

# Waste Incineration and Particulate Pollution: *A failure of governance*

- Incinerators exceed pollution-reporting thresholds but public not told
- We reveal emissions of PM and NOx from English incinerators - see overleaf
- Incinerator pollution costs £billions: 'Polluter pays' principle must apply

Particulate matter (PM) is the minute particles emitted by many industrial processes; in this case we are concerned with waste incineration. PM comes in various sizes: PM10 is all particles whose average diameter is less than 10 micrometres (a micrometre is 1/1000 of a millimetre). PM2.5 is all particles that measure up to 2½ micrometres in diameter, and PM0.1 is particles up to one-tenth of a micrometre. They are invisible and dangerous to health.

## Public kept in the dark

DEFRA Minister Thérèse Coffey MP has told Parliament that the Environment Agency (EA) is 'required' to set 'limit values' for PM10 and PM2.5 emissions, and that a 'strict monitoring system' is in place to enforce these rules.<sup>1</sup>

The EA has set a reporting threshold for PM10 and PM2.5 emissions at **one tonne** per year.<sup>2</sup> This means that if emissions reach those levels then this information should be made public via the EA's Pollution Inventory.

But the Minister has also said 'there is no commercially available' equipment for the continuous monitoring of PM10 or PM2.5,<sup>3</sup> so the EA's Pollution Inventory contains no separate data for either PM10 or PM2.5. In other words, these emissions can exceed reporting thresholds (see overleaf) **without the public being told**.

Finally, the Minister has admitted that **there is no specific limit set for PM1 emissions from incinerators**.<sup>4</sup> This is concerning because smaller particles are the most likely to pass into the bloodstream and adversely affect health.

## The TPM fiddle

Because PM10 and PM2.5 are not measured separately, the EA only requires incinerators to continuously monitor the **Total Particulate Matter (TPM)** emitted. The reporting threshold for TPM is set at a massive 10 tonnes per year.<sup>5</sup> Because incinerators do not usually emit that level of TPM, operators are able to report that their emissions are 'below reporting threshold', **so the public is told nothing about TPM emissions either**.

## The 'no equipment' fiddle

It may sound reasonable to say that there is no equipment to measure PM10 and PM2.5 separately so we can only measure TPM – until we learn that DEFRA's own National Atmospheric Emissions Inventory (NAEI) has said: 'The vast majority of emissions are very fine, so we [assume that] 100% of PM is of a size less than 2.5...hence TPM emissions = PM10 emissions = PM2.5 emissions'.<sup>6</sup> In other words, smaller PMs *can* be measured by proxy. **The Government accepts this is a 'reasonable conclusion'**.<sup>7</sup>

### Overleaf:

- Official guidance ignored
- We report emissions for first time
- Policies needed

## PARTICULATE POLLUTION: THE HEALTH EFFECTS

### What the Committee on the Medical Effects of Air Pollutants says:

'Particles [particulate matter] emitted directly from a range of pollution sources...and those formed by chemical reactions in the atmosphere are associated with **adverse effects on health** and the current **consensus** is that these associations are, at least in part, causal. Hence, reductions in concentrations of both types of particles are likely to benefit public health'.<sup>8</sup>

### What Public Health England says:

'PM is inhaled into the lungs and ultrafine PM0.1 is thought to **pass into the blood**, causing **many adverse outcomes** including **systemic inflammation**'.<sup>9</sup>

### What DEFRA says:

'Exposure to airborne PM is associated with a range of **adverse effects on human health** including effects on the **respiratory and cardiovascular systems**, leading to **hospital admissions and mortality**. There is increasing evidence that fine (PM2.5) and ultrafine (PM0.1) particulate matter plays a more significant role than previously thought'.<sup>10</sup>

