The Carbon Footprint of Scotland's Waste

2016 Carbon Metric Summary Report

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Date: September 2018

European Union

The Scottish Government
Riaghaltas na h-Alba

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

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Executive Summary

This report introduces Scotland's Carbon Metric and describes key findings from the 2016 Carbon Metric update.

- By measuring the lifecycle impacts of waste, the Carbon Metric shows how waste reduction and sustainable waste management can play a critical role in the fight against climate change.
- Despite large annual fluctuations in waste generated, improved recycling and declining use of landfill continues to reduce the overall carbon impact of waste in Scotland, which has fallen by 26% or 3.9 $MtCO_2e$ (million tonnes of carbon dioxide equivalent) since 2011.
- Household waste accounts for less than 25% of all Scottish waste by tonnage, but a growing majority of the carbon impacts.
- The five most carbon intensive waste materials make up just 9% of Scotland's waste by weight, but nearly half of the associated carbon impacts. Food waste is the most carbon intensive waste material, generating 22% of carbon impacts.

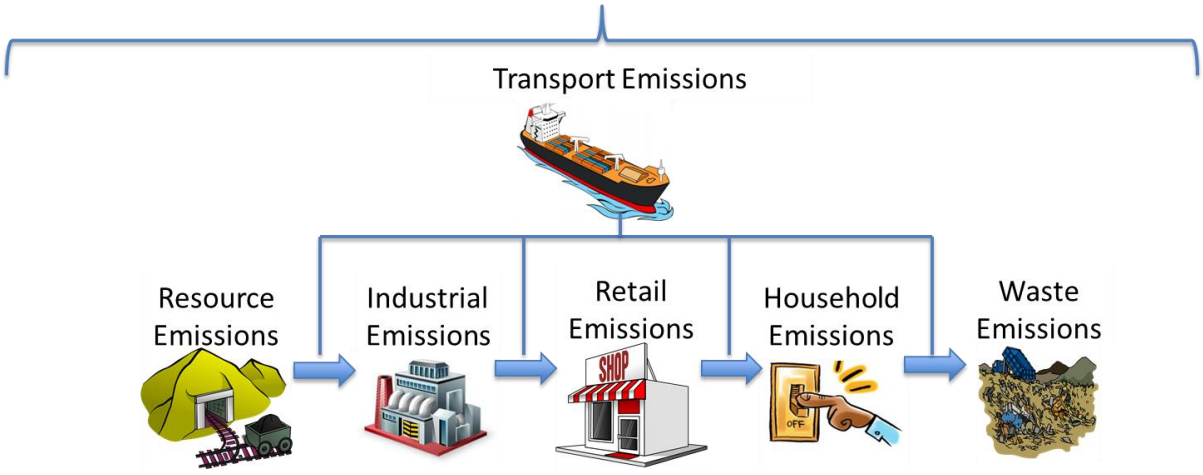
Further information on the Carbon Metric and archived documents relating to its development can be found on the Zero Waste Scotland website.

The Carbon Metric: a powerful tool to fight climate change

In the Carbon Metric, Scotland has developed a ground-breaking tool in the fight against global climate change. The Scottish Carbon Metric measures the whole-life carbon impacts 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. After all, climate change is a global problem.

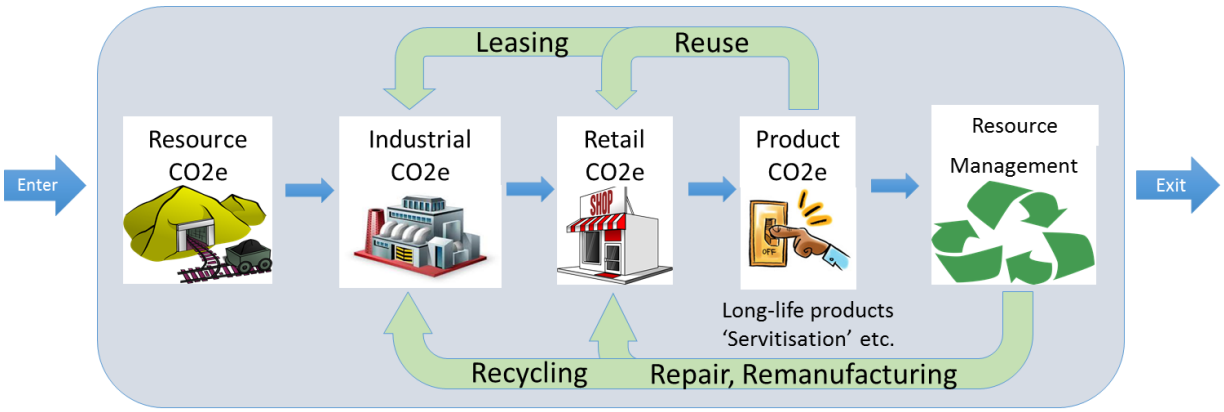
The Carbon Metric shows how reducing our waste, and managing what waste remains in a more sustainable way, is critical to the global fight against climate change.

