The Carbon Footprint of Scotland's Waste

2016 Carbon Metric: Annual Report and Technical Update

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The Scottish Carbon Metric measures the carbon impacts of Scotland's waste using a ground-breaking carbon accounting approach which measures the whole life carbon impacts of waste, regardless of where in the world those emissions occur. Traditionally, measurements of waste emissions are limited to end-of-life emissions occurring within a country's borders, meaning decision-makers do not have a complete understanding of the impacts associated with these materials and how their impacts may be reduced most effectively. The Carbon Metric addresses this by including the production emissions from materials which then becomes waste, giving a fuller understanding of the climate change impacts of waste and the potential to reduce these impacts through waste prevention and management measures. Further information on the Carbon Metric approach can be found on the Zero Waste Scotland website.

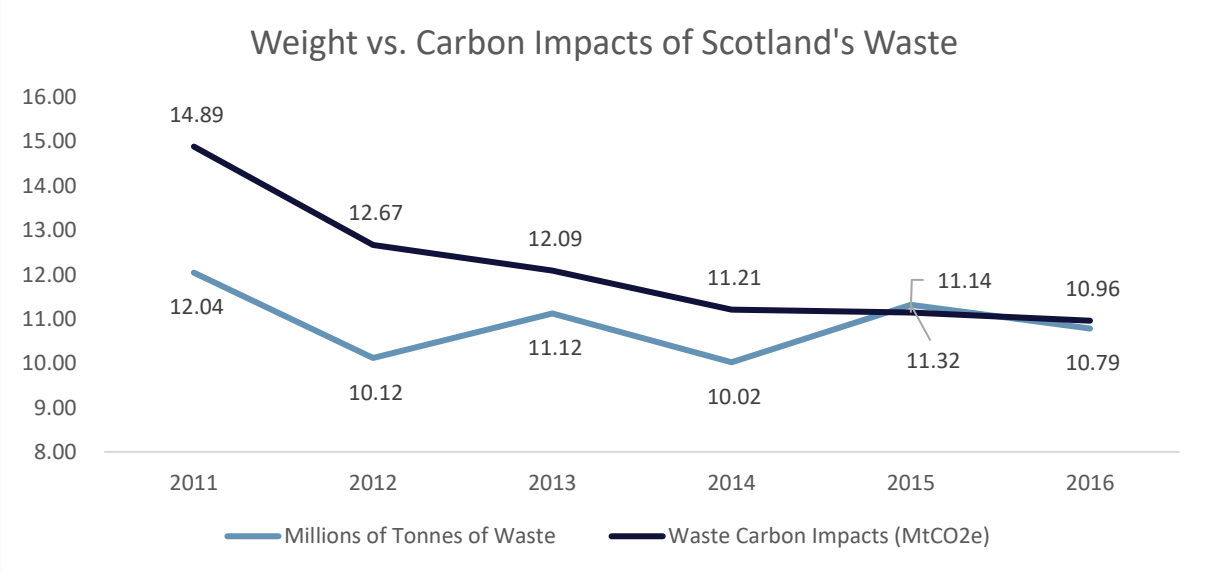
Executive Summary

The first estimate of Scotland's waste carbon footprint was published in 2013 by Zero Waste Scotland (ZWS) using the Scottish Environment Protection Agency's (SEPA's) 2011 published waste data. This report contains the sixth annual Carbon Metric updates, covering 2016 data, as well as details on the Carbon Metric technical update.

The carbon factors used in the Carbon Metric were updated this year as part of the biennial improvement process. Additionally, SEPA changes to the way waste management is categorised have been reflected in the Carbon Metric dataset. The effects of these updates are described in this report. While several of these changes have been significant on the level of individual materials, their impact on Scotland's total waste carbon footprint has been relatively minor.

The carbon impact of Scotland's waste in 2016 was 10.96 $MtCO_2e$ (million tonnes of carbon dioxide equivalent). Household waste accounted for 55% of the carbon impacts. Scotland's waste carbon impacts continue to decline year-on-year, falling 2% from 2015 to 2016, resulting in a 26% reduction below the 2011 baseline year. Emissions saved from recycling continued to rise, reaching 2.7 $MtCO_2e$ in 2016. Waste sent to landfill contributed 0.89 $MtCO_2e$ in 2016. The carbon impact of producing waste material is far greater than the carbon impacts of managing waste, making waste prevention the most effective means of reducing waste carbon impacts. Scotland generated 10.79 Mt of waste in 2016. Yearly changes in Scotland's waste arisings are primarily due to large year-on-year fluctuations in wastes from the construction industry; a feature seen throughout the lifetime of the Carbon Metric.

Scotland's existing waste policies (contained within *Making Things Last: A Circular Economy Strategy for Scotland*) were initially anticipated to deliver a 22% (3.1 $MtCO_2e$) reduction in waste carbon impacts between 2011 and 2025. As of 2016, waste carbon impacts have already declined by 26% (3.9 $MtCO_2e$).



1 Updates to waste data

1.1 Revisions to SEPA's waste dataset

The Scottish Environmental Protection Agency (SEPA) revised its published waste data with the 2016 dataset[1]. SEPA makes changes to the waste data on a yearly basis, when it publishes a new year's set of waste data. The Carbon Metric was updated to reflect these changes, which include:

- SEPA revised the data for C&D recycling and C&I waste generated, including historical datasets, following improvements to the methodologies.
- SEPA formed a new methodology for composting out-with Scotland, which may impact "Organics recycled" data.
- Small changes to the SEPA waste data tonnages were reported for 2011-2015 publications, and these were updated in the historical datasets of the Carbon Metric.
- The "Managed by other methods" management subcategory has been amended for Household waste – it now includes non-PAS compost, which was previously accounted for in the "Organics recycled" sub-category.
- The "Managed by other methods" sub-category has now been added in All-waste for 2014 and 2015, which has led to the subsequent addition of an "Other diversion" category in the Non-household waste sector, for 2014 onwards.

Table 1.1 Changes to the recorded Household waste tonnages due to revisions to the data.

	Generated	Recycled	Incinerated	Landfilled	Other
2011	0	347,107	-1	0	37,698
2012	-1	149,837	0	0	15,838
2013	-186	-32	0	0	154
2014	-58	-2	-67	69	24
2015	-68	-3,176	1	1	2,036

[1] SEPA (2016) Waste Data Tables 2014

Table 1.2 Changes to the recorded Non-household waste tonnages due to revisions to the data.

