Wheelabrator TECHNOLOGIES

Deadline 3: Applicant's Response to the Examining Authority's Further Written Questions (ExQ1A)

Appendix 1.13a – UK Statistics on Waste – 19th March 2020

Wheelabrator Kemsley (K3 Generating Station) and Wheelabrator Kemsley North (WKN) Waste to Energy Facility Development Consent Order

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Department for Environment Food & Rural Affairs

Government Statistical Service

19th March 2020

UK Statistics on Waste

The purpose of this release is to announce UK waste estimates that are produced in relation to official reporting requirements and targets. It includes data on:
1. Recycling rate from Waste from Households – new 2018 data
2. Biodegradable municipal waste sent to landfill – new 2018 data
3. Packaging waste – 2017 figures now finalised, with minor revisions
4. Recovery rate from construction and demolition – not updated, latest data 2016
5. Commercial and industrial (C&I) waste – new 2018 England data and revised 2017 England data (UK figures not updated, latest data 2016)
6. Total waste generation and final treatment of all waste – latest data 2016, updated with minor revisions to England 2016 waste generation figures
7. Waste infrastructure – not updated, latest data 2016

There is a detailed separate dataset available for all sections.

Key points

- The **UK recycling rate for Waste from Households** (WfH; including IBA metal) was 45.0% in 2018, decreasing from 45.5% in 2017. There is an EU target for the UK to recycle at least 50% of household waste by 2020.
- **The recycling rate for WfH decreased in all UK countries except Northern Ireland in 2018**. The recycling rate for England was 44.7%, compared with 47.7% in Northern Ireland, 42.8% in Scotland, and 54.1% in Wales. The reduction for England was driven primarily by a reduction in 'other organics' such as green garden waste sent for recycling, linked to adverse weather conditions for plant growth.
- **UK biodegradable municipal waste (BMW) sent to landfill** has fallen from approximately 7.4 million tonnes in 2017 (21% of the baseline 1995 value) to around 7.2 million tonnes in 2018 (20% of the baseline 1995 value). The UK is therefore still on track to meet the EU target to restrict BMW landfilled to 35% of the 1995 baseline by 2020.
- Figures for 2017 show that 70.0% of **UK packaging waste** was either recycled or recovered compared to 71.4% in 2016. This exceeds the EU target to recycle or recover at least 60% of packaging waste.

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- It is estimated that the UK generated 41.1 million tonnes of **commercial and industrial (C&I) waste** in 2016, of which 33.1 million tonnes (around four fifths) was generated in England. The latest estimates for England only indicate that C&I waste generation was around 36.1 million tonnes in 2017 and 37.2 million tonnes in 2018.

- **The UK generated 221.0 million tonnes of total waste in 2016**, with England responsible for 85% of the UK total.

Data revisions in this update:

This release contains minor revisions to the Scotland 2017 Recycling rate for Waste from Households (WfH) and Biodegradable Municipal Waste to Landfill figures, due to routine revision of site returns provided by operators. Scotland also made minor amendments to one of the waste codes (19 12 12) for their 2011-2017 Municipal Waste to Landfill figures, to correct an error in the apportionment between municipal and non-municipal waste. Wales made minor revisions to WfH recycling figures for 2013-2017, reflecting an amendment to their calculation methodology. These changes for Wales have been made to improve the accuracy of the identification of recycling rejects for use in their calculations and to improve consistency with other current and future reporting requirements.

The 2017 UK figures for Packaging waste arisings, recycling and recovery have now been finalised following submission to Eurostat. The final figures include minor revisions to waste arisings estimates for paper, aluminium, steel and wood, following amendments to 'placed on the market' estimates in late 2016.

The 2017 Commercial & Industrial (C&I) waste arisings estimate for England has been revised to correct an error in Defra calculations to estimate the proportion of incinerated waste that was attributable to C&I. This correction has resulted in a decrease in the England 2017 C&I estimate of around 1.8 million tonnes (5%).

Minor revisions were also made to the 2016 Waste Generation figures for England, as the wet-to-dry weight factors had not been applied to the incorporated C&I data in error. This reduced the total England Waste Generation figure by around 1.9 million tonnes (1%).

1 Waste from Households (WfH)

Updated, with new figures for 2018

WfH is the agreed harmonised UK measure used to report household recycling to comply with the Waste Framework Directive (2008/98/EC). Under this Directive the UK and other EC Member States must meet a target to recycle 50% of household waste by 2020. The UK currently defines 'household waste' using the WfH measure.

Updated UK figures for 2018 are available as summarised in Table 1. The recycling figures all include metal recovered and recycled after incineration (incinerator bottom ash metal; IBAm). This methodological change was introduced in the February 2018 release for 2016 data. At an overall UK level this change in methodology raised the recycling rate for 2018 by around 0.7 percentage points (equivalent to 196 thousand tonnes; see dataset). For more details on this change refer to the methodology section.

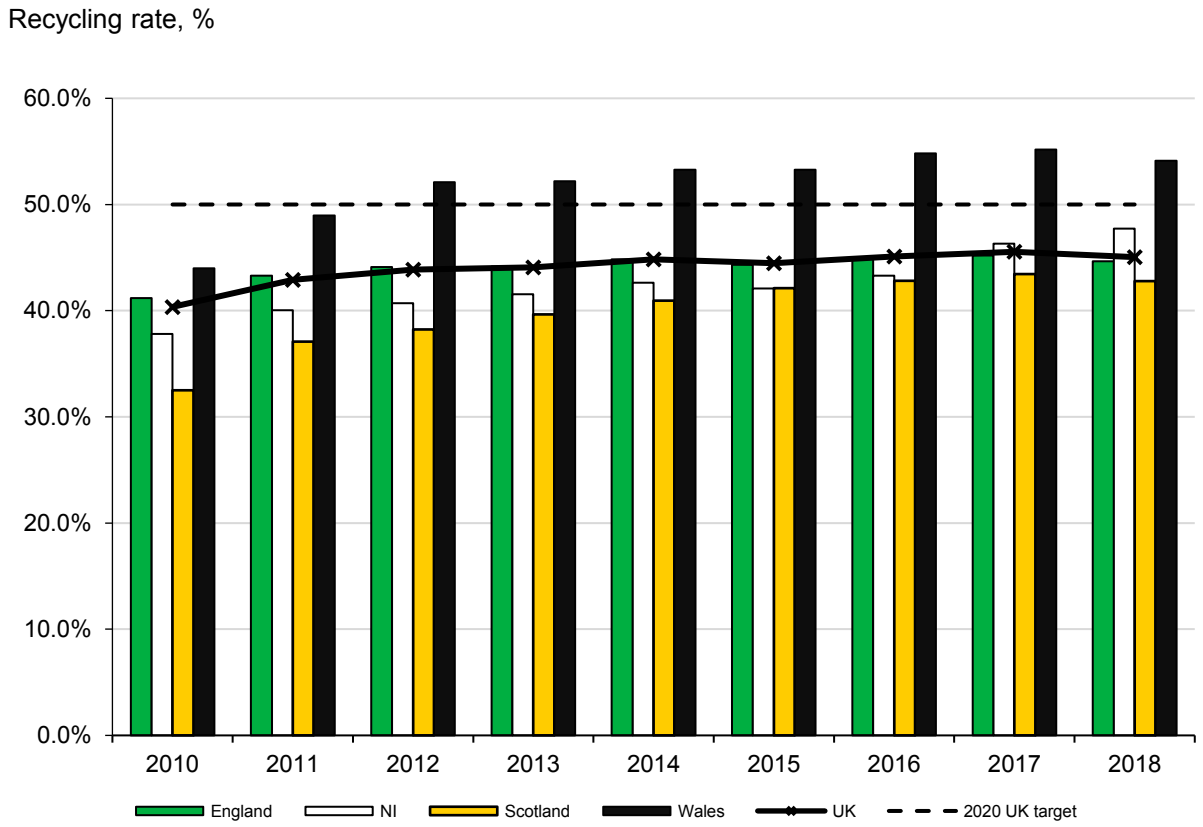
Table 1. Waste from Households, UK and country split, 2015-18

