Briefing from the United Kingdom Without Incineration Network (UKWIN)

Incinerators & Health: Fact or Fiction?

Many claims and assumptions are made when the health impacts of waste incinerators are considered. Are these claims true? This briefing explores how claims and assumptions made by the Environment Agency, UK Health Security Agency, the UK Government, and others do not always stand up to scrutiny. This briefing is centred on England and considers waste incinerators ('Energy from Waste' plants) and not clinical, hazardous, or animal carcass incinerators, although some of the same issues may apply more broadly.

Fact or fiction? "All large incinerators in England … receive permits only if plants do not cause any damage to human health" (Rishi Sunak, PM)[1]

Similar claims have been made by government ministers[2,3], Environment Agency (EA) leaders[4,5], and EA permitting Decision Documents[6]. However, such claims are inconsistent with the Government's own position on the impact of air quality and pollution on health.

Both the Department for Environment, Food and Rural Affairs (Defra) and the UK Health Security Agency (UKHSA)[7], formerly Public Health England (PHE), consider some pollutants to be 'non-threshold'[8] meaning there is no safe level, i.e. there is no pollution level below which harmful impacts are thought not to occur. When discussing non-threshold pollutants reference is often made to particulate matter and nitrogen dioxide[9], and these are not the only non-threshold air pollutants that incinerators are known to emit[10,11,12,13].

When promoting measures to improve air quality, the UKHSA/PHE have said "health benefits of interventions must … be inferred from the reductions in emissions"[14] - in other words, reducing emissions benefits health. It follows that *increasing* emissions *harms* health. As all waste incinerators emit air pollution, all incinerators that have ever received permits harm human health.

Fact or fiction? The EA would never issue a permit for an incinerator that would contribute to air pollution levels exceeding UK air quality thresholds

In the UK there are legally binding limits for concentrations in outdoor air of the following major air pollutants known to impact on public health: sulphur dioxide, nitrogen oxides such as nitrogen dioxide, particulate matter (as PM_{10} and $PM_{2.5}$), lead, benzene, carbon monoxide, and ozone[15].

One might reasonably assume that the Environment Agency would therefore never issue a permit for an incinerator that would contribute to the exceedance of any of these air quality thresholds. However, we know that the EA has issued such permits.

For example, exceedances of nitrogen dioxide concentrations in the London Borough of Sutton have been recorded for many years[16]. Despite this, the Environment Agency granted a permit for an incinerator in Beddington, Sutton in 2013, and the EA allowed increased emissions in 2020[17]. In 2023, the EA published a draft permit for the Beddington incinerator showing they are minded to allow a further increase in emissions[18].

Fact or fiction? Compliance with UK air quality thresholds ensures no significant harm to health

The EA uses a comparison of air pollution modelling predictions with air quality thresholds to assess health risks. The EA's assessments of permit applications typically assume incinerator air pollution will not significantly harm human health if the modelling predicts UK air quality thresholds will not be exceeded[19]. *Note: Assessment of dioxins is different, see overleaf.*

Considerable research in recent years has shown the wide-ranging harms caused by air pollutants, such as fine particulate matter and nitrogen dioxide, at levels much lower than previously understood. In 2021, in response to overwhelming scientific evidence, the World Health Organisation (WHO) slashed its long-term Air Quality Guidance (AQG) thresholds for nitrogen dioxide and fine particulate pollution ($PM_{2.5}$)[20].

Pollutant	2005 WHO AQG ($\mu g/m^3$)	2021 WHO AQG ($\mu g/m^3$)	UK Threshold ($\mu g/m^3$)
Nitrogen Dioxide	40	**10**	**40**
$PM_{2.5}$	10	**5**	**20**

The 2021 WHO guidelines, based on a thorough analysis of the scientific evidence, show significant harm is expected at levels just a quarter of UK nitrogen dioxide and $PM_{2.5}$ thresholds. In 2019, the government declared an Air Quality Health Emergency[21] but did not tighten the current thresholds[22].

Defra has acknowledged that pollution has been a significant burden on the health of the country's population even where current UK air quality thresholds have not been exceeded[23] and according to the UKHSA "Evidence continues to build showing that even low concentrations of air pollution can cause a variety of health effects throughout our lifetime, it is a significant public health burden"[24]. Air pollution is recognised by the United Nations as the greatest environmental threat to public health[25].

Despite the known inability of the UK's current statutory air quality thresholds to avoid significant harm to health, the EA continues to use these inadequate thresholds to assess incinerator health impacts. The levels used by the EA are not in line with current scientific research.

An information request response shows the EA held no evidence that a significant public health burden could not arise from air pollution that its own permitting assessment criteria considers to be "insignificant"[26]. The same response showed that the EA has carried out no reassessment of its criteria since they were defined in 2010 or earlier to take account of new evidence showing significant health impacts occurring at low concentrations of air pollution below current UK thresholds.

Thus, despite the EA's general reliance on UK air quality thresholds, compliance with these outdated thresholds does not ensure there would be no significant harm to human health.

Fact or fiction? All measurable pollutants that are a risk to human health are monitored and have a limit set

Not all pollutants from waste incinerators that are known to pose a risk to health are monitored and not all pollutants that are a risk to health have a limit set.

Brominated dioxins provide an example of such an under-monitored and under-regulated pollutant.

The use of bromine as a fire retardant has likely increased bromine in incinerator feedstocks and so increased emissions of brominated dioxin-like compounds[27]. The EA's position is to assume, based on a 2010 study by the Food Standards Agency (FSA), that the assessment of dioxins is representative of both dioxins and brominated dioxins[28] – but the 2010 study did not measure brominated dioxins near incinerators and dioxin modelling predictions do not take brominated dioxins into account.

Whilst periodic measurements of brominated dioxins may be required by some newer permits, the EA does not set specific limits on brominated dioxin emissions[29] nor are limits set for human intake. Older permits, and even some recently issued permit variations, do not even require measurement of brominated dioxin emissions[30,31].

Fact or fiction? Regardless of how many dioxins someone already consumes, up to a further 10% of the "Tolerable Daily Intake" is not a significant risk to human health

Dioxins are amongst the most toxic of all pollutants, with limits for human intake defined in picograms (a millionth of a millionth of a gram) per kilogram (pg/kg) of body weight per day/week. Dioxins persist and accumulate in humans, animals and soils so increase in concentration both over time and as they go up the food chain. As the UK Government's Committee on Toxicity (COT) puts it: "Dioxins remain in the environment for a long time and accumulate in all living things. Dioxins are known to cause a wide range of toxic effects in animals, some of which have been seen at very low doses. These effects may have significant consequences for human health"[32].

Dioxins are 'non-threshold' pollutants[10], meaning they cause harm at any level. Once absorbed, dioxins continue to harm health for many years even if no further dioxins are consumed.

The EA assesses other air pollutants, even non-threshold air pollutants such as $PM_{2.5}$, by comparing predicted environmental levels with thresholds. Dioxin emission impacts are assessed differently. The human intake of dioxins is modelled (more on that later) and the prediction compared with a Tolerable Daily Intake (TDI) threshold.

Prior to 2018, the EU tolerable limit was 2 pg/kg of body weight per day, but, after much research[33], the European Food Safety Authority (EFSA) considered that level unsafe and set a new EU level, defined as a Tolerable Weekly Intake (TWI), just one seventh of the previous limit[34]. The new EU limit is less than an average of 0.3 pg/kg of body weight per day.

Despite not carrying out its own detailed research, the COT questioned the EFSA's approach, disregarded the new TWI, and reverted to the TDI[35]. UKHSA/PHE informed the EA that "current advice" was to "keep on using the COT TDI from 2001 … rather than using the [more recent] EFSA TWI"[36].

Thus, the precautionary principle is not being applied to the EA's consideration of health impacts. The EA attempts to justify their practice of not applying the precautionary principle by referring to a quote from a 2006 document from the Health Protection Agency (the predecessor of UKHSA/PHE)[37] that could not have taken account of the EFSA's advice from 2018. When challenged[38], both the EA and the UKHSA just repeat the 2006 quote without providing further explanation[39].

