European Union Network for the Implementation and Enforcement of Environmental Law

Waste Incineration BATc Survey Report

Result of survey on Waste Incineration BAT Conclusions application within IMPEL members

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Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Brussels, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

During the previous years IMPEL has developed into a considerable, widely known organisation, being mentioned in a number of EU legislative and policy documents, e.g. the 7th Environment Action Programme and the Recommendation on Minimum Criteria for Environmental Inspections.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its website at: www.impel.eu

Title of the report: Waste Incineration BATc Survey Report	**Number report:** *2022(III)WG5*
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Executive Summary

The survey has been the first step of the WI subgroup's work that aims to carry out practical tools to help inspectors and permit writers. It wants to "take a picture" of the state of art on how permit writers within IMPEL members are effectively implementing WI BAT Conclusions on the base of their experience/knowledge.

Disclaimer

This report is the result of a project within the IMPEL Network. The content does not necessarily represent the view of the national authorities or the European Commission.

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TABLE OF CONTENTS

1. Scope, timing and structure of the survey

1.1. Premise

BAT Conclusions on waste incineration have been issued in 2019 and their relevant application in IED permits within 2024 is a challenge for regulators.

The need for practical guidance for regulators, permit writers and inspectors is widely felt. Under the joint umbrella of IMPEL "Waste Management & Circular Economy" and "Supporting IED Implementation Project", runs an IMPEL project that aims at examining the implementation issues related to the most critical BAT Conclusions for the Waste Incineration sector.

1.2. Scope of the survey

The objective of the survey has been to gather practise of how the BAT-conclusions are effectively implemented on the base of the experience/knowledge of experts, permit writers and inspectors within IMPEL network.

The survey has been the first step of the WI subgroup's work that aims to carry out practical tools to help inspectors and permit writers.

People have been asked to respond to a questionnaire with their views on Waste Incineration and to spread the questionnaire through the Experts, Permit writers, and inspectors in their country

They could choose as many incinerators as they wanted.

They could submit answers from one up to five, depending on the number of plants they deal with and how much time they had to respond. In case of two or more plants, the suggested criterion has been: choose "the best/ a good environmental performer in addition to other with a satisfactory/less good environmental performance."

1.3. Timing and requests

The survey has been launched in Basecamp in May 2023 as the result of virtual/on-site meetings of core team which have started in October 2022.
https://3.basecamp.com/4481666/buckets/17641762/message_boards/4771647682
The deadline – initially fixed in June 2023- was postponed at the end of August 2023 to give people more time to respond.

1.4. Structure of the survey

In Annex 1 you can find the survey.

The rationale was to make a survey as much user-friendly and timesaving as possible.
Therefore, most questions have been multiple choice; only few presented a text field.

Focus items have been BAT AEL (current and after 2023), continuous monitoring of dioxins and mercury and OTNOC (Other Than Normal Operating Condition)

The survey is composed of 47 questions (apart Terms and Conditions) divided into 13 sections, described shortly in the following paragraphs.

1.4.1. General information (Section 2)

General information refers to the WI plant (the name of the company has been treated anonymously) and to nominal capacity (tons/year for each line); referring to one line of WI plant allows to identify correctly the BAT application in term of BAT-AEL and abatement system.
Other info is the state of the permit, if the renewal process has been completed, ongoing or still to start.

1.4.2. Wastes burnt (Sections 3 and 4)

In this section type of wastes burnt in the plant are asked. Section 3 lists the most common Non-Hazardous Waste (like Refuse Derived Fuel, Sewage sludge), section 4 the most common Hazardous Waste (like Contaminated packaging, Oils, Hazardous wood wastes).
In both sections a free text field is present in case of “others”.

1.4.3. ELV (Sections 5)

In section 5 is asked the general criterion about the choice of Emission Limit value (ELV) within BAT AEL range, if they are set in the middle, at the upper or lower limit in BAT AEL range.

1.4.4. OTNOC (Sections 6)

The management of OTNOC is the issue of Section 6; it is composed of 3 questions. The scope is to understand what is considered as OTNOC and if ELVs are set during OTNOC.
Eventually – if granted at regional or national level- National/regional/local guidelines for OTNOC are asked to attach.

1.4.5. BAT AELs and abatement system (Section7)

Focus of this section are NOx; the abatement techniques adopted by the plant, daily average ELV after 2024 (once BATC are mandatory) and current ELV (daily average) if the permit has not been yet renewed. For ELV the choice is expressed through 5 classes of range (mg/Nm^3), listed below:
<60 61-
80
81-100
101-150
>150
The last question is about the acid gases abatement techniques.

1.4.6. Continuous monitoring Dioxins and mercury (Sections 8 and 9)

Section 8 and 9 aim to gather information on continuous monitoring for dioxins (PCDD/F) and mercury. Questions of the two sections are analogues.
Firstly, is asked if the continuous systems are already in place, or to be prescribed within 2023, or not in place neither prescribed within 2023.
For mercury it has been added “Necessity of continuous monitoring due to past episodes”
In case of not installed long-term sampling the reasons/rationale for "proven low and stable content" is asked.
The other questions are about the current ELV - if the permit has not been yet renewed - or the ELV set in the permit renewal.

1.4.7. Energy Efficiency (Section 10)

This section deals with the issue of energy that represents the real news among the BATC.
Firstly, it’s important to understand if the levels of the energy efficiency set in the BATC are considered mandatory. The not mandatory approach makes the difference either for the company or for the authorities.
The other questions are related to the plant design and its equipment (like gas condenser) increasing the efficiency.
The last question is about the certification ISO standards for EnMS - series 50001.

1.4.8. Derogations (Section 11)

The issue of derogations is dealt in this section.
In case of derogation allowed in the permit the next questions are related to the type of emission (water, air or both), which AELs are derogated (specifying the ELV) and the last of derogation.

1.4.9. Circularity (Section 12)

Circular economy is an issue that you can't take into consideration nowadays.
For a WI plant circularity is shown through:

- Measures in place or prescribed to reduce water usage and to prevent or reduce the generation of wastewater from the incineration plant (BAT 33)
- Measures taken in place or prescribed to treat and recycle slags and bottom ashes.

Specifying these measures is asked.

The last two questions are about the bottom ashes if they are recycled on site or off site and which are the output of bottom ashes and slugs recycling process.

1.4.10. Suggestion (Section 13)

The last section is dedicated to suggestion, is asked to indicate:

- other critical points in the BATC implementation that you would like to focus on in the project (practical tools and workshop)
- which practical tool you would like the project to deliver (e.g. checklist for inspectors, template for OTNOC management plan, self-monitoring plan etc..)

2. Results of the survey

The results of the survey are shown in the following paragraphs. First, it's worth focusing on the number of answers and on the panel of persons that have responded (nationality and their fields of competence),

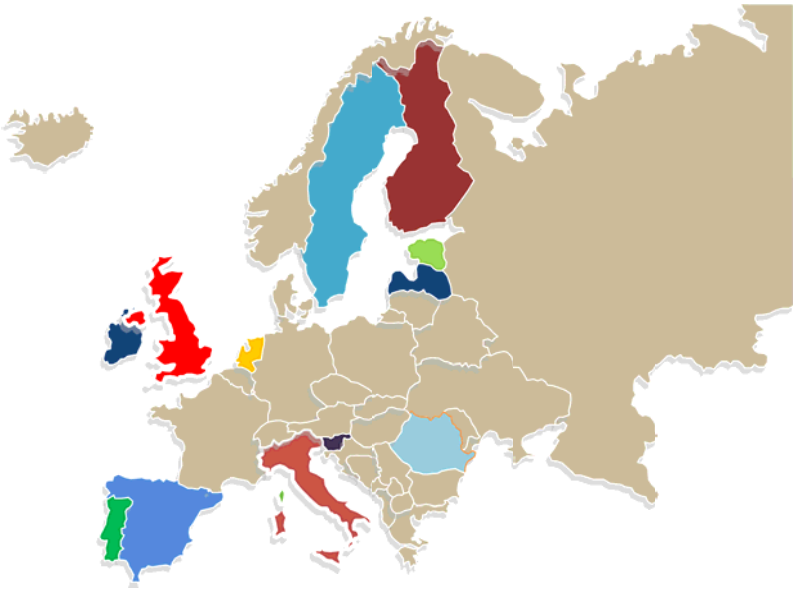
2.1. General information (Section 2)

Responses have been 19; for sure the number can be considered not representative if compared with the number of plants under the scope of WI BATC, but other factors have to be assessed in favour of "representativeness":

- the responses come from different countries spread all over Europe, which mean different approaches.
- the large number of permit writer who filled in the questionnaire: the permit writer is supposed to operate at provincial/regional level; generally, the approach is to "standardize" the BATC application at provincial/regional level even if the application can be case by case.

Romania
Finland
Sweden
Estonia
Spain (4)
Portugal
Ireland
Malta
Italy
Portugal (2)
Slovenia
UK
The Netherlands
Latvia

Inspector	9
Permit writer	8
Other	*2*



Most of permitting processes according BATC were ongoing at the time of the questionnaire.
In 2 cases permit renewal had still to start.

2.1.1. Comments

Considering the nominal capacities, not all the plants are in the scope of BATC (3 ton/h or 10 tons per day); this means that not all the responses are "valid" but allow to get some information about other kind of incinerators like those treating animal carcass wastes.

