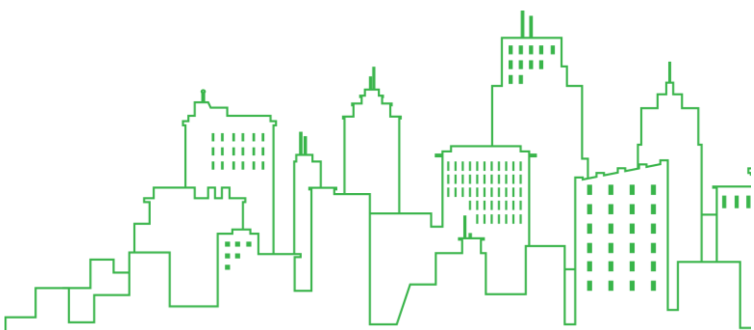
MORE CIRCULARITY
LESS CARBON
-25% BY 2025

THE CARBON FOOTPRINT OF WASTE

IRELAND



ACR+
www.acrplus.org

ZERO WASTE SCOTLAND

ACR+ is an international network of cities and regions sharing the aim of promoting a sustainable resource management and accelerating the transition towards a circular economy on their territories and beyond.

Circular economy calling for cooperation between all actors, ACR+ is open to other key players in the field of material resource management such as NGOs, academic institutions, consultancy or private organisations.

Find out more at www.acrplus.org

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 www.zerowastescotland.org.uk/

Project name: Carbon Metric International – ZWS & ACR+ partnership

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Contents

ACR+ 'MORE CIRCULARITY LESS CARBON' CAMPAIGN

The ACR+ has partnered with its member Zero Waste Scotland to launch the 'More Circularity Less Carbon' campaign in November 2019 to reduce the carbon impact of municipal waste among its members by 25 per cent by 2025.

Zero Waste Scotland's Carbon Metric International (CMI) tool, developed from Scotland's ground-breaking Carbon Metric, will enable ACR+ members to measure the carbon impact of their municipal waste, take effective actions to reduce it, and track their progress towards the 2025 target. A first cohort was organised in 2020, in which three ACR+ members collected data and analysed the carbon footprint of their municipal waste: the Brussels Region (BE), Pays de la Loire region (FR), and the city of Genoa (IT). This first cohort led to the publication of a cross-analysis that highlights similarities, differences, and potential improvements for the follow-up activities.

Ireland is one of the ACR+ members who joined cohort 2 to benefit from this project and received support use the CMI to quantify the whole-life carbon impacts of its municipal waste. The results are summarised in this report, which has three main objectives:

1. Enable Ireland to establish its 2025 carbon reduction target;
2. Provide a detailed breakdown of waste carbon impacts by materials and management process; and
3. Assess several carbon reduction scenarios that can help Ireland achieve its target.

ZERO WASTE SCOTLAND'S CARBON METRIC INTERNATIONAL

Zero Waste Scotland has developed a ground-breaking tool in the fight against global climate change. The 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 (Figure 1).

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

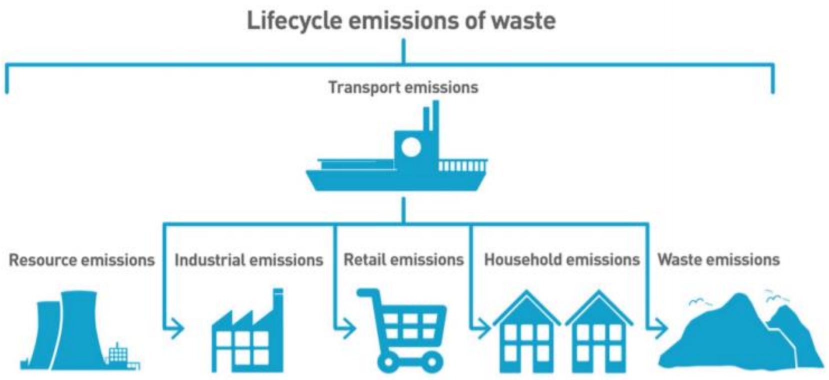

Figure 1 Schematic diagram presenting the lifecycle emissions of waste.

The Carbon Metric provides policymakers and business leaders with an alternative to weight-based waste measurement, 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[1].

Further details on the Carbon Metric methodology can be found on Zero Waste Scotland's website[2].

The Carbon Metric could be adapted to Ireland's data thanks to the collaborative work between Zero waste Scotland and ACR+. The data has been collected by ACR+ members: Eastern Midlands Waste Region and Southern Waste Region, two of the three regional authorities in charge of waste management in Ireland.

Figure 2 Logos of Eastern Midlands Waste Region and Southern Waste Region.

METHOD & DATA SOURCE

The whole-life carbon impacts of **household waste** in Ireland were quantified in this report, based on 2019 data.

Stages covered in the analysis as follow:

- **Waste generated:** all waste generated by households in Ireland during the reporting year (2019). Embodied carbon impacts linked to the production of material (resource extraction, manufacturing and transport emissions) are included in this category. Impacts associated with the product's use are excluded.
- **Waste recycled:** all recycled (or reused) materials, including biodegradable materials that have been composted or anaerobically digested. The analysis covers all activities linked to recycling waste, namely waste collection, sorting, recycling, and displacement benefits as recycled content substitutes virgin materials or for reuse.
- **Energy from Waste (incineration):** all incinerated waste. The analysis covers waste collection and treatment (including carbon benefits of energy recovery as well as metal recovery when applicable).
- **Waste landfilled:** all landfilled waste, including incinerator ash and any recycling and composting rejects. The analysis covers the carbon impacts of waste collection and disposal.

[1] Scottish Government (2016) Making Things Last
[2] Zero Waste Scotland (2020) Carbon Metric Publications.

ABOUT IRELAND

The Republic of Ireland occupies most of the island of Ireland, off the coast of England and Wales. The population of Ireland in 2019 is estimated to be nearly 5 million inhabitants[3]. The total amount of household waste generated in Ireland in 2019 is estimated to be 1.6 million tonnes (Table 1), representing around 320 kg/inh. The data only includes waste generated by household, and no "assimilated" commercial waste. The composition of the generated household waste is presented in Table 1.

Figure 3 Map of Ireland.

Table 1 Breakdown of waste generated in Ireland in 2019.

