The Carbon Footprint of Scotland's Household Waste

2020 Household Carbon Metric Brief

EUROPE & SCOTLAND
European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

Zero Waste Scotland exists to lead Scotland to use products and resources responsibly, focusing on where we can have the greatest impact on climate change.

Using evidence and insight, our goal is to inform policy, and motivate individuals and businesses to embrace the environmental, economic, and social benefits of a circular economy.

We are a not-for-profit environmental organisation, funded by the Scottish Government and European Regional Development Fund.

Find out more at https://www.zerowastescotland.org.uk/

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Key Findings

The Scottish Carbon Metric measures the whole-life carbon impacts[1] of Scotland's waste, from resource extraction and manufacturing emissions, right through to waste management emissions, regardless of where in the world these impacts occur. This report summarises the carbon impacts of Scotland's 2020 household waste using the latest Scottish Environment Protection Agency (SEPA) published waste data[2]. For more information about the Carbon Metric and its methodology, see the latest Carbon Metric Technical Report on the Zero Waste Scotland website[3].

Scotland's Household Waste and its Carbon Impacts in 2020

In 2020, Scotland's household waste increased by 0.3% to 2.4 million tonnes and the household waste recycling rate was 42.0%, a decrease of 2.9 percentage points from the 2019 household recycling rate[4] (Figure 1). The whole lifecycle carbon impacts of Scotland's household waste generated and managed in 2020 was 5.8 million tonnes of carbon dioxide equivalent (Mt CO_2 eq), an increase of 3.2% (~180,000 tonnes CO_2 eq.) from 2019 (Figure 2).

The increase in 2020 carbon impacts of waste can be partially attributed to carbon impacts arising from an increase in Household & similar wastes generated of 79,000 tonnes (5.9%). More importantly, 2020 household waste arisings and management have likely been impacted by the COVID 19 pandemic in two ways: First, national lockdowns have led to significant shift in people's consumption behaviour to be prominently home-based. There are a number of studies that have made similar observations with regards to an increase in the amount of household waste arisings across countries observing national lockdowns[5]. A high level comparative analysis of 2019 and 2020 household waste data in Scotland, Figure 3, quantitatively shows this trend in 2020 Scotland's household waste data: the amount of glass, paper & cardboard, and plastic wastes generated increased in 2020 by 18,500, 23,600, and 17,000 tonnes, respectively.

In addition to its impact on waste arisings, COVID 19 lockdowns have led to the closure of household recycling centres and hence the amount of waste collected for recycling dropped. According to SEPA[4], there was a reduction in the recycling of some material categories such as construction and soils (26,000 tonnes, 14.8%) and in the composting of vegetal wastes (17,000 tonnes, 5.7%). Moreover, there is mounting evidence that COVID 19 has caused disruption to kerbside waste collection services due to staff shortages, which has led to the prioritisation of residual waste collection services[6]. Any reduction in the amount of waste recycled will consequently lead to a drop in carbon savings reported in the analysis.

In spite of the increase in 2020, the carbon impact of household waste in 2020 remains 13.6% (approximately 920,000 tonnes) below the 2011 baseline (Figure 2).

[1] Shorthand term for the emissions of any of the greenhouse gases that affect climate change. Carbon emissions are usually expressed as tonnes of CO_2 eq. (equivalent), which is a unit of measurement based on the relative impact of a given gas on global warming.

[2] SEPA (2020) SEPA Household Waste Data Portal [Online]. Available at: https://www.sepa.org.uk

[3] Zero Waste Scotland Carbon Metric – Publications [Online]. Available at: zerowastescotland.org.uk

[4] SEPA (2020) Scottish Household waste – summary data 2020 [Online]. Available at: https://www.sepa.org.uk/

[5] Sarkodie, S.A., Owusu, P.A. Impact of COVID-19 pandemic on waste management. Environ Dev Sustain 23, 7951–7960 (2021). https://doi.org/10.1007/s10668-020-00956-y

[6] COSLA (2020) Coronavirus (COVID-19): Reopening and Managing Household Waste Recycling Centres. Available at: www.cosla.gov.uk