If, on one side, it needs to be aware that the information from the survey – because of the few responses and the state of art of renewal process - are partial, on the other side the survey can be seen as a chance:

- for having a quick overview of the state of art of BATC application
- to gather documents as regional/national guidelines
- to gather comments

2.2. Wastes burnt (Sections 3 and 4)

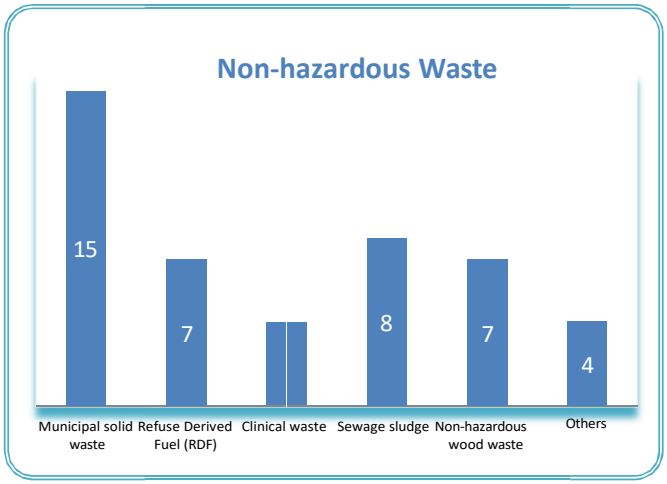
Non-hazardous

Diagram shows that 15 plants treat municipal solid wastes, among these only 2 treat also hazardous ones.

RDF, Sewage sludge and non-hazardous wood wastes are associated with municipal solid waste in the most of cases.

Other than non-hazardous clinical waste others are meant:

- EER 02 01 03, 20 01 99, 19 01 99
- Chemical waste
- Animal By-products and infected birds



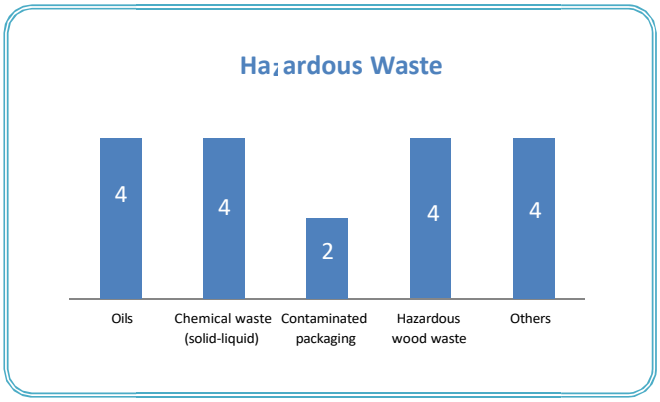
Hazardous

Type of Hazardous wastes are shown in the picture.

Others are meant:

- EER 07 05 04*
- Hazardous clinical waste
- Animal carcass waste

Note that one plant treats only hazardous wastes.
One plant treats animal carcasses, and these two plants have nominal capacities not in the scope of BATC.



2.2.1. Comments

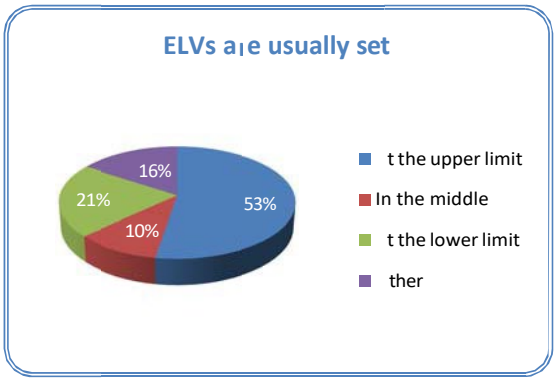
15 of the responses refer to plants which treat municipal solid waste
The “representative sample” is a plant treating Municipal solid wastes combined with RDF, sewage sludge and non hazardous wood wastes.

2.3. ELV (Sections 5)

To the question about ELVs setting, most responses have been “At the upper limit”.

This reflects a general approach to face the issue of new stringent limits to comply with considering:

- The applicability of BAT for existing plants (lack of space, cost-benefits analysis)
- ELVs set in IED are – in most cases- higher than BAT upper limits.



The upper limit can be seen as the best results of the “debate” between the two parts, Competent Authorities and operator, during the permit renew process.

On the other side, an appreciable percentage of responses (21%) has been “At the lower limit”, while 10% has been “in the middle”.

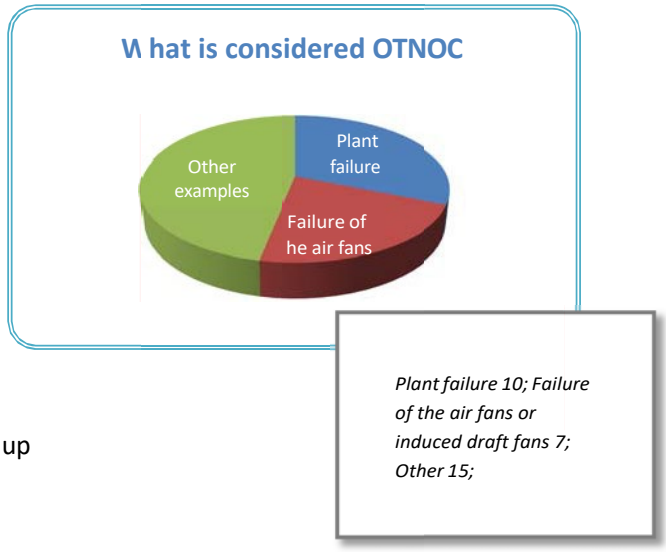
Others have to be meant:

- Limit values according to Order 462/93 (case of carcass waste incinerator)
- ELV is determined based on the results of measurements made by the company: this reflects the tailor-made approach.
- Values higher than the upper limit of BAT-AEL (see forward “Derogation”)

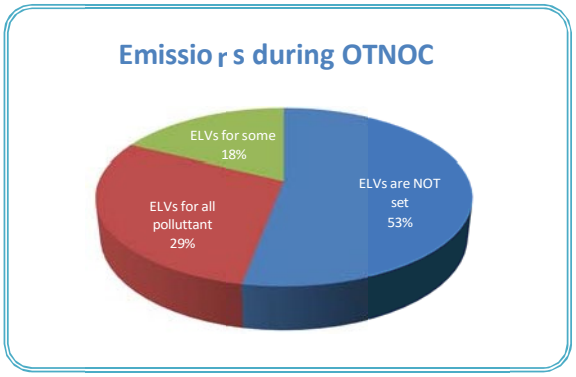
2.4. OTNOC (Section 6)

Responses to "What is considered OTNOC" could be multiple: *Plant failure* and *Failure of the air fans or induced draft fans* were listed.
Given example of "others" have been:

- Accident, incident (because of the electric filter must be switched off)
- N_2O-gas cylinder explosions
- NOx system maintenance
- Atomizer anomaly
- Probe anomaly
- OTNOC risk-based management plan to be drawn up
- Case by case analyses
- Unforeseen situation



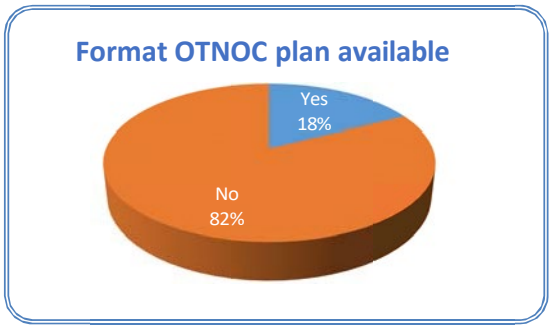
Emissions during OTNOC have to be monitored (BAT 5 and BAT 18).
BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system.
This does not necessarily imply setting ELVs, even if it can be adopted as solution in the permit.
The question about this issue has shown a high percentage of plants with ELV associated to OTNOC.



Other than CO and TVOC, dust (which have to comply with IED provisions) example of pollutants to monitor severely (associated emission limits) are: HCl, NOx, SO2, HF, NH_4 and heavy metals.
Other info about ELVs is not available to go through the issue.

Format of OTNOC management plan was not available at the time of filling in the questionnaire.

Response on the existence of guidelines at national/ regional/ local level has shown results in accordance with the previous question.



2.4.1. Comments on Section 6

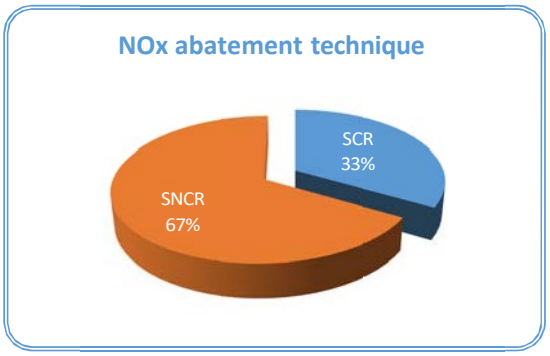
BAT 5 points attention to the OTNOC monitoring to carry out *by direct emission measurements (e.g. for the pollutants that are monitored continuously) or by monitoring of surrogate parameters if this proves to be of equivalent or better scientific quality than direct emission measurements. Emissions during start-up and shutdown while no waste is being incinerated, including emissions of PCDD/F, are estimated based on measurement campaigns, e.g. every three years, carried out during planned start-up/shutdown operations.*

If it's quite easy to monitor emissions trough CEMS during OTNOC (considering enlargement of measurement ranges) it's more complicate in case of micro pollutants like metals.