Waste Category	Waste generated (tonnes)
Paper and cardboard wastes	259,300
Mixed and undifferentiated materials	211,000
Plastic wastes	210,000
Garden wastes	184,500
Textile wastes	118,400
Glass wastes	116,600
Sorting residues	93,100
Household and similar wastes	92,000
Food waste	71,300
Health care and biological wastes	59,700
Discarded electronic equipment	37,400
Non-ferrous wastes	29,000
Wood wastes	25,000
Soils	23,300
Ferrous wastes	23,200
Used oils	9,800
Batteries wastes	5,800
Mixed ferrous and non-ferrous wastes	1,200
Spent solvents	1,200
Grand Total	**1,571,800**

[3] https://www.cso.ie/en/releasesandpublications/er/pme/populationandmigrationestimatesapril2019/

Several waste categories represent undifferentiated waste fractions:

- Mixed and undifferentiated materials are mostly bulky waste not collected in civic amenity sites (e.g. on the kerbside or on-demand), for which there is no data on composition, mixed bulky waste collected in civic amenity sites, and composite beverage cartons selectively collected or collected in residual waste.
- Household waste and similar: there are mostly composed of undifferentiated fractions in residual waste, construction and demolition waste collected in civic amenity sites, and undifferentiated fractions contaminating the mixed dry recycling stream.
- Sorting residues: there are mostly undifferentiated fine elements collected with residual waste and with organic waste.

4.1 Waste collection and separation

The main collected streams are presented in the graph below:

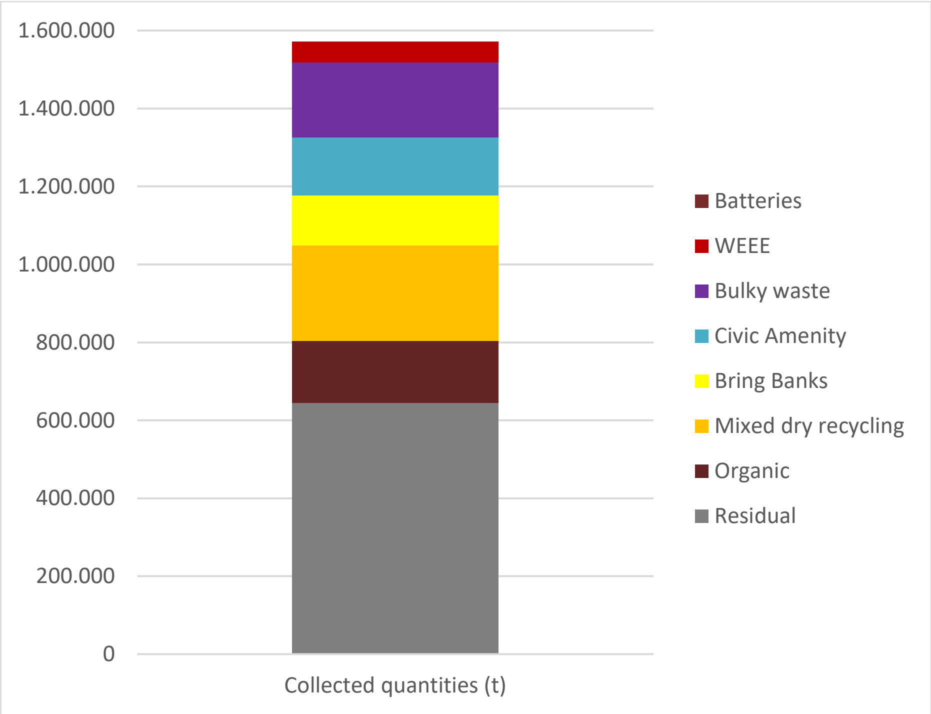

Figure 4 main collected waste streams in 2019 (in t)

Residual waste represents about 40% of the total collected waste, while the rest is selectively collected.

It is also interesting to see how key waste fractions are collected. Since the composition of bulky waste collected outside of civic amenity sites is unknown, it is possible that part of the quantities presented in the Figure 5 are not included (for instance metal or large cardboards might be collected with bulky waste). The following figure shows the collected quantities by collection streams, along with the sorting rates:

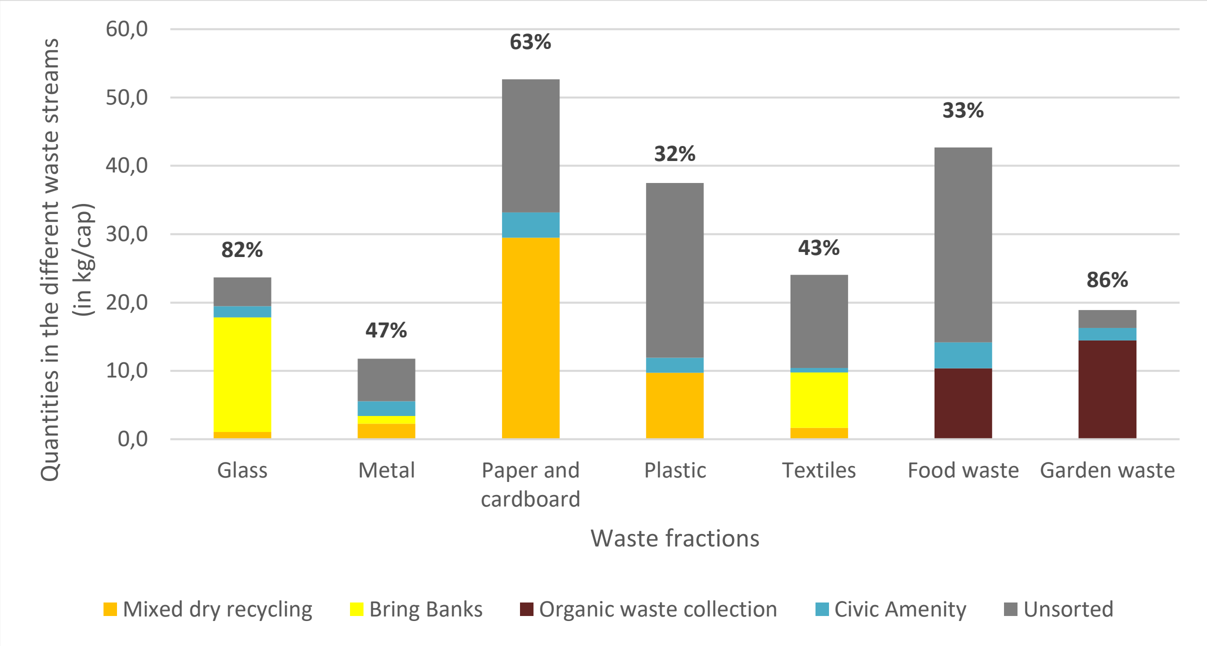

Figure 5 collected quantities in kg/cap for several waste fraction, by collection streams, and sorting rates in % (calculated as the quantities selectively collected and sent to recycling compared to the total arising)[4].

Sorting rates appear to be high for glass and garden waste, and average to low for the other presented waste fractions. In particular, only one third of plastic and food waste seems to be selectively collected. However, food waste might also be composted at home, and the associated quantities might not be reported.

