Briefing Document: Review of IMPEL Waste Incineration BAT Conclusions Application and Site Visit

Date: October 26, 2024

Subject: Review of findings from the IMPEL Waste Incineration BATc Survey Report and site visits to Veolia's South-East London Combined Heat and Power (SELCHP) municipal Waste Incinerator and Day Group's Greenwich Incinerator Bottom Ash (IBA) treatment plant.

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Purpose: This briefing document summarizes the key themes, important ideas, and facts extracted from the provided sources, focusing on the implementation of Best Available Techniques (BAT) Conclusions for Waste Incineration (WI) within IMPEL member countries.

Source Documents:

1. Excerpts from "2022-24iwg9-and-iiiwg5-waste-incineration--survey-report (1).pdf" (Dated 10/05/2024)
2. Veolia Day Group Waste Supporting IED Waste Incineration (WI) Subgroup SITE VISIT REPORT (Dated 1-2 November 2023)

Key Findings & Themes:

The sources highlight the challenges and diverse approaches to implementing the 2019 Waste Incineration BAT Conclusions within IMPEL member countries. A central theme is the transition from existing permits to aligning with the new, more stringent BAT-Associated Emission Levels (BAT-AELs) by the 2024 deadline. The practical application of BATs for emission control, energy efficiency, and circular economy principles, particularly regarding bottom ash, are also prominent topics.

1. Implementation of Waste Incineration BAT Conclusions (Based on Survey Report):

- **IMPEL's Role:** IMPEL, the European Union Network for the Implementation and Enforcement of Environmental Law, is an international non-profit association of environmental authorities. Funded by the European Commission, its objective is to ensure more effective application of environmental legislation. The survey is part of the Waste Incineration subgroup's work to develop practical tools for inspectors and permit writers.
- **Survey Scope and Methodology:** The survey aimed to capture the practical implementation of WI BAT Conclusions based on the experience and knowledge of experts, permit writers, and inspectors within the IMPEL network. Respondents were

asked to provide information on Waste Incineration plants they are involved with, covering various aspects from general information to specific BATs.

- **Permit Renewal Status:** A significant number of responses indicated that permit renewal processes to incorporate the new BATCs were "Ongoing" or "Still to start" at the time of the survey circulation. This underscores the ongoing challenge of meeting the 2024 deadline.
- **Emission Limit Value (ELV) Setting:** The survey revealed a tendency to set ELVs towards the upper limit of the BAT-AEL range.
- According to the report, **"To the question about ELVs setting, most responses have been 'At the upper limit'."**
- Reasons for this approach included the applicability of BAT for existing plants (considering lack of space, cost-benefit analysis) and that ELVs set in IED (Industrial Emissions Directive) permits are often higher than BAT-AELs.
- Conversely, a smaller percentage of responses indicated setting ELVs "In the middle" or "At the lower limit."
- **Other Than Normal Operating Conditions (OTNOC):** The management of OTNOCs is a critical issue. The survey explored what is considered an OTNOC and whether ELVs are set during these periods.
- Commonly cited OTNOCs include **"Plant failure"** and **"Failure of the air fans or induced draft fans."**
- A significant percentage of respondents (53%) indicated that **"ELVs are NOT set"** during OTNOC, while others (29%) set ELVs for all pollutants and a smaller group (18%) for some.
- The report notes that **"BAT 5 points attention to the OTNOC monitoring to carry out by direct emission measurements (e.g. for the pollutants that are monitored continuously) or by monitoring of surrogate parameters if this proves to be of equivalent or better scientific quality than direct emission measurements."**
- The format of OTNOC management plans was not widely available at the time of the survey.
- **NOx Abatement:** SNCR (Selective Non-Catalytic Reduction) and SCR (Selective Catalytic Reduction) were the most common NOx abatement techniques reported.

- The report states, **"The most adopted NOx abatement technique has shown that most plants have installed SNCR; none has combination SNCR and SCR."**
- A notable finding is that **"For many plants reaching BAT AEL for NOX will be a challenge"** and that **"SNCR can't reach the middle level of BAT-AEL range."** This suggests potential future upgrades may be necessary to meet stricter limits.
- **Acid Gases Abatement:** Dry sorbent injection was the most frequently adopted technique. The report mentions its advantages (no water consumption, less wastewater) but also notes that **"it can be not optimal to reach the lowest limits."** The potential shift towards wet scrubbers for more stringent limits (like mercury) is also highlighted.
- **Continuous Monitoring (Dioxins and Mercury):** The survey revealed variations in the implementation of continuous monitoring for dioxins (PCDD/F) and mercury.
- For dioxins, the percentage of plants with continuous monitoring **"Already in place"** (37%) was equal to those **"Not in place neither prescribed within 2023."**
- For mercury, a higher percentage were **"To be prescribed within 2023"** (47%) compared to those **"Already in place"** (37%).
- The rationale for not installing long-term sampling often centered on **"proven low and stable content."**
- The report notes that the application of BAT 30 (Dioxins) and BAT 31 (Mercury) represents an **"on-going challenge"** for most cases, with a significant percentage reporting "not installed neither prescribed" continuous systems.
- **Energy Efficiency (BAT AEEL):** Energy efficiency is identified as a "real challenge" for waste incineration. While a high percentage of respondents considered BAT AEEL mandatory (63%), a notable portion did not (37%).
- The report observes that the approach to BAT AEEL **"is based on the difference between BAT AEEL (which IED provisions consider explicitly as mandatory) and Associated Energy Efficiency Levels, which can be seen as a target to reach."**
- The application of BAT 19 (heat recovery boiler) and BAT 20 (increasing energy efficiency) were explored.
- **Derogations:** A small percentage of responses indicated that derogations had been allowed, primarily for emissions to air. Specific details regarding the pollutants and allowed ELVs were provided in some cases.

