The Carbon Footprint of Scotland's Waste

2014 and 2015 Carbon Metric: Annual Report and Biennial Technical Update

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Date: September 2017

European Union
The Scottish Government
Riaghaltas na h-Alba
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European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

Contents

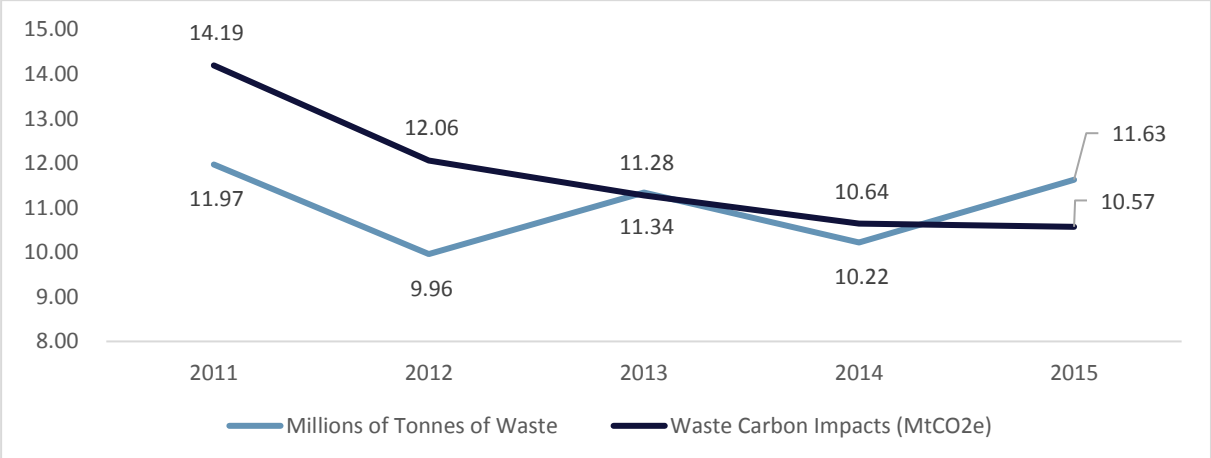
The Scottish Carbon Metric measures the carbon impacts of Scotland's waste using a ground-breaking carbon accounting approach which measures the whole life carbon impacts of waste, regardless of where in the world those emissions occur. Traditionally, measurements of waste emissions are limited to end-of-life 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 fourth and fifth annual Carbon Metric updates, covering 2014 and 2015 data, as well as details on the biennial Carbon Metric technical update. The decision to report on 2014 and 2015 simultaneously was made in order to return to a regular September publication date following delayed release of the 2013 Carbon Metric.

The carbon factors used in the Carbon Metric were updated this year as part of the biennial improvement process. Inconsistencies between different material types have been addressed and more Scottish specific data incorporated into the carbon factors. In addition, 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 2014 and 2015 was 10.64MtCO_2e and 10.57MtCO_2e respectively. Household waste accounted for 56% of 2014 impacts and 57% of 2015 impacts. Scotland's waste carbon impacts continued to decline year-on-year over the period, falling 6% in 2014, and a further 1% in 2015, resulting in a cumulative 26% reduction below the 2011 baseline year. Emissions saved from recycling continue to rise, reaching 2.4MtCO_2e in 2014 and 2.9MtCO_2e in 2015. Waste sent to landfill over the same period contributed 0.73MtCO_2e and 0.7MtCO_2e respectively. 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 10.2Mt of waste in 2014, and to 11.6Mt in 2015. This change is due to large year-on-year fluctuations in wastes from the construction industry; a feature seen throughout the lifetime for 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% (3.1MtCO_2e) reduction in waste carbon impacts between 2011 and 2025. As of 2015, waste carbon impacts have already declined by 26% (3.6MtCO_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 2014 dataset[1]. The Carbon Metric was updated to reflect these changes which include:

- The amendment of the "Other diversion" management option for household (HH) waste includes Non PAS compost which was previously counted under the 'organics recycling' sub-category..
- The mapping of WasteDataFlow categories was altered for some materials as shown in the table below.
- Small changes by SEPA to the tonnages reported for 2011 and 2012 publications were updated in the historical datasets of the Carbon Metric.
- Revisons to C&D recycling and C&I waste generated, including historical datasets, following improvements to the methodologies

Table 1.1 Changes in 2014 household mapping of waste data by SEPA

WasteDataFlow Category	Old Mapping	New Mapping
Mixed garden and food waste	Animal and mixed food waste	Vegetal wastes (75%), Animal and mixed food waste (25%)
Carpets	Household and similar wastes	Textile wastes
Absorbent Hygiene Products (AHP)	Household and similar wastes	Health care and biological wastes

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 HH materials sent to "Other diversion" were added. On advice from SEPA, "Non PAS compost" was given the same carbon factors as "Animal and mixed food waste", "Compost like output from MBT plants" was given the same carbon factors as "composition wastes" and "Process loss from waste treatment" given the same carbon factors as "household and similar waste" sent to landfill and "recycled metal from incineration" given the same carbon factors as "mixed metals" sent to recycling.
- The Carbon Metric tables were reordered to show material type alphabetically and "Arisings" renamed "Waste generated".
- The carbon factors for materials affected by the mapping changes were updated. The material flows of "Animal and mixed food waste" and "Vegetal wastes" were altered to reflect the new material flows in the tonnage data. A carbon factor for "Carpets" was added to the textiles

[1] SEPA (2016) Waste Data Tables 2014

carbon factor (based on the WRAP 2014 Benefits of Re-use Two study[2]). There is still no carbon factor for “Absorbent Hygiene Products” so the “Healthcare and biological wastes” factors did not change.