thousand tonnes and % rate

Year	Measure	UK Total	England	Northern Ireland	Scotland	Wales
2015	Arisings	26,675	22,225	818	2,354	1,278
	Of which recycled	11,865	9,849	344	991	681
	Recycling rate	**44.5%**	**44.3%**	**42.1%**	**42.1%**	**53.3%**
2016	Arisings	27,300	22,770	845	2,378	1,307
	Of which recycled	12,318	10,217	366	1,018	716
	Recycling rate	**45.1%**	**44.9%**	**43.3%**	**42.8%**	**54.8%**
2017	Arisings	26,897	22,437	843	2,345	1,271
	Of which recycled	12,250	10,139	390	1,019	702
	Recycling rate	**45.5%**	**45.2%**	**46.3%**	**43.5%**	**55.2%**
2018	Arisings	26,411	22,033	841	2,292	1,244
	Of which recycled	11,896	9,840	401	981	673
	Recycling rate	**45.0%**	**44.7%**	**47.7%**	**42.8%**	**54.1%**

Source: WasteDataFlow, Defra Statistics
Figures include IBA metal.
Minor revisions made to historical figures for UK, Wales and Scotland (see Data Revisions section).
Percentages calculated from unrounded figures; breakdowns for individual countries may not exactly sum to UK totals due to rounding.

Figure 1. Recycling rate from Waste from Households, UK and country split, 2010-18



Source : WasteDataFlow, Defra Statistics
From 2015, these figures include IBA metal (this typically adds up to 0.7 percentage points to the overall UK recycling rate).
For Northern Ireland, figures including IBA metal are the same as those excluding IBA metals as no local authority collected municipal waste went directly to incinerators.

Total UK WfH generation was 26.4 million tonnes in 2018, a decrease of 1.8% from 26.9 million tonnes in 2017. England is responsible for the vast majority of UK WfH, generating 22.0 million tonnes (83% of the UK total) in 2018. WfH generation has decreased in all UK countries for the last two years.

The UK WfH recycling rate (including IBA metal) was 45.0% in 2018, decreasing from 45.5% in 2017. There is an EU target for the UK to recycle at least 50% of WfH by 2020.The recycling rate for England was 44.7%, compared with 47.7% in Northern Ireland, 42.8% in Scotland, and 54.1% in Wales.

From 2017 to 2018, there were decreases in the recycling rates for England (-0.5 percentage points), Scotland (-0.7 percentage points) and Wales (-1.1 percentage points). All three countries saw a reduction in 'other organics', including green garden waste sent for recycling, which is likely linked to the adverse weather conditions for plant growth seen in 2018. Additionally, Scotland and Wales both saw a reduction in dry recycling. In Scotland, this was partly driven by a decrease in paper and card sent for recycling, which some Scottish local authorities attributed to a decrease in the market for these materials. In Wales, this was largely attributed to an improvement in the reporting of end destinations for wood waste by Welsh local authorities.

The recycling rate for Northern Ireland increased by 1.4 percentage points in 2018, following an increase of 3.0 percentage points the previous year. This continued increase has

been primarily attributed to the statutory requirement for Councils to provide a container to allow for the separate collection of food waste in 2017.

2 Biodegradable municipal waste (BMW) sent to landfill

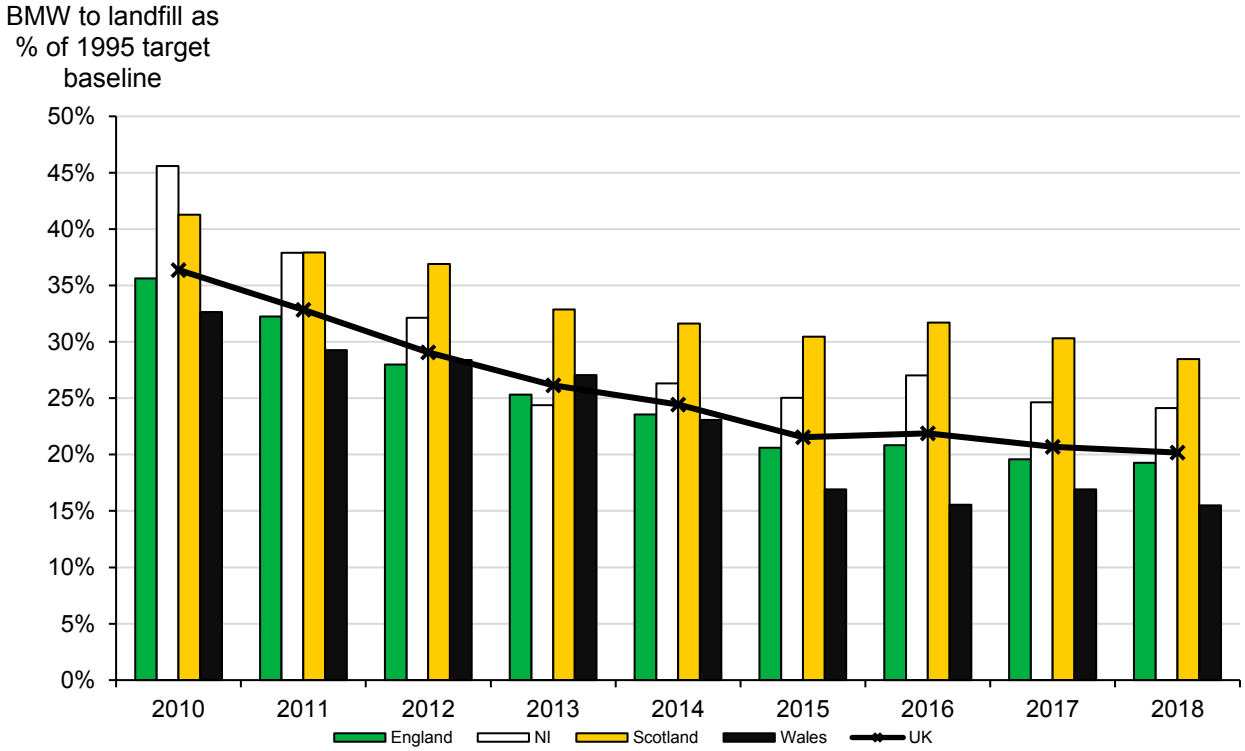
Updated, with new figures for 2018

UK estimates for biodegradable municipal waste (BMW) to landfill have been calculated in accordance with the Landfill Directive (1999/31/EC), which aims to prevent or reduce as far as possible negative effects of landfilling waste. BMW is the fraction of municipal waste that will decompose within a landfill to produce methane, a potent greenhouse gas. Amongst other materials it will include food waste, green waste, cardboard and paper. Within the Landfill Directive the UK has three targets to meet, measured as a percentage of the tonnage of BMW generated in 1995 ('the 1995 baseline'). These require the tonnage of BMW to landfill to be:

- No greater than **75%** of the 1995 baseline by 2010
- No greater than **50%** of the 1995 baseline by 2013
- No greater than **35%** of the 1995 baseline by 2020

For this reporting obligation, the UK countries have agreed a set of European Waste Catalogue (EWC) classification codes to represent 'municipal waste'. Countries use broadly similar, but non-identical sets of factors, for the proportion of each EWC code that is biodegradable, based upon composition studies of landfill waste. See methodology section for more details.

Figure 2. Biodegradable municipal waste (BMW) to landfill as a percentage of 1995 baseline, UK and country split, 2010-18



Source: Waste Data Interrogator, Defra Statistics

UK BMW sent to landfill in 2018 was 7.2 million tonnes, representing 20% of the 1995 baseline value. There is an EU target to restrict BMW landfilled to no greater than 35% of the 1995 baseline by 2020. The UK comfortably met the interim targets for 2010 (75%) and 2013 (50%).

There was a slight decrease in the UK percentage of BMW to landfill between 2017 and 2018, with the figure falling from 21% to 20% of the target baseline. UK tonnages of BMW to landfill

have reduced each year since 2010, except in 2016 when there was a small increase. **England is responsible for over three quarters (78%) of UK BMW to landfill,** generating 5.6 million tonnes of the 7.2 million tonnes UK total in 2018.

Table 2. BMW to landfill, UK and country split, 2010-18

thousand tonnes

Year	Measure	UK	England	NI	Scotland	Wales
1995	BMW generated (baseline)	35,688	29,030	1,225	3,595	1,837
2010	Municipal Waste to Landfill	25,019	20,298	893	2,508	1,319
	of which BMW to Landfill	12,982	10,339	558	1,484	600
2011	Municipal Waste to Landfill	22,879	18,421	734	2,560	1,164
	of which BMW to Landfill	11,725	9,360	464	1,364	538
2012	Municipal Waste to Landfill	20,260	16,187	622	2,429	1,023
	of which BMW to Landfill	10,372	8,129	394	1,327	522
2013	Municipal Waste to Landfill	18,450	14,780	472	2,244	954
	of which BMW to Landfill	9,325	7,347	299	1,182	497
2014	Municipal Waste to Landfill	17,281	13,714	511	2,194	862
	of which BMW to Landfill	8,726	6,843	322	1,137	424
2015	Municipal Waste to Landfill	15,605	12,215	484	2,264	642
	of which BMW to Landfill	7,693	5,980	307	1,095	311
2016	Municipal Waste to Landfill	16,111	12,381	524	2,306	900
	of which BMW to Landfill	7,807	6,049	331	1,140	286
2017	Municipal Waste to Landfill	14,996	11,784	539	1,995	678
	of which BMW to Landfill	7,386	5,684	302	1,090	311
2018	Municipal Waste to Landfill	14,644	11,688	545	1,837	574
	of which BMW to Landfill	7,201	5,598	296	1,023	285

Source: Waste Data Interrogator, Defra Statistics
The 1995 target baseline was modelled and agreed in 2010
Minor revisions made to historical data for Scotland (see Data Revisions section)
Individual countries may not exactly sum to UK total due to rounding.

Table 3. Municipal waste to landfill, by main waste types, UK and country split, 2018

thousand tonnes

Waste Type (EWC code)	UK	England	NI	Scotland	Wales
Wastes from mechanical treatment of waste (19 12 12)	8,745	7,748	220	410	365
Mixed municipal waste (20 03 01)	4,398	2,842	211	1,162	183
Other (all other EWC codes)	1,502	1,097	115	264	26
Total	**14,644**	**11,688**	**545**	**1,837**	**574**

Source: Waste Data Interrogator, Defra Statistics
Individual countries may not exactly sum to UK total due to rounding.

The vast majority of municipal waste received at landfill is classified as "mixed" waste categories, from which it is not possible to routinely identify individual material streams, e.g. food waste, outside of separate specific commissioned research on waste composition. Wrap have recently published the results of a study to quantify the composition of municipal waste at the point of collection, but this does not directly relate to data on waste received at treatment sites.

The two main municipal waste categories at landfill are 'wastes from mechanical treatment of waste' (EWC code 19 12 12) and 'mixed municipal waste' (EWC code 20 03 01), which together make up around 90% of all municipal waste received at landfill.

In 2018, 8.7 million tonnes of municipal waste sent to landfill in the UK was categorised as 'wastes from mechanical treatment of waste', and 4.4 million tonnes was categorised as 'mixed municipal waste'. The proportions of these municipal waste categories at landfill have nearly reversed since

2010, with 'wastes from mechanical treatment of waste' increasing each year (from 38% in 2010 to 60% in 2018) and 'mixed municipal waste' decreasing each year (from 54% in 2010 to 30% in 2018). Data on the biodegradable portions of these waste codes can be found in the underlying dataset.

For England in 2018, EWC codes 19 12 12 and 20 03 01 together accounted for 90.6% of municipal waste received at landfill. Of the remaining 9.4%, 6.7% was accounted for by four EWC codes with tonnages between 100 and 350 thousand tonnes (20 02 02, 20 03 07, 20 03 03 and 19 05 03), 2.4% by eight EWC codes with tonnages between 10 and 100 thousand tonnes and the final 0.3% by small tonnages of a further 33 EWC codes.

3 Packaging waste

Updated with final figures for 2017

UK estimates of recovery/recycling rates for packaging materials have been calculated for reporting against material specific targets set by the EC Directive 94/62/EC on packaging and packaging waste. The Packaging and Packaging Waste Directive (as amended) set minimum recovery targets (60%) and recycling targets (55%) for packaging waste, to be met by 31 December 2008, as well as material-specific recycling targets. These are 60% for glass, 60% for paper and cardboard, 50% for metals, 22.5% for plastics, and 15% for wood. Since 2008, Member States must continue to meet these minimum targets, but they have the freedom to set higher domestic targets if they so choose.