The EA applies a 10% "insignificance" criteria to the TDI[40]. For other air pollutants the EA uses a 1% "insignificance" threshold for screening out long-term impacts[41]. The EA's justification for taking a less precautionary approach to dioxins is a 2016 PHE email that is essentially an opinion without supporting evidence[42].

UKWIN raised concerns about the 10% insignificance threshold with the UKHSA. The UKHSA repeated its position that "An additional 10% of the TDI … is unlikely to result in a significant risk" but provided no evidence to support their position[43].

As such, when it comes to dioxins, the EA appears to be relying on non-precautionary opinions rather than the latest scientific evidence.

Fact or fiction? There are no concerns about the EA's approach to regulation

The EA has a statutory duty to ensure incinerators cause no significant pollution[44] but the previous sections provide evidence that the EA's assessment criteria are insufficient to ensure that significant public health burdens are prevented.

Other assessment criteria used by the EA are also inadequate. In May 2020 the Institute of Air Quality Management published 'A guide to the assessment of air quality impacts on designated nature conservation sites' and this guide noted how:

> "For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC [process contribution, e.g. pollution from an incinerator] is less than 100% of the critical level or load, they do not require further assessment to support a permit application. In ecological impact assessments of projects and plans, it is, however, normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different. It is difficult to understand how the Environment Agency's approach can provide adequate protection"[45].

Internal EA correspondence, released as the result of an information request, reveals how an EA air quality specialist found it "hard to square" the EA's actions with the environmental protections required by legislation[46]. The apparent reason for this discrepancy seems to be based not on science, but on the inadequacy of resources available to the EA as the waste industry regulator[47].

Fact or fiction? Incinerators comply with emissions limits

The EA relies on incinerator operators reporting their own emissions. Such a system would appear open to abuse. There are reasons to be concerned about the accuracy of some of the emissions reporting[48,49,50,51,52,53] which raises further questions about whether the EA is checking the annual performance reports it receives with sufficient rigour.

EA inspections of incinerator sites are usually pre-arranged with the operator, raising concerns that operators could prepare for a site visit to ensure everything appears in order. According to a response to an information request, more than two thirds of incinerators operating in England have never had an unannounced inspection by the EA[54].

The Beddington incinerator, which commenced operations in 2018, provides an example of an incinerator that has never had an unannounced inspection in more than half a decade of operation. This is despite the local press reports of overflowing sorting halls[55]; a serious fire in 2019 with calls for the operator to be prosecuted[56] and questions about whether non-compliance with the permit was a contributing factor to the fire[57]; and the operator having been reported to have been given financial penalties for emissions breaches[58]. Recently, the Health and Safety Executive (HSE) is reported to have fined the operator £3m following the death of two workers at other sites[59]. Despite this, the EA considers the numerous permit breaches to be "insignificant"[60].

Of the many incinerators that have never had an unannounced inspection three have been operating since the 1970s[61], all of which reported emissions breaches (or other notifiable incidents) every year in their last three reporting years (2020, 2021, and 2022)[62].

Incinerator operator annual performance reports for 2022 show most incinerator operators reported breaches of emissions limits, or other permit non-compliance. According to the performance reports, some breaches were substantial. For example, at one plant, the Carbon Monoxide reportedly released in a single day exceeded the total limit for a period of two months[63].

Where measurements exceed the limit, the EA also allows operators to subtract the measurement uncertainty and re-compare the measurement with the limit before classifying the exceedance as a permit breach. As a result, no incinerator operators are held to the emissions limits in their permits, because the emissions limits are inflated by the measurement uncertainty.

This uncertainty can be as high as 40%[64]. Where such exceedances occur, operators do not always record the cause nor do they always record any action to be taken. The EA's tolerance of emissions above the emissions limit values (ELVs) raises concerns that opportunities for prevention may be missed[65].

Incinerator operators are not required to continuously monitor emissions of all pollutants. Dioxins are one such group of periodically measured pollutants. When pollutants are only measured occasionally it is impossible to know if that incinerator complied with emissions limits throughout the other 99.8% of the year[66].

Even with dioxin measurements made at most plants twice a year, performance reports show notable exceedances of dioxin emissions were found at several UK plants in 2022[67] - in one case, dioxin emissions were nearly 50 times the limit. When dioxin exceedances are found, the cause is often never identified[68,69,70]. One operator even reported both the reason for the exceedance and their proposed action for preventing recurrence as "n/a"[71].

Despite huge dioxin emission exceedances, and the unexplained elevated dioxin levels found by the EA near UK incinerators[108], the EA continues to allow most incinerator operators to make dioxin measurements just twice a year.

Fact or fiction? All modelling assumptions are 'worst case' so modelling predictions cannot be underestimated

Incinerator permit assessments rely on predictions based on models created using computer software systems. Two types of model in particular are used: an air dispersion model and a Human Health Risk Assessment (HHRA) model. The first predicts environmental concentrations of various air pollutants and the second is used to predict the human intake of dioxins.

EA Guidance requires incinerator permit applicants to estimate the level of uncertainty in predictions[72]. The predictions depend on many assumptions and the results are subject to considerable uncertainty. Whilst the uncertainties arising from some specific assumptions are usually considered, the overall cumulative level of uncertainty in the predictions is not quantified. The audit reports written by the EA's Air Quality Modelling & Assessment Unit (AQMAU) also do not record a quantified estimate of overall modelling uncertainty. The EA requires neither applicants nor AQMAU to follow important aspects of the Atmospheric Dispersion Modelling Liaison Committee Guidelines on modelling[73,74] even though the EA was part of the Committee that formulated the guidance[75].

EA assessments are said to use "worst case" assumptions[76]. If all assumptions were genuinely worst case, and if all sources of uncertainty were considered, then that would give some confidence that the predictions are not underestimated. Unfortunately, the EA allows air dispersion modelling assessments that do not consider important sources of uncertainty and that make assumptions that are not worst case[77]. The EA also accepts HHRA models with large numbers of default assumptions – assumptions that can be *very* far from worst case[78] and do not necessarily reflect local agricultural practices[79]. As a result, actual pollution levels and risks to human health may be very much higher than predicted.

The Human Health Risk Assessment Protocol (HHRAP), on which HHRA models are based, says some of the values on which the assessment depends are typical (not protective) "yielding a point estimate of exposure and risk that falls at an unknown percentile of the full distributions of exposure and risk"[80]. In other words, the actual risk could potentially be much higher than predicted. The HHRAP includes ways to "introduce a degree of quantitative information" about uncertainties[81], but the EA requires neither applicants nor AQMAU to quantify and publicly report such HHRA uncertainties.

Air dispersion modelling and HHRA modelling is a complex area. The issues are more extensive and wide-ranging than outlined above, but the few issues listed here are sufficient to show that modelling predictions typically lack robustness and assessments based on such predictions may underestimate the risk to human health.

Fact or fiction? "We will only issue a permit if we believe that harm to the environment, people and wildlife will be minimised …" (EA)[82]

The EA does not generally require incinerator operators to use catalytic pollution reduction techniques such as Selective Catalytic Reduction (SCR) or catalytic filter bags. Catalytic techniques can significantly reduce dangerous pollutants such as nitrogen dioxide and dioxins, and incinerator permit application documents usually acknowledge that SCR would result in lower emissions than Selective Non-Catalytic Reduction (SNCR).

The EA says it requires operators to use "Best Available Technique" (BAT), but the EA's interpretation of "Best" is not the technique that minimises pollution. As long as the Environment Agency expects the UK's inadequate and somewhat arbitrary air quality thresholds to be met, EA permitting Decision Documents show the EA considers that a technique can be classified as "Best" because it minimises costs for the incinerator operator even where it does not minimise pollution levels for the public[83].

Higher stacks reduce ground-level pollution concentrations and therefore constitute an important way local health and environmental impacts can be reduced. The EA used, and may continue to use, an unpublished draft document to assess the stack height of permit applications[84]. The EA did not disclose its draft stack height guidance to the public but confirmed that it routinely shared its draft stack height guidance with permit applicants[85]. UKWIN only became aware of the document following steps towards a potential legal challenge taken by a local campaign group[86] where the EA was under a legal duty of candour to disclose relevant information.