- **Circularity:** Circular economy principles are addressed through measures to reduce water usage/wastewater generation and to treat/recycle slags and bottom ashes.
- The widespread use of dry abatement systems contributes to reduced wastewater generation.
- Treatment and recycling of slags and bottom ashes are predominantly carried out off-site. Common practices include metal recovery, producing secondary aggregates, valorization in cement kilns, or landfilling.

2. Site Visit Findings (Based on Site Visit Report):

- **Veolia SELCHP (Municipal WI):Waste Acceptance:** Visual inspection, weighing of deliveries were standard. Radioactivity detection was noted as *not* being practiced, justified by the UK's regulatory system for radioactive sources.
- **Operations:** Dealing with nitrous oxide cylinders in waste was highlighted as a challenge causing damage to the furnace. Waste blending and mixing prior to incineration were noted.
- **Energy Recovery:** Significant electricity generation and heat export to a district heating network were observed. Plans to expand the district heating network further illustrate the focus on energy efficiency.
- **Dust Emissions:** IBA is quenched in water and stored inside a building, minimizing dust risk.
- **Wastewater Treatment:** Notably, there is **"no waste water treatment plant at the incinerator because all of the water from the process is reused in the IBA quenching process."**
- **Bottom Ash Management:** Ash is sampled for TOC (Total Organic Carbon). After quenching, ferrous metals are recovered on-site, and the ash is sent off-site for further metal recovery and production of aggregate for construction.
- **Flue Gas Cleaning:** Bag Filter, Semi-wet absorber, and SNCR were the abatement systems in place.
- **Monitoring:** Real-time emission levels are displayed in the control room.
- **Continuous Monitoring (UK Approach):** The UK adopts a flexible approach, allowing operators to **"not have to carry out continuous monitoring if they can demonstrate that their emissions of dioxins are always below the periodic monitoring limit,**

and their mercury emissions are below 10 µg/m3." This contrasts with mandatory continuous monitoring in many other EU countries.

- **Public Perception:** WI remains controversial in the UK and Europe, though considered a better option for climate change than landfill.
- **Permit Compliance:** The incinerator permit was described as comprehensive and detailed, incorporating BAT.
- **Day Group IBA Treatment Plant:IBA Source:** Processes bottom ash from the SELCHP plant.
- **Dust Control:** Good dust control systems were observed, including covered conveyors and water sprays, and ensuring sufficient moisture content in the ash.
- **Metal Recovery:** The plant utilizes screening, sieving, crushing, aeraulic separation, magnetic separation (ferrous), and eddy current separation (non-ferrous). Recent investment in additional eddy-current separation has proven economically beneficial.
- **Ageing and Washing:** Ageing processes (carbonation, draining, oxidation) are used, often with wetting to optimize moisture and prevent dust. Washing is used to reduce leachability of soluble substances.
- **End-of-Waste Status:** The possibility of the treated aggregate achieving end-of-waste status in the UK was discussed.
- **Circular Economy:** The plant contributes to the circular economy by recovering metals and producing recycled aggregates from IBA.

3. Challenges and Suggestions:

Both sources highlight critical points and suggestions for future work:

- **Critical Points in BATC Implementation:**Clarity and implementation of OTNOC management plans.
- Verifying the reliability of energy efficiency data provided by operators.
- Developing tools to evaluate "proven low and stable Hg content."
- Finding effective solutions for bottom ashes and slags.
- Addressing inconsistencies/differences between IED and BAT.
- **Suggested Practical Tools:**Templates for OTNOC management plans.

- Self-monitoring plans.
- Checklists for inspectors.
- Reports on uniform BAT adoption and interpretation in permits.

4. Overall Conclusions:

The implementation of the 2019 Waste Incineration BAT Conclusions presents a complex landscape across IMPEL member countries. While progress is being made, particularly in areas like energy recovery and circularity, challenges remain in fully aligning existing plants with the new BAT-AELs by the 2024 deadline. Variations in permit setting approaches and the implementation of continuous monitoring for dioxins and mercury highlight areas for further harmonization and guidance development.

The site visits provided valuable practical insights into the application of BATs in real-world settings, showcasing both successful implementations (e.g., wastewater reuse at SELCHP, effective metal recovery at Day Group) and ongoing challenges (e.g., NOx reduction at older plants, dealing with problematic waste). The UK's approach to continuous monitoring, based on demonstrated low emissions, represents a different perspective compared to mandatory requirements elsewhere.

The identified critical points and suggested practical tools underscore the need for continued collaboration and knowledge exchange within the IMPEL network to support inspectors and permit writers in achieving effective and consistent implementation of the WI BAT Conclusions. The project's focus on self-monitoring requirements and developing practical tools is crucial for addressing these challenges.

Next Steps:

- Further analysis of the survey data to identify specific areas requiring guidance.
- Development of practical tools based on the suggestions from the survey respondents.
- Facilitating workshops and knowledge exchange events to share best practices and address implementation challenges.
- Considering the insights from the site visits to inform guidance development, particularly regarding OTNOC management, continuous monitoring approaches, and circular economy aspects of IBA.

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