Lifecycle Emissions of Waste



The Carbon Metric quantifies the complete lifecycle impacts of more than 30 different common waste materials, providing policy makers and business leaders with an alternative to weight-based waste measurement, and allowing them to identify and focus specifically on those waste materials with the highest carbon impacts and greatest potential carbon savings. Scotland's 33% per capita food waste reduction target is an example of a policy informed by the Carbon Metric.

The Circular Economy



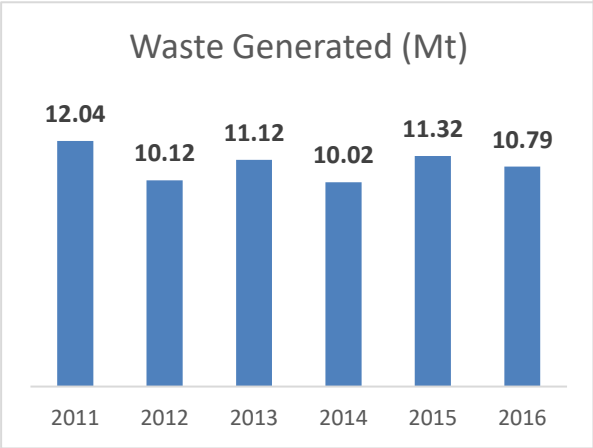
As Scotland continues to transition towards a more circular economy, the Carbon Metric is helping to measure our progress, proving that sustainable waste and resource policy can deliver major emissions savings across all economic sectors.

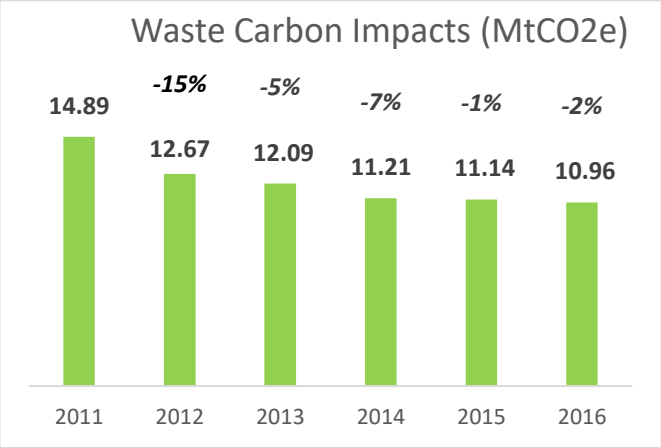
Key Findings from the 2016 Carbon Metric

The Scottish Carbon Metric is updated on an annual basis using the latest SEPA published waste data. The first edition, the 2011 Carbon Metric, was published in 2013, and new editions of the Carbon Metric are published each September. This report summarises the key findings from the 2016 Carbon Metric.

Scotland's Waste and Waste Carbon Impacts (2011-2016)

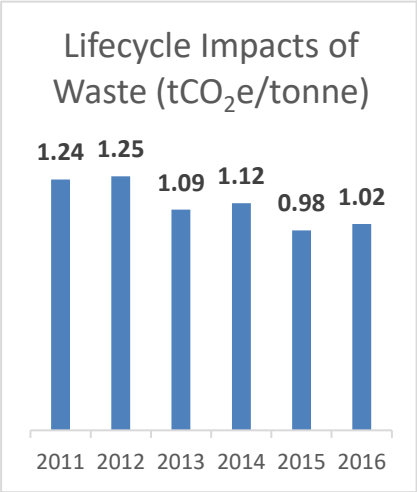
Since 2011, the total amount of waste generated in Scotland has varied considerably year to year, primarily due to large annual fluctuations in waste from the construction and demolition industry. Despite this, the carbon impact of Scotland's waste has steadily declined over the same period, falling 26% since 2011. From 2015 to 2016, Scotland's waste carbon impacts decreased by 2%.