These changes had very little impact on the overall results. The total carbon impacts of “Other Diversion” materials is less than 1% of the total carbon impact of household waste. “Carpets” account for 4.3% of the total material flows of textiles wastes.

[2] WRAP (2014) Benefits of Re-Use Two

2 Updates to the carbon factors

2.1 Changes to the 2014 and 2015 carbon factors

A number of changes were made to carbon factors as part of the 2014 and 2015 Carbon Metric update. These changes, presented in **Error! Reference source not found.**, 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.

Error! Reference source not found. **Summary of changes to carbon factors in 2014 and 2015 Carbon Metric**

Description of change	Applies to	Reference
Animal and mixed food production factors updated in line with ZWS research into food carbon factors. These factors now account for different food types and life cycle stages of food production more comprehensively.	Animal and mixed food production factors for households and non-households	ZWS internal research 2017
Animal and mixed food waste management factors reviewed. A double counting error in transport distances for IVC was removed and vegetable oil removed from factor (as it only contribute 0.04% of impact by mass). AD and IVC ratios updated based on latest ZWS published information. Also updated incineration factor with internal calculation which accounts for changes in grid decarbonisation.	Animal and mixed food waste	ZWS (2016) Organics survey and ZWS internal calculation
Linked data cells on carbon impact of electricity grid (and updated this to 2016 figures) and landfill capture to “General assumptions” tab.	General Assumptions, Animal and mixed food waste, Paper and card waste, Textile wastes, Wood waste	DEFRA/DECC company reporting factors 2016
Streamlined the General Information format. Updated Metadata. Data quality information on material carbon factors is now in a table on the metadata tab. Removed mapping tab and links. Carbon overview tab now links directly to material tab data sources (rather than mapping tab). Factors which are created from other material impacts now link to material tabs rather than the carbon overview tab.	Metadata tab. Carbon overview and mapping tabs. HH and similar (Household sources), Household and similar (Non-Household sources) and Discarded vehicles factors.	N/A
Updated carbon factors for household “Combustion waste” and “Chemical wastes” to C&I equivalent factors. These are small tonnages and it was assumed that linking to the equivalent C&I factor would be more representative of the true impact of this category than linking to no factor at all.	Combustion and chemical wastes	Carbon Metric carbon factors
Rubber sent to incineration added to carbon factors table. C&I rubber sent to landfill added. Transport emissions added.	Rubber waste	Ecoinvent V3.0
Glass waste sent to incineration and landfill factors were updated using the general assumptions data. This was considered more	Glass waste	ZWS (2016) Dry Mixed Recyclate

accurate and more consistent than the 2003 source. Also included glass fibre in carbon factor based on material flow split from ZWS DMR report and Ecoinvent carbon factor.		Report and Ecoinvent V3.0
Added “Historical data” tab to track backcasting more transparently. 2014 factors applied unless annual data specified (electricity and transport factors)	Historical data	N/A
Updated residual kerbside composition based on 2015 ZWS study.	Household tonnages, “Household and similar wastes”	Internal ZWS calculations based on LA composition studies carried out in 2013 and 2015
Amended Textiles carbon factor to include carpets in line with SEPA tonnage changes.	Textile waste	WRAP (2015) Benefits of Re-use Two
Updated “Paper and board wastes” factor with domestic/export ratio for recycled paper and removed double-counting of avoided landfill emissions within recycle carbon factor.	Paper and board wastes	SEPA (2016)
Added waste export data for all recycled materials for which >95% of tonnages collected are recycled in Scotland. Updated material specific data for these materials (except “Paper and board wastes” and C&I “Batteries and accumulators” which already included export estimates). “Discarded equipment” remains unchanged as transport emissions are not separate from overall emissions figures.	Metallic wastes, ferrous, Metallic wastes, mixed ferrous and non-ferrous, Metallic wastes, non-ferrous, Plastic wastes, Discarded vehicles, Batteries and accumulators wastes (HH)	SEPA (2016)
Changed carbon factors for recycling several materials. This corrects an erroneous double count of avoided landfill in these carbon factors.	Chemical wastes, Glass wastes, Metallic wastes, ferrous, Metallic wastes, mixed ferrous and non-ferrous, Metallic wastes, non-ferrous, Mixed and undifferentiated wastes, Paper and board wastes, Spent solvents, Mineral wastes from C&D (C&I)	WRAP personal communication (2015)
Updated incineration factors with new incineration equation to ensure consistency of method across all waste material types.	General assumptions tab, Carbon overview, Animal and mixed food waste, Animal faeces, urine and manure, Chemical wastes, Discarded equipment, Glass, Healthcare waste, HH & Similar , Industrial effluent sludges, mixed metals, mineral waste from C&D, paper, plastic, rubber, sludges and liquid waste from waste treatment, textiles, Vegetal wastes and wood wastes	See separate ZWS incineration equation for full references (2016)
Plastics composition updated, as original source is unspecified.	Plastics tab	Polymer demand by packaging for consumption in the UK (2005)

2.2 Revision of 2011-2013 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 (2011-2013) have been updated with the new 2014 and 2015 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 2011-13 are shown in Annex 2.