Table 4. Packaging waste and recycling / recovery, split by material, UK 2017

	Packaging waste arising (thousand tonnes)	Total recovered / recycled (thousand tonnes)	Achieved recovery / recycling rate (%)	EU target recovery / recycling rate (%)
Metal	738	525	71.1%	50.0%
of which: Aluminium	181	94	52.0%	z
of which: Steel	557	431	77.3%	z
Paper	4,749	3,754	79.0%	60.0%
Glass	2,399	1,623	67.6%	60.0%
Plastic	2,260	1,044	46.2%	22.5%
Wood	1,335	411	30.8%	15.0%
Other* materials	23	0	0.0%	z
Total (for recycling)	**11,504**	**7,357**	**63.9%**	**55.0%**
Energy from Waste	z	700	6.1%	z
Total (for recycling and recovery)	**11,504**	**8,057**	**70.0%**	**60.0%**

Source: Defra Statistics
* 'Other' includes materials such as cloth, corks, gel, glue, hessian sacks and wax used as packaging.
z = Not applicable
Percentages calculated using unrounded figures.
Arisings estimates made at point of manufacture. For further details see the methodology section.

In 2017, figures indicate that 70.0% of UK packaging waste was either recycled or recovered. This was above the EU target of 60% but lower than the 71.4% achieved in 2016. Equivalent figures for 2012-2016 can be seen in the accompanying dataset.

Recycling accounted for 7.4 million tonnes of the 11.5 million tonnes of packaging waste arisings in 2017, with a further 0.7 million tonnes recovered by use in 'energy from waste' incineration. Paper and cardboard had the highest waste arisings, at 4.7 million tonnes.

The highest recycling rate achieved in 2017 was 79.0% for paper and cardboard, followed by 71.1% for metal and 67.6% for glass.

4 Recovery rate from non-hazardous construction and demolition (C&D) waste

Not updated

UK estimates of recovery rates from non-hazardous C&D waste have been calculated for reporting against the EC Waste Framework Directive. Accurately quantifying C&D waste is challenging and whilst the absolute tonnage figures are subject to a relatively high level of uncertainty, there is not a significant impact on the final recovery rate. Under this Directive there is a target for the UK to recover at least 70% of non-hazardous C&D waste by 2020, which it is currently meeting.

Table 5. Recovery rate from non-hazardous construction and demolition waste, UK and England, 2010-16

million tonnes and % rate

	UK			England		
	Generation	Recovery	Recovery rate	Generation	Recovery	Recovery rate
	M tonnes	M tonnes	%	M tonnes	M tonnes	%
2010	59.2	53.1	89.7%	53.6	49.4	92.2%
2011	60.2	55.0	91.4%	54.9	50.8	92.5%
2012	55.8	50.8	91.1%	50.5	46.4	92.0%
2013	57.1	52.0	91.2%	51.7	47.6	92.0%
2014	61.5	56.3	91.5%	55.9	51.7	92.4%
2015	63.8	58.1	91.1%	57.7	53.3	92.3%
2016	66.2	60.2	91.0%	59.6	55.0	92.1%

Source: Defra Statistics

In the February 2019 release, revisions were made to all figures, in line with updates made to underlying Mineral Products Association data. This increased absolute tonnages for both generation and recovery by 10-20% each year in comparison to previously published figures, but had little impact on the recovery rate, which has remained around 90% throughout the time series.
Excludes excavation waste because this is outside the scope of the target.
Percentages calculated using unrounded figures.

In 2016 the UK generated 66.2 million tonnes of non-hazardous C&D waste, of which 60.2 million tonnes was recovered. This represents a recovery rate of 91.0%.

The recovery rate from non-hazardous C&D waste has remained at similar levels from 2010 to 2016 and has been comfortably above the minimum target of 70%, which the UK must meet in 2020.

5 Waste from commercial and industrial (C&I) activities

Updated, with new England figures for 2018 and revisions to England 2017 figures

Defra has worked closely with industry experts to improve the C&I methodology for England (for details see Commercial and Industrial waste arisings methodology revisions for England). Nonetheless, C&I waste generation remains extremely difficult to estimate owing to data limitations and data gaps. As a result, C&I estimates for England have a much higher level of uncertainty than Waste from Households (or other Local Authority Collected Waste) and users should exercise caution in application of the figures and interpreting trends over time.

The methodology relies largely on known tonnages of waste processed at permitted sites and recycling facilities. It makes no attempt to estimate waste that maybe processed at exempt sites that is not captured in the available recycling data.

UK and England estimates for waste generation by the C&I sectors have been calculated as part of the Waste Statistics Regulation returns for 2010, 2012, 2014, 2016 and 2018. The term 'commercial and industrial' spans a range of economic activities (based on the European NACE statistical classification of economic activities in the European Community) including manufacturing, industrial processes and service based enterprises, but excluding sewage sludge.

Estimates presented below are "as received" tonnages and do not include an additional adjustment from wet weight to dry weight for sludges, which is a Eurostat requirement for the figures submitted as part of the Waste Statistics Regulation return (See Section 6).

Table 6. Total waste generated by the commercial and industrial sectors, UK and England, 2010-18

million tonnes

	UK			England		
	Commercial	**Industrial**	**Total C&I**	**Commercial**	**Industrial**	**Total C&I**
2010	28.7	15.0	**43.7**	21.6	10.4	**32.0**
2011	:	:	**:**	21.4	12.0	**33.4**
2012	25.0	17.6	**42.6**	21.0	12.9	**33.9**
2013	:	:	**:**	20.8	12.0	**32.8**
2014	25.4	14.6	**40.0**	21.3	10.4	**31.7**
2015	:	:	**:**	22.5	9.4	**31.9**
2016	27.5	13.6	**41.1**	23.6	9.5	**33.1**
2017	:	:	**:**	25.8	10.3	**36.1**
2018	:	:	**:**	27.1	10.1	**37.2**

Source: Defra statistics
: = Not available
Revisions made to 2017 England figures (see Data Revisions section)

The UK C&I sectors generated 41.1 million tonnes of waste in 2016, of which 33.1 million tonnes (around four fifths) was produced in England. By comparison, the 2014 UK C&I waste arisings figures was 40.0 million tonnes, of which 31.7 million tonnes was generated by England. Over two thirds of C&I waste is generated by the commercial sector, in both the UK and England.

The latest estimates for England only indicate that waste generation was around 37.2 million tonnes in 2018 and 36.1 million tonnes in 2017. For 2017, the England estimate was a relatively large increase from 33.1 million tonnes in 2016. Around half of this increase is accounted for by some treatment categories where EA have made improvements to capture additional installations from 2017 that were omitted for previous years; therefore, figures for 2017 onwards are not completely directly comparable with earlier years. Caution should generally be exercised in interpreting apparent year-on-year changes in the C&I data, owing to inherent uncertainties in the underlying data and methodology.