4.2 Waste treatment

A breakdown of waste treatment and disposal route is shown in Figure 6. About half of the household waste is sent to recycling, while the rest is mostly sent to energy recovery, and landfilling.

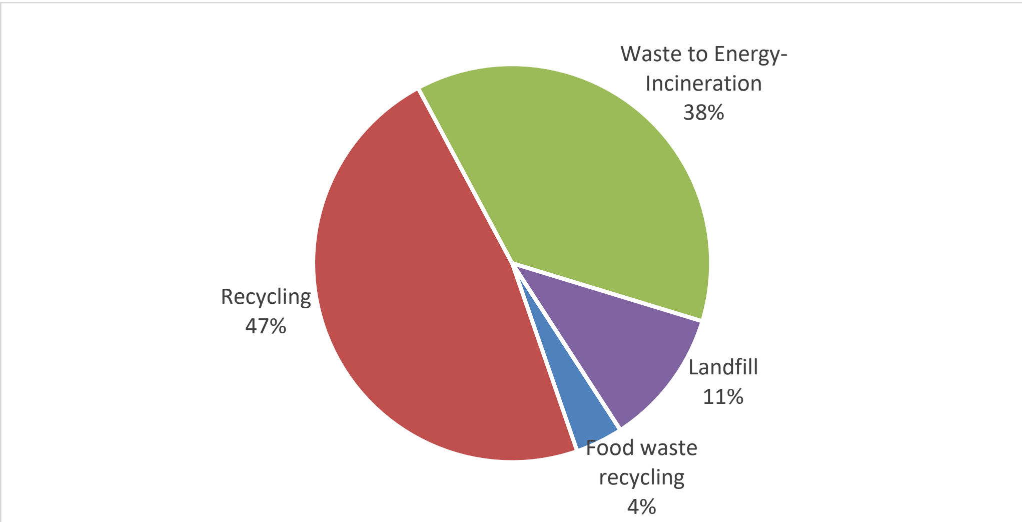

Figure 6 Final destination of household waste in 2019.

[4] Mixed dry recycling" refers to the kerbside collection of commingled recyclable materials (paper, cardboard, steel cans, aluminium cans, plastic bottles and selected other plastics)

The distribution of each waste stream included above according to its treatment destination is presented on the graph below:

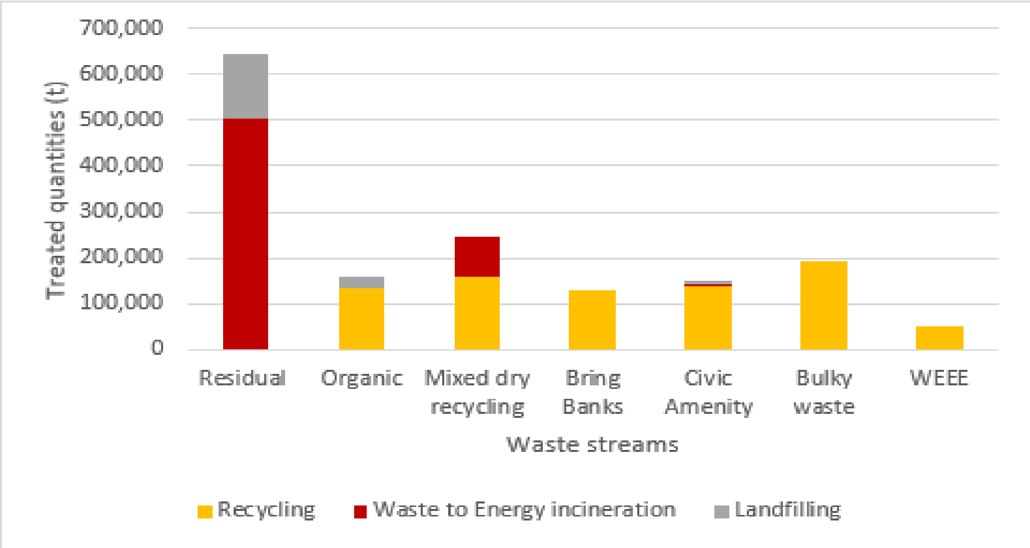

Figure 7 treatment destination for each of the reported waste stream (in t)

It must be noted that this figure might only give partial information. For instance, the contamination of source-separated fractions is not necessarily included (e.g. for bring banks, bulky waste, and WEEE, for which it is likely that impurities or further sorting residues occur).

More details on the treatment routes for the key waste streams are presented in the table below:

Waste stream	Treatment route
Residual waste	79% of residual waste is sent to waste to energy. The rest is sent to landfilling sites, where biogas is recovered as electricity.
Food waste	About 60% is sent to composting, while the rest is sent to anaerobic digestion, producing electricity, heat, and bio-fertiliser. Organic waste collected on kerbside includes 56% of garden waste, 28% of food waste, 4% of paper, 6% of fine elements, and 6% of impurities (including plastic, textiles, and nappies).
Mixed dry recycling	The different fractions are sorted in mechanical sorting centres. The contamination rate of co-mingled dry recyclable waste ranges from 15 to 30%
Glass packaging waste	In 2019, 93% of the collected glass packaging waste was sent to close-loop (“bottle-to-bottle”) recycling, while the rest is sent to open-loop recycling and recovered as aggregate substitute. The contamination amounts to 2%.
Textiles	Textile waste is collected via different collection schemes (bring banks, donations in charity shops, door-to-door and/or on-demand collection, take back schemes by retailers). Textile waste management is mostly managed by charity organisation and textile recycling companies. About 7,000 tonnes of textiles collected by Irish charity shops are sold as second-hand products, while the rest is sent as rags to textile recyclers. Most textiles collected for recycling by commercial recyclers are exported. About 50% of the generated textile waste is sent to incineration, and 13% to landfilling.

RESULTS

5.1 Key findings

The carbon impacts of household waste in Ireland in 2019 were approximately 5.3 million tonnes of carbon dioxide equivalent (tCO_2eq.), or 1.0 tCO_2eq./capita. Figure 8 shows that carbon saved through recycling was higher than carbon impacts of waste disposal (i.e., incineration and landfilling), meaning waste management activities (i.e., collection, treatment, and disposal) in Ireland are carbon negative. Embodied carbon impacts of waste material (i.e. the emissions generated by the extraction of resources, production, manufacturing, etc. of the corresponding products, labelled as "Generated" in Figure 8) are always the highest contributor to the net carbon impacts of waste however, which is **why waste prevention, in accordance with the waste hierarchy, always offers the greatest carbon savings**. Accounting for the full lifecycle impacts, Ireland's waste carbon intensity is of 3.4 tCO_2eq./tonne of waste.