## ...AND THE COST

Atmospheric pollution costs the UK money. That's not us talking, it's HM Treasury. The Government has published the cost-to-society figures for some of the pollutants released by waste incinerators.<sup>11</sup> The Treasury assumes particulate matter (PM) from the waste sector costs the country £24,994 per tonne of PM; for nitrogen oxides (NOx) the cost is £9,049 per tonne; for sulphur oxides (SOx) it is £1,956 and for ammonia £2,363. Using Environment Agency data we worked out the cost to society of PM and NOx, from English incinerators in 2017 (see overleaf for total emissions by area and methodology used for these calculations).

|                                    |                                |
|------------------------------------|--------------------------------|
| • PM                               | £5.65 million in 2017          |
| • NOx                              | £102.28 million in 2017        |
| • Total cost to society            | £107.93 million in 2017        |
| • Total cost to society × 30 years | <b>More than £3.23 billion</b> |

Multiplying the 2017 rate of incineration by a typical operational lifetime of 30 years results in a conclusion that existing incinerators will cost society more than £3bn during their lifetime. And this calculation uses only two pollutants; when CO<sub>2</sub>, carbon monoxide and other harmful emissions are included, we are talking about an even greater cost to society caused by incineration. We will be saying more on this matter in due course.

## The 25-Year Environment Plan: The 'polluter pays' principle

The Government published a 25-year plan for the environment on 24<sup>th</sup> February 2018. The Plan explains (on page 129) that the polluter-pays principle is one of the 'key underlying principles of existing policy' that will be maintained after Brexit by the European Union (Withdrawal) Act. Applying this key principle, and bearing in mind that there are many more pollutants from incinerators in addition to PM and NOx, there can be only one conclusion: **an incineration tax must be introduced to ensure polluters pay their fair share for the harmful emissions arising from waste incinerators**.



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<sup>1</sup> 8.12.17 answer to PQ 117197 asked by David Drew MP on 4.12.17

<sup>2</sup> EA Pollution Inventory, Column K

<sup>3</sup> 19.4.18 answer to PQ 135379 asked by David Drew MP on 13.4.18

<sup>4</sup> 8.12.17 answer to PQ 117197 asked by David Drew MP on 4.12.17

<sup>5</sup> EA Pollution Inventory, Column K

<sup>6</sup> 24.5.18 e-mail from NAEI

<sup>7</sup> 16.5.18 answer to FOI request NR85604

<sup>8</sup> Statement on the evidence for differential health effects according to source or components (COMEPAP, March 2015)

<sup>9</sup> *Air Quality in England: A Briefing for Directors of Public Health* (PHE, DEFRA and LGA, March 2017)

<sup>10</sup> Particle Numbers and Concentrations Network – see: <https://uk-air.defra.gov.uk/networks/network-info?view=particle>

<sup>11</sup> <https://www.gov.uk/guidance/air-quality-economic-analysis>

# Revealed: Unreported and harmful incinerator emissions in your area

## Official guidance ignored

In December 2012, the Environment Agency (EA) issued guidance for England on how to assess PM10 and PM2.5 emissions using an Emissions Factor (EF) based on the quantity of waste incinerated.<sup>12</sup> However, the EA admits that ‘very few, if any’ operators have been following its guidance.<sup>13</sup> How few? There were just ‘five instances in the past 19 years where operators reported emissions of PM2.5’.<sup>14</sup>

## What should have happened

With reporting thresholds set at 1 tonne a year for both PM10 and PM2.5, and the EA’s Emission Factor of 0.022 kg of PM10 and PM2.5 per tonne of waste combusted,<sup>15</sup> **every incinerator burning over 45,455 tonnes of waste per year should report PM2.5 and PM10 emissions** (as 0.022 kg × 45,455 tonnes = 1 tonne). Instead, there have been just five reports in 19 years! But that doesn’t seem to bother the Government - Minister Thérèse Coffey said: ‘There is no need to monitor specifically for PM2.5’.<sup>16</sup>

## Official guidance applied

We applied the official guidance by multiplying the quantity of waste incinerated in 2017 by the EF of 0.022. The results displayed in Table 1 (right) demonstrate that in 2017, according to EA guidance, **every incinerator listed emitted PM10 and PM2.5 over the reporting threshold of one tonne per year. Thus, all those operators should have reported their emissions.** Why has the EA allowed them to get away with ignoring its guidance for so many years?