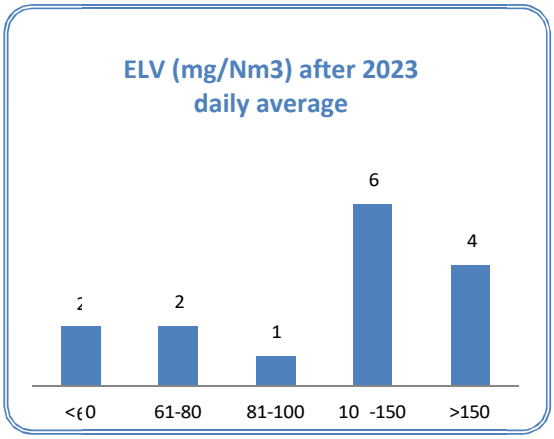
In the renewed permit OTNOC management plan shall be included; results of the survey show that – at the moment of its circulation – format and guideline were not available yet.

2.5. BAT AELs and abatement system (Section7)

Question about NOx abatement technique has shown that the most plants have installed SNCR; none has combination SNCR and SCR.
It's likely that some plant shall install SCR in the next future to comply with the new stringent limits.
SCR has a positive effect non only on NOx reduction but also on PCDD/F levels.
Not all responses have been filled in (1 response empty)



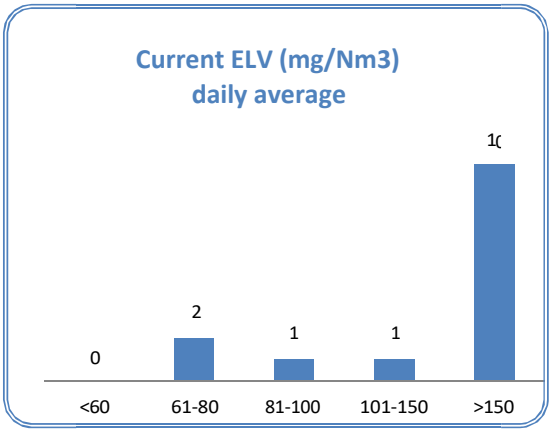
Daily average NOx ELV in the renewed permits has been set in the range 101-150 for most of the cases.
This can be the consequence of the performance of SNCR.
It has to be considered that the limit of 180 is allowed where SCR is not applicable.
Note that for 2 plants ELV are at the lower limit.
Among those with limit over 150 there are plants out of the scope of BATC (e.g. carcass incinerator)
Not all responses have been filled in (4 responses empty)



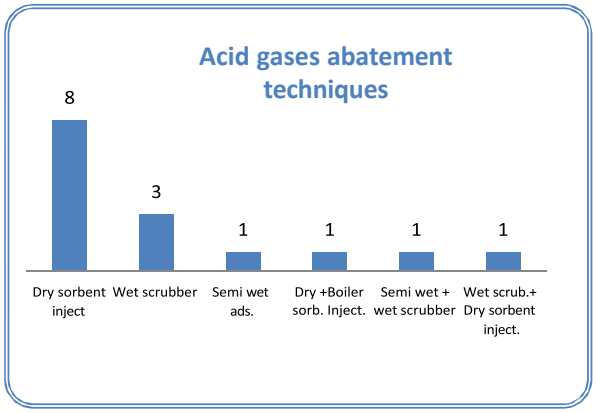
Current NOx ELV are set up over the BATC range at the time of circulation of the survey for most of the cases.
This is the consequence of the previous responses.

Plants equipped with SCR are able to guarantee limit in the middle range.
Note that for none of the plants ELV was at the lower limit.

Not all responses have been filled in (5 responses empty)



The most adopted acid gases abatement technique is dry sorbent injection.
This technique has been largely adopted because its advantages (no water consumption, no wastewater to discharge…)
It also true that it can be not optimal to reach the lowest limits.
It's likely that in the next future wet scrubber could be adopted to comply with stringent limits (mercury for example)
For 1 plant Boiler sorbent injection is adopted.
Not all responses have been filled in (4 responses empty)



2.5.1. Comments on Section 7

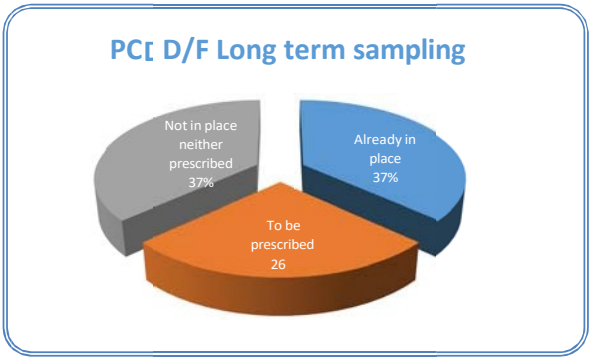
Responses put in evidence some issues:

- Techniques for NOx abatement are consolidated and effective but SNCR can't reach the middle level of BAT-AEL range:
- For many plants reaching BAT AEL for NOX will be a challenge
- Gases abatement technique could need to be implemented to reach the lowest limits.

2.6. Continuous monitoring Dioxins and mercury (Sections 8 and 9)

Dioxins

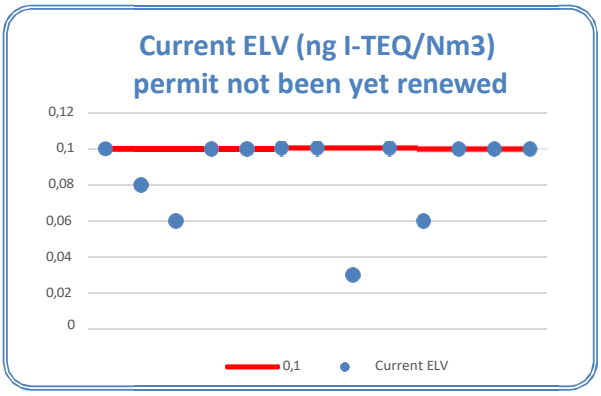
At the time of survey circulation 37% of the plants had in place PCDD/F long term sampling.



The responses on the rationale for "proven low and stable content" - in case of not installed long term sampling neither prescribed- were:

- never been exceedances of the ELV and emission values are stable.
- measurements in 2022 under the limit of detection
- Consistent periodic monitoring results below top end of BAT-AEL range

Current (at the time of survey circulation) ELV were set up at 0,1 (compliance with IED provisions) in the most of cases.

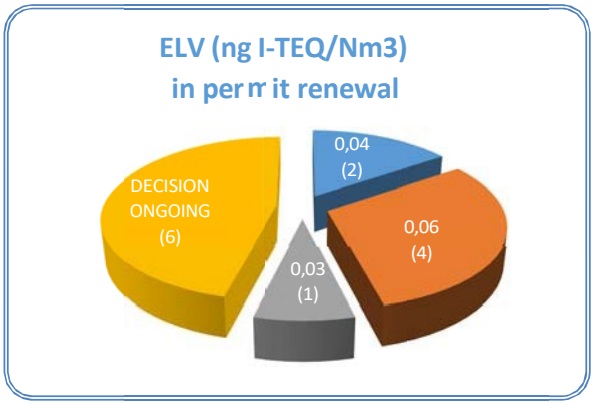


For 4 plants ELV have been set up below 0.1

Note that BAT-AEL range is 0,01–0,06 (Average over the sampling period); 3 plants are compliant with this range.

Not all responses have been filled in (2 responses empty among Municipal waste incinerators)

At the time of survey circulation decisions on PCDD/F ELV in the renewed permit were ongoing for most of the cases. This appears a consequence of the previous responses.

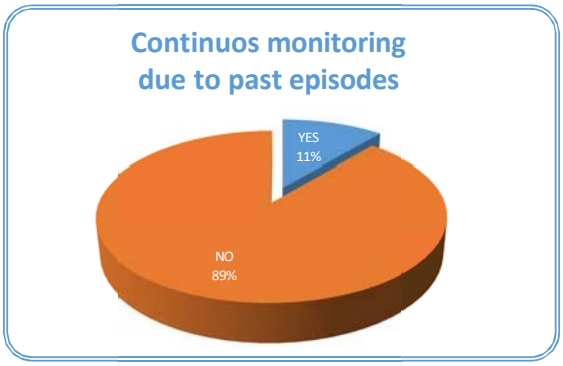


Limit of 0,06 represents the higher value of the range (Average over the sampling period)

Not all responses have been filled in (2 responses empty among Municipal waste incinerators)

Mercury

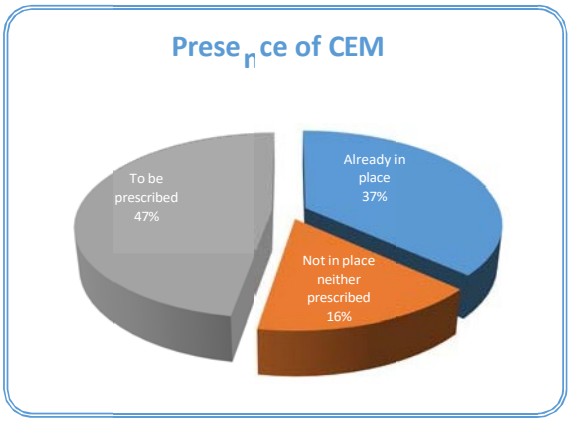
The first question on mercury monitoring aims to assess one of the criteria for prescribing the continuous monitoring. The occurrence of mercury emission peaks has been observed in some cases (11%).