	Generated	Recycled	Incinerated	Landfilled	Other
2011	72,861	-329,249	3,940	-24,076	0
2012	159,183	-122,539	23,605	-16,051	0
2013	-216,658	-156,903	18,462	0	0
2014	-197,088	-11,918	-11,021	-68	62,619
2015	-314,111	-25,016	-4,302	201	81,393

The changes observed in Tables 1.1 and 1.2, are partly a result of the yearly update to SEPA's waste data. However, changes have also resulted from a methodological modification. In previous years, the Non-household recycled waste data had been calculated by subtracting both the Household recycled waste data, and the "Managed by other Methods" data, from the ALL waste data. This has been altered, so that only the Household recycled data is removed from the all waste recycled data.

1.2 Impact of waste data changes on the Carbon Metric

The Carbon Metric was updated in line with the SEPA waste data reporting changes:

- Carbon factors for "Sorting Residues" were incorporated into the Carbon Metric. These were calculated by applying compositional data (an average from several published sources) and carbon factors of the respective materials present within "Sorting Residues".
- Carbon factors for the "Other diversion" category for Non-household waste were added. Following advice from SEPA, these were calculated using a similar method for the carbon factor for recycled "Animal and mixed food waste", however as non-PAS compost cannot be used to displace other forms of soil nutrient, there are no carbon saving benefits from its formation. This also applies to non-PAS AD (energy recovery), however, the gas produced in this process would provide an offset.
- The carbon factors for "Animal and mixed food waste" in the "Recycling" and Household "Other division" categories were adjusted. Originally, the carbon factor only accounted for AD, rather than AD and compost. This was an error and has not been revised to reflect the proportions of organic waste that are composted and treated via AD.

The addition of sorting residue carbon factors closed an important gap in previous iterations of the Carbon Metric, with sorting residue impacts accounting for 8% of total carbon impacts of Non-household waste in 2016. The other revisions described above had very little impact on the overall results.

2 Updates to the carbon factors

2.1 Changes to the 2016 carbon factors

A number of changes were made to carbon factors as part of the 2016 Carbon Metric update. These changes, presented in Table 2.1, have corrected modelling inaccuracies and inconsistencies identified since the last update, or improved the accuracy of carbon savings estimates resulting from new information or research.

Table 2.1 Summary of changes to carbon factors in 2016 Carbon Metric

Description of change	Applies to	Reference
The transport and electricity grid factors were updated using the 2016 values.	General Assumptions	DEFRA/DECC company reporting factors 2016
The carbon factors for transport and the electricity grid were updated in the historic factors tab, so the factors now match up with the corresponding year. The overall carbon factors for 2011-2015 were then determined and recorded, so that they now include factors for sorting residues (i.e. the change to the sorting residues tab has now been backcast). The carbon factors for 2016-17 were also determined, and then recorded in this tab.	Historic Factors	DEFRA/DECC company reporting factors 2016
Carbon factors for sorting residues have been calculated and incorporated into the Carbon Metric. A compositional analysis was undertaken, and the resulting composition was applied to the carbon factors for the relevant materials, and then this was combined in order to provide overall carbon factors for sorting residues.	Sorting Residues	WRAP/ ACT NOWaste/ RMIT University/ Cascadia Consulting Group, Inc
The "Other Diversion" category for Non-household waste was added into the waste tonnages data this year, therefore carbon factors had to be developed for this management method. These factors were formulated by adapting the calculation used for the recycling of "Animal and mixed food waste". The resulting carbon factors incorporate the carbon emissions produced as a result of composting, and the carbon impacts of AD for food waste.	Carbon Factors	N/A
The historical data tab was updated by adding in the 2015 data. The SEPA waste data tables for 2011-13 were also incorporated into the spreadsheet, to allow changes in SEPA's waste data to be tracked more easily. Each year's transport and electricity factors were applied to the corresponding year's carbon factors. These changes allow backcasting to be tracked more transparently and accurately.	Historical Data	N/A

2.2 Revision of 2011-2015 datasets

Carbon accounting methodology requires that previous years' data be revised or "backcast" using the latest available data on carbon factors. This ensures differences and trends observed between datasets are not the result of methodological differences. Therefore, previous Carbon Metric datasets (2011-2015) have been updated with the new 2016 carbon factors (except where data specific for that year is still relevant, such as grid electricity and transport factors) to allow trend analysis. The impacts of these changes on the overall carbon impact of waste for each year that the Carbon Metric has been published are shown in Table 2.2 below. The revised carbon impacts of all waste materials for 2011-15 are shown in Annex 2.

Table 2.2 Effect of backcasting the carbon impacts for 2011-15

Year	Original carbon impact (tCO_2e)	Backcast carbon impact with 2016 factors (tCO_2e)	Change (tCO_2e)	Change (%)
2011	13,946,414	14,886,428	940,014	6%
2012	12,001,334	12,667,154	665,820	5%
2013	10,805,834	12,088,128	1,282,294	11%
2014	10,644,338	11,206,196	561,858	5%
2015	10,571,815	10,959,004	569,411	5%

2.3 Impact of carbon factor changes on the Carbon Metric

The 2016 Carbon Metric features multiple updated carbon factors however, most of them have no significant impact on the overall results. Of all the changes made regarding carbon factors, incorporating carbon factors for sorting residues was expected to have the largest impact on the overall results, as the carbon impact of sorting residues makes up 8% of the overall carbon impacts of Non-household waste. The number of tonnes of sorting residues generated in 2016 was almost ten-times (6.3kt) the amount generated in 2011 (0.6kt). Yet this change only had a minor effect on the overall results - the overall waste carbon impact only increased by 3% (0.38 $MtCO_2e$) due to the addition of carbon factors for sorting residues.

2.4 Considerations for future updates

Future comprehensive updates to the Carbon Metric's carbon factors will take place every two years, however, transportation and electricity impacts will continue to be updated annually. Whilst considerable updates have been made to the Carbon Metric in this publication, there are some possible changes which were considered beyond the scope of this publication but might become more relevant in future versions of the Carbon Metric. These are noted below:

- More realistic modelling of the origin of imports for key materials may provide insight into prioritising materials to be brought back into Scottish production, under a circular economy framework, based on their potential carbon savings. Very little is known of the origins of Scottish imports of specific materials, particularly for the EU and beyond. Assumptions based on UK data could prove a useful starting point for this analysis, particularly if an understanding of how these differ from Scottish specific imports became available.

- Improved modelling of manure factors. At present, only poultry manure is considered but about 50% of Scottish manure is from cattle. A better understanding of pre-farm gate waste and how this is managed is required to model this in detail. Zero Waste Scotland are currently researching this issue.