## Policies needed

**1. PM10 and PM2.5 monitoring and reporting should be made mandatory for incinerators, and EA guidelines should be strengthened and enforced. Simply put, incinerators must develop and implement accurate systems to measure the particulate matter they release**

*Reason:* To increase transparency on a matter of serious public concern associated with the adverse health impacts described overleaf. The Government has conceded that TPM = PM10 for incinerators. The National Atmospheric Emissions Inventory (NAEI) says PM10 = PM2.5. Page 15 of the EA guidance gives the same EF for PM10 as for PM2.5.

**2. Where PM emission factors are used they should not be reduced**

*Reason:* Reported TPM levels indicate that the EF for PM10 has been set too low, yet there are suggestions that the EF could be reduced. The lower the EF, the greater the incentive to avoid monitoring – and operators should not be encouraged to be any less transparent.

**3. If possible, a limit value should be placed on PM1 emissions**

*Reason:* Fine particles are the most damaging – see overleaf.

**4. Incinerators should be taxed on their emissions**

*Reason:* The ‘polluter pays’ principle is identified as a ‘key underlying principle’ in the Government’s 25-Year Environment Plan. In its latest publication, the industry does not argue against this principle but calls for tax changes to be ‘signalled well in advance’.<sup>17</sup> As such, the Government should consult on an incineration tax that implements the ‘polluter pays’ principle as a matter of urgency.

**5. Moratorium on new incinerators until these policies are in place**

*Reason:* New sites must not begin operating on the basis of current inadequate practices and policies. Given the current level of incineration overcapacity and plans to increase recycling, there is no reason to risk public health by allowing more incinerator pollution.

Table 1: PM and NOx emissions based on EA Emissions Factors (2017)

| Incinerator    | Constituency                        | Tonnes waste burnt <sup>18</sup> | Tonnes PM10 & PM2.5 emitted | Tonnes NOx emitted |
|----------------|-------------------------------------|----------------------------------|-----------------------------|--------------------|
| Allington      | Maidstone and the Weald             | 469,162                          | 10.3                        | 516.1              |
| Ardley         | Banbury                             | 286,157                          | 6.3                         | 314.8              |
| Belvedere      | Erith and Thamesmead                | 746,326                          | 16.4                        | 821.0              |
| Billingham     | Stockton North                      | 563,349                          | 12.4                        | 619.7              |
| Bolton         | Bolton South East                   | 50,202                           | 1.1                         | 55.2               |
| Chineham       | Basingstoke                         | 93,374                           | 2.1                         | 102.7              |
| Colnbrook      | Windsor                             | 455,692                          | 10.0                        | 501.3              |
| Coventry       | Coventry South                      | 292,989                          | 6.4                         | 322.3              |
| Devonport      | Plymouth Moor View                  | 250,992                          | 5.5                         | 276.1              |
| Dudley         | Dudley North                        | 95,216                           | 2.1                         | 104.7              |
| Edmonton       | Edmonton                            | 511,930                          | 11.3                        | 563.1              |
| Ellesmere Port | Ellesmere Port and Neston           | 71,934                           | 1.6                         | 79.1               |
| Exeter         | Exeter                              | 55,685                           | 1.2                         | 61.3               |
| Ferrybridge C  | Normanton Pontefract and Castleford | 631,515                          | 13.9                        | 694.7              |
| Four Ashes     | South Staffordshire                 | 337,701                          | 7.4                         | 371.5              |
| Greatmoor      | Buckingham                          | 291,352                          | 6.4                         | 320.5              |
| Grimsby        | Great Grimsby                       | 54,363                           | 1.2                         | 59.8               |
| Hartlebury     | Mid Worcestershire                  | 197,076                          | 4.3                         | 216.8              |
| Huddersfield   | Huddersfield                        | 132,448                          | 2.9                         | 145.7              |
| Ipswich        | Central Suffolk & N. Ipswich        | 261,670                          | 5.8                         | 287.8              |
| Leeds          | Leeds Central                       | 171,567                          | 3.8                         | 188.7              |
| Marchwood      | New Forest East                     | 201,781                          | 4.4                         | 222.0              |
| Middlesbrough  | Middlesbrough                       | 393,235                          | 8.7                         | 432.6              |
| Newhaven       | Lewes                               | 222,960                          | 4.9                         | 245.3              |
| N. Hykeham     | Sleaford and N. Hykeham             | 168,759                          | 3.7                         | 185.6              |
| Nottingham     | Nottingham South                    | 150,682                          | 3.3                         | 165.8              |
| Peterborough   | Peterborough                        | 81,248                           | 1.8                         | 89.4               |
| Portsmouth     | Portsmouth North                    | 202,192                          | 4.4                         | 222.4              |
| Runcorn        | Halton                              | 890,932                          | 19.6                        | 980.0              |
| Sevenside      | Filton and Bradley Stoke            | 340,422                          | 7.5                         | 374.5              |
| Sheffield      | Sheffield South East                | 229,662                          | 5.1                         | 252.6              |
| Shrewsbury     | Shrewsbury and Atcham               | 96,831                           | 2.1                         | 106.5              |
| SELCHP         | Lewisham Deptford                   | 446,363                          | 9.8                         | 491.0              |
| St Dennis      | St Austell and Newquay              | 188,728                          | 4.2                         | 207.6              |
| Stoke-on-Trent | Stoke-on-Trent Central              | 183,974                          | 4.0                         | 202.4              |
| Tyesley        | Birmingham Yardley                  | 344,851                          | 7.6                         | 379.3              |
| Wolverhampton  | Wolverhampton North East            | 112,213                          | 2.5                         | 123.4              |
| <b>Totals</b>  |                                     | <b>10,275,533</b>                | <b>226.1</b>                | <b>11,303.1</b>    |