The EA also allowed a lower stack height in that instance because requiring a higher stack would have increased developer costs (as planning permission granted for a lower stack would need to be varied at a cost to the developer). Despite the EA's position that the higher stack would reduce the facility's adverse impact, the EA decided to reward the would-be operator of the incinerator by allowing them to include such additional planning costs in their cost-benefit analysis (rather than considering those costs to have been 'self-inflicted' and thus artificial). The EA's Decision Document was not entirely transparent about this[87].

UKWIN is concerned that the EA's draft stack height assessment document is far from robust and can be used to justify a very wide range of stack heights. The draft document admits that its method "produces a range of possible stack heights that could be considered to be BAT ['Best Available Technique']".

When these and other concerns were raised with the EA in response to a public consultation on another incinerator permit application[88], the EA's permitting Decision Document included no substantive response, saying little more than that the EA was "satisfied" with the applicant's stack height calculations[89].

Fact or fiction? "Incinerators make only a very small contribution to local concentrations of air pollutants" (UKHSA/PHE)[90]

An information request[91] shows that the UKHSA/PHE held very little evidence to support their assumption, which is stated by UKHSA/PHE as "fact", that incinerators make only a very small contribution to local concentrations of air pollutants. The only evidence referred to by UKHSA is a modelling study of larger particulate pollution (PM_{10}) from incinerators. As part of discussions with UKHSA, UKWIN submitted a detailed analysis showing that the contribution incinerators make to the local concentrations of other air pollutants can be many orders of magnitude higher than PM_{10} as a percentage of thresholds[92]. A subsequent information request revealed how the UKHSA held no records of any UKHSA/PHE reviews or assessments of UKWIN's analysis[93]. This suggests that the UKHSA had either not considered UKWIN's evidence or chose not to record their review.

The EA grants permits even when the application documents predict an incinerator will make a large contribution to the local concentrations of air pollutants. As an example, the following table uses information from the Air Quality Assessment for the Carlisle incinerator permit application (permit EPR/SP3609BX) to show the contribution to the local concentration of various pollutants based on the modelled level of 'process contribution' (i.e. pollution) from the proposed incinerator.

Contributions to Local Concentrations of Air Pollutants (EPR/SP3609BX/A001)

Pollutant	Background Concentration	Process Contribution	% increase	% contribution
NOx	13.50 µg/m³	2.22 µg/m³	16	**14**
VOCs (as 1,3-butadiene)	0.15 µg/m³	0.26 µg/m³	173	**63**
Cadmium	0.04 µg/m³	0.53 µg/m³	1,300	**93**
PCBs	0.13 ng/m³	0.13 ng/m³	100	**50**
Hydrogen Chloride	1.42 µg/m³	2.47 µg/m³	170	**63**
Mercury	1.51 ng/m³	0.53 ng/m³	35	**26**
Chromium (VI)	0.28 ng/m³	7.93 ng/m³	2,700	**97**

The column on the right shows the incinerator was predicted by the modelling to give rise to a large percentage of the local concentrations of air pollutants. For cadmium and chromium (VI), the modelling predicted that almost all the local concentration would arise from the incinerator at the point of maximum impact. This is not the "very small" contribution declared by the UKHSA/PHE as a "fact" and instead shows their assumption to be incorrect. Air Quality Assessments for other incinerators also predict high contributions to the local concentrations of some air pollutants.

The EA allows incinerators to make very substantial contributions to local concentrations of air pollutants, even though it knows the UKHSA's statement on the safety of municipal waste incinerators is premised on an incinerator only making a very small contribution.

Fact or fiction? "... modern, well run and regulated municipal waste incinerators ... are not a significant risk to public health" (UKHSA/PHE)[94]

The oft-repeated UKHSA claim that modern, well run and regulated municipal waste incinerators are not a significant risk to public health is premised on "the fact that these incinerators make only a very small contribution to local concentrations of air pollutants", but, as shown above, that key assumption underpinning UKHSA's position is questionable.

Reasons to consider that incinerators could pose a significant health risk include:

- Concerns raised by UK medical professionals regarding incineration and the evidence they cite in support of those concerns, including by NHS Ayrshire & Arran Respiratory Managed Clinical Network (MCN)[95] and other doctors and medical professionals[96,97].
- The Government's Committee on the Medical Effects of Air Pollutants (COMEAP) define mortality risk coefficients for nitrogen dioxide[98] and $PM_{2.5}$[99]. A study commissioned by the Greater London Authority used the COMEAP coefficients to predict that London's five incinerators result in 15 deaths 'brought forward' per year[100]. A major international study, ELAPSE[101], provides evidence that the COMEAP coefficients are too small and so the actual number of deaths brought forward could be higher still[102].
- Evidence that incinerators are permitted even when the calculated mortality risk is predicted to exceed the risk level that would trigger the Health and Safety Executive recommending against allowing a new housing development[103,104].
- In 2020, a review by PW Tait et al was published. Entitled "The health impacts of waste incineration: a systematic review"[105] this review considered 93 manuscripts. The conclusion makes concerning reading and includes the warnings that: "based on a precautionary principle there is insufficient evidence to conclude that any incinerator is safe" and that "Food grown near an incinerator should be avoided"[106].
- The EA found elevated and "puzzling" dioxin levels near UK incinerators as long ago as 2007[107], but an information request showed no further investigation was undertaken by or for the EA[108]. More recently, Toxicowatch found dioxin contamination near European incinerators[109] , which, like the UK, also operates under Industrial Emission Directive legislation. Following Toxicowatch's studies, Paris authorities confirmed dioxin contamination in eggs up to 50 times the threshold and people living in the region were told to avoid consuming eggs from hens in their gardens or local urban farms[110].
- The risks to health recognised by the review on incineration in Scotland[111].
- The All-Party Parliamentary Group on Air Pollution's evidence from experts about incinerator health impacts that included ultrafine particulates and heavy metals. The Group called for an immediate moratorium on new incinerators, raising concerns about how incinerators are regulated, and calling for all the pollutants to be taxed[112].

Previous sections have also shown that: compliance with UK air quality thresholds is insufficient to prevent significant harm; thresholds can be exceeded; some pollutants have no safe level; and the modelling which is relied upon by the EA lacks robustness in some key respects. EA regulation does not ensure that significant health harm is prevented, and the lack of resources available to the EA coupled with the reliance on self-regulation raises questions about whether the industry is truly being "well regulated".

Fact or fiction? The UKHSA/PHE "will continue to review its advice in light of new substantial research on the health effects of incinerators published in peer-reviewed journals" (UKHSA/PHE)

A response to an information request shows important research has not been considered by UKHSA when reviewing its advice on Municipal Waste Incinerators, including some specific research on waste incinerator health risks and the considerable research showing the harm caused by air pollution at much lower air levels than previously understood[113].

The EA's "understanding is that the UKHSA review its advice as new validated research is published"[114] but, when the EA is made aware of new research that is potentially relevant to incinerator health risks, the EA does not, as a matter of course, ask the UKHSA to review that new information, nor does the EA routinely pass references on to the UKHSA[115]. Permitting Decision Documents do not show how new health-related research has been considered in the assessment[116].

Fact or fiction? Traffic and overall GHG emissions are EA permitting issues

The EA would be the first to acknowledge that their permitting regime focuses only on the installation and not on the traffic to and from the incinerator. Nor does the EA consider the greenhouse gas (GHG) emissions that are released through the incineration of waste feedstock. Both issues are considered by the EA to be planning matters[117], meaning permits are issued for increased throughput without considering traffic and GHG implications. As such, these are matters to be dealt with under the planning regime.

Fact or fiction? We need incinerators so have to accept the risk to our health

The health risks and inequalities[118] associated with waste incineration is one of the reasons why UKWIN opposes incineration. There is an urgent need to hasten the transition to a truly circular economy, an economy which has no need for incinerators.

Falsely denying incinerator health risks undermines public trust, stifles debate, blocks measures to reduce pollution, harms public health, and increases costs to society. Genuine steps must be taken to minimise local pollution and health risks. Much more could be done including better technology, higher stacks, greater controls over feedstocks, and more rigorous monitoring and enforcement.