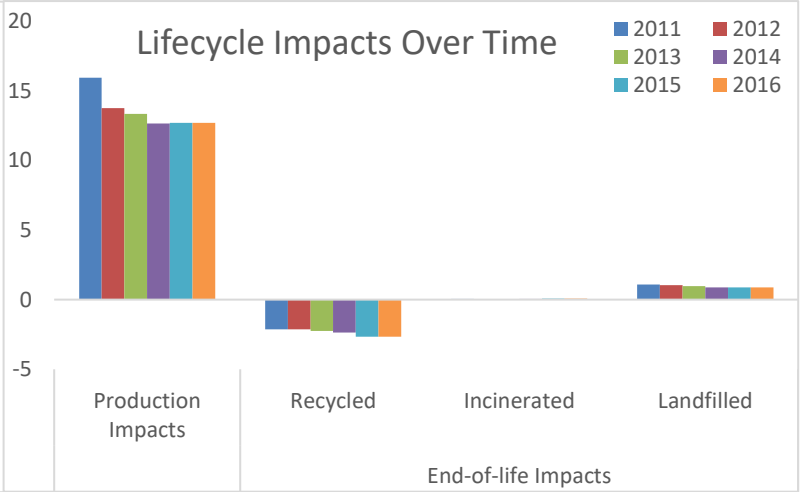




Lifecycle Impacts of Scotland's Waste (2011-2016)

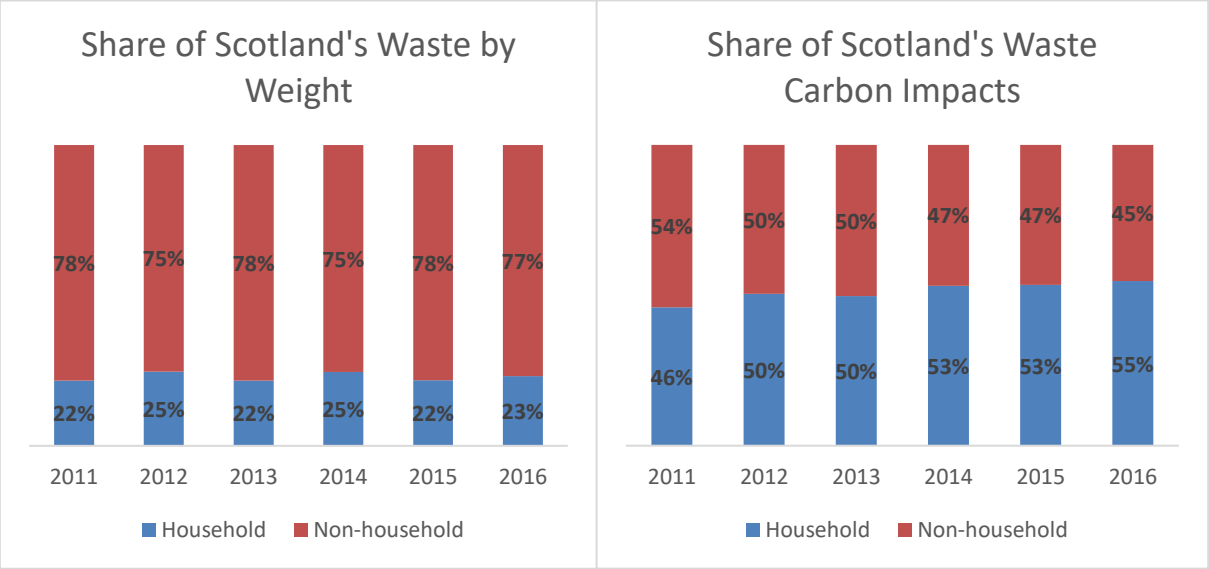
The lifecycle impact of a tonne of waste fell by 18% from 2011 to 2016. This was largely due to improved recycling rates, particularly for high impact waste materials, and steadily declining landfill emissions. The growing use of incineration has had little direct impact on waste carbon emissions however, ongoing UK grid decarbonisation means energy from waste is likely to become a growing source of waste carbon impacts in future.