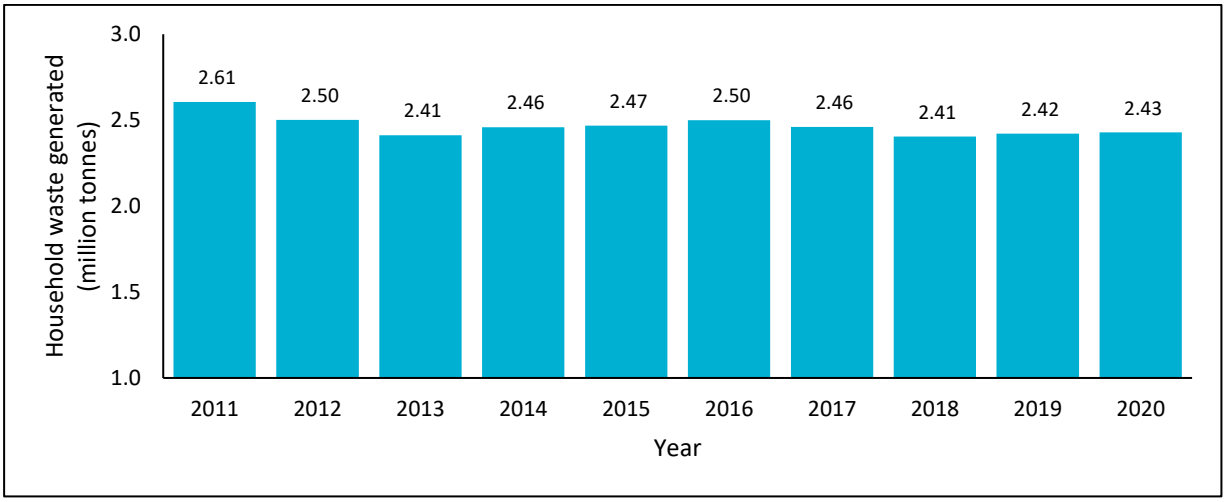


Figure 1 Scottish Household waste generated, 2011 to 2020. Note: the vertical axis does not start at 0.

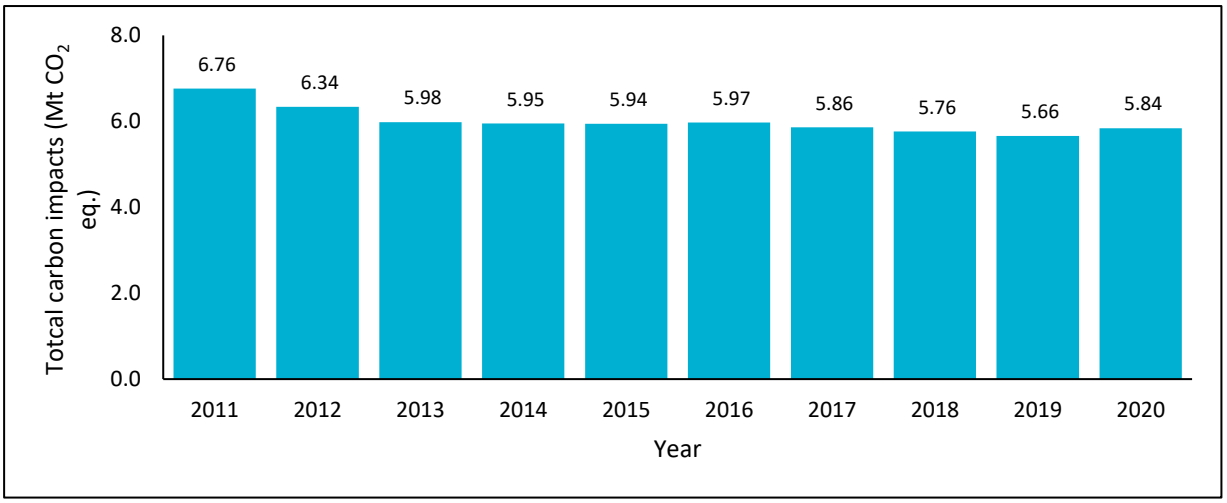


Figure 2 Carbon impact of Scottish Household waste generated and managed 2011-2020.