There is already excess incineration capacity[119] to meet England's residual waste targets, and health risks are another reason to avoid further overcapacity. Dr Colin Church, in his review of incineration in Scotland[120], considered immediate action was needed to prevent further incineration overcapacity in Scotland. The recognition of the risk to human health from incineration was one of the factors that informed Dr Church's recommendations[120].

Incineration overcapacity harms recycling[119], and thus is associated with wider environmental harm. There is already significant public concern about incinerator health impacts, which can be expected to grow as public interest in improving air quality increases and as incineration is seen as an avoidable source of pollution.

For further information visit the UKWIN website at https://ukwin.org.uk/

References and Further Information

[1]Prime Minister Rishi Sunak in the House of Commons on 26 October 2022
https://hansard.parliament.uk/Commons/2022-10-26/debates/DA634E71-6A00-4C9C-8D40-CCE730776B42/Engagements

[2]The Minister of Housing, Stuart Andrew, when speaking on behalf of the government on 8 March 2022, said "Needless to say, the Environment Agency will never issue an environment permit if a proposed plant has a significant impact on the environment or if it may cause harm to human health."
https://hansard.parliament.uk/commons/2022-03-08/debates/4476E7B2-6D00-4311-A632-CDFA3FFFE88A/ConsettEnergyFromWastePlant

[3]Jo Churchill in response to a parliamentary question to the Department for Environment, Food and Rural Affairs said: "The EA will only issue a permit for a municipal waste incinerator if the applicant can demonstrate that … the plant would not give rise to … harm to human health."
https://questions-statements.parliament.uk/written-questions/detail/2022-05-26/9833/

[4]For example, Sir James Bevan, then Chair of the Environment Agency, on Tuesday 17 May 2022 at the Environment, Food and Rural Affairs Committee meeting said "Every incinerator that I have seen … is well designed and well run. As far as we are aware, based on the evidence that we have seen, it is not posing a threat to public health. If it was, we wouldn't be giving it an environmental permit."
https://committees.parliament.uk/oralevidence/10238/pdf/

[5]"Under the environmental permitting rules we assess new Energy from Waste plants under the following criteria: … Whether emissions from the installation could cause harm to human health. We will not approve environmental permits if these criteria are not met." Emma Howard-Boyd, then Chair of the EA, 24 June 2020.
https://environmentagency.blog.gov.uk/2020/06/24/emma-howard-boyd-discusses-scrutiny-of-incinerator-projects/

[6]The Environment Agency's template incinerator decision document (updated June 2023) includes unqualified claims of no effect on human health, e.g. "Section 5.2.1 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation."

[7]The Environment Agency is an executive non-departmental body associated with Defra and the UKHSA is an executive agency of the Department of Health and Social Care (DHSC).

[8]Defra's Detailed Evidence Report for Air Quality $PM_{2.5}$ targets is an example of Defra using the term non-threshold air pollutants:
https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/supporting_documents/Air%20quality%20targets%20%20Detailed%20Evidence%20report.pdf

The 2019 report "Review of interventions to improve outdoor air quality and public health" is an example of the UKHSA's/PHE's use of the term non-threshold air pollutants:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938623/Review_of_interventions_to_improve_air_quality_March-2019-2018572.pdf

[9]An example of UKHSA showing it considers both particulate matter and nitrogen dioxide to be non-threshold air pollutants can be found in the EA's reporting of UKHSA's consultation comments for permit EPR/AP3904SB:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1077783/Decision_document.pdf

Defra's publication "Air Quality: A Briefing for Directors of Public Health" (Page 61). Defra, March 2017:
"There is no safe level for particulate matter (PM_{10}, $PM_{2.5}$), while NO_2 is associated with adverse health effects at concentrations at and below the legal limits" https://laqm.defra.gov.uk/assets/63091defraairqualityguide9web.pdf

Incinerator Annual Performance Reports show emissions of both particulate matter and nitrogen dioxide.

[10]Dioxins are an example of a non-threshold air pollutant emitted from incinerators. Link showing Dioxins are considered non-threshold: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2898056/

[11]Benzene is an example of a non-threshold air pollutant emitted from incinerators. Link showing Benzene is considered non-threshold:
https://iris.who.int/bitstream/handle/10665/329481/WHO-CED-PHE-EPE-19.4.2-eng.pdf

[12]1,3-Butadiene is an example of a non-threshold air pollutant emitted from incinerators. Link showing 1,3-Butadiene is considered non-threshold: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9564389/

[13]Lead is an example of a non-threshold air pollutant emitted from incinerators. Link showing Lead is considered non-threshold:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128326/hpr0123_LEICSS_2021.pdf

[14]PHE, 2019, "Review of interventions to improve outdoor air quality and public health"
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938623/Review_of_interventions_to_improve_air_quality_March-2019-2018572.pdf

[15]Defra UK Air Quality Policy Context webpage at:
https://uk-air.defra.gov.uk/air-pollution/uk-policy-context

[16]Sutton Council Air quality monitoring reports report the whole borough was declared an AQMA in 2013 with the 2014 Air Quality report showing exceedances from the earliest data shown in the 2014 report (2007). Sutton's Air Quality reports can be found at:
https://www.sutton.gov.uk/w/advanced-information-on-air-quality-action-plan-and-reports

[17]The emissions increases arose from an increase in plant throughput to 347,222 tonnes per year. See permit status log included in the permit:
https://www.gov.uk/government/publications/cr0-4td-viridor-south-london-limited-environmental-permit-issued-eprgp3305lnv002

[18]CR0 4TD, Viridor South London Limited, EPR/GP3305LN/V003: environmental permit draft decision advertisement
https://consult.environment-agency.gov.uk/psc/cr0-4td-viridor-south-london-ltd/

[19]The EA's June 2023 template Decision Document for permit applications says: "For those pollutants which do not screen out as insignificant, we determine whether exceedences of the relevant ES [Environmental Standard] are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where an exceedance of an AAD [Ambient Air Directive] limit value is identified, we may require the applicant to go beyond what would normally be considered BAT [Best Available Technique] for the Installation or we may refuse the application if the applicant is unable to provide suitable proposals. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT. This is not the end of the risk assessment, because we also take into account local factors (for example, particularly sensitive receptors nearby such as a SSSIs [Sites of Special Scientific Interest], SACs [Special Areas of Conservation] or SPAs [Special Protection Areas]). These additional factors may also lead us to include more stringent conditions than BAT."

The only examples provided by the EA of particularly sensitive receptors relate to wildlife sites rather than human health, indicating that for human health it therefore generally only matters whether a pollutant is screened out as "insignificant" and whether exceedances are considered likely. Only if an exceedance is considered likely does the EA say it may "require the applicant to go beyond what would normally be considered BAT".

[20]World Health Organisation, 2021, "WHO global air quality guidelines: particulate matter ($PM_{2.5}$ and PM_{10}), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide"
https://www.who.int/publications/i/item/9789240034228

[21]Health and Social Care Secretary Matt Hancock, 2019, "Air pollution is a health emergency"
https://www.gov.uk/government/speeches/air-pollution-is-a-health-emergency

[22]For a House of Commons Library briefing on evolving air quality policies and legislation across the UK, targets, statistics and health and inequality concerns
https://commonslibrary.parliament.uk/research-briefings/cbp-9600/

[23]"Existing Air Quality Standards Regulations 2010 set out legally binding standards for a range of pollutants including $PM_{2.5}$, yet despite those standards not being exceeded, ambient $PM_{2.5}$ generates a significant burden on the health of the country's population."
https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/supporting_documents/Air%20quality%20targets%20%20Detailed%20Evidence%20report.pdf

[24]UKHSA Chemical Hazards and Poisons Report Issue 28 – June 2022
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1083447/CHaPR_AQ_Special_Edition_2206116.pdf

[25]UN Environment Programme "Pollution Action Notes - Data you need to know" September 2021, updated September 2023.
https://www.unep.org/interactives/air-pollution-note/

[26]Information request response NR290106.