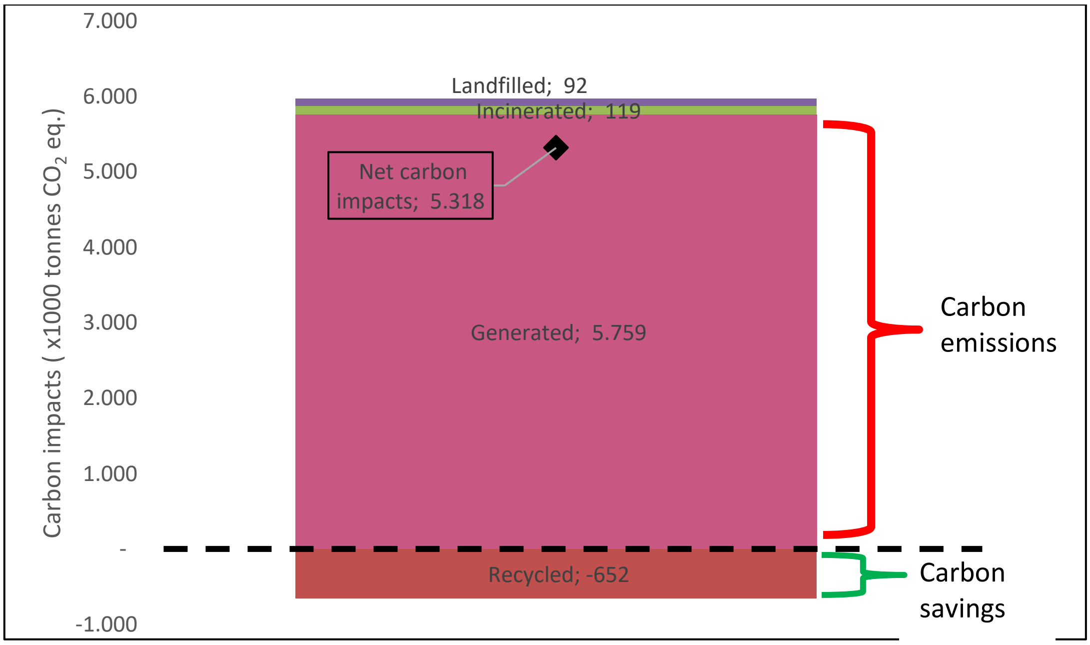

Figure 8 Breakdown of whole-life carbon impacts of waste by stage.

Figure 9 shows that the amount of waste generated by each waste category[5] and their associated carbon impacts. The "Household and Similar Wastes", a pre-defined EUROSTAT EWC-Stat waste category, includes the following fractions: unclassified combustibles, unclassified incombustibles, and a fraction of hazardous municipal waste. The "mixed and undifferentiated materials" waste category covers mainly bulky waste.

Figure 9 also shows that textile waste is responsible for substantially higher carbon burdens when compared to the amount of textile waste generated. In addition, plastics,

[5] Each category does not refer to waste tonnages in a single stream (e.g. "garden waste collected in civic amenity sites"), but rather to the total waste fraction that encompassed in multiple waste streams (e.g. garden waste collected in civic amenity sites, garden waste collected door-to-door, and garden waste improperly discarded in residual waste

food, and bulky waste have high carbon impacts when compared to their tonnages. Regarding bulky waste, the lack of data on its actual composition makes the assessment of its carbon footprint quite uncertain.

Further carbon savings can be achieved by capturing more materials (in particular plastics and food) for recycling instead of waste to energy (incineration) and landfilling respectively (Figure 10). Overall, the majority of carbon impacts is attributed to the production of materials (i.e., embodied impacts) in the first place as shown in Figure 11.

The impact of landfilling is rather limited for most waste fraction, possibly due to the fact that the amount of biodegradable waste going to landfills is rather small. Overall, emissions linked with landfilling only amount to about 2% of the total emissions. The impact of landfilling is more noticeable for food and paper/cardboard waste; it represents 5% of the total carbon footprint of food, and 9% of the carbon footprint of paper/cardboard.

The impact of waste to energy (incineration) is also quite limited, representing only 2% of the total emission. However, the incineration of plastic waste has quite a significant footprint, accounting to 20% of the carbon footprint of plastic waste. Overall, the savings achieved thanks to energy recovery are quite limited when compared to the embodied impact of waste, due to low energy recovery, and the lack of heat recovery.

Recycling brings a more significant contribution to reduce the overall carbon footprint. The emissions saved by recycling amounts to about 10% of the embodied emissions of the household waste. Savings are quite significant for specific fractions: glass recycling reduces the carbon footprint of glass waste by 75%, while wood recycling reduces it by 57%. It reflects the rather high performances when it comes to glass sorting (82% sorting rate), and the fact that closed-loop recycling yields relatively high benefits. On the contrary, the benefits associated with plastic recycling are rather small, due to relatively high rejection rates for PET and PP, and the fact that it is assumed that plastic polymers other than PET, PP, and HDPE, are sent to incineration without energy recovery; more precise information on the actual recycling routes for the different plastic polymers might lead to different results. The same can be said for food waste recycling: most carbon savings are achieved thanks to anaerobic digestion that concerns 61% of the collected food waste. However, it should be noted that composting contributes to other positive outcomes when it comes to the recycling of nutriments.

WEEE recycling yields quite significant benefits compared to other ACR+ members that participated in the MCLC campaign[6]. This can be explained by a rather high re-use rate of 31% assumed in the analysis. Data was not available to model the actual reuse rate of discarded equipment in Ireland, so default assumptions based on Scotland were applied.

A detailed breakdown of waste tonnages and their impacts is available in Appendix 1 and 2 and can be used to identify areas for improvements in terms of both recycling rates and waste reduction.