Table 2.2 Effect of backcasting carbon impact for 2011-13 Carbon Metric datasets with 2014 and 2015 carbon factors

Year	Original carbon impact (tCO_2e)	Backcast carbon impact with 2014 and 2015 factors (tCO_2e)	Change (tCO_2e)	Change (%)
2011	13,946,414	14,194,333	247,919	2%
2012	12,001,334	12,059,988	58,654	0%
2013	10,805,834	11,276,000	470,166	4%

2.3 Impact of carbon factor changes on the Carbon Metric

The 2014 and 2015 Carbon Metric features many updated carbon factors however, most of them have no significant impact on the overall results. Two changes which do affect the results considerably are discussed below.

The change in the carbon factor for production of food which becomes waste increases the carbon impact of this waste stream considerably, particularly for non-household food waste. This change reflects a more detailed approach to estimating the carbon impacts of Scotland's food waste based on food waste composition data. It also reflects the life cycle stages of food production from different sectors more accurately. For example, some Commercial and Industrial sectors, such as Food and Drink Manufacturing, do not include storage and cooking emissions as they are not relevant, whereas others, such as Hospitality, do. These differences are now reflected in the carbon factors for food waste.

The change in how incineration impacts are calculated greatly reduced the potential savings from burning wood waste. The update was introduced to ensure consistency of method across all waste material types and reflects the latest available understanding of impacts from different waste materials, including wood, from academic literature.

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 (particularly regarding civic construction projects such as the new Queensferry Crossing over the Forth Estuary). 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, healthcare and biological wastes and sorting residues). 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, implementation of Scotland's forthcoming 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[3].

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 significant portion of Scotland's waste (7.6% in 2015 and 7.4% in 2014) 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, Sorting residues 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) to sort residual waste has led to a 48% increase in 'Sorting Residues' between 2011 and 2015. 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.

[3] 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 2014 and 2015 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 include 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 2014

The overall carbon impact of Scottish waste in 2014 was 10,44,338 tCO_2e, down 6% from 2013. 56% of this impact was generated by Scottish households, and the remaining 44% 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 2014

Sector	Carbon impact of waste (tCO_2e)	Carbon impact of waste (%)
Households	5,975,354	56%
Commercial and Industrial	4,667,984	44%
Total	10,644,338	100%

The carbon impact associated with waste generation (i.e. emissions generated from productions of materials which ultimately become waste) is much higher than the combined impacts of waste management. Carbon impacts from landfilling (primarily methane production) were the second largest contributor to waste carbon impacts in 2014, followed distantly by emissions from 'other diversion' and incineration. Recycling over the same period partially offset these impacts, saving 2.4$MtCO_2e$.

Table 4.1.2 Carbon impact of waste generated and managed in 2014

Life cycle phase	Carbon impact of waste in 2014 (tCO_2e)	Share of 2014 waste carbon impacts
Waste generated	12,247,319	115.1%
Recycled	-2,350,074	-22.1%
Incinerated	2,229	0.0%
Landfilled	729,997	6.9%
Other diversion	14,867	0.1%

2014 saw a large increase in waste sent to incineration, up 236kt (55%) from the previous year. This generated only minor carbon impacts (2.2ktCO_2e) because electricity generated from waste incineration displaced more carbon intensive UK grid electricity which had an average carbon factor of 412gCO_2e/kWh in 2014. Since Scotland's electricity grid is not independent of the wider UK's, use of the UK grid factor is standard practice however, if compared against the Scottish grid (196gCO_2e/kwh in 2014), net waste incineration emissions rise more than 24 times to 55.3ktCO_2e. As the UK continues to reduce the carbon intensity of its electricity grid, the marginal carbon impacts of waste incineration are likely to increase significantly.

4.2 Carbon impact of waste in 2015

The overall carbon impact of Scottish waste in 2015 was 10,571,815 tCO_2e. 57% of this was generated by Scottish households, and the remaining 43% by the Commercial and Industrial (C&I) sector (including the Construction and Demolition sector).

Table 4.2.1 The Carbon Impact of Scottish waste in 2015

Sector	Carbon impact of waste (tCO_2e)	Carbon impact of waste (%)
Households	5,986,193	57%
Commercial and Industrial	4,585,622	43%
Total	10,571,815	100%

Waste arisings in 2015 were 14% (1.4Mt) higher than in 2014, resulting in increased carbon impacts from waste generation. Carbon impacts from landfilling remained the second largest carbon contributor, but were 5% below the previous year. This, combined with greater carbon savings from recycling and incineration totalling 2.9MtCO_2e (up 23% from 2014), resulted in a net reduction in waste carbon impacts of 1% compared to 2014 levels.

Table 4.2.2 Carbon impact of waste generated and managed in 2015

Life cycle phase	Carbon impact of waste in 2015 (tCO_2e)	Share of 2015 waste carbon impacts
Waste generated	12,760,971	120.7%
Recycled	-2,897,489	-27.4%
Incinerated	-3,145	0.0%
Landfilled	696,711	6.6%
Other diversion	14,766	0.1%

Overall carbon impact	9,622,790	100%

2015 saw a modest but continued increase in waste sent to incineration, up 30kt (5%) from the previous year. Waste incineration actually resulted in a net carbon savings of 3.1ktCO_2e over the same period using UK grid displacement, largely due to a greater portion of organic waste inputs. If compared against the Scottish grid (196gCO_2e/kwh in 2015), waste incineration would be a net generator of emissions, producing 52.9ktCO_2e.