Household vs. Non-Household Waste (2011-2016)

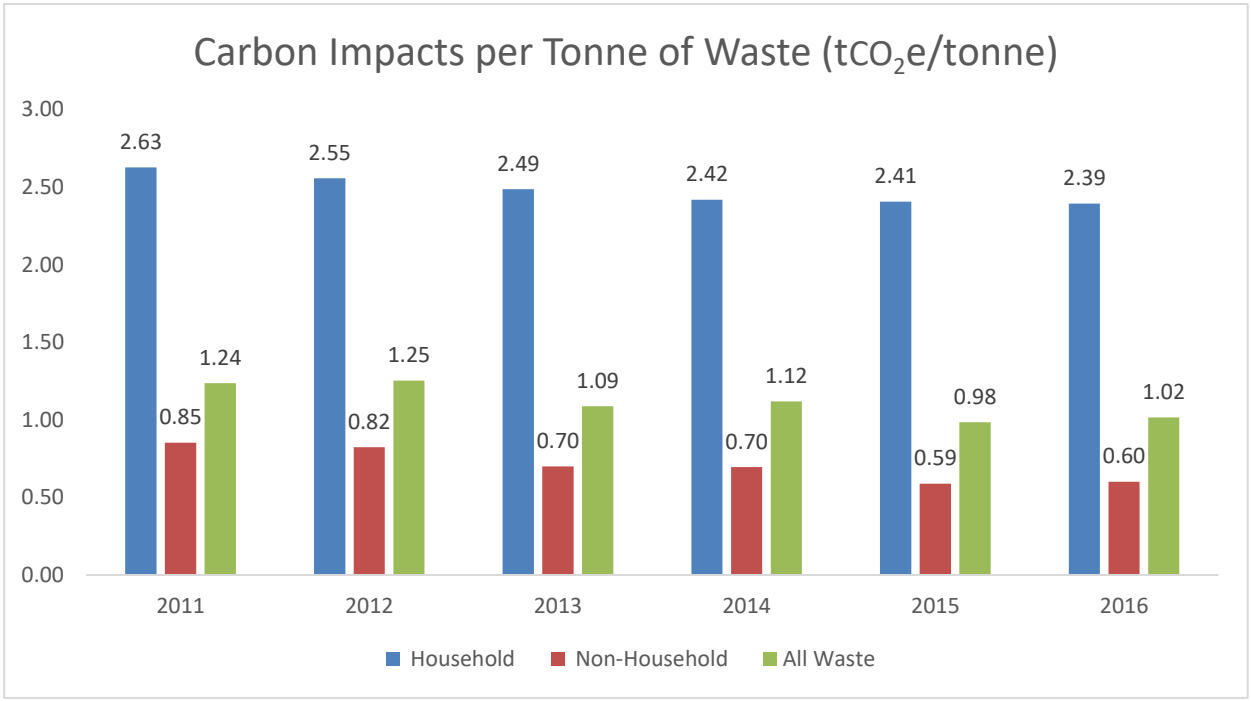
Between 2011 and 2016, no more than 25% of Scotland's waste has originated from households. Over the same period, however, the share of Scotland's waste carbon impacts attributed to Household waste has consistently increased. In 2016, Household waste accounted for 55% of total waste carbon impacts - a 9% increase since 2011.



Two factors help explain this changing dynamic:

1. The Household waste stream contains a higher portion of carbon intensive materials.
2. The Non-household waste recycle rate has outpaced the Household sector (up 26% and 10%, respectively, between 2011-2016)

While the marginal carbon impact of a tonne of Household waste only fell by 9% between 2011 and 2016, the impacts for Non-Household waste have fallen by 30% in this time frame.

