The Best Available Techniques Review Process – An Operator's View from the UK

Stewart Davis, Head of Technical Compliance, Viridor

The Process

Incineration of non-hazardous municipal solid waste is governed by Chapter IV of the European Union's (EU's) Industrial Emissions Directive (IED, 2010). A core feature of IED is the use of Best Available Techniques (BAT) to prevent, and, where that is not practicable, to reduce emissions and the impact on the environment as a whole:

> 'best' means most effective in achieving a high general level of protection of the environment as a whole;
>
> 'available' means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question; and
>
> 'techniques' includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

In order to ensure an effective and active exchange of information ahead of producing BAT reference documents (BREFs), the European Commission (EC) established a forum to enable Member States and stakeholders to provide data of sufficient quality and quantity based on established guidance, the Joint Working Centre (JRC) of the EU Integrated Pollution Prevention and Control Bureau (EIPPCB).

There were 11 UK delegates at the Waste Incineration Technical Working Group (TWG) in Sevilla, including 2 delegates from the Environment Agency who represented the UK as a Member State.

The overall BREF review process is complex and may be summarised briefly as:

- BREF author(s): provided by the EIPPCB (early 2015);
- Technical Working Group (TWG): established with 126 representatives from Member States, 113 from industry and 9 non-governmental organisations (NGOs);
- JRC meetings of the TWG (the "Sevilla Process"): A kick-off meeting to initiate data gathering and exchange from hundreds of plants in operation; an informal meeting to iron out any remaining issues ahead of publication of the final TWG; and a Final TWG to issue the final draft (~3 years);
- Information Exchange Forum: Agreement on draft final BREF. Following the final TWG there is an EC approval process which culminates in a vote by Member States and then publication of the BREF and BAT Conclusions (BATCs); and
- Publication: Formal adoption and publication by Commission.

The Waste Incineration BATCs were published on 3rd December 2019. These apply immediately to new installations i.e. to any permits issued after this date. For existing installations, national regulators have up to 4 years to update permit conditions to implement these new standards which come into force on 3rd December 2023.

Substance	Standard	IED ELV – Daily or periodic (mg/Nm³)	BAT-AEL new plant (mg/Nm³)	BAT-AEL existing plant (mg/Nm³)
NO_x	Generic EN	200	50 – 120	50 – 150 (180**)
NH_3	Generic EN	-	2 - 10	2 - 10
N_2O	EN 21258	-		
CO	Generic EN	50	10 - 50	10 - 50
SO_2	Generic EN	50	5 - 30	5 - 40
HCl	Generic EN	10	<2 - 6	<2 - 8
HF	Generic EN	2	<1	<1
Particulates	EN 13284-2	10	<2 - 5	<2 - 5
Metals (As, Co, Cr, Cu, Mn, Ni, Pb, Sb, V)	EN 14385	0.5	0.01 – 0.3	0.01 – 0.3
Cd + Tl	EN 14385	0.05	0.005 – 0.02	0.005 – 0.02
Hg	Generic EN & EN 14884	0.05	0.005 – 0.02 (periodic / continuous daily) 0.001 – 0.01 (long-term sampling)	0.005 – 0.02 (periodic / continuous daily) 0.001 – 0.01 (long-term sampling)
Dioxins and furans	EN 1948 1-3	0.1 ng/Nm³ I-TEQ	<0.01 – 0.04 ng/Nm³ I-TEQ (periodic) <0.01 – 0.06 ng/Nm³ I-TEQ (long-term sampling)	<0.01 – 0.06 ng/Nm³ I-TEQ (periodic) <0.01 – 0.08 ng/Nm³ I-TEQ (long-term sampling)
Dioxins and furans + dioxin-like PCBs	EN 1948 1-3	-	<0.01 – 0.06 ng/Nm³ WHO-TEQ (periodic) <0.01 – 0.08 ng/Nm³ WHO-TEQ (periodic)	<0.01 – 0.08 ng/Nm³ WHO-TEQ (long-term sampling) <0.01 – 0.1 ng/Nm³ WHO-TEQ (long-term sampling)
** 180 mg/Nm³ applicable if the plant uses Selective Non-Catalytic Reduction for NO_x abatement				

Under IED, there is very limited scope for operators to claim derogations from having to apply the BATCs. In the UK, it is unlikely that any municipal Energy from Waste facilities will claim whole-scale derogations from applying BAT and the BATCs will be applied in full.