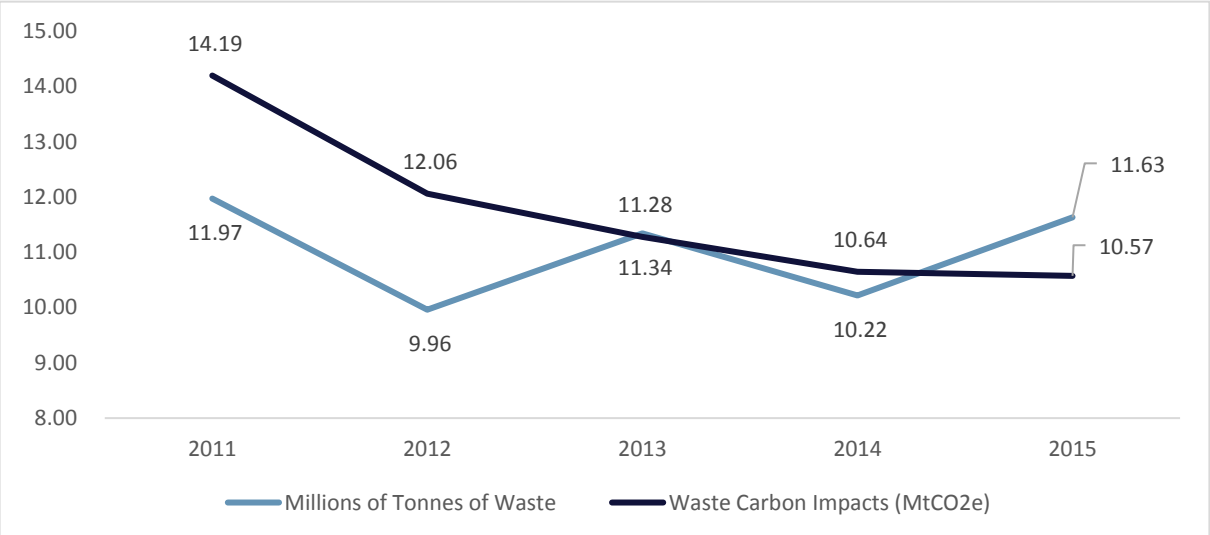
4.3 Trends 2011-15

Annual Scottish waste tonnage fluctuated significantly between 2011 and 2015, 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 4.3 Tonnage and carbon impact of Scottish waste 2011-2015

Year	Tonnage impact of waste (t)	Carbon impact of waste (tCO_2e)
2015	11,631,031	10,571,815
2014	10,218,186	10,644,338
2013	11,340,173	11,276,000
2012	9,960,132	12,059,988
2011	11,969,774	14,194,333

Figure 4.3 Tonnage and carbon impact of Scottish waste 2011-2015



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 4.4 Proportion of carbon impact of Scottish waste by origin 2011-2015

Year	Household proportion of impact (%)	Non-Household proportion of impact (%)
2015	57%	43%
2014	56%	44%
2013	53%	47%
2012	53%	47%
2011	48%	52%

The carbon intensity of Scotland's waste (net tCO_2e/tonne) has declined 23% 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 36% compared to just 8% for Household waste.

Table 4.5 Carbon intensity of Scottish waste 2011-2015

Year	Household carbon intensity of waste (tCO_2e per t)	Non-household carbon intensity of waste (tCO_2e per t)	Total waste carbon intensity (tCO_2e per t)
Percentage change 2011-2015	**-8%**	**-36%**	**-23%**
2015	2.42	0.50	0.91
2014	2.43	0.60	1.04
2013	2.49	0.59	0.99
2012	2.56	0.76	1.21
2011	2.63	0.78	1.19

Scotland's waste carbon footprint (tonnes waste carbon per person) declined significantly between 2011 and 2015. Per capita impacts of Household Waste fell 15% while per capita impacts from All Waste fell 27%.

Table 4.6 Scotland's waste carbon footprint 2011-2015

Year	Household Waste Only (tCO_2e per capita)	All Waste (tCO_2e per capita)
Percentage change 2011-2015	**-15%**	**-27%**
2015	1.12	1.97
2014	1.12	1.99
2013	1.13	2.12
2012	1.20	2.27
2011	1.31	2.70

4.4 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 2014 and 2015 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 4.7 Top five materials by carbon impact in 2014 (tCO_2e)

Position	Household wastes	Non-household wastes	All Scottish waste
1	Household and Similar Waste	Household and Similar Waste	Household and Similar Waste
	4,620,132	1,907,231	6,527,362
2	Animal and Mixed Food Waste	Animal and Mixed Food Waste	Animal and Mixed Food Waste
	554,229	1,009,144	1,563,373
3	Mixed and Undifferentiated Materials	Discarded vehicles	Mixed and Undifferentiated Materials