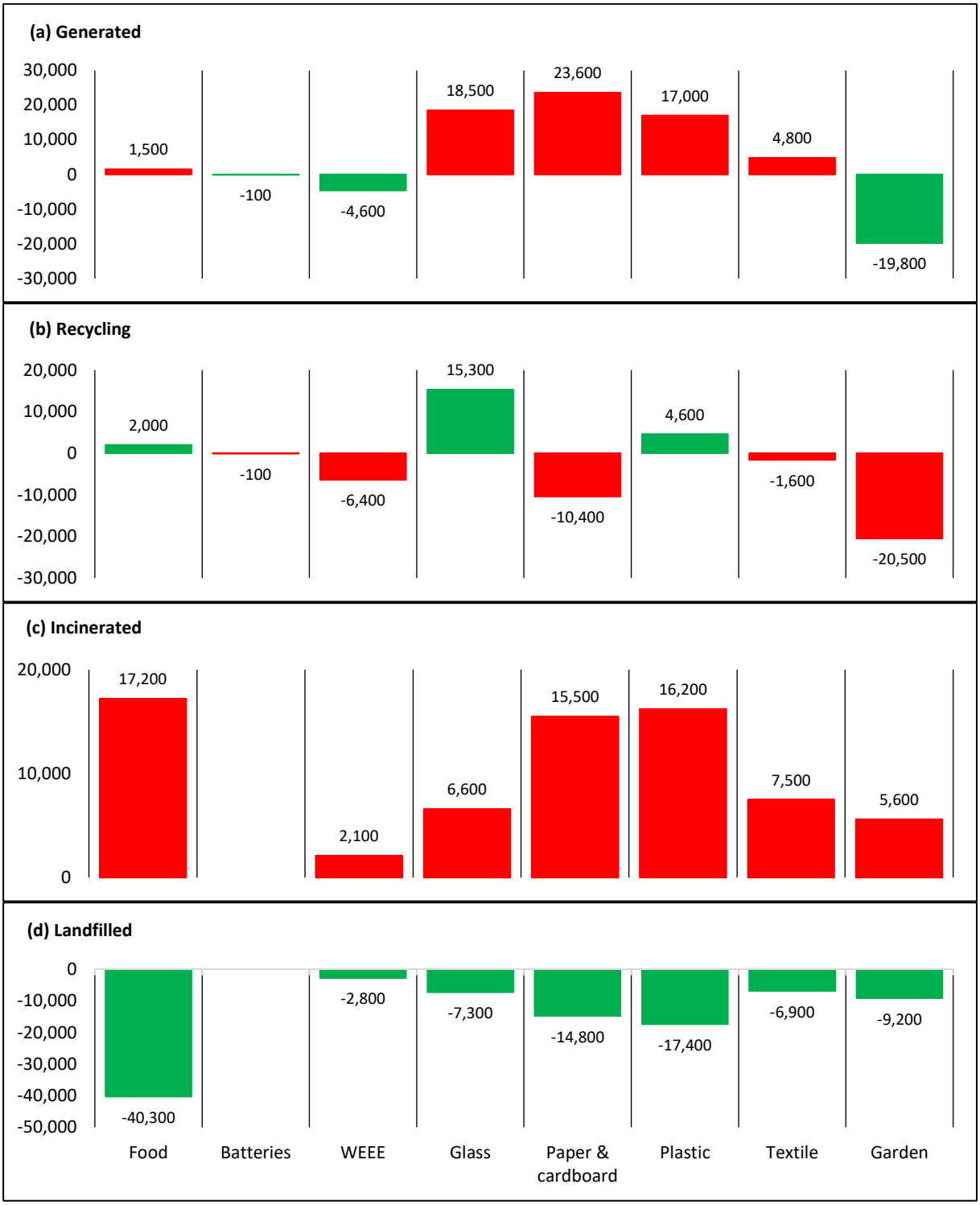


Figure 3 Difference (in tonnes) in the amount of key waste materials (a) generated, (b) recycled, (c) incinerated, and (d) landfilled in Scotland between 2019 and 2020.