3 Outstanding data gaps and limitations

3.1 Fluctuations in Construction and Demolition waste arisings

There are large annual fluctuations in Construction and Demolition (C&D) waste tonnage arisings reflecting high variability in construction and demolition activity in Scotland. Ongoing annual fluctuations in C&D waste arisings are likely to persist with changing economic activity. While these fluctuations can dramatically impact waste arising tonnages year-on-year (and thus progress towards tonnage-based waste targets), the high recycle rate for C&D waste combined with its relatively low carbon value means they do not necessarily lead to increased national waste carbon impacts.

3.2 Waste data gaps

The carbon impacts of the Commercial and Industrial (C&I) waste management routes for many waste types are poorly understood because they are extremely heterogeneous (examples include chemical wastes and healthcare and biological wastes). Issues such as a lack of properly reported data, differences in the classification of waste, and changes in waste classification through the waste management process create further inaccuracies in the C&I data set. In the short-term, this issue is likely to persist however, Scotland's Waste Data Strategy, as well as the proposal from the Scottish Government to transition to an electronic waste data system of some kind, will help close this data gap in future[2].

3.3 Carbon factor limitations

Some waste categories have poorly understood carbon impacts meaning the carbon factors in the Carbon Metric could be inaccurate. The most common issues which lead to a lack of understanding of the carbon impacts of waste types are:

- Heterogeneous and poorly defined waste categories; and
- A lack of carbon data with appropriate temporal, geographical or technical boundaries, particularly regarding the origins of imported material which becomes waste.

In addition, a portion of Scotland's waste (2.9% in 2016) has no carbon factor at all, meaning the carbon impact of Scotland's waste is underestimated. Waste materials without a complete set of carbon factors include: Chemical wastes, Dredging spoils, Healthcare and biological wastes, Industrial effluent sludges, and Wastes containing PCB.

The proportion of waste not assigned a carbon factor is gradually declining with improvement to the Carbon Metric, however, increased recycling and sorting may warrant more regular residual waste composition studies to ensure associated carbon factors reflect changing waste composition. For instance, food waste collection has removed a significant portion of organic matter from the 'household and similar' residual waste stream, while increased use of Material Recycling Facilities (MRFs) has led to a 49% increase in the tonnages of 'Sorting Residues' between 2011 and 2016. Each update of the Carbon Metric includes a review of all the carbon factors to ensure the most up to date information is used where possible.

[2] Scottish Government, 2016 Making Things Last: A Circular Economy Strategy for Scotland

4 The carbon impacts of Scotland's waste

The carbon impacts of Scotland's waste in 2016 are presented in this section, alongside 2011-2015 trend data. These figures include the impact from all waste produced in Scotland during a given year and the impact from managing this waste. The latter includes the carbon benefits from recycling (avoided production of virgin materials) and energy from waste (avoided fossil fuel generation) as well as the impacts from all waste management routes. Carbon impacts and savings attributed to the consumption of materials in Scotland are counted wherever they occur in the world. Reuse and repair activities that prevent waste are largely uncaptured in the Carbon Metric dataset.

4.1 Carbon impact of waste in 2016

The overall carbon impact of Scottish waste in 2016 was 10,959,004 tCO_2e. 55% of this was generated by Scottish households, and the remaining 45% by the Commercial and Industrial (C&I) sector (including the Construction and Demolition sector).

Table 4.1.1 The Carbon Impact of Scottish waste in 2016

Sector	Carbon impact of waste (tCO_2e)	Carbon impact of waste (%)
Households	5,979,195	55%
Commercial and Industrial	4,978,507	45%
Total	10,957,702	100%

Waste arisings in 2016 were 5% (0.5 Mt) lower than in 2015, resulting in decreased carbon impacts from waste generation. Carbon impacts from landfilling remained the second largest carbon contributor at 0.9 $MtCO_2e$, up 0.25% above the previous year. Carbon savings from recycling totalled 2.7 $MtCO_2e$, while carbon impacts from incineration reached 62 KtCO2e, more than double 2015 levels. Overall, there was a net reduction in waste carbon impacts of 2%, compared to 2015 levels.

Table 4.1.2 Carbon impact of waste generated and managed in 2016

Life cycle phase	Carbon impact of waste in 2016 (tCO_2e)	Share of 2016 waste carbon impacts
Waste generated	12,673,463	115.7%
Recycled	-2,657,947	-24.3%
Incinerated	61,515	0.6%
Landfilled	885,222	8.1%
Other diversion	-4,551	0.0%
Overall carbon impact	10,957,702	100.0%

2016 saw a continued increase in waste sent to incineration, up nearly 38kt (an increase of 6%) from the previous year. Sorting residues account for a significant portion of waste incinerated (27% in 2016); with the addition of carbon factors for this material class, the historic impact od waste incineration has been revised, resulting in a substantial increase in overall impact. Waste incineration is now a net source of carbon emissions throughout 2011 to 2016. The Carbon Metric uses the UK grid's carbon intensity to estimate the avoided impact of energy from waste. In 2016, this was 412gCO2e/kwh, down 11% from the previous year. If compared against the Scottish grid (196 gCO_2e/kwh in 2015), the emissions generated by incineration would have been higher still, at 134 $ktCO_2e$. As the UK continues to reduce the carbon intensity of its electricity grid, the carbon impacts of waste incineration are likely to increase significantly.