	410,736	478,395	573,611
4	Textile Wastes	Metallic wastes, mixed ferrous and non-ferrous	Discarded vehicles
	187,527	361,780	480,506
5	Discarded Equipment	Textile wastes	Textile wastes
	50,257	242,917	430,444
Share of Total Impacts	**97%**	**86%**	**90%**

Table 4.8 Top five materials by carbon impact in 2015 (tCO_2e)

Position	Household wastes	Non-household wastes	All Scottish waste
1	Household and Similar Waste	Household and Similar Waste	Household and Similar Waste
	4,563,915	1,820,332	6,384,248
2	Animal and Mixed Food Waste	Animal and Mixed Food Waste	Animal and Mixed Food Waste
	589,431	1,154,990	1,744,421
3	Mixed and Undifferentiated Materials	Metallic wastes, mixed ferrous and non-ferrous	Mixed and Undifferentiated Materials
	465,944	572,790	797,277
4	Textile Wastes	Textile Wastes	Textile Wastes
	191,830	382,867	574,697
5	Discarded Equipment	Mixed and Undifferentiated Materials	Metallic wastes, mixed ferrous and non-ferrous
	53,762	331,333	564,377[4]
Share of Total Impacts	**98%**	**93%**	**95%**

[4] Impacts are less than in Non-Household stream due to net savings from recycling in Household stream.

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[5]
2. Reduce weight of waste arisings in Scotland by 15% below 2011 levels by 2025[6]
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 3.1MtCO_2e, below 2011 levels by 2025. Despite significant tonnage and carbon factor revisions that have occurred since 2011, as of 2015, Scotland's waste carbon impacts are 26% (3.6MtCO_2e) below 2011 baseline levels.

The most recently created target aims to reduce food waste arisings specifically. Since food waste 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.[7]
2. Achieve 95% reuse and recovery, and 85% reuse and recycling for end-of-life vehicles by 2015.[8]

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 2014 and 2015, as well as 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 10.64 MtCO_2e in 2014, and 10.57 MtCO_2e in 2015. Household waste accounts for a growing portion of the carbon impact of waste in Scotland, reaching 57% in 2015. The carbon intensity of household waste (tCO_2e/tonne) is 4.8 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.

[5] Waste (Scotland) Regulations 2012
[6] Scottish Government (2016) Making Things Last
[7] The Producer Responsibility Obligations (Packaging Waste) (Amendment) Regulations 2016 (2020 targets detailed in 2017 Spring Budget.
[8] Regulation 18 of The End-of-Life Vehicles (Producer Responsibility) Regulations 2005.

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

Annex 1 Carbon Impacts of Scottish Waste in 2014 and 2015

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	2014 Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	-	-	-	-	-
Animal and mixed food waste	254,087	-4,064	-359	305,210	-644
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,879	-240	-	-	-
Chemical wastes	506	1,397	9	-	-
Combustion wastes	-	-	-	166	-54
Common sludges	-	-	-	-	-
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	55,723	-5,731	152	113	-
Discarded vehicles	2,767	-656	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	99,493	-75,934	502	335	-
Health care & biological wastes	-	-	1,067	46,061	-
Household and similar wastes	4,567,561	-4,123	3,048	35,091	18,554
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	3,798	-14,704	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	100,293	-99,992	293	219	-2,429
Metallic wastes, non-ferrous	5,594	-35,150	-	-	-
Mineral waste from construction and demolition	1,667	206	233	98	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	421,824	-10,882	-215	9	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	86,814	-123,799	-3,034	85,013	-
Plastic wastes	22,197	-21,312	29,128	811	-
Rubber wastes	2,452	-410	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	19	-	0	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	223,921	-79,139	1,468	41,276	-
Used oils	832	-432	-	-	-
Vegetal wastes	-	-16,382	-265	14,369	-559
Waste containing PCB	-	-	-	-	-
Wood wastes	37,499	-27,404	-815	28,327	-
Total	**5,891,909**	**-518,731**	**31,212**	**557,097**	**14,867**

Material type	2014 Non-Household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	16,383	0	0	0
Animal and mixed food waste	1,007,210	-8,583	-2	10,519
Animal faeces, urine and manure	0	1,450	-12,711	22
Batteries and accumulators wastes	68,251	-7,084	1	0
Chemical wastes	150,588	0	906	11
Combustion wastes	0	0	0	2,926
Common sludges	0	77,500	5,294	2,527
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	33,731	0	3	11
Discarded vehicles	480,849	-2,455	0	0
Dredging spoils	0	0	0	0
Glass wastes	64,111	-124,296	0	10
Health care & biological wastes	0	0	154	1,507
Household and similar wastes	1,868,865	0	0	38,366
Industrial effluent sludges	0	189	2,745	4,099
Metallic wastes, ferrous	652,948	-975,828	0	0
Metallic wastes, mixed ferrous and non-ferrous	503,262	-141,482	0	0
Metallic wastes, non-ferrous	374,937	-563,833	0	1
Mineral waste from construction and demolition	105,663	-62,459	77	351
Mineral wastes from waste treatment and stabilised wastes	0	724	0	2,266
Mixed and undifferentiated materials	172,480	-12,023	0	4,418
Other mineral wastes	5,511	1,104	0	622
Paper and cardboard wastes	43,004	0	-3	510
Plastic wastes	120,961	0	0	6
Rubber wastes	114,830	0	24,692	1
Sludges and liquid wastes from waste treatment	0	0	3,896	8
Soils	0	2,148	0	1,535
Sorting residues	0	0	0	97,371
Spent solvents	97,400	0	1,440	0
Textile wastes	238,252	0	652	4,014
Used oils	93,590	0	-103	0
Vegetal wastes	0	-14,126	0	439
Waste containing PCB	0	0	0	0
Wood wastes	142,584	-2,289	-56,022	1,360
Total	**6,355,410**	**-1,831,343**	**-28,983**	**172,900**