The total carbon impacts per tonne of household waste increased in 2020 by 3% when compared to last year's intensity. However, our analysis shows that the net carbon intensity (tonne CO_2 eq./tonne of waste) of Scottish Household waste is still 7% below the 2011 net carbon intensity, when the analysis began (Figure 4). The overall decrease in the net carbon intensity can be attributed largely to increased recycling rates - particularly for high impact waste materials - as well as reduced landfilling of household waste. For example, the amount food, glass, and plastic wastes recycled in 2020 has increased by 2%, 14%, and 8% respectively when compared to 2019 figures. What's more, SEPA's latest waste data reveals that the amount of 2020 Scottish household waste landfilled was 659,800 tonnes, a reduction of 13% from 2019[7].

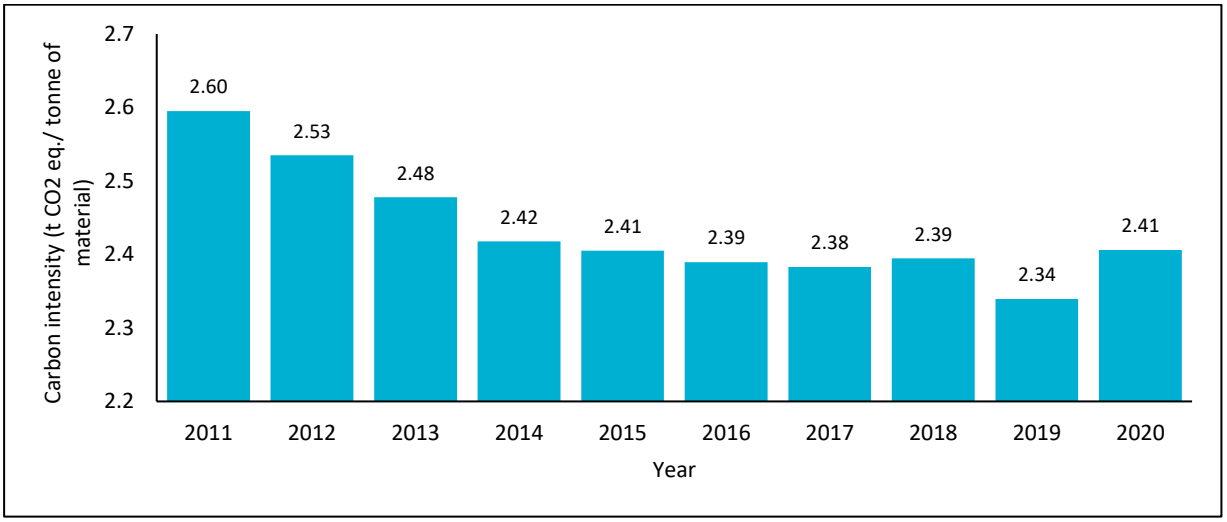


Figure 4 Net carbon intensity of Scottish Household waste 2011-2020. Note: the vertical axis does not start at 0.

Embodied carbon impacts from material production (i.e. impacts of producing the material in the first place before they become waste) are the greatest contributor to Scotland's whole-life waste carbon impacts, 5.97 Mt CO_2 eq. in 2020 as shown in Figure 5. In 2020, carbon impacts from landfilling household wastes remained the second largest carbon contributor at 244,300 tonnes CO_2 eq., followed by incineration, which reached 171,300 tonnes CO_2 eq., an increase of nearly 41,600 tonnes CO_2 eq. since 2019, and the highest yet recorded. Carbon benefits associated with recycling offset Scotland's household waste carbon impacts by 538,100 tonnes CO_2 eq.