6 Total Waste Generation and Final Treatment of All Waste

Updated with minor revisions to 2016 Waste Generation

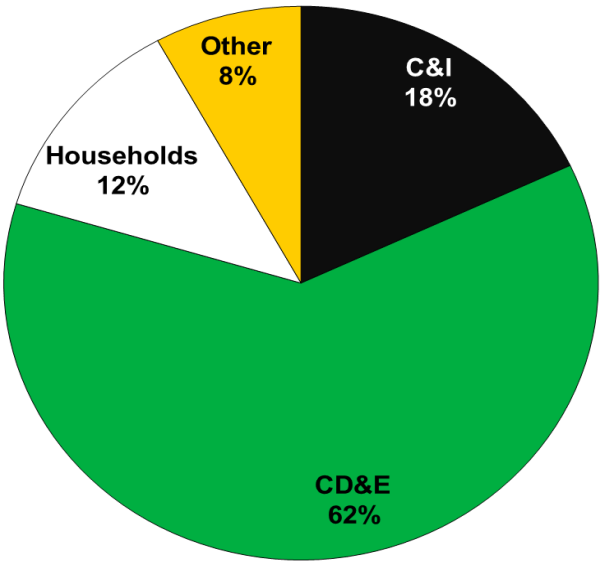
There are some differences between the C&I figures presented here, and those shown in the C&I section of this release (Section 5). For the purposes of the Waste Statistics Regulation return (WStatR), for which the total waste figures are compiled, sewage sludge is included in the C&I estimates. However, as WStatR also requires that figures for sludges are converted from wet to dry weight for reporting, the UK 2016 figure for C&I that is incorporated in Table 7 (39.8 million tonnes) does not differ greatly from that published in Section 5 on an 'as received' basis, but excluding sewage sludge (41.1 million tonnes). Minor additional revisions are detailed in the methodology section.

UK and England tonnage estimates for generation and final treatment of all waste have been calculated in order to report against the EC Waste Statistics Regulation return for 2016. In line with

the Regulation requirements, total waste generation is split by material and NACE economic activity responsible for generating it. In line with the Regulation requirements, total waste generation is split by material and NACE economic activity responsible for generating it. Users should be aware that 'total waste' includes all waste produced by the economy and is therefore much broader than frequently analysed subsets such as 'municipal waste' or 'Waste from Households'. Users should also consider the varying natures and impacts of different waste materials included within total waste.

6.1 Waste Generation

Figure 3. Waste generation split by source, UK, 2016



Source: Defra Statistics
Percentages may not sum to exactly 100% due to rounding
C&I figures presented here differ from those in the C&I section in that they include sewage sludge. However, as these figures are from the WStatR return, which requires sludges to be converted to dry weight for reporting, the C&I figures do not differ greatly from those presented in the C&I section.
C,D&E figures include excavation waste and dredging.
Household figures are based on the WfH measure.

Construction, demolition and excavation (CD&E; including dredging) generated around three fifths (62%) of total UK waste in 2016. Commercial and Industrial (C&I) waste accounted for almost a fifth (18%) of total waste generation and the remaining fifth was split between 'Households' (12%) and 'Other' activities (8%). In England, the share of CD&E was higher at 64% of the total, 'Households' was similar to the UK, and the C&I and 'Other' contributions were slightly lower than the UK at 17% and 6% respectively.

Note: The 'Households' measure quoted here is the WfH measure (used for household recycling reporting against the Waste Framework Directive), with mapping between the WasteDataFlow and EWC-STAT material categories.

Table 7. Waste generation split by responsible economic activity, UK and England, 2014-16

million tonnes and % change

		Commercial & industrial	Construction, demolition & excavation (includes dredging)	Households	Other	Total
UK	**2014**	38.7	130.3	26.8	18.2	214.0
	2016	39.8	136.2	27.3	17.7	221.0
	Change	3.0%	4.5%	1.9%	-2.8%	3.3%
England	**2014**	30.7	116.8	22.4	11.9	181.8
	2016	32.1	120.3	22.8	11.8	187.0
	Change	4.7%	3.0%	1.9%	-1.3%	2.8%

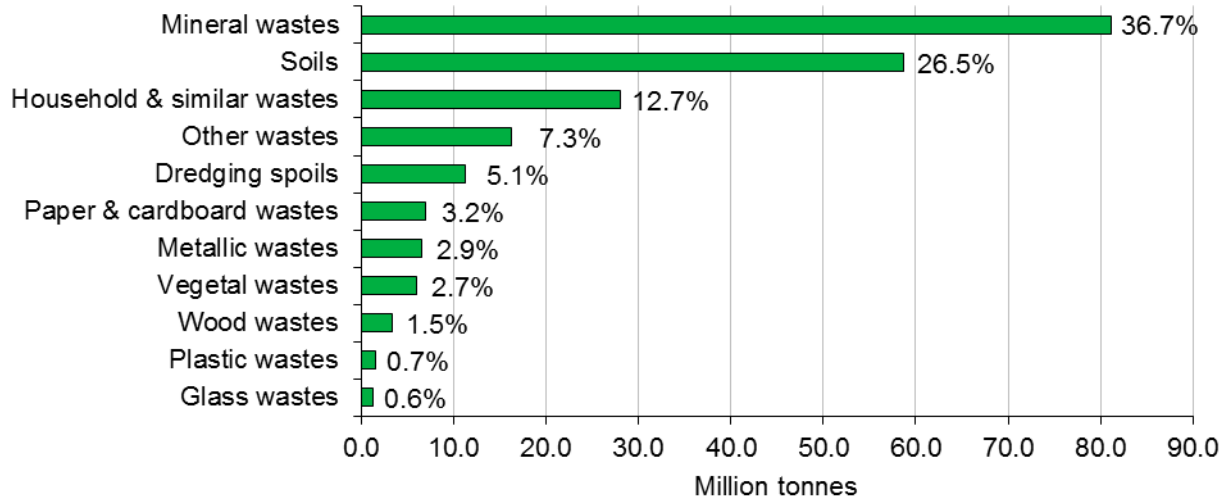
Source: Defra Statistics
Includes waste that may go for export, but excludes waste imported from outside the UK.
'Other' consists of waste from mining, agriculture, forestry and fishing.
Percentages calculated from unrounded figures; breakdowns may not exactly sum to totals due to rounding.
Revisions made to 2016 'Commercial & Industrial' figures for England (see Data Revisions section).

The UK generated 221.0 million tonnes of total waste in 2016, an increase of 3.3% from the 214.0 million tonnes generated in 2014. England generated 187.0 million tonnes of total waste in 2016, an increase of 2.8% from 2014, and 85% of the UK total.

The largest waste material categories generated in the UK in 2016 were 'Mineral Wastes' (81.1 million tonnes), and 'Soils' (58.7 million tonnes). Together, these make up almost two thirds (63%) of total UK waste.

Note: Figure 4 below splits all waste generated in the UK by waste materials, which are categorised by European Waste Catalogue (EWC) codes. Care should be taken when interpreting this information as some categories, e.g. 'Household & similar wastes' will include mixtures of waste. As a result, an individual material stream such as 'Plastic wastes' will not represent total tonnages of plastic waste, because there will also be some in mixed waste streams (e.g. black bag waste) that are categorised as 'Household and similar wastes'.