At the time of survey circulation 37% of the plants had in place CEMS for mercury, while for 47% the responses were “to be prescribed”. In comparison with the same question for PCDD long term monitoring, this percentage is higher.

The responses on the rationale for "proven low and stable content" - in case of not installed CEMS neither prescribed (16%)- were:

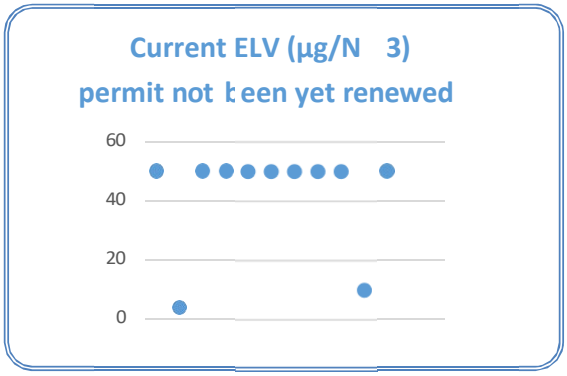
- CEMS is installed, but mercury is not included (measured every six months)
- Never been exceedances of the ELV, and emission values are stable
- Consistent periodic monitoring results for mercury below 10 µg/m^3
- Emission concentration below ELV, proven by emission concentration measurements every half year



Current (at the time of survey circulation) ELV were set up at 50 µg/Nm^3 in the most of cases.

Note that BAT-AEL range is 5–20 (Daily average or Average over the sampling period); 2 plants are compliant with this range.

Not all responses have been filled in (4 responses empty among Municipal waste incinerators)

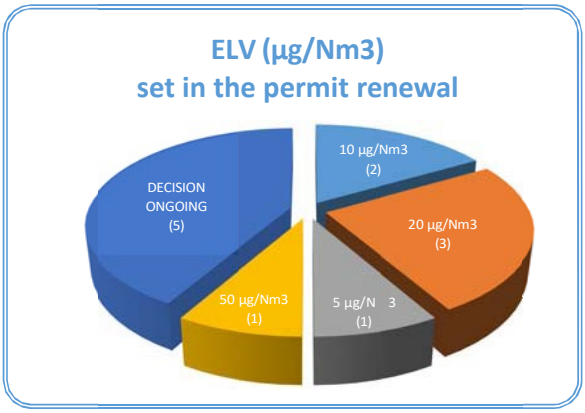


Among 11 responses , two comments have been added on ELV set in the permit:

- 0.05 mg/Nm3 (at least 2 annual samplings: interval between measurements must be minimally two months)
- 0,05 mg/m3 - half an hour average value, daily average value is not defined.

Question on ELV (µg/Nm^3) set in the permit renewal have shown that

- At the time of survey circulation decisions on mercury monitoring in the renewed permit were ongoing for most of the cases.
- For 3 plants limit is the higher end of the BAT-AEL range
- For 2 plants limit is set up in the middle range
- For 1 plant limit is the lower end of the BAT-AEL range



This appears a consequence of the previous responses. It needs to consider also that The higher end of the BAT-AEL ranges may be associated with the use of dry sorbent injection (*note 2 table 8 BATC*) which is the most applied acid gases abatement technique.

Not all responses have been filled in (4 responses empty among Municipal waste incinerators)

Among 11 responses , two comments have been added on ELV set in the permit:

- no limit over a 24 month period after permit renewal; upper limit of BAT AEL for sampling period (monthly)
- 0,05 mg/m3 - half an hour average value, 0,02 mg/Nm3 daily average value

2.6.1. Comments on Section 8 and 9

Responses put in evidence some issues:

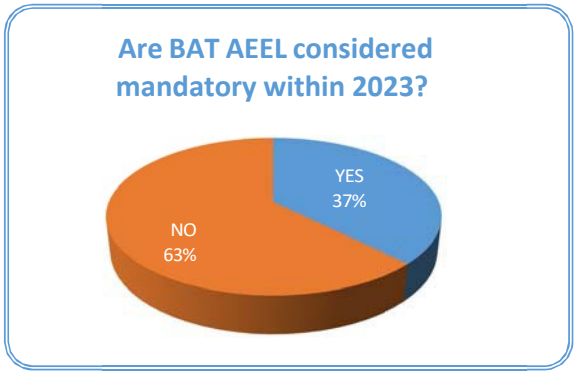
- Application of BAT 30 and BAT 31 represents an “on-going challenge” for most of the cases.
- Appreciable percentage of “not installed neither prescribed” continuous systems, the higher percentage for PCDD/F long term sampling.
- Other abatement technique could be implemented to reach the BAT AEL range for mercury.

2.7. Energy Efficiency (Section 10)

The application of BAT AEEL on energy efficiency represents a real challenge for waste incinerator in the next future.

First question on how BAT AEEL are considered shows a high percentage of cases that do not consider mandatory the levels listed in Table 8 (BAT 20 BATC Decision)

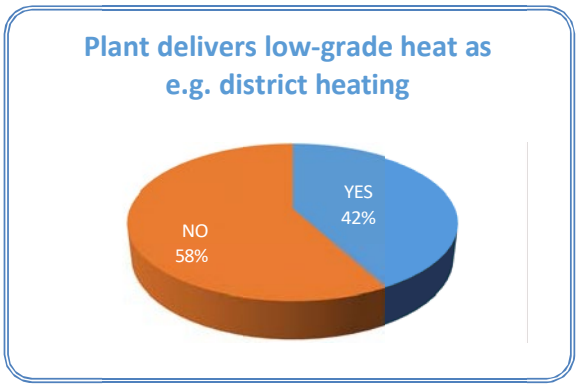
This approach is based on the difference between BAT AEL (which IED provisions consider explicitly as mandatory) and AEEL, Associated Energy Efficiency Levels, which can be seen as a target to reach.



The next question is related to the application of BAT 19

The energy contained in the flue-gas is recovered in a heat recovery boiler producing hot water and/or steam, which may be exported, used internally, and/or used to produce electricity-

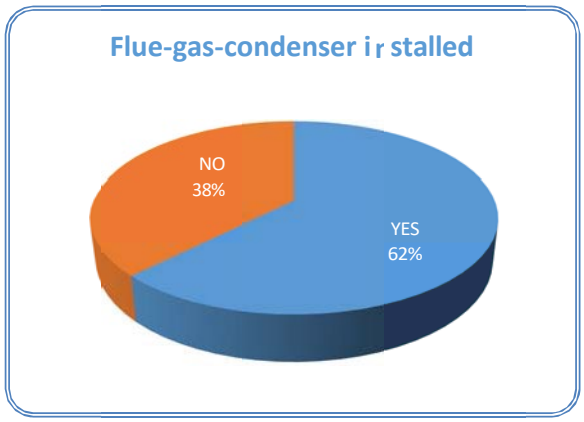
42% of the plants deliver low-grade heat externally.



Other question is related to the application of BAT 20 on technique in order to increase the energy efficiency of the incineration plant, Flue-gas condenser.

A heat exchanger or a scrubber with a heat exchanger, where the water vapour contained in the flue-gas condenses, transferring the latent heat to water at a sufficiently low temperature (e.g. return flow of a district heating network). The flue-gas condenser also provides co- benefits by reducing emissions to air (e.g. of dust and acid gases).

A great percentage (62%) responded affirmatively.

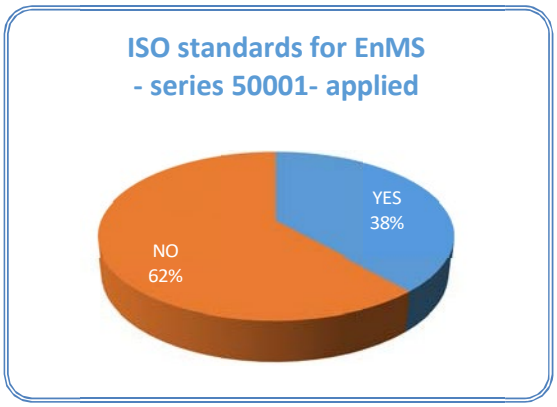


The last question of the section was about the application of ISO standards for EN - series 50001.

Although not listed among BATs, ISO standards are applied for an appreciable percentage of plants (38%)

Not all responses have been filled in (3 responses empty among Municipal waste incinerators)

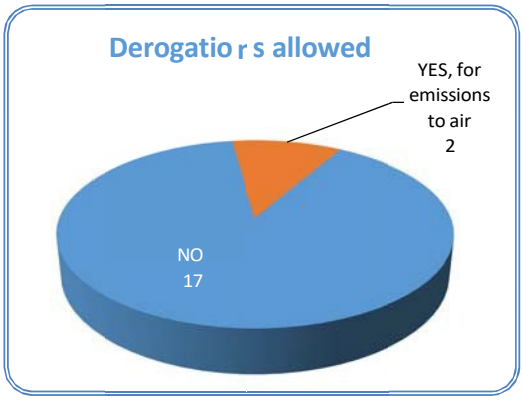
Among 13 responses , one comment has been added
The execution of the Energy Consumption Rationalization Plan was validated and is valid until 2024



2.8. Derogations (Section 11)

Responses on derogations allowed have shown 2 cases of plants treating municipal solid wastes; both derogations are for emissions to air.