Material type	2015 Household (tCO_2e)				
	Generated	Recycled	Incinerated	Landfilled	Other diversion
Acid, alkaline or saline wastes	0	0	0	0	0
Animal and mixed food waste	308,524	-5,686	-472	287,092	-28
Animal faeces, urine and manure	0	0	0	0	0
Batteries and accumulators wastes	7,216	-352	0	0	0
Chemical wastes	312	953	0	0	0
Combustion wastes	0	0	0	231	-68
Common sludges	0	0	0	0	0
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	59,185	-5,730	200	108	0
Discarded vehicles	3,083	-731	0	0	0
Dredging spoils	0	0	0	0	0
Glass wastes	96,270	-77,031	660	315	0
Health care and biological wastes	0	0	1,403	43,301	0
Household and similar wastes	4,514,611	-5,677	4,009	32,989	17,984
Industrial effluent sludges	0	0	0	0	0
Metallic wastes, ferrous	2,786	-15,769	0	0	0
Metallic wastes, mixed ferrous and non-ferrous	107,986	-114,511	385	206	-2,479
Metallic wastes, non-ferrous	9,272	-41,926	0	0	0
Mineral waste from construction and demolition	1,714	215	306	92	0
Mineral wastes from waste treatment and stabilised wastes	0	0	0	0	0
Mixed and undifferentiated materials	487,493	-21,401	-181	33	0
Other mineral wastes	0	0	0	0	0
Paper and cardboard wastes	70,450	-121,578	-3,991	80,006	0
Plastic wastes	22,165	-22,260	38,311	762	0
Rubber wastes	2,440	-407	0	0	0
Sludges and liquid wastes from waste treatment	0	0	0	0	0
Soils	0	19	0	0	0
Sorting residues	0	0	0	0	0
Spent solvents	0	0	0	0	0
Textile wastes	222,203	-71,108	1,931	38,803	0
Used oils	792	-412	0	0	0
Vegetal wastes	0	-16,237	-338	13,788	-643
Waste containing PCB	0	0	0	0	0
Wood wastes	36,448	-26,904	-1,529	26,593	0
Total	**5,952,949**	**-546,535**	**40,695**	**524,317**	**14,766**

Material type	2015 Non-Household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	7,598	0	0	0
Animal and mixed food waste	1,154,275	-8,812	-6	9,532
Animal faeces, urine and manure	0	5,213	-10,579	21
Batteries and accumulators wastes	75,491	-9,122	0	0
Chemical wastes	141,599	0	926	9
Combustion wastes	0	0	0	2,601
Common sludges	0	107,225	6,706	1,125
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	76,610	-7,361	8	12
Discarded vehicles	316,237	-4,803	0	0
Dredging spoils	0	0	0	0
Glass wastes	77,049	-105,736	0	81
Health care & biological wastes	0	0	189	2,868
Household and similar wastes	1,801,167	0	0	19,165
Industrial effluent sludges	0	2,078	5,236	3,107
Metallic wastes, ferrous	940,804	-948,532	0	0
Metallic wastes, mixed ferrous and non-ferrous	572,790	0	0	0
Metallic wastes, non-ferrous	317,414	-1,290,566	1	18
Mineral waste from construction and demolition	105,195	-60,366	1	141
Mineral wastes from waste treatment and stabilised wastes	0	1,226	0	3,641
Mixed and undifferentiated materials	325,602	0	0	5,731
Other mineral wastes	6,982	2,470	0	603
Paper and cardboard wastes	31,515	0	-6	154
Plastic wastes	92,781	0	0	9
Rubber wastes	92,802	0	13,113	0
Sludges and liquid wastes from waste treatment	0	0	573	7
Soils	0	2,571	0	1,680
Sorting residues	0	0	0	116,058
Spent solvents	104,972	0	973	16
Textile wastes	375,838	0	2,061	4,968
Used oils	68,096	0	-44	0
Vegetal wastes	0	-22,328	-191	0
Waste containing PCB	0	0	0	0
Wood wastes	123,204	-14,111	-62,801	846
Total	**6,808,022**	**-2,350,954**	**-43,839**	**172,394**

Annex 2 Revised 2011, 2012 and 2013 carbon assessments of Scottish Waste

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 2011-13 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	181,620	-7	-307	406,362	-
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,815	-313	-	-	-
Chemical wastes	318	976	-	-	-
Combustion wastes	-	-	-	89	-
Common sludges	-	-	-	-	-
Discarded equipment	63,558	-6,610	130	191	-
Discarded vehicles	2,663	-644	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	112,588	-71,648	274	365	-
Health care and biological wastes	-	-	365	45,900	-
Household and similar wastes	5,720,403	-4,291	2,303	55,532	-
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	4,344	-10,775	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	96,446	-90,087	195	287	-
Metallic wastes, non-ferrous	6,961	-19,359	-	-	-
Mineral waste from C&D	2,079	225	-	-	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	21,248	-18,535	-	-	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	100,017	-131,399	-2,147	107,220	-
Plastic wastes	26,003	-15,968	14,923	926	-
Rubber wastes	3,630	-714	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	26	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	240,919	-85,028	803	45,793	-
Used oils	782	-405	-	-	-
Vegetal wastes	-	-19	-94	9,070	-
Waste containing PCB	-	-	-	-	-
Wood wastes	33,657	-26,105	-592	36,993	-
Total	**6,622,052**	**-480,680**	**15,853**	**708,728**	**0**