Figure 4. Waste generation by waste material, UK, 2016



Source: Defra Statistics
Includes waste that may go on to be exported, but excludes waste imported from outside the UK.
Any type of waste can be generated by any economic activity. E.g. 'Household & similar wastes' are not solely generated by 'Households'.
Percentages may not sum to exactly 100% due to rounding.

A more detailed material split is available in the accompanying dataset.

6.2 Waste Treatment

Table 8. All waste at final treatment, split by method, UK and England, 2014-16

million tonnes and % change

		Incineration with Energy recovery (R1)*	Incineration (excl. R1)	Recycling and other recovery	Backfilling	Landfill	Land treatment and release into water bodies	Total
UK	**2014**	1.9	7.6	96.3	21.7	48.2	29.8	**205.4**
	2016	7.3	5.7	104.0	16.8	52.3	28.2	**214.3**
	Change	278.3%	-24.8%	8.0%	-22.5%	8.5%	-5.4%	**4.3%**
England	**2014**	1.3	7.3	87.0	19.1	41.3	22.1	**178.1**
	2016	6.2	5.4	92.4	13.3	44.7	20.2	**182.2**
	Change	374.9%	-25.5%	6.2%	-30.7%	8.3%	-8.5%	**2.3%**

Source: Defra Statistics

*where formal R1 accreditation has been awarded
Includes waste that may have been imported, but excludes waste exported for treatment outside the UK.
Around two thirds of 'Recycling and other recovery' is recovery of C,D&E wastes. The remainder is predominantly recycling (dry recyclates and composting) but also includes some non-recycling activities, e.g. wood used for biomass.
See methodology section for more details on the Eurostat treatment categories.
Percentages calculated from unrounded figures; Breakdowns may not exactly sum to totals due to rounding.

'Recycling and other recovery' was the most common final waste treatment type in the UK, accounting for 104.0 million tonnes (48.5%) in 2016. Around two thirds of 'Recycling and other recovery' is recovery of mineral wastes from the construction, demolition and excavation sector. The remainder is predominantly recycling (glass, plastic, metal, wood, composting etc.) but also includes some non-recycling activities that are not captured elsewhere, e.g. wood used for biomass. Landfill is the second most used waste treatment in the UK, with 24.4% (52.3 million tonnes) of waste disposed of at landfill in 2016.

Energy recovery showed the largest percentage change in tonnage, with the 2016 figure of 7.3 million tonnes being almost four times the 1.9 million tonnes treated in 2014. Larger tonnages of waste are now treated at energy recovery facilities than at incineration without energy recovery, coinciding with policies to divert waste away from landfill. While overall waste to landfill has not shown a corresponding decrease, the underlying Environment Agency (EA) data shows that increases in landfilled waste have largely come from materials such as soil and stone waste. However, local authority managed municipal waste to landfill has declined as more waste is diverted to other treatments higher up the waste hierarchy.

Table 9. Material breakdown for each final treatment method, UK, 2016 - proportion of tonnages

% waste material, by treatment type

Waste material	Incineration with Energy recovery (R1)*	Incineration (excl. R1)	Recycling and other recovery	Backfilling	Landfill	Land treatment and release into water bodies
Metallic wastes	0%	0%	14%	0%	0%	0%
Glass wastes	0%	0%	2%	0%	0%	0%
Paper & cardboard wastes	0%	0%	4%	0%	0%	0%
Plastic wastes	0%	0%	1%	0%	0%	0%
Wood wastes	8%	13%	2%	1%	0%	0%
Vegetal wastes	0%	1%	4%	0%	0%	0%
Household & similar wastes	76%	38%	1%	0%	11%	0%
Mineral wastes	0%	0%	55%	5%	6%	60%
Soils	0%	0%	12%	89%	55%	0%
Dredging spoils	0%	0%	0%	1%	0%	40%
Other wastes	16%	48%	6%	4%	27%	0%
All wastes	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Waste Statistics Regulation return

*where formal R1 accreditation has been awarded
Includes waste that may have been imported, but excludes waste exported for treatment outside the UK.
'Recycling and other recovery' is predominantly recycling (glass, plastic, metal, wood, composting etc.) but also includes some non-recycling activities that are not captured elsewhere, e.g. wood used for biomass.
'Other wastes' include residues following physical treatment and incineration of waste, residues from industrial processes and sewage.
Percentages calculated from unrounded figures; Breakdowns may not exactly sum to totals due to rounding.

The majority (76%) of waste treated at energy recovery facilities is 'Household & similar wastes'. Incineration without energy recovery has a different profile with only 38% of the waste accepted being 'Household & similar' and almost half (48%) being classed as 'Other wastes', which includes residues following physical treatment and incineration of waste, residues from industrial processes and sewage.

The vast majority (89%) of 'Backfilling' is 'soils', with 'mineral wastes' being the next biggest contributor at 5%.

'Soils' make up 55% and 'mineral wastes' 6% of the tonnage received by landfills, demonstrating that it is not just residual waste using this outlet. The two other main components of landfilled waste are 'household & similar wastes' (11% of the total) and 'other wastes' (27%). The 'other wastes' category includes 'sorting residues' which will typically be mixed wastes following processing to remove recyclates.

More than half (55%) of waste recorded as 'recycling and other recovery' is 'mineral wastes', while a further 12% is 'soils'. The 'mineral wastes' category is typically construction wastes such as bricks, stone and road planings that are converted into usable aggregates. 'metallic wastes' is the second biggest material group at 14%, partially a reflection of their high value. The remaining tonnage going to 'recycling and other recovery' consists of a variety of material types that each make a small contribution.

A more detailed material split along with 2010, 2012 and 2014 data and England only figures are available in the accompanying dataset.

Note: Generation and final treatment are at opposite ends of what can be a complex and multiple staged treatment process. Different methodology is used to estimate generation and final treatment figures. Furthermore, final treatment excludes some treatment processes identified as predominantly intermediate, which nevertheless may effectively be the final treatment for some waste. As a result, there is no direct reconciliation between generation and final treatment of total waste. Users should also be aware that in most cases it is not possible to estimate the final treatment of waste generated by specific economic activities. Users should take care to understand the material and economic activity categories. Further information is available in the methodology and Useful Links sections.

7 Waste Infrastructure

Not updated

Defra collates summaries from the environment agencies of all four UK countries on facilities authorised by mandatory permit or license. Capacity is based on the level authorised by permit or license with the exception of some small scale incinerators where the permit did not feature capacity. In these cases, operational capacity is used. Please see the methodology section for more detail.