[7] SEPA (2020) Scottish Household waste – summary data 2020 [Online]. Available at: https://www.sepa.org.uk/

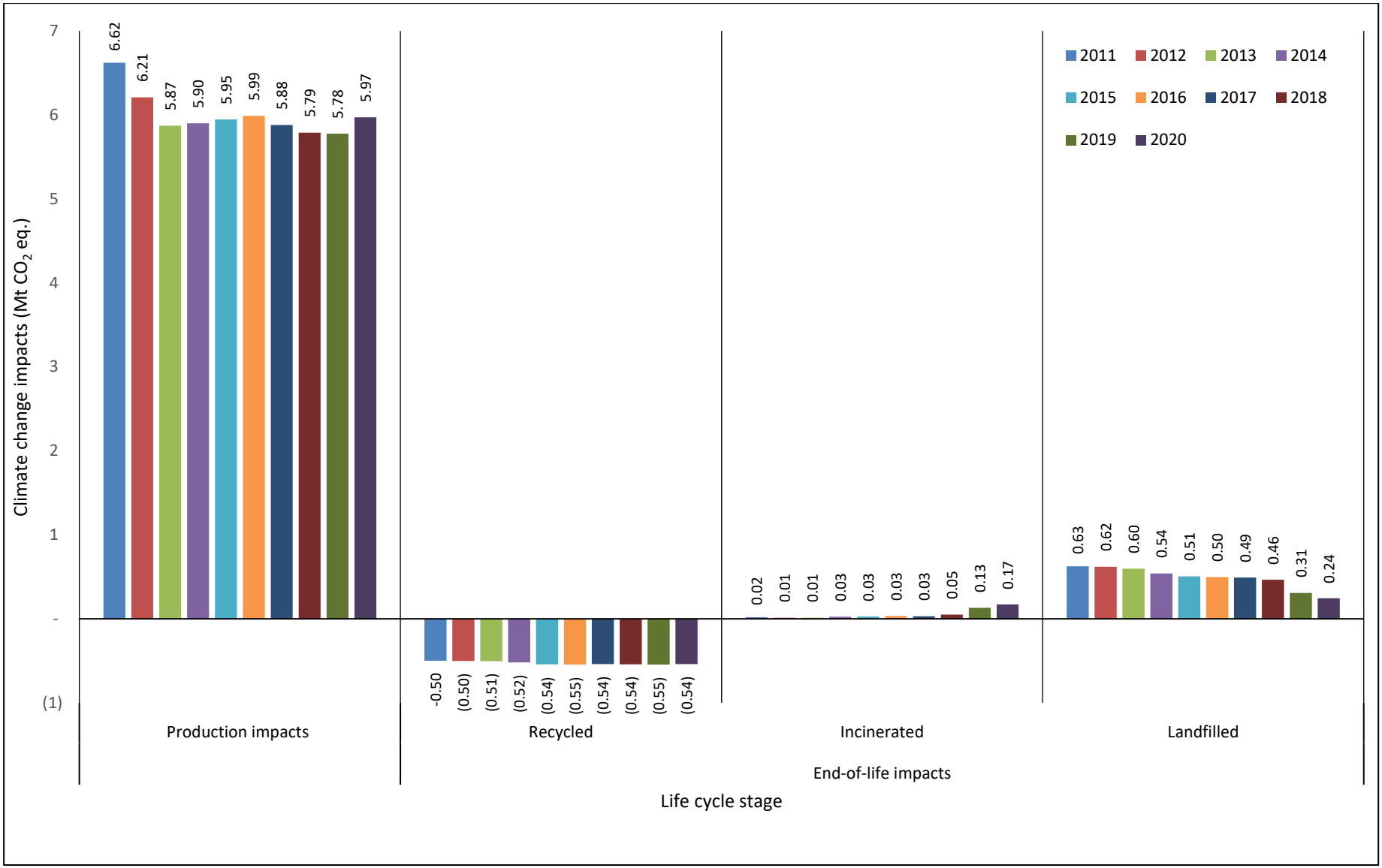
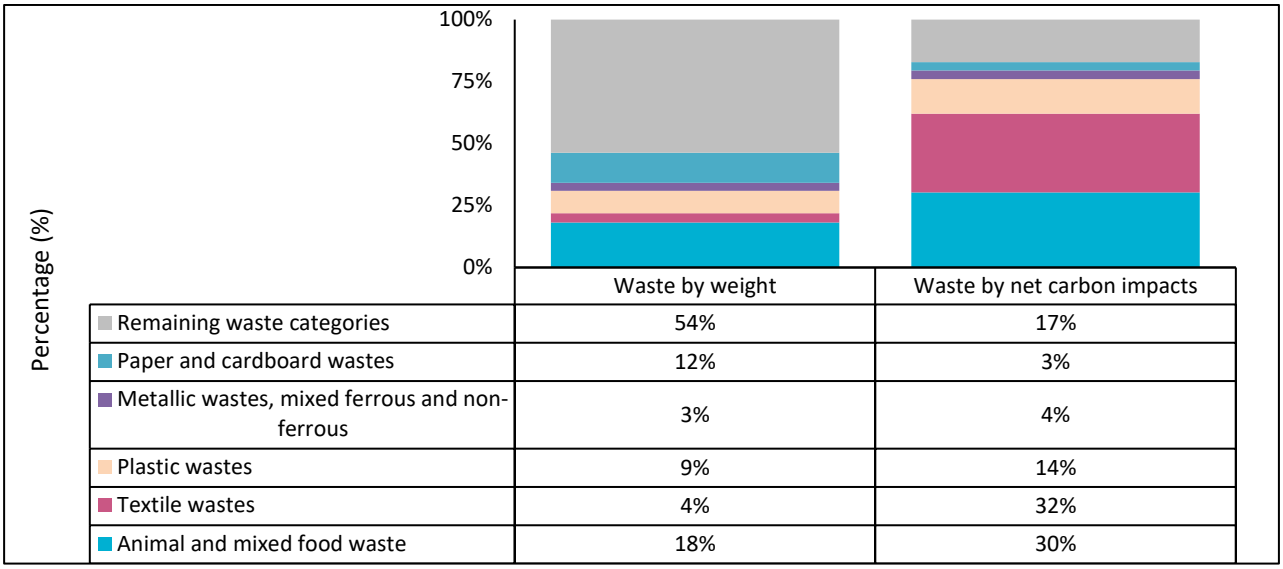