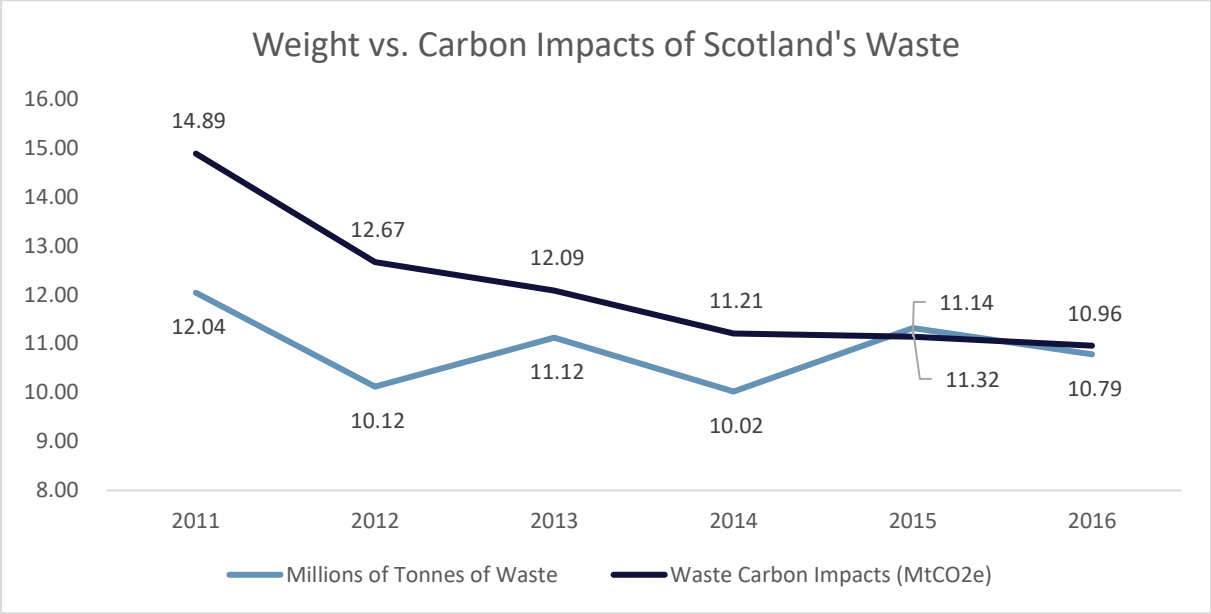
4.2 Trends 2011-16

Annual Scottish waste tonnage fluctuated significantly between 2011 and 2016, due primarily to large variations in construction and demolition waste arisings. Despite this, the carbon impact of Scotland's waste has fallen every year over the same period, culminating in a 26% reduction below 2011 baseline levels.

Table 4.2.1 Tonnage and carbon impact of Scottish waste 2011-2016

Year	Tonnage impact of waste (t)	Carbon impact of waste (tCO_2e)
2016	10,785,152	10,957,702
2015	11,316,852	11,141,226
2014	10,021,040	11,206,196
2013	11,123,329	12,088,128,
2012	10,119,314	12,667,154
2011	12,042,635	14,886,428

Figure 4.2 Tonnage and carbon impact of Scottish waste 2011-2016



As Scotland's waste carbon impacts have declined, the relative share attributable to Household waste has steadily increased, with a net change of 9%.

Table 4.2.2 Proportion of carbon impact of Scottish waste by origin 2011-2016

Year	Household proportion of impact (%)	Non-household proportion of impact (%)
2016	55%	45%
2015	53%	47%
2014	53%	47%
2013	50%	50%
2012	50%	50%
2011	46%	54%

The carbon intensity of Scotland's waste (net tCO_2e/tonne) has declined by 18% since 2011. The carbon intensity of Non-household waste is much lower than Household waste and this gap is increasing. Since 2011, the carbon intensity of Non-household waste has fallen 30% compared to just 9% for Household waste.

Table 4.2.3 Carbon intensity of Scottish waste 2011-2016

Year	Household carbon intensity of waste (tCO_2e/t)	Non-household carbon intensity of waste (tCO_2e/t)	Total waste carbon intensity (tCO_2e/t)
Percentage change 2011-2016	**-9%**	**-30%**	**-18%**

2016	2.39	0.60	1.02
2015	2.41	0.59	0.98
2014	2.42	0.70	1.12
2013	2.49	0.70	1.09
2012	2.55	0.82	1.25
2011	2.63	0.85	1.24

Scotland's waste carbon footprint (tonnes of waste carbon per person) declined significantly between 2011 and 2016. Per capita impacts of Household Waste fell 15% while per capita impacts from All Waste fell 28%.

Table 4.2.4 Scotland's waste carbon footprint 2011-2016

Year	Household Waste Only (tCO_2e per capita)	All Waste (tCO_2e per capita)
Percentage change 2011-2016	**-15%**	**-28%**
2016	1.11	2.04
2015	1.11	2.08
2014	1.11	2.10
2013	1.13	2.27
2012	1.20	2.38
2011	1.30	2.83

4.3 Material analysis

The carbon impacts of all waste material in the Carbon Metric are shown in Annex 1.

The majority of Scotland's waste carbon impacts are concentrated in a few materials which either have a high carbon intensity, or occur in large volumes (or both). The top five most significant wastes in 2016 according to their carbon impact are shown in the tables below. Note that "Household and Similar Waste" describes residual waste from both Households and Non-household streams.

Table 4.3 Top five materials by carbon impact in 2016 (tCO_2e)

Position	Household wastes	Non-household wastes	All Scottish waste
1	Household and Similar Waste	Household and Similar Waste	Household and Similar Waste
	4,491,259	2,037,567	6,528,826
2	Animal and Mixed Food Waste	Animal and Mixed Food Waste	Animal and Mixed Food Waste
	636,669	1,207,785	1,844,454
3	Mixed and Undifferentiated Materials	Mixed and Undifferentiated Materials	Mixed and Undifferentiated Materials
	538,773	466,858	1,005,631
4	Textile Wastes	Sorting Residues	Sorting Residues
	177,987	379,099	379,099
5	Discarded Equipment	Discarded Vehicles	Discarded Vehicles
	59,963	347,766	349,898
Share of Total Impacts	**99%**	**89%**	**92%**

5 Measuring Progress 2011-2025

The Scottish Government has established five main policy drivers to reduce waste generation and increase recycling rates in Scotland:

1. Ban on biodegradable municipal waste to landfill by 2021[3]
2. Reduce weight of waste arisings in Scotland by 15% below 2011 levels by 2025[4]
3. Reduce per capita food waste arisings in Scotland by 33% below 2013 levels by 2025[6]
4. Achieve 70% recycle rate for all waste by 2025[6]
5. Achieve maximum landfill rate of 5% by 2025[6]

Whilst these are tonnage targets, reducing the environmental impact of waste is the main reason for action so an assessment of progress in carbon terms (an extremely important environmental factor) is highly relevant. By reducing waste arisings and increasing recycling rates, these policies were initially expected to reduce Scotland's annual carbon impact of waste by 22%, or 3.1 $MtCO_2e$, below 2011 levels by 2025. Despite significant tonnage and carbon factor revisions that have occurred since 2011, as of 2016, Scotland's waste carbon impacts are 26% (3.9 $MtCO_2e$) below 2011 baseline levels.

[3] Waste (Scotland) Regulations 2012
[4] Scottish Government (2016) Making Things Last

The most recently created target aims to reduce food waste arisings specifically. Since food waste in Scotland has a higher carbon impact than any other homogeneous waste stream, this should be an effective driver in reducing environmental impact of waste overall.

