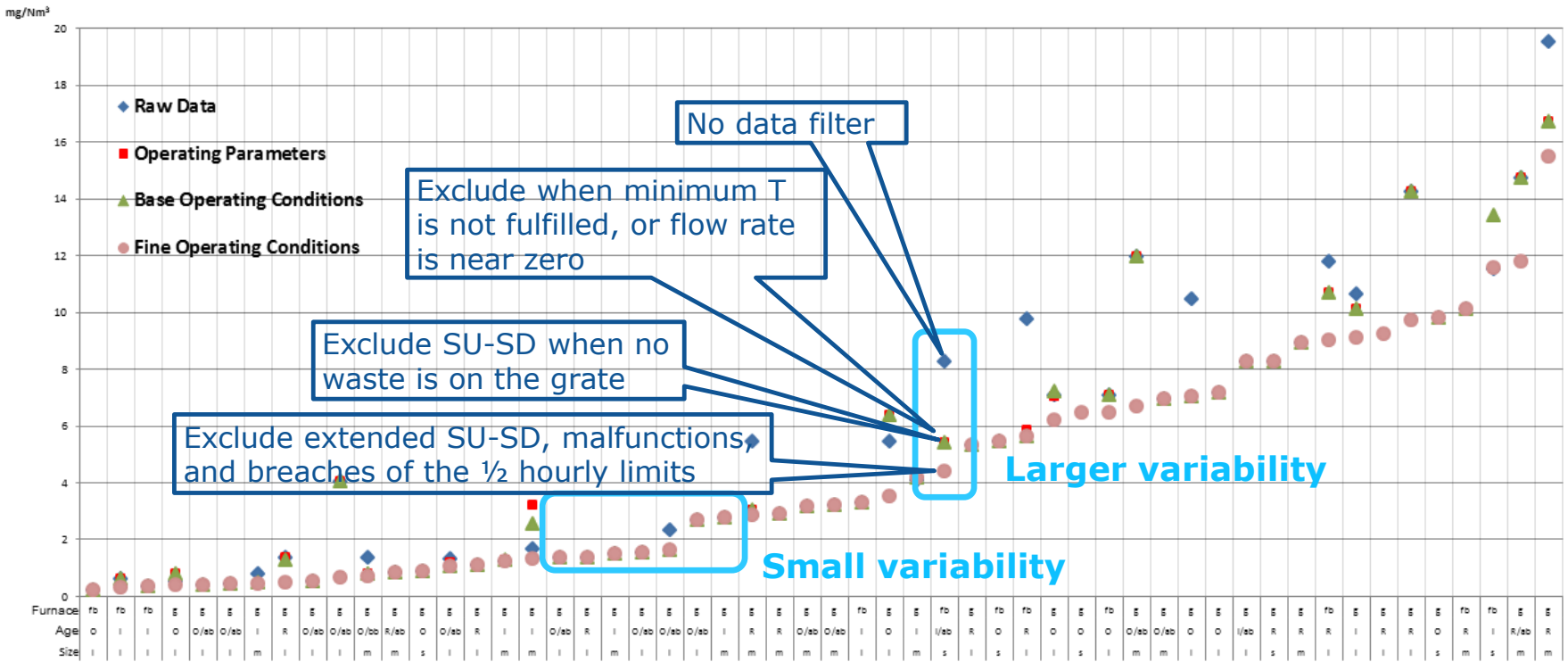
Objectives of the "data filtering" analysis

Comparing the performance levels that are derived when including or excluding certain categories of operating conditions, which could in principle be considered OTNOC and excluded from the compliance assessment framework

Assessing how much difference this makes, and building confidence in the level of discretion that the Member States and their competent authorities will have in setting permit conditions, while ensuring that the BAT-AELs are achievable under technically and economically viable conditions