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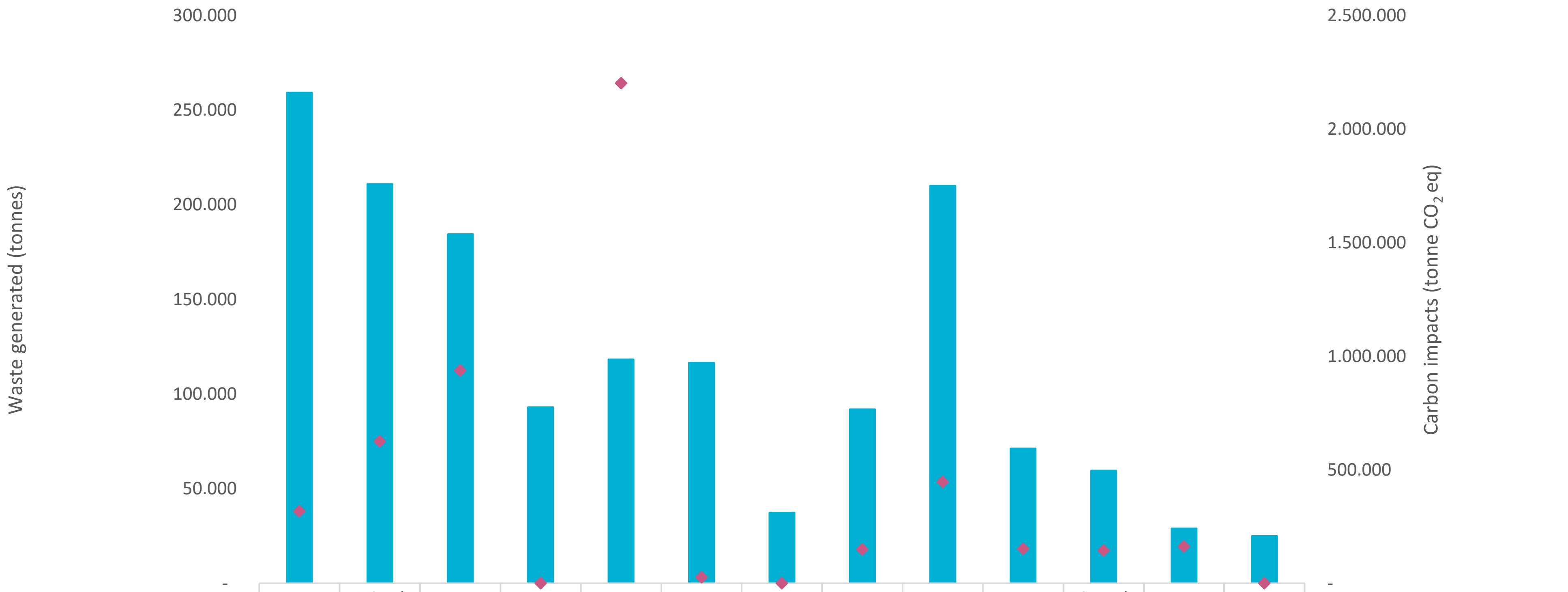
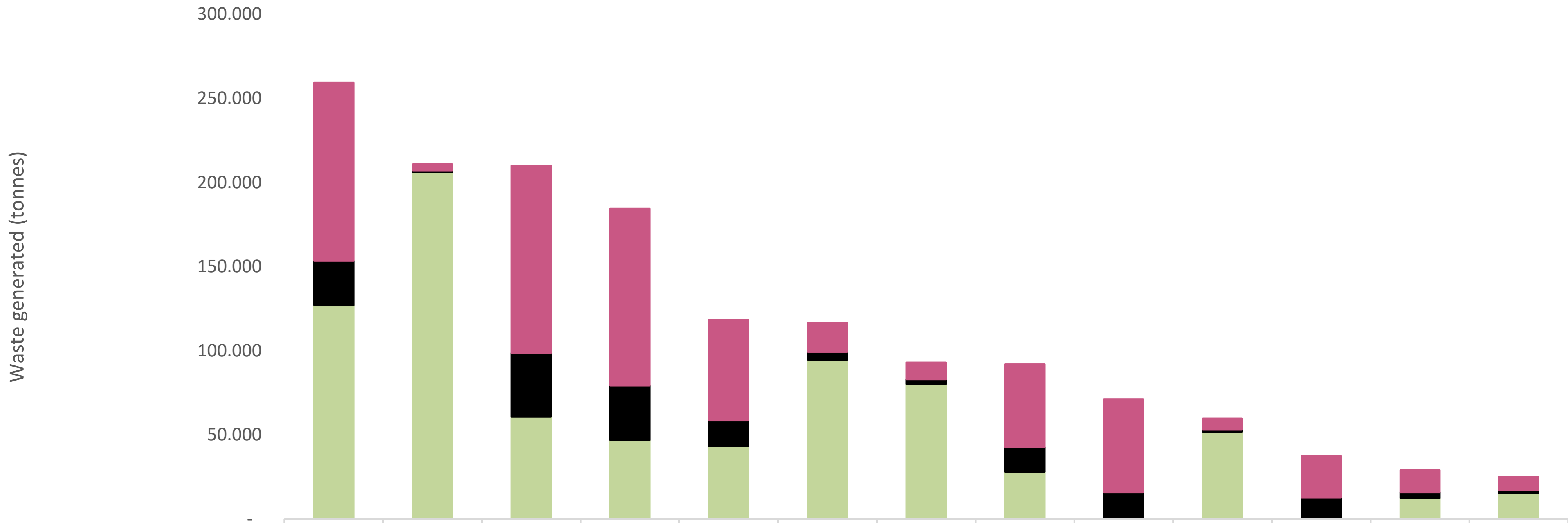
[6] See ACR+, Zero Waste Scotland (2021) The Carbon Footprint of Waste: Cross Analysis of the First Cohort [Online]. Available at: https://www.acrplus.org/en/morecircularitylesscarbon-cohort1



	Paper and cardboard wastes	Mixed and undifferentiated materials	Plastic wastes	Garden wastes	Textile wastes	Glass wastes	Sorting residues	Household and similar wastes	Food waste	Health care and biological wastes	Discarded electronic equipment	Non-ferrous wastes	Wood wastes
Waste generated (tonnes)	259.309	210.976	184.488	93.121	118.412	116.617	37.422	92.018	210.001	71.305	59.673	29.001	25.045
Carbon impacts (tCO2eq.)	317.601	624.631	937.237	-	2.202.39	26.816	-	148.689	446.741	151.034	144.352	161.433	-