Additional UK level measures affecting key waste materials are:

1. Achieve 64% recycle rate for aluminium packaging, and 85% for steel packaging by 2020.[5]
2. Achieve 95% reuse and recovery, and 85% reuse and recycling for end-of-life vehicles by 2015.[6]

For more information on how the 2025 savings estimate was calculated, see the original Carbon Metric Technical Report.

6 Further information

There are several other outputs form the Carbon Metric which can be accessed on the Zero Waste Scotland website. These include:

- Summary guide for policy makers
- Carbon Metric summary factors
- Archived information

7 Conclusion

This report describes the carbon impact of Scotland's waste in 2016, as well as the updates to Scotland's waste and carbon data, which are used to make this assessment. Updates have been made to both the waste and carbon data to improve the overall quality of the dataset, however, some significant gaps still remain, and future improvements are expected.

The overall carbon impact of waste in Scotland was 10.96 $MtCO_2e$ in 2016. Household waste accounts for a growing portion of the carbon impact of waste in Scotland, reaching 55% in 2016. The carbon intensity of Household waste (tCO_2e/tonne) is 4 times higher than Non-household waste. The material with the single greatest carbon impact is household and similar waste (mixed residual waste), followed by animal and mixed food waste.

Further information on the Carbon Metric and archived documents relating to its development can be found on the Zero Waste Scotland website.

[5] The Producer Responsibility Obligations (Packaging Waste) (Amendment) Regulations 2016 (2020 targets detailed in 2017 Spring Budget.

[6] Regulation 18 of The End-of-Life Vehicles (Producer Responsibility) Regulations 2005.

Annex 1 Carbon impacts of Waste in Scotland in 2016

The table below shows the carbon impact of waste for each material in the Carbon Metric.

Red cells indicate materials where there are tonnages of waste produced but no carbon factors exist.

Grey cells indicate material streams and management options which are not applicable to that sector.

Material type	2016 Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	362,890	-1,932	-446	276,122	34
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	7,956	-379	-	-	-
Chemical wastes	681	2,080	10	-	-
Combustion wastes	-	-	-	275	-65
Common sludges	-	-	-	-	-
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	65,873	-6,206	188	108	-
Discarded vehicles	2,794	-662	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	94,200	-80,440	623	302	-
Health care & biological wastes	-	-	1,325	41,530	-
Household and similar wastes	4,460,860	-5,704	3,780	31,601	723
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	847	-16,917	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	124,659	-129,540	364	199	-5,446
Metallic wastes, non-ferrous	1,463	-41,354	-	-	-
Mineral waste from construction and demolition	1,815	228	288	89	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	542,907	-1,906	-4,119	1,890	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	56,472	-124,581	-3,766	77,161	-
Plastic wastes	14,774	-26,107	36,160	731	-
Rubber wastes	3,175	-529	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	19	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	205,188	-66,231	1,823	37,207	-
Used oils	794	-407	-	-	-
Vegetal wastes	-	-16,274	-325	13,357	203
Waste containing PCB	-	-	-	-	-
Wood wastes	40,837	-28,234	-2,119	26,281	-
Total	**5,988,185**	**-545,078**	**33,786**	**506,853**	**-4,551**

Material type	2016 Non-household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	7,355	-	-	-	-
Animal and mixed food waste	1,205,199	-3,897	-5	6,426	62
Animal faeces, urine and manure	0	688	-8,215	19	22
Batteries and accumulators wastes	122,915	-9,329	0	0	0
Chemical wastes	148,665	0	36	10	0
Combustion wastes	-	-7	-	436	0
Common sludges	0	114,756	7,589	769	0
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	30,335	0	9	0	0
Discarded vehicles	363,482	-15,716	0	-	0
Dredging spoils	-	-	-	-	0
Glass wastes	94,398	-80,295	0	77	0
Health care & biological wastes	-	-	145	2,118	0
Household and similar wastes	1,980,042	0	0	57,170	355
Industrial effluent sludges	-	492	5,251	4,935	0
Metallic wastes, ferrous	699,799	-1,030,194	0	0	0
Metallic wastes, mixed ferrous and non-ferrous	458,980	-125,984	0	0	0
Metallic wastes, non-ferrous	395,048	-856,578	0	0	0
Mineral waste from construction and demolition	101,822	-67,596	2	192	0
Mineral wastes from waste treatment and stabilised wastes	-	2,033	0	3,901	0
Mixed and undifferentiated materials	467,183	2,353	0	2,023	6
Other mineral wastes	5,217	1,039	0	553	0
Paper and cardboard wastes	28,269	0	-7	0	0
Plastic wastes	124,392	0	0	7	0
Rubber wastes	67,049	0	5,417	-	0
Sludges and liquid wastes from waste treatment	-	-	2	55	24
Soils	0	3,169	-	1,388	0
Sorting residues	22,381	-18,600	81,353	293,966	0
Spent solvents	83,729	0	917	0	0
Textile wastes	151,599	0	0	3,920	0
Used oils	53,002	0	0	-	0
Vegetal wastes	0	-19,756	0	405	831
Waste containing PCB	-	-	-	-	0
Wood wastes	73,419	-4,743	-64,766	0	3
Total	**6,685,278**	**-2,112,869**	**-27,729**	**378,369**	**1,302**

Annex 2 Revised 2011-2015 carbon assessments of waste in Scotland

In accordance with standard accounting methodology, as data is updated, historic data is revised to account for more accurate information. This allows fair comparison between the current year and past years. This means the historical tonnage data in the Carbon Metric is revised annually and the latest carbon factors applied to it before any trend analysis between years is conducted. This annex shows the carbon impact of Scottish waste for 2011-15 using the most up to date tonnage data from SEPA and the latest carbon factors.