[27]Aimin Song, Huiru Li, Mingyang Liu, Ping'an Peng, JianFang Hu, Guoying Sheng, Guangguo Ying, Polybrominated dibenzo-p-dioxins/furans (PBDD/Fs) in soil around municipal solid waste incinerator: A comparison with polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs), Environmental Pollution, Volume 293, 2022, 118563, ISSN 0269-7491, https://doi.org/10.1016/j.envpol.2021.118563.

[28]The template EA Decision Document refers to a 2010 FSA study but includes no evidence that a general study of foods cannot significantly underestimate the contribution of brominated dioxins to local toxicity arising from municipal waste incinerators.

[29]For example, the permit for the Beddington incinerator, EPR/GP3305LN
https://ukwin.org.uk/library/51-PermitVariation-2022.pdf

[30]For example, permit EPR/CP3535CK variation EPR/CP3535CK/V005
https://ukwin.org.uk/incinerators/library/Gloucestershire/163

[31]For example, permit EPR/GP3334CX/V005, variation EPR/GP3334CX/V005, for Leeds Recycling and Energy Recovery Facility. The permit says "Not required unless wastes containing brominated flame retardants are burned" but it is unclear whether the operator will know whether the wastes may contain brominated flame retardants and whether the Environment Agency is going to check.
https://ukwin.org.uk/incinerators/library/West+Yorkshire/233

[32]Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) 'Lay Summary of the COT Statement on the Tolerable Daily Intake for Dioxins and Dioxin-Like Polychlorinated Biphenyls' (16th November 2001)
https://cot.food.gov.uk/sites/default/files/cot/cot-diox-lay.pdf

[33]EFSA Panel on Contaminants in the Food Chain (CONTAM), 2018, "Risk for animal and human health related to the presence of dioxins and dioxin-like PCBs in feed and food"
https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2018.5333

[34]EFSA, 20 November 2018, "Dioxins and related PCBs: tolerable intake level updated"
https://www.efsa.europa.eu/en/press/news/dioxins-and-related-pcbs-tolerable-intake-level-updated
The TWI and the TDI have the same numeric value, but the TWI is defined as a weekly intake figure and the TDI as a daily intake. The TWI is effectively just one seventh of the TDI.

[35]Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT), March 2021, Position paper on dioxins
https://cot.food.gov.uk/sites/default/files/2021-03/Dioxin%20interim%20position%20statement_0.pdf

[36]Email sent 15 December 2020 from PHE to the EA, subject "RE: OFFICIAL: RE: Tolerable Weekly Intake for dioxins and furans" obtained in response to information request NR241726.

[37]This is an established EA position. The EA's response to consultation responses that say the precautionary principle should be applied can be seen in the EA's template incinerator Decision Document (last updated June 2023):
'The United Kingdom Interdepartmental Liaison Group on Risk Assessment (UK-ILGRA) state in their paper "The Precautionary Principle: Policy and Application" that the precautionary principle should be invoked when there is good reason to believe that harmful effects may occur and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. The Health Protection Agency (as it was called then) stated in its response to the British Society for Ecological Medicine Report, "The Health Effects of Waste Incinerators" that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators". As explained in section 5.3 the UKHSA maintain there [sic] view on impacts from incineration.'

[38]The Health Protection Agency (HPA) report considered the scientific evidence reported by the British Society for Ecological Medicine (BSEM) and therefore recognised there is another body of scientific evidence showing the effects may be more significant. Even if the report authors considered that the evidence, on balance, suggested there are at most minor effects on human health and the environment from incineration, it is clearly incorrect to say "there are no grounds" for adopting the precautionary principle. Furthermore, since 2006 when the HPA statement was written, there is considerably more evidence that air pollution, and therefore also incineration, is harmful to human health with effects that are more significant than "minor" as stated by the HPA statement.

[39]The EA' response to an extended and detailed consideration of why the precautionary principle should be applied was simply to repeat the same justification without substantively addressing the concerns raised. Similarly, UKHSA restated the 2006 position (complaint reference HCOM2575) without substantively addressing UKWIN's concerns.

[40]EA Decision Documents can show the EA applying a 10% insignificance screening threshold to the COT TDI, e.g. page 144 of the 2023 EPR/SP3609DX/A001 Decision Document says "Our HHRA screening check calculations of dioxins, furans and dioxin-like PCB intakes, indicate that the PC is likely to be less than 10% of the COT-TDI …": https://ukwin.org.uk/incinerators/library/Cumbria/79

AQMAU Reports may also show the 10% screening threshold, e.g. page 6 of the "Audit of Air Quality and Human Health Risk Assessments" for permit application EPR/CP3308TD/V002 said "Their predicted maximum contribution presented in table 4.2 is 3.3% of the TDI (adult) which is below 10% insignificance criterion suggested by Public Health England (PHE)."
https://consult.environment-agency.gov.uk/psc/rh12-4qd-britaniacrest-recycling-limited-draft-dec/

[41]EA Guidance "Air emissions risk assessment for your environmental permit" and "Environmental permitting: air dispersion modelling reports"
https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports

[42]An email sent 04 November 2016 15:28 from PHE to the EA responded to an enquiry by the EA and said "it is unlikely that an additional 10% [of the TDI] would result in significant risk". The email was provided in response to information request NR241726.

[43]"Exceedance of a TDI does not mean adverse effects will occur but it erodes the margin of safety. An additional 10% of the TDI on top of existing estimates of exposure for any population group is unlikely to result in a significant risk." Response to formal complaint, 9 February 2023, reference HCOM2575.

[44]Article 11 (c) of the Industrial Emissions Directive (2010/75/EU), The Environmental Permitting (England and Wales) (Amendment) Regulations 2013 and The Environmental Permitting (England and Wales) Regulations 2016
https://www.legislation.gov.uk/eudr/2010/75/
https://www.legislation.gov.uk/uksi/2013/390
https://www.legislation.gov.uk/uksi/2016/1154

[45]Institute of Air Quality Management "A guide to the assessment of air quality impacts on designated nature conservation sites". May 2020: https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf

[46]'Based on [name redacted]'s assertion that we have a duty contained in section 7(1)(b) Environment Act 1995, requiring us to have regard to the desirability of conserving and enhancing natural beauty and of conserving "flora, fauna and geological or physiographical features of special interest" when formulating or considering any proposals, as an air quality specialist, I find it hard to square this requirement with our allowing deposition of pollution up to the critical level (damage threshold) without taking background air quality into account.'
EIR response NR281128.

[47]"… we just do not have the people or the time available to assess the impacts on so many wildlife sites and meet the target of permitting activities within a given time."
Air Quality Specialist, EIR response NR281128.

Also see the list of concerns raised in UKWIN's March 2023 evidence to the Environment, Food and Rural Affairs Committee (EFRACOM)
https://committees.parliament.uk/writtenevidence/118874/pdf/

[48]For several consecutive years UKWIN has identified errors in Annual Performance Reports and/or Pollution Inventory returns submitted by incinerator operators to the EA, e.g. with respect to the reporting of greenhouse gas emissions (e.g. CO_2 and N_2O). This raises serious concerns regarding the quality control procedures used (or not used) by these incinerator operators.