Table 10. Number and capacity of permitted final treatment facilities, UK and England, 2014-16

Facility type	Measure	UK		England	
		2014	2016	2014	2016
Energy recovery	Number of facilities	29	37	13	23
	Capacity (thousand tonnes/year)	4,862	9,808	2,803	7,202
Incineration	Number of facilities	83	78	60	57
	Capacity (thousand tonnes/year)	9,859	8,474	9,040	8,193
Recovery other than energy recovery (includes backfilling)	Number of facilities	2,660	3,506	1,669	1,944
	Capacity	:	:	:	:
Deposit onto or into land (landfill)	Number of facilities (includes closed facilities)	596	604	493	510
	Rest (remaining) capacity (thousand m^3)	592,637	554,751	484,370	464,891

Source: Defra Statistics
: = Not available
Energy recovery refers to facilities where the main purpose is generation of energy and formal R1 accreditation has been awarded.
Excludes: Recovery facilities operating solely under a waste exemption; facilities permitted only for intermediate treatment (including most anaerobic digesters); facilities that were formally closed throughout 2016 (except landfills).

From 2014 to 2016, energy recovery facilities in the UK increased in number from 29 to 37, with capacity doubling from 4.9 million tonnes to 9.8 million tonnes per year, coinciding with policies aimed at diverting waste away from landfill. Energy from waste is generally the best management option for waste that cannot be reused or recycled in terms of environmental impact and getting value from the waste as a resource.

DATA USES, METHODOLOGY, GLOSSARY, FEEDBACK AND REFERENCES

User Statement

Data on waste generation and management is collected to monitor policy effectiveness, particularly the commitments in the Waste Review and to support policy development, including the Resource and Waste Strategy published in December 2018. The data also meet legislative reporting targets on recycling targets set out in the Waste Framework Directive (2008/98/EC), the Packaging and Packaging waste Directive (94/62 EC) and supply data for the Waste Statistics Regulation (2002/2150/EC). The data are used extensively by local and central government, the waste industry, academia and the public.

Feedback

We welcome feedback on the data from all users including how and why the data is used. This helps us to understand the value of the statistics to external users. Please use the contact details at the bottom of the first page of this notice.

Methodology

Waste from Households (WfH)

UK estimates for WfH have been calculated in accordance with the EC Waste Framework Directive. The WfH measure has been chosen as the UK interpretation of the EC term 'household waste', which they define as "waste generated by households". Waste management and recycling is a devolved matter and different countries have used their own data to adopt to the EU definition. The statistics are the best estimates that provide the conformity to the EU definition.

WfH includes waste from:

- Regular household collection
- Civic amenity sites
- 'Bulky waste'
- 'Other household waste'.

WfH excludes waste from:

- Street cleaning/sweeping
- Gully emptying
- Separately collected healthcare waste
- Soil, Rubble, Plasterboard & Asbestos waste

All UK countries base the WfH measure on output from the WasteDataFlow database, which records Local Authority Collected Waste. Whilst the general approach and principles of the calculation is consistent across UK countries, there may be some differences in the specifics of the calculations as there are some differences in the structure and wording of some of the questions.

Users should be aware that individual UK countries other than England publish their own independent national household recycling estimates other than WfH recycling. Local Authorities in England may also use an alternative measure.

A change was introduced from the February 2018 release to include **metal recovered and recycled after incineration** as recycling, instead of being reported as 'recovery'. The amount this contributes to recycling depends on the amount of the residual waste being incinerated and the metal content of the residual waste.

Inclusion of IBA metal has been facilitated through the new Q100 reporting structure for waste treatment which all local authorities have been using since April 2015. This has provided the opportunity for more complete recording of waste treatment, including outputs from incineration.

The majority of local authorities are reporting more fully, but not in all cases. While reporting and associated quality assurance are developing and being refined, the figures need to be regarded as more indicative until it becomes fully established and embedded.

This methodological change for IBA metal has been applied to all UK countries from 2015. England data only includes IBA metal from April 2015, when Q100 came into full use by all local authorities. For Wales, Q100 was introduced in 2012 and IBA metals have been included from 2015 in line with the other UK countries. Northern Ireland did not have any incinerators that burnt local authority collected municipal waste in these years and so their figures are unaffected by the change.

At an overall UK level this change in methodology raised the recycling rate for 2018 by around 0.7 percentage points (equivalent to 196 thousand tonnes).

Biodegradable municipal waste (BMW) to landfill

UK estimates for BMW to landfill have been calculated in accordance with the Landfill Directive and a consistent approach is used by all UK countries. BMW is the fraction of municipal waste that will degrade within a landfill site. Amongst other materials it will include food waste, green waste, cardboard and paper. Tonnage data is collated from mandatory returns made for landfills to the Environment Agencies of each of the four UK countries. Tonnages are split by European Waste Catalogue (EWC) categorisation codes, as determined by landfill operators. For this reporting obligation, the UK countries have agreed a set of EWC codes to represent 'municipal waste'. Scotland applies a factor to EWC code 19 12 12 on the basis that only a proportion is 'municipal', however other countries do not do this. Scotland also includes one additional EWC code. Factors on the proportion of waste that is biodegradable are applied to each code. Countries use broadly similar, but non-identical sets of factors. The factors are multiplied by the tonnages and then summed to give final country level estimates for BMW to landfill. New factors were adopted by England in 2014 for the two EWC codes that dominate Municipal Waste, based upon a commissioned study of landfill waste composition. All England figures published here have been produced using these new factors. Wales adopted these new factors from 2013 and have now backdated their estimates for 2010-2012.

Packaging waste

UK estimates for recovery/recycling from packaging have been compiled in accordance with the packaging and packaging waste directive reporting requirements. All estimates are made at a UK level and cannot be broken down into individual UK countries. Estimates of packaging waste arisings ('placed on the market') have been updated based on research done since 2014. The arisings figures exclude exports, but include filled and unfilled imports. Because these estimates are recorded at point of manufacture, materials are all separately identifiable and therefore may appear large in comparison to material type estimates based on collected waste (such as those in the Waste Statistics Regulation return), where a substantial proportion of packaging waste will be captured under mixed waste categories.

Estimates of tonnages recycled are based on Packaging Recovery Notes (PRNs) and Packaging Export Recovery Notes (PERNs) reported to the Environment Agency and held in the National Packaging Waste Database (NPWD). PRNs and PERNs are sold by accredited reprocessors and exporters to packaging producers. All packaging producers that have a turnover of at least £2m and handle at least 50 tonnes of packaging per year are obligated to obtain sufficient PRNs/PERNs to evidence that they meet an individual target. The targets are set by Defra to ensure that the aggregated obligation for all producers is sufficient to ensure the UK meets the Directive targets. The tonnage recorded against 'Total (for recovery)' is incinerated in facilities that have either been granted formal R1 accreditation (an EC standard on efficiency factors) by the relevant Environment Agency, or meet the Directive description of 'Energy from Waste': "the use of combustible packaging waste as a means to generate energy through direct incineration with or without other waste but with recovery of the heat".

Recovery rate from non-hazardous construction and demolition (C&D) waste

UK estimates for recovery rate from non-hazardous C&D waste have been calculated in accordance with the EC Waste Framework Directive. Accurately quantifying C&D waste is challenging and whilst the absolute tonnage figures are subject to a relatively high level of uncertainty, sensitivity analysis suggests there is not a significant impact on the final recovery rate. Whilst efforts were made to synchronise approaches across UK countries, methodologies are not identical. The England methodology was originally devised in conjunction with industry. Estimates are dependent on several key assumptions relating to the role of permitted sites, simple registrations and the volume of aggregate production. Within the UK, some C&D waste is transferred across borders for treatment, primarily into England. This may slightly inflate the England recovery rate and deflate rates for Devolved Administrations.