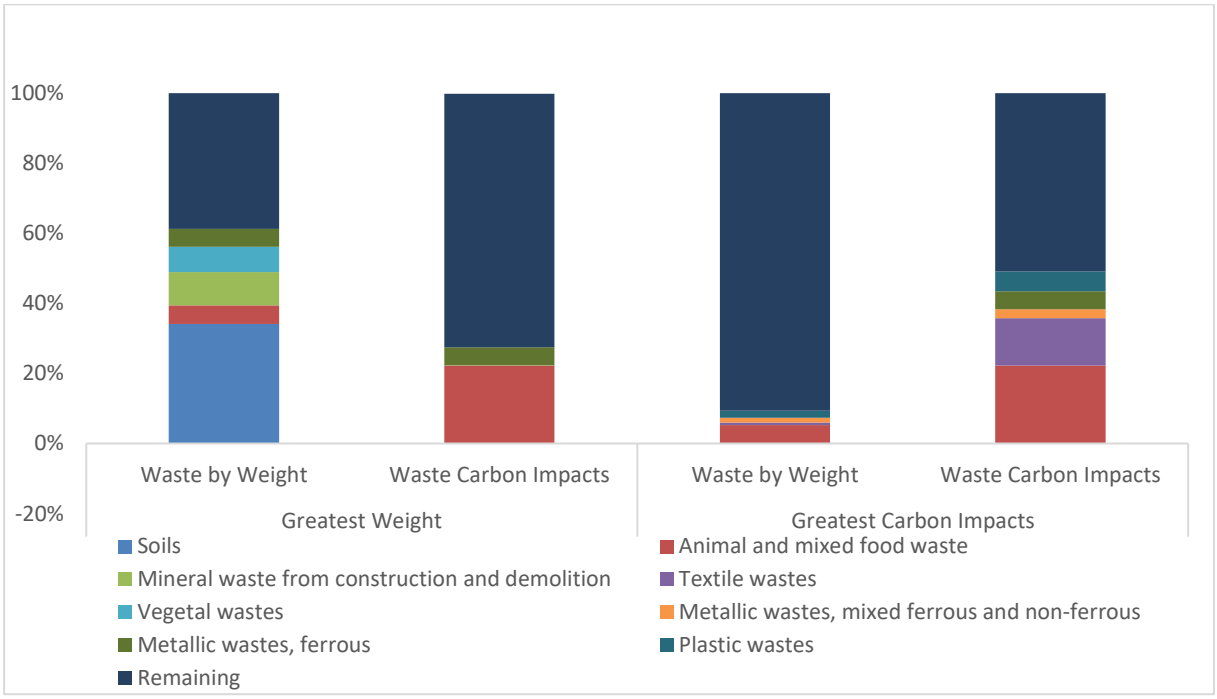


The Big Five Waste Materials: Weight vs. Carbon Impacts

The Carbon Metric shows that many of the high tonnage waste materials which dominate the national waste stream have relatively low carbon impacts. To maximise the climate change benefits of waste and resource management, focus should instead be placed on the carbon intensive waste materials.

The top five waste materials by weight in 2016 (excluding mixed residual waste[1]) accounted for 61% of Scotland's waste, but only 27% of its waste carbon impacts. Food waste appears among the top five for the first time, reflecting the significant increase in food waste collections across Scotland. It accounts for 5% of all waste by weight, but 22% of all waste carbon impacts. The remaining top four materials account for 56% of Scotland's total waste, but just 5% of its waste carbon impacts.

In contrast, the top five most carbon intensive waste materials accounted for just 9% of total weight (half of which was food waste), but 49% of waste carbon impacts.



[1] Waste types such as household & similar, other mixed materials, and sorting residues are comprised of many different material types and therefore, their Carbon Metric carbon factors reflect their material composition. For the purpose of the top five weight vs. carbon comparison however, these materials have been extracted out into their material specific categories, so their tonnage and carbon impacts can be assessed separately.

Measuring Progress 2011-2025

There are five main policy drivers to reduce waste generation and increase recycling rates in Scotland:

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

These policies were initially expected to reduce Scotland's annual waste carbon impact by 22% below 2011 levels, or 3.1 $MtCO_2e$, by 2025. As of 2016, waste carbon impacts had already declined by 26% (3.9 $MtCO_2e$) below 2011 levels.

Additional UK level measures affecting key waste materials are:

1. Achieve 64% recycle rate for aluminium packaging, and 85% for steel packaging by 2020.[4]
2. Achieve 95% reuse and recovery, and 85% reuse and recycling for end-of-life vehicles by 2015.[5]

Conclusion

This report introduces Scotland's Carbon Metric and describes key findings from the 2016 Carbon Metric update. Despite large annual fluctuations in waste arisings, the overall carbon impact of waste in Scotland has steadily declined since 2011. This trend has been driven primarily by increased recycling, particularly of carbon intensive materials, and reduced landfill impacts.

Household waste accounts for ≤ 25% of all Scottish waste, but a growing majority of the carbon impacts. This is due to the high carbon value of Household Waste and more rapid impact reduction in the Non-household waste stream since 2011.

Over half of Scotland's waste is comprised of just five waste materials. However, these account for just 27% of waste carbon impacts. In contrast, the five most carbon intensive wastes made up just 9% of Scotland's waste by weight, yet nearly half of associated carbon impacts. Food waste made up just 5% of all Scottish waste in 2016 but accounted for 22% of 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.

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

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