Case 1 is not related directly to BAT AEL.
It's due to NOx emissions from natural gas boilers, not in continuous use.
Derogation is for ELV for NOx (daily average) and it has been allowed until 31.12.2023



Case 2 is related directly to BAT AEL and it concerns the following parameters
HF (daily average)
NO_x (daily average)
Mercury (average over sampling period)
Metals (average over sampling period)

- Cd+Tl
- Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V

It has been allowed until 2028-12-14 (permit validity)

2.9. Circularity (Section 12)

Circular economy is an issue that you can't take into consideration nowadays.
For a WI plant circularity is shown through:

- Measures in place or prescribed to reduce water usage and to prevent or reduce the generation of wastewater from the incineration plant (BAT 33)
- Measures taken in place or prescribed to treat and recycle slags and bottom ashes.

Except for two cases of no implementation, responses have shown a general application of BAT33 due to the use of dry abatement systems; therefore, wastewater connected to the incineration plant is not produced.
Recycling water is applied for two of plants with other abatement systems.
For the plant with semi-wet absorber water is recycled - e.g. use of boiler blow down and for bottom ash quenching.
In the case of the presence of two stage wet scrubber wastewater is collected for recycling in the flue gas treatment system or used for humidification/cooling of the bottom ash outlet.
Two responses have specified measures for re-use of rainwaters:

- storage in an attenuation tank for re-use in the process
- collection and use for washing areas.

In relation to the treatment and recycling of slags and bottom ashes responses have shown that for the most cases processes are carried out off-site.

It needs a clarification on what is meant for process and its different steps.
Recovery of metals is widely applied as first step, but the final "destiny" of bottom ashes can be different:

- maturation, screening and separating to produce secondary aggregates
- valorised in a cement kiln
- placed in landfill.

Analogously for slags, after the recovery of metal they are reused as or placed in landfill-
One response has specified that

- Ferrous slags sold to scrap dealers for recycling;
- Non-ferrous slags sold to construction companies for road construction processes.

while another response was done with the comment that the government is in the process of assessment of a new valorisation installation for slags treatment.

2.10. Suggestion (Section 13)

The last section is dedicated to suggestion, has been asked to indicate:

- other critical points in the BATC implementation that you would like to focus on in the project (practical tools and workshop)
- which practical tool you would like the project to deliver (e.g. checklist for inspectors, template for OTNOC management plan, self-monitoring plan ecc.)

Critical points in the BAT have been considered

- What should be covered or how should the OTNOC management plan be implemented
- How to check reliability of the energy efficiency data provided by the company
- Tools to evaluate 'proven low and stable Hg content' in an installation
- Solutions for bottom ashes and slugs
- Inconsistencies/differences between IED/BAT

Example of suggestion of practical tools have been:

- Template for OTNOC management plan
- Self-monitoring plan
- Check-list for inspectors
- Report on WI BAT adoption in permits (uniform implementation, different interpretation)

Annexes

Annex I. Survey

WMCE & IED IMPLEMENTATION PROJECTS - Subgroup "Waste Incineration"

Section 1

Information

BAT Conclusions on waste incineration have been issued in 2019 and their relevant application in IED permits within 2024 is a challenge for regulators. The need for practical guidance for regulators, permit writers and inspectors is widely felt. Under the joint umbrella of IMPEL "Waste Management & Circular Economy" and "Supporting IED Implementation Project", runs an IMPEL project that aims at examining the implementation issues related to the most critical BAT Conclusions for the Waste Incineration sector. A particular focus of the work will be on self-monitoring requirements. The project will also draft practical tools to help inspectors and permit writers.

The objective of the survey is to gather practise of how the BAT-conclusions are effectively (basing on your experience/knowledge) implemented in your country/region/province. You can choose as many incinerators as you want. It is enough to submit answers from one up to five, depending on how many plants you have in your country/region/province (and how much time you have). If you have several, choose maybe "the best/ a good environmental performer in addition to other with a satisfactory/less good environmental performance."

The project team would like to kindly ask the Experts, Permitters, and Inspectors in IMPEL to please support this work and respond to a questionnaire with your views on Waste Incineration BATC implementation.

We would be very grateful if you could spread the questionnaire, accessible here, through the Experts, Permitters, and inspectors in your country to get their individual views.
If you have any document(s), preferably in English, that you could share, please provide the link(s), or if not available on the internet, please attach them or send to the provided email addresses.

Thank you so much for your support!
Fabio Colonna, Romano Ruggeri

DEADLINE: Please fill in the questionnaire no later than **7th June 2023**.
If you have further technical questions, please contact the Subgroup referents: Romano Ruggeri (rruggeri@impel.eu), Fabio Colonna (f.colonna@arpalombardia.it) or post your question on Basecamp - 2022 Supporting IED implementation, subgroup WG9 waste incineration (https://3.basecamp.com/4481666/buckets/17641762/message_boards/4771647682). Then more people can benefit from Q&As given at the same time.

1. NAME AND SURNAME

2. COUNTRY

3. AGENCY

4. ROLE (INSPECTOR - PERMIT WRITER - OTHER)

5. EMAIL

Section 2

GENERAL INFORMATION

6. Name of the Company

7. Town of the installation

8. Nominal capacity (tons/year for each line)

9. Permit renewal within 4 years from BATc
   - Done
   - Ongoing
   - Still to start

10. Useful documents

Send useful documents as Guidelines at the following address: rruggeri@impel.eu, f.colonna@arpalombardia.it
List below the documents you have provided.

Section 3

NON-HAZARDOUS WASTE

11. Non-hazardous Waste burned at the incineration plant
   - Municipal solid waste
   - Refuse Derived Fuel (RDF)
   - Clinical waste
   - Sewage sludge
   - Non-hazardous wood waste
   - Others (specify below)

Section 4

HAZARDOUS WASTE

12. Hazardous Waste burned at the incineration plant
   - Oils
   - Chemical waste (solid-liquid)

- Contaminated packaging
- Hazardous wood waste
- Others (specify below)

Section 5

EMISSIONI LIMIT VALUES

13. ELVs are (usually) set
    - At the lower limit of BAT-AEL
    - At the upper limit of BAT-AEL

Section 6

OTNOC

14. According to the plant management plan (BAT 1, 18) what is considered as OTNOC? (Premise: excluding start up and shut-down OTNOC is related to the following occurrences)
    - Plant failure (e.g. boiler)
    - Failure of the air fans or induced draft fans
    - Other examples (specify below)

16. Emission values during OTNOC
    - ELVs are NOT set
    - ELVs are set for ALL pollutants mentioned in BATc
    - ELVs are set for SOME pollutants mentioned in BATc

17. If ELVs are set for SOME pollutants, specify which ones

Free text

18. Is a format of OTNOC management plan (BAT 18) available?
    - Yes (if yes please send a copy via email)
    - No

19. National/regional/local guidelines exist for OTNOC
    - YES (Please provide the link below or send it via email)
    - NO

Section 7

NOx AND ACIDS

20. NOx abatement technique
    - SCR
    - SNCR
    - Combination SCR-SNCR

21. ELV (mg/Nm3) after December 2023, daily average
    - <60
    - 61-80
    - 81-100
    - 101-150
    - >150

22. Current ELV (mg/Nm3 - daily average) if the permit has not been yet renewed
    - <60
    - 61-80

- 81-100
- 101-150
- >150

23. Acid gases abatement techniques
    - Wet scrubber
    - Semi wet adsorber
    - Dry sorbent injection
    - Boiler sorbent injection

Section 8

PCDD/PCDF

24. Long term sampling
    - Already in place
    - To be prescribed within 2023
    - Not in place neither prescribed within 2023

25. In case of not installed long term sampling specify the reasons/rationale for "proven low and stable content"

Free text

26. Current ELV (ng I-TEQ/Nm3) if the permit has not been yet renewed

Free text

27. ELV (ng I-TEQ/Nm3) set in the permit renewal within 2023

Section 9

Mercury: continuous monitoring

28. Necessity of continuous monitoring due to past episodes
    - YES
    - NO

29. Presence of CEMS
    - Already in place
    - To be prescribed within 2023
    - Not in place neither prescribed within 2023

30. In case of not installed CEMS specify the reasons/rationale for "proven low and stable content" (e.g. no presence in the waste)

Free text

31. Current ELV (mg/Nm3) if the permit has not been yet renewed

Free text

32. ELV (mg/Nm3) set in the permit renewal within 2023

Free text

Section 10

Energy efficiency

33. Are BAT AEEL considered mandatory within 2023?
    - YES

- NO

34. Does the plant deliver low-grade heat as e.g. district heating?
    - Yes
    - No

35. Is flue-gas-condenser installed?
    - Yes
    - No

36. Are ISO standards for EnMS - series 50001- applied?
    - Yes
    - No

37. Please include here other input you want to leave on energy efficiency

Free text

Section 11

DEROGATIONS

38. Have any derogations been allowed?
    - NO
    - YES, for emissions to water
    - YES, for emissions to air
    - YES, for both emissions to air and water

39. If YES, for which BAT-AELs?

Free text

40. What ELV has been allowed (insert value set in the permit)

Free text

41. How long is the derogation for ?

Free text

Section 12

CIRCULARITY

42. Measures in place or prescribed to reduce water usage and to prevent or reduce the generation of waste water from the incineration plant (BAT 33)

Free text

43. Measures in place or prescribed to treat and recycle slags and bottom ashes

Free text

44. Are bottom ashes recycled?

Yes, the treatment plant is within the incineration installation

Yes, bottom ashes are sent to an external waste recycling installation

No

45. Which products are the output of bottom ashes and slugs recycling process?

Free text

Section 13

SUGGESTIONS

46. Please indicate here other critical points in the BATc implementation that you would like to focus on in the project (practical tools and workshop)

Free text

47. Please indicate here which practical tool you would like the project to deliver (e.g. checklist for inspectors, template for OTNOC management plan, self-monitoring plan ecc.)