## Methodology for calculating emissions and assessing cost to society

**For PM** we used the EA’s emissions factor (EF) of 0.022kg per tonne of waste burnt, as explained opposite. We multiplied the tonnes of waste burnt (Column 3) by the EF of 0.022 kg/tonne. The results shown in Column 4 are rounded to one decimal place. To obtain the costs to society listed overleaf, we then multiplied 226.1 tonnes by £24,994 per tonne (as per the HM Treasury’s Green Book<sup>19</sup>) = £5,651,143.

**For NOx** there is no emissions factor set by the EA, so we used the EA-advised method to create one. To do this we added up the total emissions of NOx from those sites that reported a figure (some did not) for 2016 (the most recent year available in the pollution inventory) and then divided it by the total tonnes of waste incinerated in that year by those sites. That gave us an EF of 0.0011 which we then applied to the 2017 figures for total waste incinerated at each site (Column 3). To obtain the costs to society listed overleaf, we then multiplied 11,303.1 tonnes by £9,049 per tonne (as per the Green Book) = £102,281,752.

<sup>12</sup> Pollution inventory reporting – incineration activities guidance note (Environment Agency, 2012), page 15. <https://www.gov.uk/government/publications/pollution-inventory-reporting-guidance-notes>

<sup>13</sup> 8.5.18 reply to FOI request to EA National Request Ref. NR85604

<sup>14</sup> 15.5.18 e-mail to EA from National Atmospheric Emissions Inventory Helpdesk

<sup>15</sup> Pollution inventory reporting (Environment Agency, 2012), page 15

<sup>16</sup> 19.4.18 answer to PQ 131978 asked by David Drew MP on 12.3.2018

<sup>17</sup> Energy for the Circular Economy (ESA, June 2018), recommendation 2 on page 7

<sup>18</sup> 2017 Incineration Inputs and Capacity (Environment Agency)

<sup>19</sup> <https://www.gov.uk/guidance/air-quality-economic-analysis>