Table A2.1 Carbon impacts of Scottish waste by sector and material type, 2011

Material type	Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	181,621	-384	-296	406,935	-
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,819	-313	-	-	-
Chemical wastes	319	973	-	-	-
Combustion wastes	-	-	-	89	-46
Common sludges	-	-	-	-	-
Discarded equipment	63,557	-6,610	128	191	-
Discarded vehicles	2,665	-644	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	112,588	-71,648	271	365	-
Health care and biological wastes	-	-	392	45,900	-
Household and similar wastes	5,720,07	-4,286	2,298	55,591	485
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	4,344	-10,776	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	96,447	-90,086	192	287	-5,998
Metallic wastes, non-ferrous	6,960	-19,362	-	-	-
Mineral waste from C&D	2,079	225	208	163	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	21,247	-18,535	-	-	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	100,016	-131,399	-2,106	107,386	-
Plastic wastes	26,005	-15,968	15,015	926	-
Rubber wastes	3,630	-714	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	26	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	240,910	-85,025	803	45,794	-
Used oils	783	-405	-	-	-
Vegetal wastes	-	-17,544	-92	9,070	-
Waste containing PCB	-	-	-	-	-
Wood wastes	33,657	-26,241	-581	36,995	-
Total	**6,622,053**	**-498,716**	**16,232**	**709,693**	**-5,559**

Material type	Non-household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	8,429	-	-	-
Animal and mixed food waste	710,785	-1,126	-5	5,541
Animal faeces, urine and manure	-	23	-14,374	2
Batteries and accumulators wastes	127,801	-9,033	-	1
Chemical wastes	269,573	203,837	10,529	4
Combustion wastes	-	-6	-	4,246
Common sludges	-	43,199	8,779	3,340
Discarded equipment	45,416	-	-	3
Discarded vehicles	396,31	-2,801	-	-
Dredging spoils	-	-	-	-
Glass wastes	48,296	-137,306	-	5
Health care and biological wastes	-	-	175	2,347
Household and similar wastes	4,213,368	-32,746	6,939	89,527
Industrial effluent sludges	-	181	1,535	5,090
Metallic wastes, ferrous	783,390	-934,146	-	45
Metallic wastes, mixed ferrous and non-ferrous	866,527	-83,568	-	-
Metallic wastes, non-ferrous	518,732	-453,328	-	1
Mineral waste from construction and demolition	113,600	-67,061	-	417
Mineral wastes from waste treatment and stabilised wastes	-	394	-	2,698
Mixed and undifferentiated materials	303,350	-41,650	-878	8,108
Other mineral wastes	6,789	1,921	-	616
Paper and cardboard wastes	66,618	-	-17	215
Plastic wastes	104,936	-37,497	-	2
Rubber wastes	77,314	-	22,289	-
Sludges and liquid wastes from waste treatment	-	-	-	3
Soils	-	2,518	-	1,729
Sorting residues	2,198	-18,350	13,957	232,487
Spent solvents	92,127	-	260	-
Textile wastes	373,835	-	1,504	3,770
Used oils	93,945	-	-	-
Vegetal wastes	-	-10,265	-	355
Waste containing PCB	-	-	-	-
Wood wastes	67,528	-58,097	-27,080	2,681
Total	**9,290,789**	**-1,634,909**	**-23,613**	**363,233**

Table A2.2 Carbon impacts of Scottish waste by sector and material type, 2012

Material type	Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	152,815	-561	-222	386,419	-
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,880	-240	-	-	-
Chemical wastes	401	1,227	-	-	-
Combustion wastes	-	-	-	68	-49
Common sludges	-	-	-	-	-
Discarded equipment	59,573	-6,091	94	182	-
Discarded vehicles	2,439	-587	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	106,516	-72,973	198	346	-
Health care and biological wastes	-	-	263	43,647	-
Household and similar wastes	5,161,768	-3,889	1,660	52,806	446
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	4,508	-10,785	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	99,565	-99,792	140	273	-1,086
Metallic wastes, non-ferrous	6,299	-25,826	-	-	-
Mineral waste from C&D	1,909	214	152	156	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	202,792	-8,652	-114	-	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	90,599	-126,714	-1,547	101,962	-
Plastic wastes	23,707	-18,817	10,755	880	-
Rubber wastes	3,658	-615	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	25	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	250,109	-84,355	579	43,560	-
Used oils	687	-357	-	-	-
Vegetal wastes	-	-16,901	-91	8,910	-
Waste containing PCB	-	-	-	-	-
Wood wastes	35,645	-27,529	-426	35,177	-
Total	**6,207,870**	**-503,218**	**11,440**	**674,388**	**-689**

Material type	Non-household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	7,964	-	-	-
Animal and mixed food waste	683,984	-2,160	-3	6,397
Animal faeces, urine and manure	-	1,924	-14,814	18
Batteries and accumulators wastes	77,087	-6,206	-	-
Chemical wastes	144,182	-	1,006	10
Combustion wastes	-	-4	0	3,778
Common sludges	-	131,532	7,915	3,319
Discarded equipment	22,013	-	6	5
Discarded vehicles	377,120	-14,895	-	-
Dredging spoils	-	-	-	-
Glass wastes	99,727	-89,068	-	1
Health care and biological wastes	-	-	95	2,472
Household and similar wastes	3,132,274	-19,006	2,938	30,558
Industrial effluent sludges	-	467	3,772	4,489
Metallic wastes, ferrous	598,849	-814,837	-	15
Metallic wastes, mixed ferrous and non-ferrous	775,263	-140,888	-	-
Metallic wastes, non-ferrous	372,197	-504,910	-	1
Mineral waste from construction and demolition	87,095	-54,822	-	223
Mineral wastes from waste treatment and stabilised wastes	-	1,300	-	3,290
Mixed and undifferentiated materials	227,942	-35,458	-1	5,130
Other mineral wastes	9,152	3,610	-	675
Paper and cardboard wastes	56,330	-6,967	-11	203
Plastic wastes	125,239	-	-	14
Rubber wastes	67,242	-	21,109	-
Sludges and liquid wastes from waste treatment	-	-	-	56
Soils	-	1,518	-	1,749
Sorting residues	12,767	-6,591	26,942	301,759
Spent solvents	83,501	-	2,575	-
Textile wastes	320,518	-	2,101	976
Used oils	143,004	-	-	-
Vegetal wastes	-	-12,918	-	379
Waste containing PCB	-	-	-	-
Wood wastes	105,558	-66,546	-38,844	2,975
Total	**7,529,009**	**-1,634,926**	**14,788**	**368,493**

Table A2.3 Carbon impacts of Scottish waste by sector and material type, 2013

Material type	Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	177,875	-959	-254	355,497	-
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,434	-220	-	-	-
Chemical wastes	550	1,679	-	-	-
Combustion wastes	-	-	-	69	-52
Common sludges	-	-	-	-	-
Discarded equipment	54,927	-5,662	112	167	-
Discarded vehicles	2,189	-521	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	102,716	-75,476	238	317	-
Health care and biological wastes	-	-	368	40,013	-
Household and similar wastes	4,607,080	-3,191	2,037	48,505	469
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	4,142	-11,888	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	97,765	-97,818	169	250	-1,487
Metallic wastes, non-ferrous	7,405	-30,482	-	-	-
Mineral waste from C&D	1,644	188	182	144	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	402,825	-3,045	-1,136	2,288	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	80,068	-124,593	-1,839	93,757	-
Plastic wastes	17,401	-20,758	13,409	805	-
Rubber wastes	2,575	-526	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	20	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	267,100	-87,471	713	39,950	-
Used oils	796	-414	-	-	-
Vegetal wastes	-	-16,013	-119	8,350	-
Waste containing PCB	-	-	-	-	-
Wood wastes	39,366	-28,936	-711	32,331	-
Total	**5,870,859**	**-506,087**	**13,169**	**622,442**	**-1,070**