[49]For example, Lincolnshire Energy from Waste Facility reported, for 2022, a maximum and average "95%ile 10-min avg" for carbon monoxide of 859.3 mg/m^3 and 150 mg/m^3 respectively against a limit of 150 mg/m^3 yet reported no notifications, breaches or permit non-compliance. According to the 2022 permit, the limit is set for the "95% of all 10-minute averages in any 24-hour period").
https://ukwin.org.uk/incinerators/library/Lincolnshire/5

[50]For example, Riverside Resource Recovery Facility did not report their particulate emissions for 2022 and said "Following EA guidance and approval in July 2015, RRRL now monitor particulate emissions qualitatively as opposed to quantitatively. The particulate data is now reported in mA (milliamps) and the reporting range of the

instrument is 4mA to 20mA."
https://ukwin.org.uk/incinerators/library/South+East+London/49

[51]For example, Newhaven Energy Recovery Facility reported the average "95%ile 10-min avg" for carbon monoxide for its two incineration lines was just 0.4 and 0.3 mg/m^3 but said that the average daily carbon monoxide for these two lines was 4.9 and 5.3 mg/m^3. UKWIN does not understand how the daily mean can be an order of magnitude larger than the 95%ile of the 10-min average values.
https://ukwin.org.uk/incinerators/library/East+Sussex/129

[52]For example, Sheffield Energy Recovery Facility reported for June that its "95%ile 10-min avg maximum" for carbon monoxide was just 16 yet reported its maximum average carbon monoxide was 30. The permit sets a limit for the "95% of all 10-minute averages in a calendar day" for carbon monoxide so it is difficult to understand how the maximum of the daily 95%ile of the month can be just 16 when the maximum daily average was 30.
https://ukwin.org.uk/incinerators/library/South+Yorkshire/229

[53]For example, Bolton Energy Recovery Facility reports under "Permit Compliance" a dioxin exceedance of 2.3 ng/m^3 compared to a threshold of 0.1 ng/m^3. The tables only show what appears to be an average value of 1.2075 ng/m^3. The spreadsheet template says "User to add additional tables as necessary, depending on whether quarterly or bi-annual reporting is required for the compliance year" but additional tables do not appear to have been added.
https://ukwin.org.uk/incinerators/library/Greater+Manchester/73

[54]Response to information request NR320444 shows 36 of 53 operational incinerators have never received an unannounced visit.
https://www.whatdotheyknow.com/request/ea_site_visits_to_municipal_wast

[55]"Overflowing sorting hall sees Viridor facing health complaints" 19 October 2020
https://insidecroydon.com/2020/10/19/overflowing-sorting-hall-sees-viridor-facing-health-complaints/

[56]"Air quality group calls for prosecution over fire at Beddington incinerator site" 21 August 2019
https://www.yourlocalguardian.co.uk/news/17850684.air-quality-group-calls-prosecution-fire-beddington-incinerator-site/

[57]"Something still stinks over Viridor's Beddington Lane fire" 22 July 2020
https://insidecroydon.com/2020/07/22/something-still-stinks-over-viridors-beddington-lane-fire/

[58]The operator of Beddington incinerator was reportedly fined in 2022 (https://insidecroydon.com/2022/07/16/viridor-incinerator-fined-for-multiple-breaches-pollution-permit/) but information request NR320444 showed the EA had never carried out an unannounced visit.

[59]"Waste management company fined £3m following HSE investigations" 7 September 2023
https://press.hse.gov.uk/2023/09/07/waste-management-company-fined-3m-following-hse-investigations/

[60]Beddington has had numerous exceedances, including the release of unabated emissions "via a boiler expansion flap" on 12 February 2020 which can be expected to have also bypassed all emissions measurements. Since 2019, many exceedances have been ascribed to gas bottles. Despite awareness of the exceedances gas bottles cause, no measures were put in place to prevent such exceedances in the future. Despite this failure to address problems and ensure permit compliance, the EA Draft Decision Document for permit variation EPR/GP3305LN/V003 said: "The facility has recorded a number of exceedances of permitted limits for emissions to air from the ERF. Exceedances have been recorded for carbon monoxide, TOC, sulphur dioxide and hydrogen chloride. These exceedances have generally only occurred for a short period of time, before the emissions are brought back below the permitted emission limits. These exceedances all relate to breaches of the short term emission limit values. … Exceeding one of these limits by a small amount will not necessarily result in a measurable impact on the environment or harm to human health. … The ELV exceedances encountered at Beddington were marginal and, whilst they were correctly identified as permit breaches and scored accordingly, they were insignificant when assessed against published air quality standards and extremely unlikely to have resulted in any environmental or human health impacts. We did issue minor non-compliances and measures have been put in place by the operator to minimise the risk of these types of event happening in the future."
https://consult.environment-agency.gov.uk/psc/cr0-4td-viridor-south-london-ltd/supporting_documents/Draft%20Decision%20Document.pdf
The operator recorded a 10 minute Carbon Monoxide level of 8483 mg/Nm^3 (September 2020). Huge levels of a similar scale have been recorded at other times. Averaged over 24 hours, 8483 mg/Nm^3 in just one 10 minute interval exceeded the daily Carbon Monoxide limit of 50 mg/Nm^3, yet the EA considers the exceedances all relate to breaches of the short term emission limit value and considers such exceedances to be "marginal" and

"insignificant when assessed against published air quality standards". It is unclear whether any level of exceedances would be considered to be more than marginal and significant.

[61]The three incinerators, that commenced operations in 1973, 1974 and 1975 respectively are Eastcroft (Nottingham), Edmonton (North London) and Coventry.

[62] Coventry in 2020, 2021, 2022)
https://ukwin.org.uk/incinerators/library/West+Midlands+Met+Districts/211
Eastcroft in 2020, 2021, 2022:
https://ukwin.org.uk/incinerators/library/Nottingham/6
Edmonton in 2020, 2021, 2022:
https://ukwin.org.uk/incinerators/library/North+London/48

[63]Hull Energy Production Facility, which ran on RDF/SRF for part of the year, reported a maximum daily mean for carbon monoxide of 3241 mg/m^3 when the daily limit is 50 mg/m^3
https://ukwin.org.uk/incinerators/library/Hull/237

[64]This is the uncertainty typically allowed by the Environment Agency for measurements of Hydrogen Chloride and Ammonia.

[65]For example, Enviropower Ltd's 2018 annual report (incorrectly titled as the report for 2019) shows a dioxin exceedance of 0.1199 occurred on 24 March 2018 but the operator subtracted a measurement uncertainty of 0.02905. A dioxin measurement in 2019 (18-21 March) of 0.2361 ng/m^3 far exceeded the threshold so had to be reported. The operator considered this was "the only dioxin exceedance the plant has had". The two measurements in excess of the threshold in two years following raises questions of how many exceedances may have gone unmeasured and undetected between March 2018 and March 2019.
https://ukwin.org.uk/incinerators/library/West+Sussex/140

[66]Based on two dioxin measurements of 8 hours duration and 8,000 operational hours per year.

[67]For example, Energy Works Hull (Q2 result: 4.8 ng/m^3), Kemsley Generating Station (L2Q1: 1.6 ng/m^3), Levenseat Renewable Energy Limited (May: 0.2754 ng/m^3), Bolton Thermal Recovery Facility (Q2: 2.3 ng/m^3), all compared to a threshold of 0.1 ng/m^3.

[68]Kemsley Generating Station dioxin exceedance on 11 May 2022.

[69]Ardley Energy Recovery Facility exceedance on 6 November 2019.

[70]The Coventry And Solihull Waste Disposal Company Ltd reported a dioxin exceedance on 8 May 2019. The reason was "unconfirmed" and the only action was to retake samples and retest.

[71]The reason for dioxin exceedance and the "Measures taken to prevent reoccurrence" were recorded as "n/a" for the dioxin exceedance on 13 May 2022 reported by Levenseat Renewable Energy Limited (LREL).

[72]EA Guidance Environmental permitting: air dispersion modelling reports
https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports

[73]ADMLC-R12 "Guidelines for the Preparation of Short Range Dispersion Modelling Assessments for Compliance with Regulatory Requirements – An Update to the ADMLC 2004 Guidance"
https://admlc.com/publications/

[74]A non-exhaustive list of important aspects of ADMLC Guidance that may not be followed include: the need to give consideration to the variability of exhaust gas emission parameters such as emissions rates with the need for full details of calculations for the derivation of normalised flow rates; predictions may be seen as invalid without uncertainties and results need to given as numerical values; the need to avoid unsubstantiated assertions as to the insensitivity of the results to certain factors; the underlying model should have a sound physical basis (of relevance to the deposition velocities assumed by the EA); and the avoidance of quoting numbers to more significant figures than are warranted by the modelling method.

[75]The Environment Agency is listed as an organisation that is part of the ADMLC
https://admlc.com/about/

[76]For example, the Decision Document for EPR/SP3609BX/A001 says "Worst case conservative assumptions have been made." and "We have already considered impacts using conservative assessments (for worst case)."