Figure 5 Carbon whole-life cycle impacts over time, 2011 - 2020.

The Big Five Waste Materials: Weight vs. Carbon Impacts

Scotland's Carbon Metric shows that some materials in the household waste stream have a particularly high carbon impact relative to their tonnages. To maximise the climate change benefits of waste and resource management, focus should be placed on these carbon intensive waste materials.

The top five most carbon intensive materials accounted for under half (46%) of all household waste in 2020, but 83% of household waste carbon impacts (Figure 6). Textile waste made up just 4% of waste arisings, but 32% of the carbon impacts. Food waste accounted for 18% of household waste by weight, but 30% of household waste carbon impacts.



	Waste by weight	Waste by net carbon impacts
Remaining waste categories	54%	17%
Paper and cardboard wastes	12%	3%
Metallic wastes, mixed ferrous and non-ferrous	3%	4%
Plastic wastes	9%	14%
Textile wastes	4%	32%
Animal and mixed food waste	18%	30%

Figure 6 Relative weight vs. carbon impact of key waste materials in 2020 (following disaggregation of the mixed Household and Similar Wastes category[8]).

Conclusion

This report describes the key findings from the 2020 household waste Carbon Metric update:

- **Household waste carbon impacts increased to 5.8 million tonnes CO_2 eq.,), an increase of 3.2% (~180,000 tonnes CO2 eq.) from 2019 figures.**
- The increase of household carbon impacts could be attributed to COVID 19 lockdowns which have led to both an increase in household waste arisings and also resulted in the temporary closure of household recycling centres.
- Despite the 3.2% year-on-year increase in the whole lifecycle carbon impacts of household waste in 2020, the carbon impact of household waste in 2020 was 13.6% (approximately 920,000 tonnes) below the 2011 baseline.
- The top five most carbon intensive materials accounted for 46% of all household waste tonnage in 2020, but 83% of the carbon impacts.
    - Textile waste made up just 4% of waste arisings, but 32% of the carbon impacts.
    - Food waste accounted for 18% of household waste by weight, but 30% of household waste carbon impacts.

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

[8] The methodology of the disaggregation of mixed Household and Similar Wastes is explained in the Carbon Metric Technical report, published annually on the Zero Waste Scotland website.

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