Material type	Non-household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	10,918	-	-	-
Animal and mixed food waste	802,629	-2,742	-4	7,543
Animal faeces, urine and manure	-	2,287	-14,644	21
Batteries and accumulators wastes	111,850	-6,034	-	-
Chemical wastes	181,307	13,530	1,056	14
Combustion wastes	-	-5	-	2,634
Common sludges	-	119,982	8,510	3,152
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	27,814	-	3	5
Discarded vehicles	417,181	-2,125	-	-
Dredging spoils	-	-	-	-
Glass wastes	87,557	-89,489	-	1
Health care and biological wastes	-	-	110	2,267
Household and similar wastes	2,620,415	-13,193	-	29,771
Industrial effluent sludges	-	165	3,180	5,061
Metallic wastes, ferrous	757,935	-903,742	1	-
Metallic wastes, mixed ferrous and non-ferrous	738,656	-156,253	-	-
Metallic wastes, non-ferrous	375,736	-570,417	-	1
Mineral waste from construction and demolition	78,882	-66,638	2	140
Mineral wastes from waste treatment and stabilised wastes	-	800	-	2,314
Mixed and undifferentiated materials	290,720	-31,926	-	1,926
Other mineral wastes	9,293	3,588	11	942
Paper and cardboard wastes	48,846	-2,304	-	226
Plastic wastes	108,841	-	-	10
Rubber wastes	80,331	-	22,147	-
Sludges and liquid wastes from waste treatment	-	-	101	84
Soils	-	2,832	-	1,717
Sorting residues	22,177	-12,827	24,674	276,827
Spent solvents	83,554	-	1,192	-
Textile wastes	371,932	-	2,506	977
Used oils	112,781	-	-19	-
Vegetal wastes	-	-15,122	-	669
Waste containing PCB	-	-	-	-
Wood wastes	127,005	-536	-35,801	3,300
Total	**7,466,360**	**-1,730,171**	**13,027**	**339,601**

Table A2.4 Carbon impacts of Scottish waste by sector and material type, 2014

Material type	Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	254,085	-1,284	-513	295,553	154
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,882	-240	-	-	-
Chemical wastes	506	1,400	8	-	-
Combustion wastes	-	-	-	171	75
Common sludges	-	-	-	-	-
Discarded equipment	55,724	-5,731	167	118	-
Discarded vehicles	2,771	-659	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	99,493	-75,934	543	347	-
Health care and biological wastes	-	-	490	45,237	-
Household and similar wastes	4,572,818	-4,172	2,969	34,070	679
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	3,812	-14,790	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	100,558	-100,375	322	227	-2,399
Metallic wastes, non-ferrous	5,599	-35,179	-	-	-
Mineral waste from C&D	1,790	206	255	96	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	424,178	-10,973	-1,289	2,239	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	87,628	-123,808	-3,525	82,182	-
Plastic wastes	22,271	-21,533	26,063	840	-
Rubber wastes	2,451	-410	2	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	20	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	221,052	-79,135	1,413	40,514	-
Used oils	833	-432	-	-	-
Vegetal wastes	-	-16,756	-326	14,144	177
Waste containing PCB	-	-	-	-	-
Wood wastes	37,990	-27,792	-1,115	27,788	-
Total	**5,898,442**	**-517,577**	**25,464**	**543,527**	**-1,466**

Material type	Non-household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	16,620	-	-	-	-
Animal and mixed food waste	1,017,784	-2,875	-3	10,372	91
Animal faeces, urine and manure	-	1,465	-15,658	22	2
Batteries and accumulators wastes	69,044	-6,902	1	-	-
Chemical wastes	155,597	-	928	11	-
Combustion wastes	-	-10	-	2,920	-
Common sludges	-	77,500	5,293	2,527	-
Discarded equipment	30,253	-	3	11	-
Discarded vehicles	480,271	-2,464	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	65,159	-124,295	-	11	-
Health care and biological wastes	-	-	74	1,507	-
Household and similar wastes	2,126,577	-782	-	44,541	381
Industrial effluent sludges	-	164	2,810	4,118	-
Metallic wastes, ferrous	569,245	-981,527	-	45	-
Metallic wastes, mixed ferrous and non-ferrous	581,295	-144,279	-	-	-
Metallic wastes, non-ferrous	523,770	-564,347	-	1	-
Mineral waste from construction and demolition	88,335	-63,281	89	351	-
Mineral wastes from waste treatment and stabilised wastes	-	802	-	2,492	-
Mixed and undifferentiated materials	194,911	-12,110	-	2,198	-
Other mineral wastes	5,917	1,164	-	626	-
Paper and cardboard wastes	42,138	-	-2	488	-
Plastic wastes	119,327	-41,346	-	6	-
Rubber wastes	87,523	-	22,605	1	-
Sludges and liquid wastes from waste treatment	-	-	46	8	-
Soils	-	2,267	-	1,619	-
Sorting residues	1,120	-5,319	62,273	258,747	7
Spent solvents	88,784	-	1,440	-	-
Textile wastes	241,386	-	637	4,012	-
Used oils	93,648	-	-103	-	-
Vegetal wastes	-	-12,951	-	422	540
Waste containing PCB	-	-	-	-	-
Wood wastes	147,014	-2,256	-67,727	1,359	3
Total	**6,745,717**	**-1,840,037**	**12,708**	**338,373**	**1,046**

Table A2.5 Carbon impacts of Scottish waste by sector and material type, 2015

Material type	Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	308,522	-1,778	-533	279,288	7
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	7,219	-353	-	-	-
Chemical wastes	311	953	-	-	-
Combustion wastes	-	-	-	230	-47
Common sludges	-	-	-	-	-
Discarded equipment	59,185	-5,730	189	108	-
Discarded vehicles	3,080	-727	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	96,270	-77,031	619	309	-
Health care and biological wastes	-	-	832	42,481	
Household and similar wastes	4,511,213	-5,702	3,518	32,117	648
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	2,779	-15,700	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	107,776	-114,170	365	202	-4,610
Metallic wastes, non-ferrous	9,270	-41,894	-	-	-
Mineral waste from C&D	1,621	215	289	90	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	
Mixed and undifferentiated materials	485,486	-21,260	-4,785	2,263	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	69,994	-121,548	-3,916	77,741	-
Plastic wastes	22,111	-22,076	31,947	746	-
Rubber wastes	2,441	-408	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	19	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	221,202	-71,115	1,672	38,050	-
Used oils	792	-412	-	-	-
Vegetal wastes	-	-16,397	-347	13,543	260
Waste containing PCB	-	-	-	-	-
Wood wastes	36,096	-26,598	-2,427	26,056	-
Total	**5,945,369**	**-541,711**	**27,422**	**513,223**	**-3,743**