[77]To give one example, the predictions take no account of the uncertainties inherent in the modelling software systems themselves. This can be considerable as shown by very different results obtained from the two most widely used air dispersion modelling systems, ADMS and AERMOD, in some situations (e.g. Mark R. Theobald,

Alberto Sanz-Cobena, Antonio Vallejo and Mark A. Sutton. 2015 "Suitability and uncertainty of two models for the simulation of ammonia dispersion from a pig farm located in an area with frequent calm conditions"). There are many other example of non-worst case assumptions. This is an extensive subject and a full consideration of all the issues is outside the scope of this document.

[78]Typical examples include: the operational lifetime of the plant which may be modelled as 30 years even though the operator may anticipate a much longer lifetime; default soil density figures; the use of dioxin deposition velocities with no stated scientific basis and that may not be worst case; soil loss assumptions; water runoff assumptions; plant loss coefficients; crop yield figures; the duration of breast milk ingestion; animal soil intake quantities; assumed human diet. A full list would be much longer.

[79]Examples include: assumptions about soil mixing depth; the mix of plants; that the outer layer of grain will be discarded and not consumed by animals; that silage will always contain grain (and hence lesson dioxin exposure because the outer layer is assumed to be removed); no inclusion of sheep and sheep products as a potential pathway; plant exposure durations that may not reflect over-wintered crops nor the potentially longer growing times of organic produce; the amount of produce that is grown undercover.

[80]Chapter 8 of the HHRAP.

[81]Section 8.4 of the Human Health Risk Assessment Protocol.

[82]From an Environment Agency "About this consultation" document for a permit application consultation, for example:
https://consult.environment-agency.gov.uk/psc/ca6-4se-fortum-carlisle-limited/supporting_documents/Application%20%20Bespoke%20%20About%20this%20consultation.pdf

[83]The EA's Decision Document template says, following a table of costs to the applicant of SCR and SNCR, "Based on the figures above the Applicant considers that the additional cost of SCR over SNCR is not justified by the reduction in environmental impact. Thus SCR is not BAT in this case, and SNCR is BAT for the Installation."
The template Decision Document gives no consideration to the cost to society of the additional pollution. *Any* additional cost to the applicant is considered justification to use SNCR rather than SCR.

[84]"EPR Permit - Stack Height Assessment", Environment Agency Internal Guidance (draft), V0.5 November 2017

[85]Response to information request NR225991 received in 6 August 2021.

[86]https://www.ilkleygazette.co.uk/news/18939006.protestors-kick-off-next-stage-campaign-incinerator-permit-granted/

[87]The Decision Document said that:

"The Applicant submitted an assessment of pollutant process contribution against the marginal cost of increasing stack. The assessment showed that increasing costs outweigh any environmental improvements from further stack height increases above 60m" without explaining how the costs would have been 'self-inflicted'.
https://ukwin.org.uk/library/247-PermitDecision-2020.pdf

[88]The concerns were raised by CRAIN in response to the public consultation on the Carlisle incinerator permit application EPR/SP3609BX/A001 in document "Questions on EPR/SP3609BX/A001 Stack Height Assessment Addendum A" 29 March 2021.

[89]The EPR/SP3609BX/A001 Decision Document says "We are satisfied that the stack height has been calculated in accordance with IED article 46(1). Having assessed the Application as a whole we are satisfied that the measures proposed, of which stack height is one aspect, are BAT"
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1149859/Decision_Document_SP3609BX.pdf

[90]Public Health England "PHE statement on modern municipal waste incinerators (MWIs) study"
https://www.gov.uk/government/publications/municipal-waste-incinerators-emissions-impact-on-health/phe-statement-on-modern-municipal-waste-incinerators-mwi-study

[91]https://www.whatdotheyknow.com/request/incinerator_contributions_to_loc

[92]David Mudge, 27 July 2022, "Can Incinerators Make More Than A Very Small Contribution To Local Concentrations Of Air Pollutants?"

[93]UKHSA reference 31/03/23/JS/1486. Response dated 24 April 2023.

[94]Public Health England "PHE statement on modern municipal waste incinerators (MWIs) study"
https://www.gov.uk/government/publications/municipal-waste-incinerators-emissions-impact-on-health/phe-statement-on-modern-municipal-waste-incinerators-mwi-study

[95]Consultation responses by NHS Ayrshire & Arran Respiratory Managed Clinical Network (MCN) to incinerator planning application reference 21/0369/PP dated 25th October 2021 and May 2022.
https://eplanning.east-ayrshire.gov.uk/online/applicationDetails.do?activeTab=summary&keyVal=QTAXJRGFG7L00

[96]Deputations to the North London Waste Authority, 25th June 2020.
https://www.nlwa.gov.uk/sites/default/files/2020-07/Supplementary%20Agenda%2025.06.2020.pdf

[97]Doctors and Health Professionals Say Carlisle's Incinerator Shouldn't Happen (January 2023).
https://www.facebook.com/john.l.campbell1/posts/pfbid0JbpTQLw4AsYo7FDUJbP3CyPeHw7wYsxHWLzQyhRvWgArsoFiftaXHwVsZaqxwaCxl

[98]Public Health England for COMEAP, 2018, "Associations of long-term average concentrations of nitrogen dioxide with mortality"
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/734799/COMEAP_NO2_Report.pdf

[99]COMEAP, 2020 "Statement on quantifying mortality associated with long-term exposure to PM2.5"
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061492/COMEAP_Statement_on_PM2.5_mortality_quantification.pdf

[100]Air Quality Consultants, May 2020, "Health Effects due to Emissions from Energy from Waste Plant in London"
https://www.london.gov.uk/sites/default/files/gla_efw_study_final_may2020.pdf

[101]2021, Strak et al., "Long term exposure to low level air pollution and mortality in eight European cohorts within the ELAPSE project: pooled analysis"
https://www.bmj.com/content/374/bmj.n1904

[102]The EA considers the COMEAP methodology "is not generally recommended" for modelling the impact of an individual installation. These are the words used in the EA's template incinerator permit decision document.

[103]The EA does not typically require COMEAP assessments as part of the permitting process, and when provided with an assessment applying COMEAP mortality coefficients to an incinerator the EA does not appear to have considered this information. In response to the public consultation on permit application EPR/SP3609BX/A001, CRAIN submitted "Questions on EPR/SP3609BX/A001 Applying COMEAP Mortality Risk Data to the Modelled NO_2 Emissions" (including addendum). The EA Decision Document on permit application EPR/SP3609BX/A001 responded "Our view is that a COMEAP assessment is not required" rather than addressing the substance of the information provided.

[104]Reducing risks, protecting people: HSE's decision-making process (2001), paragraph 138: "...in the case of most housing developments, for example, HSE advises against granting planning permission for any significant development where individual risk of death for the hypothetical person is more than 10 in a million per year, and does not advise against granting planning permission on safety grounds for developments where such individual risk is less than 1 in a million per year..."
https://www.hse.gov.uk/enforce/assets/docs/r2p2.pdf

[105]Tait PW, Brew J, Che A, Costanzo A, Danyluk A, Davis M, Khalaf A, McMahon K, Watson A, Rowcliff K, Bowles D. The health impacts of waste incineration: a systematic review. Aust N Z J Public Health. 2020 Feb;44(1):40-48.
https://onlinelibrary.wiley.com/doi/10.1111/1753-6405.12939

[106]The context of this statement is "Many older incinerators were linked with neoplasia, reproductive issues and other diseases. While the results were not consistent across the literature, based on a precautionary principle there is insufficient evidence to conclude that any incinerator is safe. There is some suggestion that newer incinerator technologies with robust maintenance schedules may be less harmful, but diseases from exposures tend to manifest only after many years of cumulative exposure, so it is premature to conclude that these newer technologies improve safety."
The UKHSA said to UKWIN "The Tait et al paper is a review summarising the findings of a number of studies on incinerators, which UKHSA is aware of. The conclusions of the review notes that much of the evidence around adverse effects of incinerators comes from literature on older incinerators, and in the UK context before the introduction of the current regulatory requirements under the Waste Incineration Directive, and subsequently the Industrial Emissions Directive." (10 May 2022 from enquiries@ukhsa.gov.uk) The UKHSA has not responded to UKWIN pointing out that, of the 89 references, nearly 60% were published in 2007 or later so likely reflecting

incinerators after the introduction of the Waste Incineration Directive (and probably some published prior to 2007 may too).