Free text

Section 14

TERMS AND CONDITIONS

48. Do you accept IMPEL's Terms and Conditions?

I have accepted the terms and conditions in the IMPEL privacy policy https://www.impel.eu/en/privacy-policy

No, I do not accept. I will inform the IMPEL Secretariat by email to info@impel.eu of m

IMPEL projects

Waste management & Circular Economy

Supporting IED Implementation Project

Waste Incineration (WI) Subgroup

SITE VISIT REPORT

Veolia's South-East London Combined Heat and Power municipal WI

Day Group's Greenwich Incinerator Bottom Ash treatment plant

1-2 November 2023

London, UK

Preparation of the inspection

- Draw up of the agenda of the meeting
- Definition of the main topics to be discussed
- Getting of the permit of *Veolia's South-East London Combined Heat and Power municipal WI* and *Day Group's Greenwich Incinerator Bottom Ash treatment plant*
- Preparation of the starting presentation (PPT) containing presentation of the previous and next steps of the project (subgroup 09)

Agenda

WEDNESDAY 1 November (SAFETY SHOES NEEDED)		
Transfer to Veolia's South-East London Combined Heat and Power municipal WI by public transport		
1	Welcome by the Operator and tour de table	09:30
2	Presentation by the host	09:40
3	Presentation of the IMPEL project	10.00
4	Site visit at the incinerator	10.15
LUNCH		12:30
5	Discussion on results of site visit and on Waste Incineration BAT Conclusions. Report the key points	13:30
6	Presentation and review of the outcome of the Waste Incineration BATCs questionnaire. Discussions on the self-monitoring plan.	14.30
7	Presentations from Member States	16.00
8	Final discussion: follow up of the Waste Incineration subgroup and ideas 20245-2027	16.30 – 17.00

THUSDAY 2 November (SAFETY SHOES NEEDED)		
Transfer to Day Group's Greenwich Incinerator Bottom Ash treatment plant		
1	Welcome by the Operator and tour de table	09:30
2	Presentation by the host	09:40
3	Presentation of the IMPEL project and Circular Economy Guidance (EoW practical tools)	10.00
4	Site visit at the incinerator	10.15
5	Discussion on the results of the site visit and on End of Waste legislation application. Report the key points	12.00

Participants

- Ben Freeman - E&B Senior Advisor (Energy from Waste) Environment Agency (England & Wales) – UK
- Enxhi Oga - Albania
- Giorgos Zouppouris - Cyprus
- Aglaia Georgaka - Cyprus
- Ave Jalakas - Estonia
- Rainer Norman Bulitta - Germany
- Fabio Colonna - Italy
- Gabriella Leanne Grima - Malta
- Jan Teekens - Netherlands
- João Paulo Resendes Fernandes Bettencourt da Silva - Portugal
- Mihaela Monica Crisan - Romania
- Hipólito Bilbao - Spain
- Mikel Neve - Spain
- Will Fawcett – UK *(present at site visit day1)*

Visited plants

Day 1: Veolia municipal Waste Incinerator

https://www.london.veolia.co.uk/energy-recovery-facilities

South East London Combined Heat and Power (SELCHP)
The Kennels Site
Landmann Way
Lewisham London SE14 5R

Environmental Agency Permit

Permit number EPR/NP3738SY
Issued by the Environmental Permitting (England & Wales)
under regulation 27(2) of the Regulations, standard conditions rules SR2008No1
The permit controls the operation of a waste incineration plant. The relevant listed activity is 5.1 A(1)(b).
The permit implements the requirements of the EU Directives on Industrial Emissions and Waste

Brief description of the process

Furnace technology: Moving Grate
Number of lines: 2
Principal waste type: Municipal
Stack height: 100 m
Permitted plant capacity: 464,000 tonnes per year
Electrical generation capacity: 32 MWe
Heat export capacity: 9.5 MWth

Structure of permit

Permit is composed of 4 parts:

- Conditions
- Operations
- Emissions and monitoring
- Information

and 7 Schedules:

- Operations
- Waste types, raw materials and fuels
- Emissions and monitoring
- Reporting
- Notification
- Interpretation
- Site plan

Each part is composed of paragraphs containing provisions while in the schedules information such as the list of permitted wastes or ELVs (Emission Limit values) are listed.

Focus was laid on the following points of the permit:

- Table S1.3Improvement programme requirements (Schedule 1 – Operations)
- Table S3.1 Point source emissions to air – emission limits and monitoring requirements (Schedule 3 – Emissions and monitoring)
- Residue quality (Schedule 3 – Emissions and monitoring)
- Par. 3.2 Emissions limits and monitoring for emission to air

Day 2: Day Group's Greenwich Incinerator Bottom Ash treatment plant

https://www.daygroup.co.uk/our-group/recycling/incinerator-bottom-ash/

Day Group Limited
Murphy's Wharf
Lombard Wall
Greenwich
London
SE7 7SH

Environmental Agency Permit

Last Permit number EPR/DP3490EU
Issued by the Environmental Permitting (England & Wales)
under regulation 20 of the Environmental Permitting (England and Wales) Regulations 2016 varies

Status log of the permit in reference to IBA (Incinerator Bottom Ash)

- variation and consolidation dated 11/02/21 EPR/DP34490EU/V006 : Application for the addition of EWC code 19 12 12, and the increase of IBA processing from 100,000(t) per year to 140,000(t) per year
- the last variation of permit EPR/DP3490EU: authorisation of external storage of IBA and increase in the storage capacity of the A2- Storage of waste- activity by 4,500 tonnes.

Brief description of the facility and its drainage systems

The facility is used for the handling of waste streams to produce a range of high-quality recycled aggregates including glass cullet and hydraulically bound mixtures (HBM). Currently, glass, construction and demolition materials (C&D), utility waste, Incinerator bottom ash (IBA) and IBA aggregate are accepted.
The site has independent drainage systems for each treatment area. Run off from the C&D plant is collected in settlement pits and recycled for use on the site with surplus passing through a 3-phase interceptor before being discharged to a combine sewer or percolated into the underlying strata.
Run off from the glass processing area is collected in settlement pits and then pumped to a water management plant where clean water is recovered for use in the washing process. The water is then recycled into the glass washing plant and the site

dust suppression systems. In the event of there being any surplus run off from this area, it is discharged to sewer.
Run off from the HBM goes to the C&D settlement pit. IBA from impermeable storage area 2 is discharged to sewer.

Structure of permit

Permit is composed of 5 parts:

- Conditions
- Operations
- Emissions and monitoring
- Information

and 7 Schedules:

- Operations
- Waste types, raw materials and fuels
- Emissions and monitoring
- Reporting
- Notification
- Interpretation
- Site plan

Each part is composed of paragraphs containing provisions while in the schedule information such as the list of permitted wastes or ELVs (Emission Limit values) are listed.

Focus was laid on the points related to IBA:

- Table S1.1 Activities- Directly Associated Activity A2 - Schedule 1 – Operations
- Table S3.1 Point source emissions to sewer, effluent treatment plant or other transfers off-site emission limits and monitoring requirements–Schedule 3 – Emissions and monitoring.

Day 1

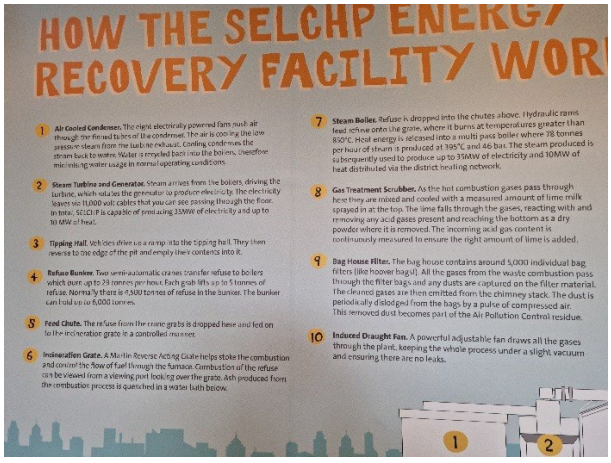
Site Visit (morning)

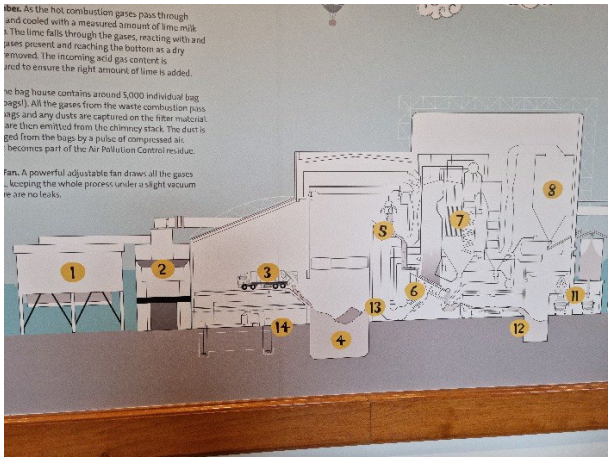
The first day was dedicated to the site visit of Veolia Waste Incinerator

Prior to the site visit a meeting in the conference room was taken in which Ben Freeman - E&B Senior Advisor (Energy from Waste) of the Environment Agency of England- introduced the IMPEL group to the operator, Fabio Colonna (co leader of WI subgroup) gave an overview about the general objectives of the WI project.
After a tour de table among all IMPEL participants, the operator Mr Husain Suwasrawala (Plant manager) gave a presentation of the installation and the general obligations of an operator.