Material type	Non-household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	7,592	-	-	-	-
Animal and mixed food waste	1,177,701	-3,054	-8	9,374	66
Animal faeces, urine and manure	-	3,196	-12,074	21	235
Batteries and accumulators wastes	76,570	-9,120	-	-	-
Chemical wastes	142,232	-	940	9	-
Combustion wastes	-	-4	-	2,602	-
Common sludges	-	107,225	6,706	1,125	-
Discarded equipment	73,556	-7,362	9	10	-
Discarded vehicles	321,486	-4,786	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	96,122	-105,736	-	81	-
Health care and biological wastes	-	-	129	2,868	-
Household and similar wastes	2,049,528	-532	0	25,625	350
Industrial effluent sludges	-	2,078	5,311	3,096	-
Metallic wastes, ferrous	957,352	-944,350	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	577,566	-1,165	-	-	-
Metallic wastes, non-ferrous	335,725	-1,289,558	1	18	-
Mineral waste from construction and demolition	88,357	-59,778	1	141	-
Mineral wastes from waste treatment and stabilised wastes	-	1,129	-	3,372	-
Mixed and undifferentiated materials	361,258	-	-	3,501	-
Other mineral wastes	6,668	2,467	-	602	-
Paper and cardboard wastes	35,966	-	-7	140	-
Plastic wastes	120,375	-	-	9	-
Rubber wastes	79,517	-	12,438	-	-
Sludges and liquid wastes from waste treatment	-	-	27	7	22
Soils	-	2,567	-	1,677	-
Sorting residues	2,005	-5,797	56,327	309,713	-
Spent solvents	95,766	-	973	19	-
Textile wastes	376,820	-	2,061	4,966	-
Used oils	68,103	-	-44	-	-
Vegetal wastes	-	-21,044	-225	-	707
Waste containing PCB	-	-	-	-	-
Wood wastes	124,249	-13,939	-70,053	846	2
Total	**7,174,513**	**-2,347,565**	**2,513**	**369,823**	**1,382**

Annex 3. 2016 Carbon factors for waste

Material type	Household (kgCO_2e per tonne of material)				
	Generated	Recycled/ Composted	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes					
Animal and mixed food waste	3,744	-21	-12	993	18
Animal faeces, urine and manure					
Batteries & accumulators wastes	12,108	-579			
Chemical wastes	1,321	4,039	403		
Combustion wastes				8	-4
Common sludges					
Discarded equipment	1,754	-181	62	5	
Discarded vehicles	6,850	-1,624	328		
Dredging spoils					
Glass wastes	1,210	-755	69	5	
Health care & biological wastes			99	420	
Household and similar wastes	3,206	-661	403	458	18
Industrial effluent sludges					
Metallic wastes, ferrous	2,926	-1,775			
Metallic wastes, mixed	3,897	-2,543	62	5	-2,481
Metallic wastes, non-ferrous	12,950	-9,966			
Mineral waste from C&D	21	2	62	3	
Mineral wastes from waste treatment & stabilised wastes					
Mixed & undifferentiated materials	1,899	-1,216	-201	108	
Other mineral wastes					
Paper and cardboard wastes	885	-547	-180	498	
Plastic wastes	3,189	-539	1,665	5	
Rubber wastes	3,100	-514	1,526		
Sludges and liquid wastes from waste treatment					
Soils		1		1	
Sorting residues					
Spent solvents					
Textile wastes	20,444	-5,828	216	599	
Used oils	1,401	-725			
Vegetal wastes		-53	-39	214	18
Waste containing PCB					
Wood wastes	519	-289	-271	925	

Material type	Non-Household ($kgCO_2e$ per tonne of material)				
	Generated	Recycled/ Composted	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	1,365				
Animal and mixed food waste	5,736	-21	-12	993	18
Animal faeces, urine and manure	0	149	-108	142	18
Batteries & accumulators wastes	12,108	-1,399	403	91	
Chemical wastes	1,321	4,039	403	7	
Combustion wastes		-4		8	
Common sludges	0	326	236	117	
Discarded equipment	1,754	-181	62	5	
Discarded vehicles	6,850	-1,624	328		
Dredging spoils					
Glass wastes	1,210	-755	69	5	
Health care & biological wastes			99	420	
Household and similar wastes	3,137	-610	403	310	18
Industrial effluent sludges		159	403	329	
Metallic wastes, ferrous	2,926	-1,775	16	5	
Metallic wastes, mixed	3,489	-2,205	62	5	
Metallic wastes, non-ferrous	12,950	-9,966	62	5	
Mineral waste from C&D	80	-77	62	2	
Mineral wastes from waste treatment & stabilised wastes		15	49	16	
Mixed & undifferentiated materials	1,899	-1,216	-201	108	18
Other mineral wastes	45	33	586	12	
Paper and cardboard wastes	885	-547	-180	498	18
Plastic wastes	3,189	-1,001	1,665	5	
Rubber wastes	3,100	-514	1,526	5	
Sludges and liquid wastes from waste treatment			370	9	18
Soils	0	1		1	
Sorting residues	3,527	-927	413	344	18
Spent solvents	1,605	-1,287	1,521	6,284	
Textile wastes	20,444	-5,828	216	599	
Used oils	1,401	-725	-1,195		
Vegetal wastes	0	-49	-39	214	18
Waste containing PCB					
Wood wastes	593	-338	-271	925	18

Annex 4 References

This table lists all the references used in the Carbon Metric. The data and calculations are not published as this contains confidential information.

Table A4. Carbon Metric references

Tonnage data

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Acids, alkaline or saline waste

Author	Year	Title	Publisher
Swiss Centre for Life Cycle Inventories	2016	Ecoinvent v3.0	Swiss Centre for Life Cycle Inventories

Animal and mixed food wastes

Author	Year	Title	Publisher
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AIC	2009	Fertiliser Statistics 2009 Report	Agricultural Industries Confederation
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Author	Year	Title	Publisher
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Other mineral wastes

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Sorting residues

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