[107]Environment Agency 2007 UK Soil and Herbage Pollutant Survey UKSHS Report No. 10
https://www.gov.uk/government/publications/uk-soil-and-herbage-pollutant-survey

[108]https://www.whatdotheyknow.com/request/uk_soil_and_herbage_pollutant_su

[109]https://www.toxicowatch.org/endocrine-disrupting-compounds

[110]ARS Ile-de-France, "Polluants organiques persistants : l'Agence recommande à titre conservatoire de ne pas consommer les œufs des poulaillers domestiques en Île-de-France"
https://www.iledefrance.ars.sante.fr/polluants-organiques-persistants-lagence-recommande-titre-conservatoire-de-ne-pas-consommer-les

"...given the risks that incineration poses to human health and the environment, and the risk of lock-in, Scotland should not construct more capacity than it needs and only some of the currently planned capacity should be built" Stop, Sort, Burn, Bury? - Independent Review of the Role of Incineration in the Waste Hierarchy in Scotland (Page 3). Scottish Government, 10 May 2022
https://www.gov.scot/publications/stop-sort-burn-bury-independent-review-role-incineration-waste-hierarchy-scotland/documents/

[112]All-Party Parliamentary Group on Air Pollution. December 2021. "Pollution from Waste Incineration A Synopsis of Expert Presentations on Health and Air Quality Impacts"
http://appgairpollution.org/report-pollution-from-waste-incineration/

[113]The UKHSA's information request response shows the papers the UKHSA has considered when reviewing its advice.
https://www.whatdotheyknow.com/request/ukhsas_reviews_of_research_relev
In addition to the considerable recent research showing evidence of harm from air pollution at lower levels (such as that considered by WHO when reviewing their AQGs), examples of papers that UKHSA appears not to have considered include:

- Tait et al (despite the UKHSA being informed of the paper and making some comments on it).
- Many of the 89 Tait et al references (the information request response includes only a few of these references).
- Aimin Song, Huiru Li, Mingyang Liu, Ping'an Peng, JianFang Hu, Guoying Sheng, Guangguo Ying, Polybrominated dibenzo-p-dioxins/furans (PBDD/Fs) in soil around municipal solid waste incinerator: A comparison with polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs), Environmental Pollution, Volume 293, 2022, 118563, ISSN 0269-7491, https://doi.org/10.1016/j.envpol.2021.118563.
- Li C, Yang L, Wu J, Yang Y, Li Y, Zhang Q, Sun Y, Li D, Shi M, Liu G. Identification of emerging organic pollutants from solid waste incinerations by FT-ICR-MS and GC/Q-TOF-MS and their potential toxicities. J Hazard Mater. 2022 Apr 15;428:128220. doi: 10.1016/j.jhazmat.2022.128220. Epub 2022 Jan 6. PMID: 35016122. (The UKHSA gave a verbal response to the paper at an online meeting on 19 July 2022 but were unable to say whether the paper had been looked at prior to UKWIN raising it with UKHSA. The information response shows the UKHSA has not formally assessed the research when reviewing its advice on Municipal Waste Incinerators)

It is also concerning that the most recent reviews listed in the response were carried out in May 2021, more than two years prior to the information request, further calling into question whether the UKHSA continues to review its advice in light of new research.

[114]Decision Document for EPR/CB3308TD/V002.

[115]As an example, UKWIN informed the EA of Yang et al. (referenced above) but it became apparent at a later meeting with UKHSA that the EA had not informed the UKHSA of this recent paper. UKWIN raised the concern with the UKHSA that the EA fails to pass on concerns regarding the health impacts of incinerators raised by the public, even if such concerns refer to new evidence (Concern #70 in "Summary of Concerns Raised and Responses" last version dated 22 February 2023). UKHSA did not deny that concerns are not passed on by the EA even if they include new evidence. The UKHSA did not respond to the concern that this increases the possibility that relevant new research may be missed. Responses to information requests (https://www.whatdotheyknow.com/request/health_impacts_of_waste_to_energ, also https://www.whatdotheyknow.com/request/communications_re_assessment_of) shows the EA did not inform the UKHSA of many health-related concerns submitted in relation to Carlisle permit application EPR/SP3609BX/A001.

[116]The Decision Document for EPR/SP3609BX/A001 failed to substantively address numerous health-related concerns and questions submitted in response to the public consultation. Another example, is the Decision Document for EPR/CB3308TD/V002 which did not substantively address all the health-related concerns raised nor respond to referenced new research.

[117]The EA stated in a letter to Swindon Borough Council dated 7 July 2017 (ref WA/2016/122998/03-L02) that "Under IED [Industrial Emissions Directive] we are not required to consider the relative CO_2 emissions compared with other disposal methods, for example a landfill where the carbon may be 'stored in the ground' as these are matters for the waste planning authority".
https://cambridgeshire.cmis.uk.com/CCC_live/Document.ashx?czJKcaeAi5tUFL1DTL2UE4zNRBcoShgo=5Bu9cLhtj2DnT1KE%2BCswymYEraqPC%2BtcCA%2BXempqQGgyqUNvAUsvsg%3D%3D&rUzwRPf%2BZ3zd4E7Ikn8Lyw%3D%3D=pwRE6AGJFLDNlh225F5QMaQWCtPHwdhUfCZ%2FLUQzgA2uL5jNRG4jdQ%3D%3D&mCTIbCubSFfXsDGW9IXnlg%3D%3D=hFflUdN3100%3D&kCx1AnS9%2FpWZQ40DXFvdEw%3D%3D=hFflUdN3100%3D&uJovDxwdjMPoYv%2BAJvYtyA%3D%3D=ctNJFf55vVA%3D&FgPlIEJYlotS%2BYGoBi5olA%3D%3D=NHdURQburHA%3D&d9Qjj0ag1Pd993jsyOJqFvmyB7X0CSQK=ctNJFf55vVA%3D&WGewmoAfeNR9xqBux0r1Q8Za60lavYmz=ctNJFf55vVA%3D&WGewmoAfeNQ16B2MHuCpMRKZMwaG1PaO=ctNJFf55vVA%3D

The EA stated in their 2020 permit variation decision document for the Suffolk incinerator (EPR/WP3438HZ/V007) that: "Where waste will be sourced from and movement of traffic to and from the Installation is outside the remit of the Environment Agency but will normally be an issue for the planning authority to consider. As such we would not require an air quality assessment submitted with an environmental permit application to consider emissions from traffic movements on local roads". https://ukwin.org.uk/library/31-PermitVariationDecision-2020.pdf

[118]"A rapidly increasing number of incinerators in the UK are being disproportionately built in low-income areas and neighbourhoods with high populations of people of colour" 'UK waste incinerators three times more likely to be in poorer areas' (Unearthed, 31 July 2022)
https://unearthed.greenpeace.org/2020/07/31/waste-incinerators-deprivation-map-recycling/
https://ukwin.org.uk/files/pdf/Coalition-response-to-Defra-on-10-point-action-plan-August-2023.pdf

[119]Incineration Overcapacity in England, UKWIN, September 2023
https://ukwin.org.uk/overcapacity

[120]Stop, Sort, Burn, Bury? - Independent Review of the Role of Incineration in the Waste Hierarchy in Scotland. Scottish Government, 10 May 2022
https://www.gov.scot/publications/stop-sort-burn-bury-independent-review-role-incineration-waste-hierarchy-scotland/documents/

Disclaimer

UKWIN has taken due care in the preparation of this report to ensure that all facts and analysis presented are as accurate as possible within the scope of the project. However no guarantee is provided in respect of the information presented, and UKWIN is not responsible for decisions or actions taken on the basis of the content of this briefing. This briefing includes opinions and interpretations regarding various matters. Nothing in this briefing is intended to imply knowledge about the intent of third parties regarding their actions, motivations, or statements.