During site visit focus was laid on the following part of plants.

A tour of the plant where participants learned about the waste incineration process, and some of the challenges faced by the operator such as dealing with nitrous oxide cylinders in the waste which explode and damage the furnace.





Control Room

Control screens show plant schematic and essential operating parameters.
Real time emissions levels are also displayed, with visual and audible alarms if an emissions limit is close to being exceeded, or is actually exceeded.

Receipt of waste

Visual inspection
NO Pre-treatment of waste prior to incineration
NO Radioactivity detection (no Clinical wastes)

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.

Municipal solid waste and other non-hazardous waste

— Radioactivity detection — Weighing of the waste deliveries — Visual inspection — 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.

Sewage sludge

— Weighing of the waste deliveries (or measuring the flow if the sewage sludge is delivered via pipeline) — Visual inspection, as far as technically possible — Periodic sampling and analysis of key properties/substances (e. g. calorific value, content of water, ash and mercury)

BAT 14. In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below

Waste blending and mixing prior to incineration includes for example the following operations: — bunker crane mixing; — using a feed equalisation system; — blending of compatible liquid and pasty wastes. In some cases, solid wastes are shredded prior to mixing.

Electricity Generation

Generation of ~ 32 MWe electrical power using a steam turbine from energy recovered from the flue gases.
Most of the electricity is exported to the national electricity network.
Some electricity is also sent via “private wire” to charge electric vehicles which collect the waste.

Heat export

Heat export to the district heating network

The boilers, heat exchangers, pumps and associated pipe work located in the District Heating Hall – responsible for servicing the district heating network.

The plant is currently exporting 20 MW of heat but is designed to supply up to 40 MW. With an additional heat exchanger it will be able to supply up to 60 MW of heat, with plans to expand the district heating network from the end of 2025.

BAT 19. In order to increase the resource efficiency of the incineration plant, BAT is to use a heat recovery boiler.
Description The energy contained in the flue-gas is recovered in a heat recovery boiler producing hot water and/or steam, which may be exported, used internally, and/or used to produce electricity.

Dust emissions

Incinerator bottom ash (IBA) is discharged into bunkers as per the picture. The bunker is inside a building, and the IBA is wet after having been quenched in water, and so there is very little risk of dust emissions from this source.

BAT 24. In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below

- *Enclose/encapsulate potentially dusty operations (such as grinding, screening) and/or cover conveyors and elevators. Enclosure can also be accomplished by installing all of the equipment in a closed building.*
- *(omissis)*

Channelled emissions

Abatement system: Bag Filter, Semi-wet absorber, Selective non-catalytic reduction (SNCR)

Wastewater treatment plant

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. Boiler blow down water and any other effluent is discharged to sewer, and rain water is discharges to surface water.

BAT 32. In order to prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to segregate waste water streams and to treat them separately, depending on their characteristics.

Bottom ashes

Ash is sampled every 2 months and the total organic carbon tested to ensure that it is below 3%. The plant has not had any recent exceedances of this limit, showing the combustion control systems are working well.
As described above, ash is quenched in a water bath, and no heat is recovered. Before it leaves the site, the ash is passed over magnets to remove large pieces of ferrous metal which are sold on to be recycled.
The bottom ash is sent off site for further metals recovery before being made into an aggregate for construction projects.

BAT 7. BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency given below and in accordance with EN standards

BAT 20 In order to increase the energy efficiency of the incineration plant, BAT is to use an appropriate combination of the techniques given below.

- *Dry, hot bottom ash falls from the grate onto a transport system and is cooled down by ambient air. Energy is recovered by using the cooling air for combustion.*

BAT 24. In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below.

- *Enclose/encapsulate potentially dusty operations (such as grinding, screening) and/or cover conveyors and elevators. Enclosure can also be accomplished by installing all of the equipment in a closed building*
- *Match the discharge height to the varying height of the heap, automatically if possible (e.g. conveyor belts with adjustable heights).*
- *Protect bulk storage areas or stockpiles with covers or wind barriers such as screening, walling or vertical greenery, as well as correctly orienting the stockpiles in relation to the prevailing wind*
- *Install water spray systems at the main sources of diffuse dust emissions. The humidification of dust particles aids dust agglomeration and settling. Diffuse dust emissions at stockpiles are reduced by ensuring appropriate humidification of the charging and discharging points, or of the stockpiles themselves*
- *Optimise the moisture content of the slags/bottom ashes to the level required for efficient recovery of metals and mineral materials while minimising the dust release.*
- *Carry out the treatment of slags and bottom ashes in enclosed equipment or buildings (see technique a) under subatmospheric pressure to enable treatment of the extracted air with an abatement technique (see BAT 26) as channelled emissions*

BAT 35. In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.

Other Wastes

2 silos: fly ashes, dry FGC residues

The plant also produced fly ash and APC residue. APC residue is a mixture of spent activated carbon (for absorbing dioxins and heavy metals) and lime (for abating acid gases). The fly ash and APC residue is sent off for disposal at hazardous waste landfill.

Discussion (afternoon)

Focus was laid on the following items

- The challenges of establishing new district heating networks in the UK
- Radioactivity monitoring, and semi-wet scrubbing systems for acid gases
- Working with operators to reduce NOx emissions
- The derogations process and forthcoming changes to IED which will require operators to meet the lower end of the BAT-AEL ranges
- Requirements for continuous mercury monitoring and dioxins sampling

Continuous monitoring PCDD and mercury

In the UK, operators do 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/m^3. Protocols have been written which operators must follow to demonstrate this.
The Veolia plant, and many other UK municipal waste incinerators, are able to meet these requirements, and so do not have to do continuous monitoring. This is different from most other EU countries who have decided to make this mandatory for municipal plants.

Perception of WI from citizens

WI remains controversial in the UK and elsewhere in Europe. There are no waste incinerators in Romania, which instead still relies on landfill as the main disposal method for residual waste. Incinerators are much cleaner than they used to be, although they do produce large amounts of CO2. But they are still a better option for the climate than landfill.

During the event, meetings were also held to present and review the outcome of the Waste Incineration BATCs questionnaire (*see Presentations attached*) discuss the self-monitoring plan, and present ideas for future work of the Waste Incineration Subgroup.

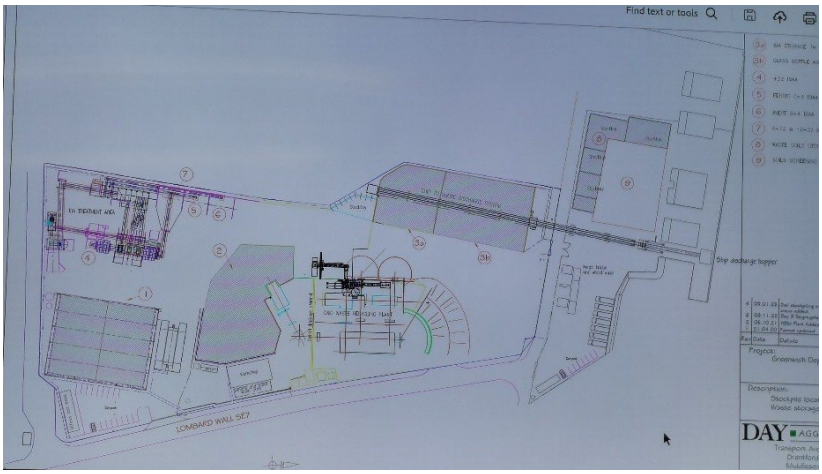
Conference Rooms at Veolia

Day 2

Site Visit (morning)

The second day was dedicated to the site visit of Day Group's Greenwich Incinerator Bottom Ash treatment plant.

Prior to the site visit a meeting in the conference room was taken in which the operator gave a presentation of the installation and the general obligations of the operator.



During site visit focus was laid on the following part of plants.

A tour of the plant (which processes the bottom ash from the SELCHP plant that we visited the day before)

Demonstration of some of the dust control measures at the site.

BAT 36. In order to increase resource efficiency for the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below based on a risk assessment depending on the hazardous properties of the slags and bottom ashes.