Material type	Non-Household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	8,428	0	0	0
Animal and mixed food waste	696,429	-6,031	-5	5,534
Animal faeces, urine and manure	0	23	-14,667	2
Batteries and accumulators wastes	127,136	-9,021	0	1
Chemical wastes	242,223	203,833	10,757	5
Combustion wastes	0	-6	0	4,246
Common sludges	0	43,199	8,779	4,404
Discarded equipment	50,387	0	0	3
Discarded vehicles	393,009	-2,801	0	0
Dredging spoils	0	0	0	0
Glass wastes	46,915	-121,896	0	5
Health care and biological wastes	0	0	163	2,347
Household and similar wastes	3,946,035	-32,783	7,175	89,756
Industrial effluent sludges	0	181	1,538	5,090
Metallic wastes, ferrous	768,454	-934,145	0	45
Metallic wastes, mixed ferrous and non-ferrous	792,306	-83,566	0	0
Metallic wastes, non-ferrous	334,081	-453,334	0	1
Mineral waste from construction and demolition	131,056	-67,080	0	417
Mineral wastes from waste treatment and stabilised wastes	0	394	0	2,708
Mixed and undifferentiated materials	283,863	-41,650	-920	8,114
Other mineral wastes	6,613	1,921	0	629
Paper and cardboard wastes	69,643	0	-17	215
Plastic wastes	106,333	-41,346	0	2
Rubber wastes	101,370	0	22,096	0
Sludges and liquid wastes from waste treatment	0	0	3,249	6
Soils	0	2,519	0	1,743
Sorting residues	0	0	0	85,750
Spent solvents	85,715	0	260	0
Textile wastes	373,833	0	1,504	3,769
Used oils	93,947	0	0	0
Vegetal wastes	0	-26,156	0	390
Waste containing PCB	0	0	0	0
Wood wastes	67,587	-58,257	-28,758	2,681
Total	**8,725,366**	**-1,626,002**	**11,156**	**217,861**

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	152,814	-1,539	-257	384,086	-
Animal faeces, urine & manure	-	-	-	-	-
Batteries & accumulators wastes	4,879	-240	-	-	-
Chemical wastes	401	1,225	-	-	-
Combustion wastes	-	-	-	68	-22
Common sludges	-	-	-	-	-
Discarded equipment	59,573	-6,091	99	181	-
Discarded vehicles	2,435	-588	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	106,517	-72,973	208	346	-
Health care and biological wastes	-	-	181	43,647	-
Household and similar wastes	5,161,559	-3,908	1,676	52,564	6,833
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	4,508	-10,782	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	99,557	-99,776	149	272	-366
Metallic wastes, non-ferrous	6,295	-25,827	-	-	-
Mineral waste from C&D	1,904	214	161	156	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	202,749	-8,650	-134	-	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	90,566	-126,713	-1,672	101,286	-
Plastic wastes	23,703	-18,810	10,472	877	-
Rubber wastes	3,658	-615	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	25	-	-	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	250,100	-84,355	579	43,554	-
Used oils	687	-357	-	-	-
Vegetal wastes	-	-9,590	-100	8,910	-
Waste containing PCB	-	-	-	-	-
Wood wastes	35,628	-27,361	-460	35,170	-
Total	**6,207,532**	**-496,711**	**10,900**	**671,117**	**6,444**

Material type	Non-Household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	6,640	0	0	0
Animal and mixed food waste	658,475	-10,590	-4	6,402
Animal faeces, urine and manure	0	1,941	-16,078	18
Batteries and accumulators wastes	72,666	-6,171	0	0
Chemical wastes	139,195	0	1,699	10
Combustion wastes	0	-4	0	3,778
Common sludges	0	131,532	9,602	3,899
Discarded equipment	25,100	0	7	5
Discarded vehicles	356,047	-14,893	0	0
Dredging spoils	0	0	0	0
Glass wastes	98,506	-76,437	0	1
Health care and biological wastes	0	0	67	2,472
Household and similar wastes	2,890,834	-19,096	3,541	30,423
Industrial effluent sludges	0	467	3,809	4,489
Metallic wastes, ferrous	623,150	-814,656	0	15
Metallic wastes, mixed ferrous and non-ferrous	708,218	-140,866	0	0
Metallic wastes, non-ferrous	344,495	-504,890	0	1
Mineral waste from construction and demolition	105,925	-54,890	0	223
Mineral wastes from waste treatment and stabilised wastes	0	1,295	0	3,278
Mixed and undifferentiated materials	209,414	-35,446	-6	5,135
Other mineral wastes	8,615	3,597	0	696
Paper and cardboard wastes	61,198	0	-12	202
Plastic wastes	123,653	0	0	14
Rubber wastes	90,828	0	20,325	0
Sludges and liquid wastes from waste treatment	0	0	4	57
Soils	0	1,514	0	1,748
Sorting residues	0	0	0	111,588
Spent solvents	85,555	0	2,584	0
Textile wastes	319,245	0	2,101	976
Used oils	142,509	0	-115	0
Vegetal wastes	0	-19,700	0	381
Waste containing PCB	0	0	0	0
Wood wastes	50,958	-66,699	-42,836	2,975
Total	**7,121,224**	**-1,623,993**	**-15,310**	**178,785**