Waste category

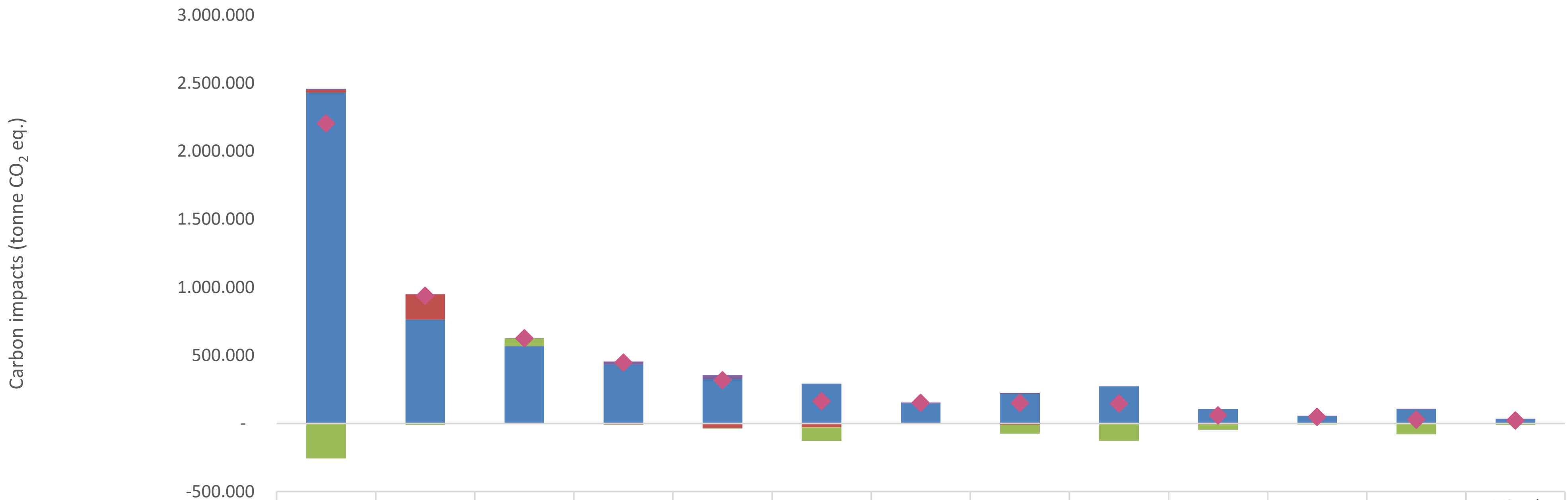
Figure 9 Weight vs carbon impacts of key waste categories in Ireland.



	Paper and cardboard wastes	Mixed and undifferentiated materials	Food waste	Plastic wastes	Textile wastes	Glass wastes	Garden wastes	Household and similar wastes	Health care and biological wastes	Discarded electronic equipment	Sorting residues	Non-ferrous wastes	Wood wastes
Waste to energy (incineration)	106.037	4.053	111.307	105.291	59.778	17.345	10.233	49.498	55.533	6.526	24.947	13.203	7.774
Landfilled	26.208	849	37.963	32.383	15.375	4.688	2.831	14.509	15.772	1.444	12.476	3.565	1.886
Recycled	127.065	206.075	60.731	46.814	43.259	94.583	80.057	28.011	-	51.704	-	12.233	15.385
Generated	259.309	210.976	210.001	184.488	118.412	116.617	93.121	92.018	71.305	59.673	37.422	29.001	25.045

Waste category

Figure 10 **Total tonnages of waste (key categories) in Ireland in 2019 by management route.**



	Textile wastes	Plastic wastes	Mixed and undifferentiated materials	Food waste	Paper and cardboard wastes	Non-ferrous wastes	Health care and biological wastes	Household and similar wastes	Discarded electronic equipment	Ferrous wastes	Batteries wastes	Glass wastes	Mixed ferrous and non-ferrous wastes
Landfilled	9.701	404	567	24.167	27.879	67	9.818	9.199	46	53	16	64	13
Recycled	-256.034	-12.402	55.891	-1.474	-3.124	-100.573	-	-64.769	-127.566	-37.253	-7.961	-78.466	-9.887
Waste to energy (incineration)	19.089	187.394	18	-7.450	-34.210	-28.503	-3.436	-10.925	-367	-7.689	402	487	-1.964
Generated	2.429.636	761.841	568.155	431.499	327.057	290.442	144.652	215.184	272.239	104.080	55.797	104.731	33.195
Total carbon impacts (tCO2)	2.202.393	937.237	624.631	446.741	317.601	161.433	151.034	148.689	144.352	59.191	48.254	26.816	21.357

Waste category

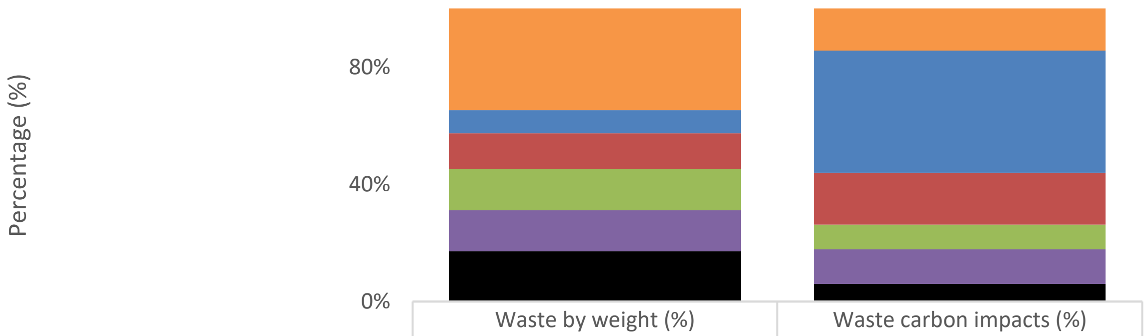
Figure 11 **Whole-life carbon impacts of key waste categories by management route.**

5.2 The Top Five Waste Materials: Weight vs. Carbon Impacts

Many of the high tonnage materials in Ireland's waste streams have relatively low carbon impacts (e.g. glass waste accounts for 3% of total waste generated, but just 0.5% of total carbon impacts and paper & cardboard wastes account for 17% of total impacts by weight and only 6% by carbon impacts). To achieve the 2025 carbon savings target, focus should be placed on the most carbon intensive waste materials, such as **textiles, plastics, food, and mixed and undifferentiated materials** which mostly consists in mixed bulky waste**.**

The top five waste materials by weight in 2019 accounted for 65% of Ireland's waste, and 86% of its waste carbon impacts (Figure 12). Unlike other ACR+ members where a similar carbon assessment has been carried out, Ireland's top 5 waste categories from carbon perspectives also have the highest tonnages. This might be because Ireland's data only encompass household waste, while the other ACR+ members generally included "assimilated" commercial waste, which can cover significant quantities of low-carbon fractions (such as construction and demolition waste).

This means that Ireland can achieve high carbon savings and increase recycling rates simultaneously by prioritising the above-mentioned five categories. Yet it is worth mentioning that textile waste accounts for 42% of the total carbon footprint, while only representing 8% of the total weight generated.



	Waste by weight (%)	Waste carbon impacts (%)
Remaining	35%	14%
Textile wastes	8%	42%
Plastic wastes	12%	18%
Food waste	14%	8%
Mixed and undifferentiated materials	14%	11,8%
Paper and cardboard wastes	17%	6%

Figure 12 Top five waste materials by weight and their associated carbon impacts.