(a) Screening and sieving : Oscillating screens, vibrating screens and rotary screens are used for an initial classification of the bottom ashes by size before further treatment.
(b) Crushing : Mechanical treatment operations intended to prepare materials for the recovery of metals or for the subsequent use of those materials, e.g. in road and earthworks construction.
(c) Aeraulic separation : Aeraulic separation is used to sort the light, unburnt fractions commingled in the bottom ashes by blowing off light fragments. A vibrating table is used to transport the bottom ashes to a chute, where the material falls through an air stream that blows uncombusted light materials, such as wood, paper or plastic, onto a removal belt or into a container, so that they can be returned to incineration.
(d) Recovery of ferrous and non-ferrous metals : Different techniques are used, including: — magnetic separation for ferrous metals; —eddy current separation for non-ferrous metals; — induction all-metal separation
(e) Ageing The ageing process stabilises the mineral fraction of the bottom ashes by uptake of atmospheric CO_2 (carbonation), draining of excess water and oxidation. Bottom ashes, after the recovery of metals, are stored in the open air or in covered buildings for several weeks, generally on an impermeable floor allowing for drainage and run-off water to be collected for treatment. The stockpiles may be wetted to optimise the moisture content to favour the leaching of salts and the carbonation process. The wetting of bottom ashes also helps prevent dust emissions.
(f) Washing The washing of bottom ashes enables the production of a material for recycling with minimal leachability of soluble substances (e.g. salts).

Discussion (after site visit)

Focus was laid on the following items:

- the possibility of end-of-waste status for incinerator bottom ash in the UK and elsewhere
- the techniques used at the site to monitor and control dust emissions
- the economics of non-ferrous metals removal from the bottom ash

CONCLUSIONS

Lessons learned

Type of industry	Lessons
Waste Incinerator **and** **Bottom Ash Treatment plant** London 1-2 Nov 2023	Highlights • Reduction of NO_x emission: Selective non-catalytic Reduction (SNCR) • Radioactivity detection • Plan to expand the current district heating network • Requirements for continuous mercury monitoring and dioxins sampling • Possibility of end-of-waste status for incinerator bottom ash in the UK and elsewhere Findings – waste incinerator • Plant is well located - no visual impact • Facility appeared to be well-organised • Waste into the furnace: dealing with nitrous oxide cylinders hidden in the waste which explode and damage the furnace (normally the grate bars). Sale of nitrous oxide cylinders has now been banned in the UK which should help reduce these events. • No pre-treatment of waste prior to incineration except for mixing and blending • No radioactivity detection (no clinical wastes) – the UK's position is that radioactivity detection is not needed at incinerators, as the regulatroy system for control of radioactive sources is sufficiently robust. • Plan to expand the current district heating network. Plant is current supplying 20 MW of heat. It was desgined to supply 40 MW but should be supplying up to 60 MW of heat by 2026. Power from the plant is also used to charge a fleet of electric refuse collection vehicles. • Semi-wet scrubbing systems for acid gases. This means that lime is fed in to the reactor as a wet slurry. No municipal waste incinerators in England have wet scrubbers – only hazardous waste incinerators. • Plan to reduce NOx emissions. The facility is quite old and so the ability to reduce NOx below the new ELV of 180 mg/m3 is limited. But the operator may be asked to look at potential for further improvements such as fitting a more sophisticated ammonia injection and control system. Findings – IBA treatment plant • Good dust control systems including covered conveyors and water sprays fitted to the front of vehicles which move the ash; dust is also managed be ensuring that the ask is kept sufficiently moist. • Good housekeeping – almost no dust outside • Operator has recently invested in an additional eddy-current separation device to improve the efficiency of recovering non-ferrous metals which paid for itself within 6 months.

Type of industry	Lessons
	• The operator is intending to declare an end-of-waste decison for the aggregate that they produce Lessons learned • Incinerator permit is comprehensive and detailed (BAT-complaint) • Different approaches discussed on how regulators will decide whether continuous mercury monitoring and continuous dioxins sampling is needed. • Open and fruitful discussion on forthcoming changes to IED which will require operators to meet the lower end of the BAT-AEL ranges (won't be automatically applied in the UK) • Working together brings us closer together: 14 environmental experts (mainly inspectors and permit writers) from various different countries, everyone enjoyed the visit

PRESENTATIONS

Presentation of WG 9 WI: Scope, Survey, Way forward.

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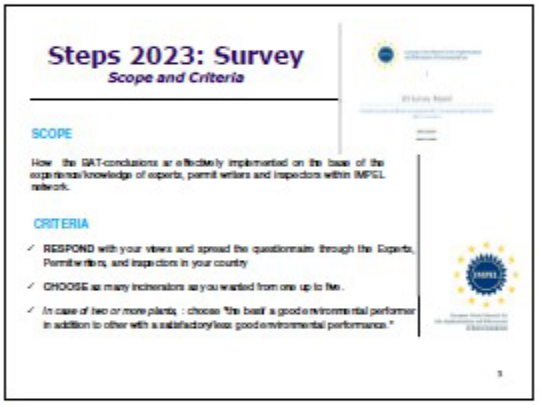

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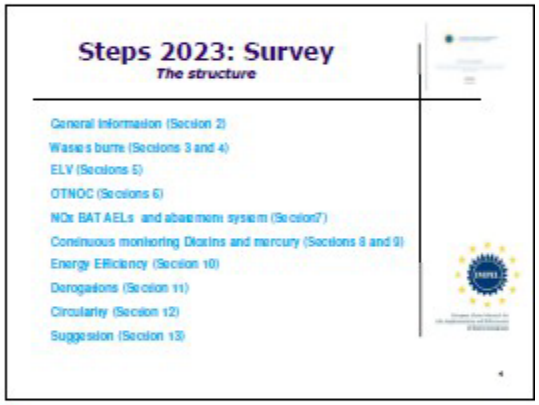

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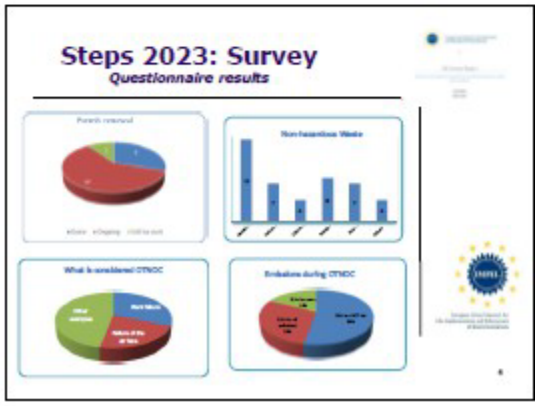

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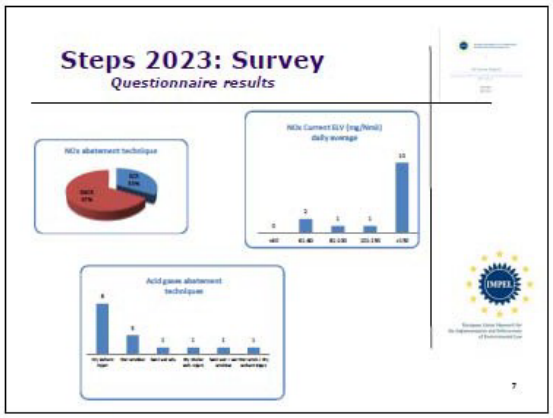
Steps 2023: Survey
Questionnaire results
NOx abatement technique
NOx Current ELV (mg/Nm3) daily average
Acid gases abatement technique
7

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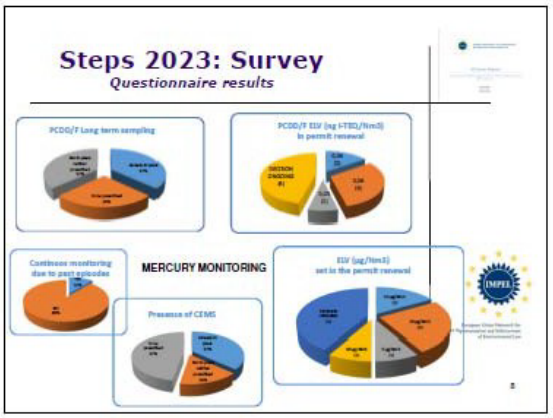
Steps 2023: Survey
Questionnaire results
PCDD/F Long term sampling
PCDD/F ELV (ng I-TEQ/Nm3) in permit renewal
Continuos monitoring due to past episodes
MERCURY MONITORING
Presence of CEMS
ELV (µg/Nm3) set in the permit renewal
8

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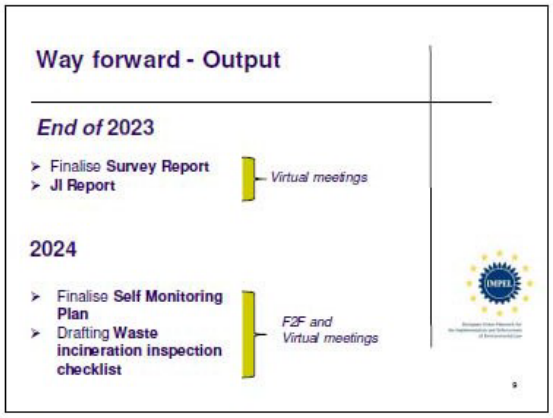
Way forward - Output
End of 2023
Finalise Survey Report
JI Report
Virtual meetings
2024
Finalise Self Monitoring Plan
Drafting Waste incineration inspection checklist
F2F and Virtual meetings
9

9


Thank you for listening
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10