All emissions limit values (ELVs) identified as BAT, the BAT-AELs, relate to normal operating conditions and daily averages only. The IED specifies the ELVs that apply for shorter averaging periods (i.e. 10 minutes or 30 minutes) and during other than normal operating conditions (OTNOC).

Turning BAT Conclusions into National Policy.

National regulators (referred to in the BREF as "competent authorities") are responsible for introducing BATCs into operating permits. In the UK, this process has been led by the Environment Agency with the other UK regulators also engaged. The UK industry, through its trade groups, has also been consulted at regular intervals throughout the process of turning BATCs into regulatory policies and guidance.

The implementation phase is well under way. UK regulators are continuing to draft guidance notes with the intention of completing the process ahead of the review and variation of existing permits. These documents will be made publically available upon completion.

The initial plan in England was to issue Reg 61 Notices to sites, requesting information on whether the new BAT Conclusions can be met. Following completion and review of the Reg 61 notices, each site's permit was to be updated with the new requirements. This process has been impacted by the COVID-19 situation and the backlog of work within the EA's National Permitting Service. The EA is now considering the possibility of commencing the first batch of permit reviews in April 2021 by issuuing a consolidated permit with improvement conditions to request information in place of the Reg 61 Notices.

The approach is likely to be slightly different in Scotland where the regulator has indicated its intention to assign limits based on historic operational data. It is not entirely clear whether Welsh and Northern Irish regulators will adopt an approach more aligned to that in England or Scotland or somewhere in between.

The development of guidance process has yielded a situation which carefully balances improvements in emissions and environmental outcomes with operational efficiencies in the use of raw materials and capital investment. There has generally been a high level of agreement on the approaches taken amongst both regulators and operators, facilitated in no small part by an open exchange of operational data as the basis for decision making.

There is no unanimity between regulators and operators (or within regulators and operators) but there has been a willingness to engage and achieve a common goal.

A contemporary summary of the key outcomes at the time of writing are:

General principles

Unless there are specific local circumstances to do otherwise, the upper range of the BAT-AELs will be used as new permit limits for emissions, following existing Defra guidance. (Note Defra guidance on transcription of BAT-AELs into ELVs in permits does not apply in Scotland). The notable exception to this generalisation is oxides of nitrogen (NO_x) for existing plants. The potential for further NO_x reductions at existing plants below the top end of the BAT-AEL range is likely to be delivered via an improvement condition in the permit.

Mercury (Hg) monitoring

Following submission of operational data from UK operators, regulators have agreed a protocol for determining whether the mercury content of the waste can be considered to be "low and stable" (based on the mercury content in the emissions) and negate the need for continuous monitoring. A threshold based on periodic monitoring of Hg of 10 µg/Nm^3 is to be used as a trigger level under the protocol. Exceedances of the threshold initiate a process which could require the operator to install a continuous Hg analyser if emissions cannot be returned below this level following investigation.

Dioxins and furans monitoring

A protocol similar to the one for Hg has also been developed for dioxins and furans monitoring (which includes dioxin-like PCBs) to negate the need for continuous sampling if emissions can be demonstrated to be "sufficiently stable". The BAT Conclusions allow either an ELV for periodic sampling of dioxins and furans (I-TEQ) at 0.06 ng/Nm^3 for existing plant or and ELV for dioxins, furans and dioxin-like PCBs (WHO-TEQ) of 0.08 ng/Nm^3. This is in the final stages of development at the time of writing.