It is potentially interesting to investigate the composition of priority fractions, to identify priorities and main contributors within these categories. For instance, the carbon factor for food waste generation in Ireland is lower than the ones assessed for the previous participants of the MCLC campaign. This might be linked to a lower share of proteins that are associated with a significant carbon footprint.

5.3 Scenario analysis

Ireland must reduce its waste carbon impacts by approximately 1.3 million tCO_2eq, to a total of 3.9 million tCO_2eq by 2025, to achieve the 25% ACR+ target. A scenario analysis was carried out to investigate scenarios that Ireland might use to accomplish this.

As part of this project, we looked into a number of waste-reduction scenarios that can help Ireland in achieving the target. Scenarios considered focus on the following carbon-intensive materials:

1. Textile waste;
2. Plastic waste;
3. Food waste;
4. Paper and cardboard wastes;
5. Non-ferrous wastes; and
6. Mixed and undifferentiated materials (predominantly bulky waste)

Table 2 lists scenarios considered in this analysis and their results, also presented in Figure 13.

Table 2 Summary of the scenario analysis results.

Scenario number	Description	Total carbon impacts (tonnes CO_2eq.)	Reduction rate (%)
Scenario 0	Business as usual	620,105	-
Scenario 1	Targeted materials - 20% reduction (all)	4,380,400	-18%
Scenario 2	Textile (30%), plastic waste (40%), remaining targeted materials (20%)	3,972,700	-25%
Scenario 3	Textile (40%), plastic waste (15%), remaining targeted materials (20%)	3,986,800	-25%
Scenario 4	All materials (25%)	3,988,831	-25%

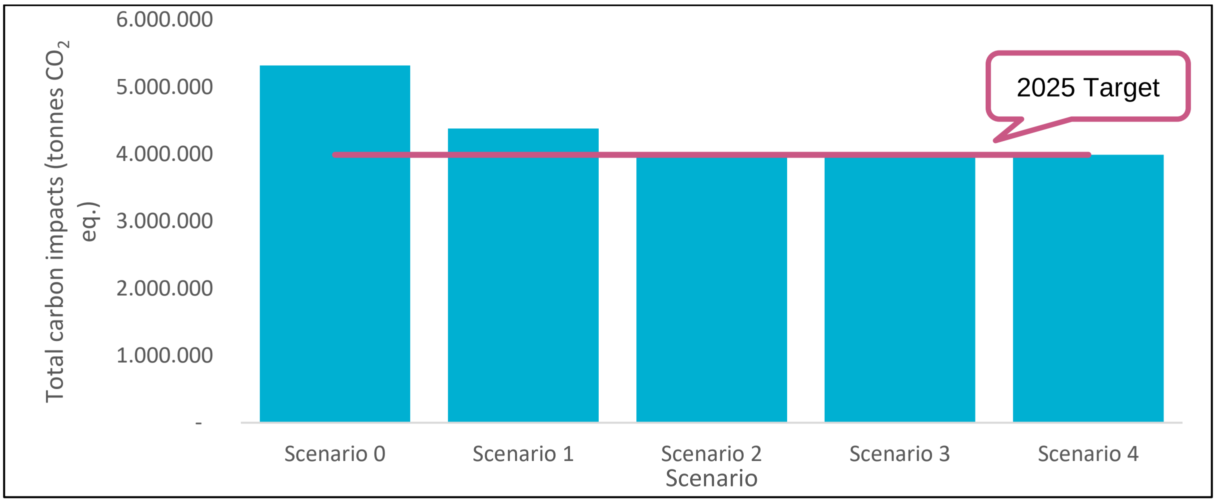


Figure 13 Results of the scenario analysis.

Results, presented in Figure 13, suggest Ireland can meet the 2025 carbon reduction target by adopting one of the following strategies:

1. Reduce the amount of textile waste by 30%, plastic waste by at least 40%, and the other targeted materials (i.e., food, paper and cardboard, metals, and bulky waste) by 20%;
2. Reduce the amount of textile waste by 40%, plastic waste by at least 15%, and other targeted waste by 20%; or
3. Introduce a waste reduction target of 25% for **all** materials.

It is worth mentioning that our analysis is based on waste reduction strategies without considering any improvements in recycling activities (diverting materials from incineration to recycling). What's more, we only looked at scenarios that prioritise waste reduction over improvements in waste disposal and treatment activities. Ireland seems to have a great opportunity to increase recycling rates, in particular for food waste, plastics and textile. Diverting these tonnages for recycling would ultimately lead to additional carbon savings, but ultimately waste prevention measures are the best approach to reduce the whole lifecycle impacts of waste to achieve the 25% reduction target.

Due to the limited availability of data necessary to develop Ireland-specific carbon factors, the Zero Waste Scotland's analysis team used insights provided by partners in Ireland alongside default datasets based on the Scottish Carbon Metric[7] to estimate the carbon impacts of waste generated in Ireland. Assumptions made by the analysis team include contamination rate, waste-to-energy efficiency rate, substitution rate (amount of virgin material offset by recycling), the composition of a number of waste categories (i.e., paper and cardboard, and textile). Identifying actual data for these parameters (actual composition, recycling routes, etc.) might provide more accurate assessment and have an impact on the recommendations, e.g. regarding the potential reduction or recycling of specific waste fractions.

It is strongly recommended to undertake further work to gather Ireland's specific granular data, in particular for high-carbon materials. This will help the analysis team to develop bespoke carbon factors to accurately quantify the carbon impacts of waste generated and managed in Ireland. Data requirements that should be prioritised are:

1. Composition of paper and cardboard waste to understand the split between these sub-groups.
2. Detailed breakdown of textile and plastic waste by subcategories: textile and plastic are carbon intensive categories so it would be key to know the type of materials captured here (e.g., natural vs synthetic textile fibre and meat and vegetables). It is also recommended to review the breakdown provided for food waste as the percentage of protein products is lower than percentages provided by other ACR+ members.

[7] Zero Waste Scotland (2020) The Carbon Footprint of Scotland's Waste Technical Report [Online]. Available at: www.zerowastescotland.org.uk/

CONCLUSION

The 2019 carbon impacts of municipal waste in Ireland are assessed by the Carbon Metric at **5.3 million** tonnes of carbon dioxide equivalent (t CO_2eq.), or **1.0 tonne CO_2eq./capita**.

To achieve a 25% reduction by 2025 as part of the ACR+ ‘More Circularity Less Carbon’ campaign, Ireland must reduce its waste carbon impacts by approximately 1.3 million tCO2eq, to a total of 3.9 million tCO_2eq.

Several scenarios, that focus on waste prevention measures, have been investigated in this report to explore pathways for Ireland to achieve the 2025 target.