Comparing different methods to calculate performance levels

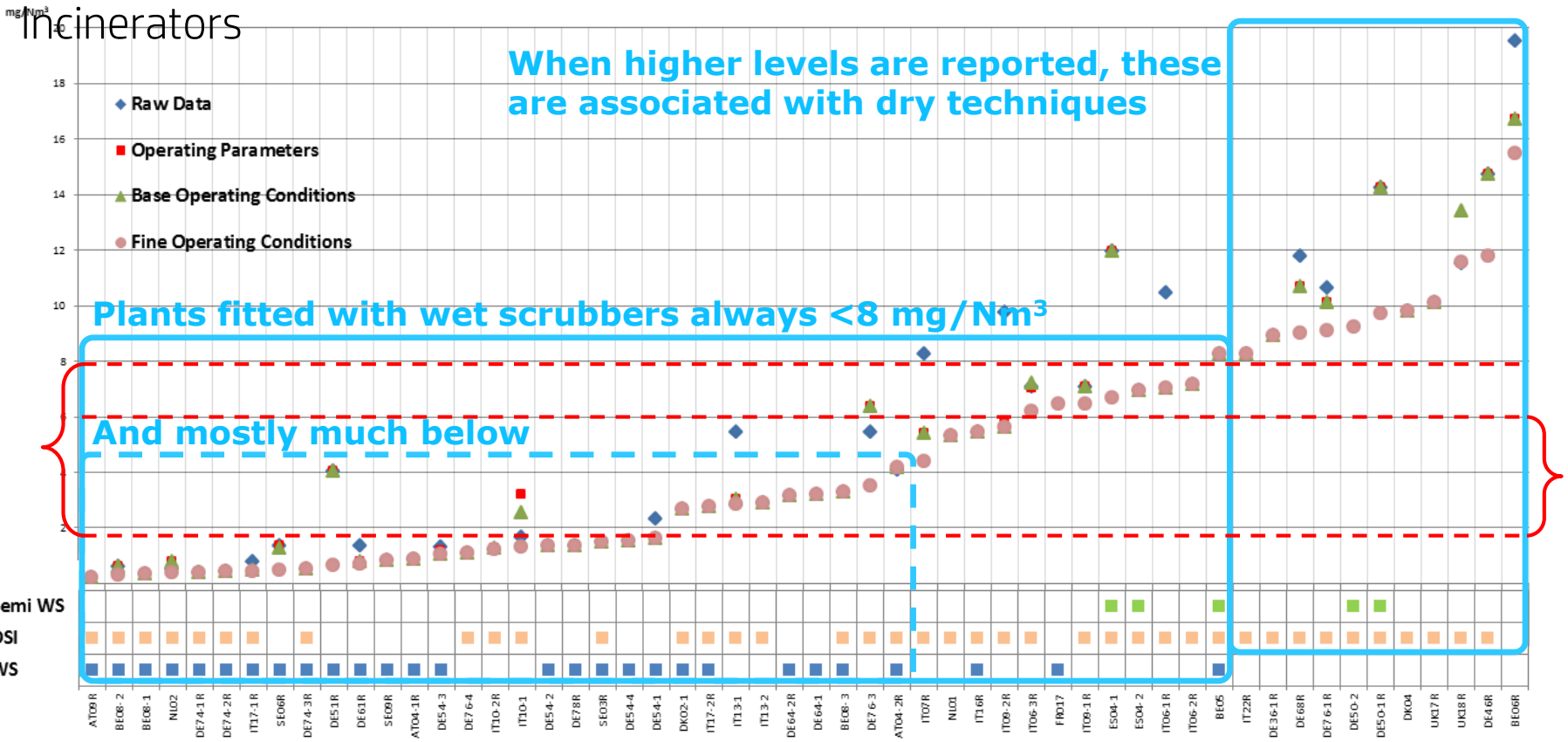
Example: Maxima of daily HCl emissions from Non-Hazardous Waste Incinerators



A smaller variability should in principle reflect stable plant operation, enabling the plant to keep low emission levels throughout a broad range of operating conditions. But could also reflect some limitations in the data collection. Also when the variability is large

Associating performance levels to techniques: BAT-AELs

Example: Maxima of daily HCl emissions from Non-Hazardous Waste



Does this mean that only wet scrubbers should be considered BAT?

Conclusions (1)

Usually, the data collection supporting a BREF review relies on plant operators to provide a limited number of key indicators for the plant's performance

With the WI BREF review, a much more data-intensive approach was undertaken, allowing for an in-depth analysis of how the emission levels are influenced by specific operating conditions of the plant. This was found to be particularly relevant when the emphasis is on BAT-AELs expressed for a short-term averaging period, and when there are specific issues related to the assessment of compliance with the emission levels

Conclusions (2)

This also comes at a substantial additional cost in terms of resources:

- From each plant operator: filling in an additional questionnaire with continuously measured emissions, process parameters and feeding crane weight signals. And checking the control room logs for all available information on what was happening at each moment
- From EIPPCB side: development of a bespoke software tool for data analysis (several months of programming); detailed manual checks, for each plant, of the specific reasons for any substantial differences in emission levels obtained with different data filters

Complete data is very hard to obtain, and without complete data much of the analysis is not possible. A big additional effort, which requires the dedicated cooperation of all parties involved.



THANK YOU FOR YOUR ATTENTION

Подробнее:

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

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

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