In the February 2019 release, revisions were made to the full time series for the recovery rate from non-hazardous C&D waste. This is due to updates made to the underlying Mineral Products Association data, following revisions to the ONS construction industry growth index on which their estimates are based. The revisions resulted in increases of 10-20% in absolute tonnages for all years, in comparison to the previously published figures. However, as the scale of change was similar for both generation and recovery, this had little impact on the recovery rate, which remains around 90% throughout the time-series.

Waste from commercial and industrial (C&I) activities

UK estimates for waste generation from C&I sectors have been compiled in accordance with the Waste Statistics Regulation reporting requirements. Data sources and detailed approaches may differ slightly between UK countries, but overarching principles will be consistent.
For the purpose of this statistics release, C&I is defined as a specific collection of economic activities described by NACE ("statistical classification of economic activities in the European Community"). Those considered to be C&I here are: C, D, E36, 37& 39 (excluding sewage sludge) and G-U (excluding G46.7.7). (For details see the Europa List of NACE Codes).

While considerable effort has been spent reviewing the methodology for England, this remains a very challenging area. Data revisions published in December 2016 identified outstanding issues with the original 'Reconcile' methodology. Defra took this opportunity to develop a further modified version alongside industry experts, which was felt to improve the transparency of the methodology and better reflect current waste management processes. Previously published estimates for 2010 and 2012-2014 for England have been substantially revised and England estimates for 2011 and 2015-2017 have been produced using the same methodology. The latest methodology has been developed with considerable input from industry experts and sense-checked against alternative data sources. As the historical data has been revised using the same methodology, some conclusions can be drawn from changes between years; however caution should still be exercised. Full details of the current methodology are available in the Commercial and Industrial waste arisings methodology revisions for England report.

Note: The historical waste generation and waste treatment figures produced in line with WStatR reporting requirements, and which use these C&I estimates, have been revised in line with the new C&I methodology.

Waste Statistics Regulation (WStatR)
Total waste generation, final treatment of total waste and waste infrastructure

In the February 2019 release, some double-counting of end-of-life vehicles was corrected in historical figures for Scotland and Wales. In the March 2019 update, revisions were made to the 2010 mining waste figures for all UK countries, in line with previous corrections to the slate waste factor. Additional minor revisions were made to data for 2012 and 2014, to correct some double-counting in the previously reported data for Wales.

UK estimates for generation and final treatment of total waste and waste infrastructure have been calculated in accordance with the EC Waste Statistics Regulation. The final datasets are built up from a large number of estimation processes and draw upon data from WasteDataFlow, Environment Agency (EA) permitted site returns and many other sources. Whilst efforts are made to synchronise approaches across UK countries, methodological differences do exist for construction, demolition & excavation (CD&E) and C&I waste. All sludges and dredging spoils have been reported dry weight (requiring conversion in some cases). The estimates are primarily designed for reporting at a UK level rather than comparison between UK countries.

The CD&E figures include excavation waste and dredging spoils that are out of scope for the recovery rate shown in Section 3 of this release. 'Household' figures are based on the same WfH measure shown in Section 1, with slight adjustments made in order to map to the EWC-STAT material categories. Where specific materials (such as glass and plastic) are reported, they represent separately identifiable materials. Residual waste categories will also include some of these materials in a less usable form. Estimates for tonnages received by landfill here are based on EA permitted site returns and differ from estimates published in HMRC Landfill Tax Bulletins which are sourced from landfill tax receipts.

Treatment categories are specified in the Eurostat Manual on Waste Statistics.

Recovery means 'any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function.'

Recycling is a subset of recovery and means 'any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material (e.g. composting, anaerobic digestion etc.) but excludes the use as fuels and the use for backfilling operations.'

Energy recovery refers to facilities where the main purpose is generation of energy, and formal R1 accreditation has been awarded. Only a subset of these are dedicated to the processing of 'municipal waste'. Facilities without formal R1 accreditation are reported as 'Incineration' rather than 'Energy Recovery'.

Backfilling means 'a recovery operation where waste is used in excavated areas (such as underground mines, gravel pits) for the purpose of slope reclamation or safety or for engineering purposes in landscaping and where the waste is substituting other non-waste materials which would have had to be used for the purpose.'

Disposal means 'any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy' (e.g. landfill, incineration).

Waste generation and treatment are estimated by separate processes and use multiple different data sources based largely administrative data sources. Elements of the calculations will use assumptions where there are data gaps so the figures for generation and treatment will not exactly correlate.

Both generation and final treatment of waste can also be split into hazardous and non-hazardous wastes. The full datasets for 2010-2016, for England and UK, can be found in the accompanying dataset.

Information on **infrastructure** is based on mandatory reporting of permitted and licensed sites for waste treatment which is collated by the environment agencies in each of the countries in the UK. Categories are defined according to EC guidance. The 'Energy Recovery' category only includes facilities where the primary function is generating energy (e.g. cement kilns) and Municipal Waste

Incinerators that have applied for and been granted formal R1 accreditation (an EC standard on efficiency factors) by the relevant Environment Agency. Small scale 'LAPPC' (Local Authority Pollution Prevention and Control) incinerators in England have not been included as sufficiently detailed data is not available.

The data excludes facilities that were formally *closed* throughout 2016 (except landfills) but may include facilities which despite being permitted were non-*operational* in 2016. Facilities permitted only for treatment operations that are identified as intermediate (which includes most anaerobic digesters) are excluded.

Recovery operations covered by simple exemptions or simple registrations are not included. These operations are classed as low risk or low volume and operators do not have to report activity to Environment Agencies. The permitted capacity of Energy Recovery and Incineration facilities includes municipal and C&I waste, and will be higher than the actual volume of waste treated (shown in Section 6 of this release).

Revisions Policy

Defra will provide information about any revisions made to published information in this statistics release and the associated datasets. Revisions could occur for various reasons, including when data from third parties is unavailable or provisional at the time of publishing or if there are subsequent methodological improvements or refinements.

Useful links

Scottish Government statistics

Welsh Government statistics

Northern Ireland Department of Agriculture, Environment and Rural Affairs statistics

Eurostat

Environment Agency

Waste Data Interrogator

WasteDataFlow portal

Estimates of Commercial and Industrial Waste Generation in England ('Reconcile' project)

2018 England C&I Methodology revisions paper

Analysis of biodegradability of residual waste project

2020 Wrap study quantifying composition of municipal waste at point of collection

EC Manual on Waste Statistics

EWC-STAT (used for Waste Statistics Regulation waste types)

List of NACE codes (used for Waste Statistics Regulation economic activities)

List of Waste (European Waste Catalogue codes)

National Packaging Waste Database