Approach to OTNOC

The new BAT-AELs apply only in normal operating conditions, not OTNOC. The current definition of OTNOC used in the UK (usually termed as "abnormal operation" (AO) under permits) is limited to failure of abatement or failure of CEMS only. Regulators are considering how and whether to widen the definition of AO to include all types of plant breakdown. A preliminary draft has been prepared and shared with industry and more dialogue is underway to refine it.

Monitoring during OTNOC

The BAT Conclusions also have a requirement to undertake monitoring of emissions during OTNOC. CEMS measurements are made throughout OTNOC, unless the OTNOC is triggered by a failure of CEMS. With the widespread use of hot-standby CEMS systems, this is not a commonly experienced situation. There is also a requirement to measure dioxins and furans specifically during start-up and shut-down whilst no waste is being burned.

An Individual Perspective on the Industry Position

The UK waste management sector has been generally very content with the way in which the UK regulators have approached the implementation of the BAT Conclusions.

The UK regulators have tried to work together to achieve common interpretations of the conclusions. They have kept industry informed of their intended approaches to implementation and have sought feedback on proposed guidance.

Where necessary, and to aid the translation of policy into practice, the UK regulators have also requested data and information from operators to support decision-making. It has been a very positive model for the interpretation of complex EU-level regulation into the local UK setting.

Here are a few remaining thoughts on the process for reflection:

Whole environment impact/cross-media effects

Industry is keen to play its part in reducing its whole environmental impact and emissions where it is appropriate to do so. A weakness of the BREF process is that it focuses solely on techniques for minimising emissions and reducing emissions limit values. No consideration is given to the wider environmental burdens associated with obtaining and maintaining lower emissions limits, including climate change impacts. For example, a 2 mg/m^3 reduction in permitted HCl emissions could require an additional 4,000 tonnes of lime to be consumed and require recovery annually. In environments where local HCl concentrations are already a very long way below the relevant air quality standard, any marginal change in local air quality should be justified against the increased raw materials consumption, transport and residue recovery impacts. Cross-media impacts were never intended to be considered as part of the BREF review process by the EUIPPC, which seems a strange omission.

CEMS measurement uncertainty

Lowering of emissions limit values will result in increased challenges of meeting the measurement uncertainty requirements of the applicable monitoring standards. These MU requirements are generally a function of the ELV and therefore as the ELV is reduced, so is the acceptable MU. There will likely need to be a further evolution of monitoring systems to facilitate measurements at ever lower emissions if we are to avoid problems of impacting apparent compliance with standards and limits which are essential in maintaining public confidence in industry.

Standard reference methods (SRMs)

Lower continuous (and periodic) emissions limit values will place additional challenges to SRMs, many of which were developed and validated on emissions that are significantly greater than those that are currently observed. SRMs will need to evolve and adapt to the lower levels of emissions or there will be a need to adopt more management approaches to achieving valid measurements until the technology evolved. For example, operators currently struggle to calibrate particulate emissions under EN 14181 as plant emissions are frequently <0.5 mg/Nm^3 with little apparent variability and there are no suitable surrogates available to challenge the whole measurement system. Work is underway to refine the current regulatory position on "indicative CEMS" measurements for particulates and it must achieve the twin objectives of not unfairly penalising operators for reducing emissions to the point where they cannot be reliably measured and providing reassurance to a sceptical public and NGOs that operators are not obfuscating compliance.

Monitoring during OTNOC

Experience to date has shown that this poses considerable challenges to operators and test houses in terms of scheduling the monitoring and undertaking isokinetic sampling on a system that is rapidly changing. It also produces results which are obtained at in stack oxygen concentrations (14% – 19% O^2) that can be a long way from the relevant reference condition (11% O^2) thereby affecting reporting requirements. It is likely that regulators will take this into consideration in any final position and this could include reporting emissions on a mass-emissions basis.