Follow-up activities might include further investigation on the actual composition of carbon intensive materials as discussed previously, as well as the identification of actions and policies that could contribute to reach the aforementioned reduction targets. Moreover, a comparison with the analysis carried out for the other participants to the MCLC campaign will help to put the figures obtained in perspective.

Appendices

Appendix 1 Total amount of waste generated in Ireland (2019). Unit: tonnes

Waste category	Generated	Recycled	Waste-to-energy (Incinerated)	Landfilled
Acid, alkaline or saline wastes	0	0	0	0
Food waste	210,001	60,731	111,307	37,963
Animal faeces, urine and manure	0	0	0	0
Batteries wastes	9,811	8,613	1,028	170
Chemical wastes	0	0	0	0
Combustion wastes	0	0	0	0
Common sludges	0	0	0	0
Discarded electronic equipment	59,673	51,704	6,526	1,444
Discarded vehicles	0	0	0	0
Dredging spoils	0	0	0	0
Glass wastes	116,617	94,583	17,345	4,688
Health care and biological wastes	71,305	0	55,533	15,772
Household and similar wastes	92,018	28,011	49,498	14,509
Industrial effluent sludges	0	0	0	0
Ferrous wastes	23,201	9,787	10,562	2,852
Mixed ferrous and non-ferrous wastes	5,800	2,447	2,641	713
Non-ferrous wastes	29,001	12,233	13,203	3,565
Mineral waste from C&D	0	0	0	0
Mineral wastes from waste treatment and stabilised wastes	0	0	0	0
Mixed and undifferentiated materials	210,976	206,075	4,053	849
Other mineral wastes	0	0	0	0
Paper and cardboard wastes	259,309	127,065	106,037	26,208
Plastic wastes	184,488	46,814	105,291	32,383
Rubber wastes	0	0	0	0
Sludges and liquid wastes from waste treatment	0	0	0	0
Soils	23,280	20,014	2,558	708
Sorting residues	37,422	0	24,947	12,476
Spent solvents	1,198	0	1,028	170
Textile wastes	118,412	43,259	59,778	15,375
Used oils	1,198	0	1,028	170
Garden wastes	93,121	80,057	10,233	2,831
Waste containing PCB	0	0	0	0
Wood wastes	25,045	15,385	7,774	1,886
Grand Total	**1,571,878**	**806,779**	**590,369**	**174,731**

Appendix 2 Whole-life carbon impacts of waste generated in Ireland (2019). Unit: tonne CO_2 eq.

Waste category	Generated	Recycled	Waste-to-energy (Incinerated)	Landfilled
Acid, alkaline or saline wastes	0	0	0	0
Food waste	431,499	-1,474	-7,450	24,167
Animal faeces, urine and manure	0	0	0	0
Batteries wastes	55,797	-7,961	402	16
Chemical wastes	0	0	0	0
Combustion wastes	0	0	0	0
Common sludges	0	0	0	0
Discarded electronic equipment	272,239	-127,566	-367	46
Discarded vehicles	0	0	0	0
Dredging spoils	0	0	0	0
Glass wastes	104,731	-78,466	487	64
Health care and biological wastes	144,652	0	-3,436	9,818
Household and similar wastes	215,184	-64,769	-10,925	9,199
Industrial effluent sludges	0	0	0	0
Ferrous wastes	104,080	-37,253	-7,689	53
Mixed ferrous and non-ferrous wastes	33,195	-9,887	-1,964	13
Non-ferrous wastes	290,442	-100,573	-28,503	67
Mineral waste from C&D	0	0	0	0
Mineral wastes from waste treatment and stabilised wastes	0	0	0	0
Mixed and undifferentiated materials	568,155	55,891	18	567
Other mineral wastes	0	0	0	0
Paper and cardboard wastes	327,057	-3,124	-34,210	27,879
Plastic wastes	761,841	-12,402	187,394	404
Rubber wastes	0	0	0	0
Sludges and liquid wastes from waste treatment	0	0	0	0
Soils	269	30	0	15
Sorting residues	0	0	6,511	7,115
Spent solvents	1,167	0	1,979	0
Textile wastes	2,429,636	-256,034	19,089	9,701
Used oils	1,457	0	1,884	0
Garden wastes	0	1,276	-1,232	1,724
Waste containing PCB	0	0	0	0
Wood wastes	17,481	-9,892	-2,645	1,570
Grand Total	0	0	0	0

Appendix 3 Carbon factors for of household waste generated in Ireland (2019). Unit: tonne CO_2 eq. per tonne of waste.

Waste category	Generated	Recycled	Waste-to-energy (Incinerated)	Landfilled
Acid, alkaline or saline wastes	2.01	0.00	2.20	0.00
Food waste	2.05	-0.02	-0.07	0.64
Animal faeces, urine and manure	0.00	0.00	0.00	0.00
Batteries wastes	5.69	-0.92	0.39	0.09
Chemical wastes	1.16	4.20	1.15	0.11
Combustion wastes	0.00	0.00	0.00	0.01
Common sludges	0.00	0.00	0.00	0.00
Discarded electronic equipment	4.56	-2.47	-0.06	0.03
Discarded vehicles	6.57	-2.24	0.00	0.00
Dredging spoils	0.00	0.00	0.00	0.00
Glass wastes	0.90	-0.83	0.03	0.01
Health care and biological wastes	2.03	0.00	-0.06	0.62
Household and similar wastes	2.34	-2.31	-0.22	0.63
Industrial effluent sludges	0.00	0.00	0.00	0.00
Ferrous wastes	4.49	-3.81	-0.73	0.02
Mixed ferrous and non-ferrous wastes	5.72	-4.04	-0.74	0.02
Non-ferrous wastes	10.01	-8.22	-2.16	0.02
Mineral waste from C&D	0.37	0.00	0.03	0.01
Mineral wastes from waste treatment and stabilised wastes	0.00	0.00	0.00	0.00
Mixed and undifferentiated materials	2.69	0.27	0.00	0.67
Other mineral wastes	0.00	0.00	0.00	0.00
Paper and cardboard wastes	1.26	-0.02	-0.32	1.06
Plastic wastes	4.13	-0.26	1.78	0.01
Rubber wastes	2.76	-1.28	1.18	0.01
Sludges and liquid wastes from waste treatment	0.00	0.00	0.00	0.00
Soils	0.01	0.00	0.00	0.02
Sorting residues	0.00	0.00	0.26	0.57
Spent solvents	0.97	0.00	1.92	0.00
Textile wastes	20.52	-5.92	0.32	0.63
Used oils	1.22	-0.70	1.83	0.00
Garden wastes	0.00	0.02	-0.12	0.61
Waste containing PCB	0.00	0.00	0.00	0.00
Wood wastes	0.70	-0.64	-0.34	0.83

-25%
BY 2025

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