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	-4,488	-338	358,321	-
Animal faeces, urine and manure	-	-	-	-	-
Batteries and accumulators wastes	4,432	-220	-	-	-
Chemical wastes	550	1,679	-	-	-
Combustion wastes	-	-	-	70	-52
Common sludges	-	-	-	-	-
Discarded equipment	54,930	-5,663	130	169	-
Discarded vehicles	2,190	-521	-	-	-
Dredging spoils	-	-	-	-	-
Glass wastes	102,715	-75,476	274	322	-
Health care and biological wastes	-	-	238	40,689	-
Household and similar wastes	4,607,253	-3,214	2,202	49,001	12,438
Industrial effluent sludges	-	-	-	-	-
Metallic wastes, ferrous	4,142	-11,887	-	-	-
Metallic wastes, mixed ferrous and non-ferrous	97,761	-97,810	195	254	-1,511
Metallic wastes, non-ferrous	7,405	-30,482	-	-	-
Mineral waste from C&D	1,642	188	211	146	-
Mineral wastes from waste treatment and stabilised wastes	-	-	-	-	-
Mixed and undifferentiated materials	402,795	-3,042	-377	7	-
Other mineral wastes	-	-	-	-	-
Paper and cardboard wastes	80,058	-124,607	-2,197	94,424	-
Plastic wastes	17,401	-20,755	13,759	818	-
Rubber wastes	2,575	-526	-	-	-
Sludges and liquid wastes from waste treatment	-	-	-	-	-
Soils	-	20	-	0	-
Sorting residues	-	-	-	-	-
Spent solvents	-	-	-	-	-
Textile wastes	268,785	-87,493	760	40,617	-
Used oils	796	-414	-	-	-
Vegetal wastes	-	-16,252	-144	8,484	-
Waste containing PCB	-	-	-	-	-
Wood wastes	39,359	-28,932	-604	32,845	-
Total	**5,872,663**	**-509,894**	**14,109**	**626,165**	**10,875**

Material type	Non-Household (tCO_2e)			
	Generated	Recycled	Incinerated	Landfilled
Acid, alkaline or saline wastes	10,546	0	0	0
Animal and mixed food waste	764,670	-12,282	-5	7,536
Animal faeces, urine and manure	0	2,316	-16,510	21
Batteries and accumulators wastes	104,222	-5,982	0	0
Chemical wastes	151,948	13,528	1,071	14
Combustion wastes	0	-5	0	2,633
Common sludges	0	119,982	8,510	3,152
Discarded equipment (excluding discarded vehicles, batteries and accumulators wastes)	29,120	0	4	5
Discarded vehicles	410,796	-2,125	0	0
Dredging spoils	0	0	0	0
Glass wastes	86,946	-96,199	0	1
Health care and biological wastes	0	0	66	2,267
Household and similar wastes	2,244,964	-13,283	0	22,981
Industrial effluent sludges	0	165	3,225	5,061
Metallic wastes, ferrous	783,666	-903,671	1	0
Metallic wastes, mixed ferrous and non-ferrous	702,554	-156,247	0	0
Metallic wastes, non-ferrous	298,671	-570,409	0	1
Mineral waste from construction and demolition	106,027	-66,629	3	140
Mineral wastes from waste treatment and stabilised wastes	0	799	0	2,312
Mixed and undifferentiated materials	254,031	-31,924	0	4,208
Other mineral wastes	8,767	3,583	10	942
Paper and cardboard wastes	47,111	0	0	235
Plastic wastes	108,691	0	0	10
Rubber wastes	104,025	0	20,983	0
Sludges and liquid wastes from waste treatment	0	0	1,623	84
Soils	0	2,829	0	1,715
Sorting residues	0	0	0	101,729
Spent solvents	89,827	0	1,192	0
Textile wastes	353,499	0	2,506	977
Used oils	112,601	0	-19	0
Vegetal wastes	0	-15,200	0	669
Waste containing PCB	0	0	0	0
Wood wastes	130,313	-52,597	-40,234	3,322
Total	**6,902,993**	**-1,783,349**	**-17,574**	**160,012**

Annex 3. 2014 and 2015 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	-70	-12	993	-70
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	458
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	-53
Waste containing PCB					
Wood wastes	519	-289	-271	925	

Material type	Non-Household ($kgCO_2e$ per tonne of material)			
	Generated	Recycled/ Composted	Incinerated	Landfilled
Acid, alkaline or saline wastes	1,365			
Animal and mixed food waste	5,736	-70	-12	993
Animal faeces, urine and manure	0	149	-108	142
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
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
Other mineral wastes	45	33	586	12
Paper and cardboard wastes	885	-547	-180	498
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
Soils	0	1		1
Sorting residues				128
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		-49	-39	214
Waste containing PCB				
Wood wastes	593	-338	-271	925

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

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