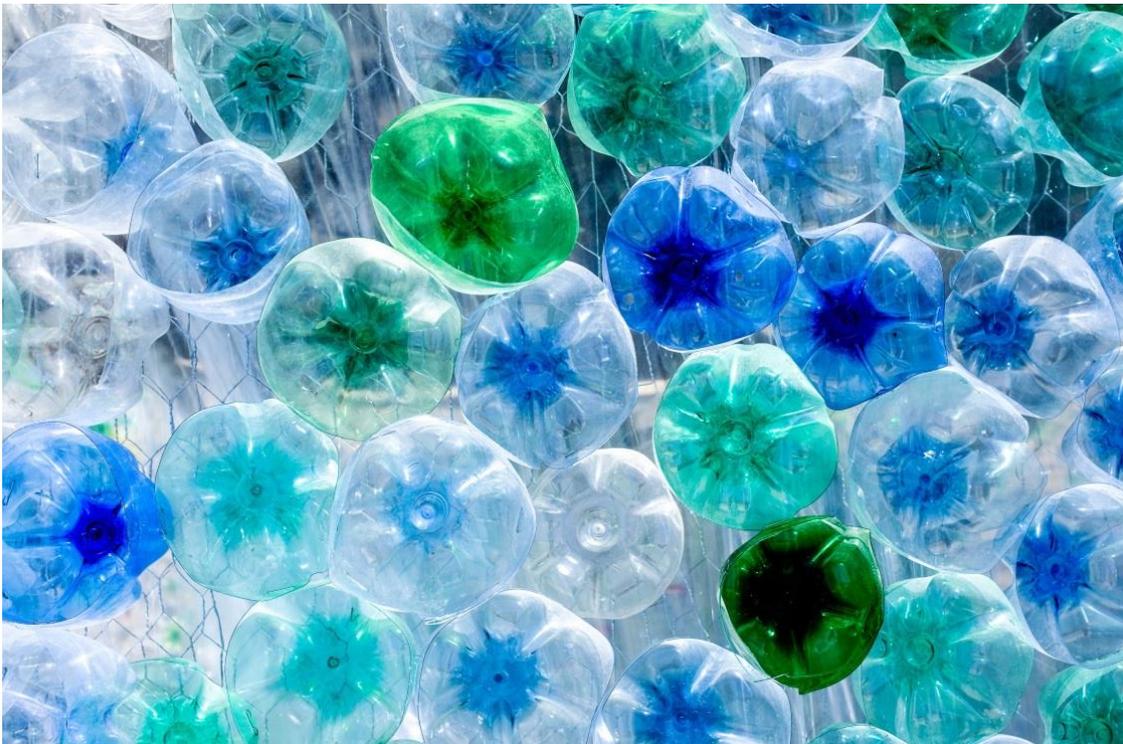


Minimum thickness of plastic bottles to be recycled – research summary

Calculation of minimum thickness of rigid plastic packaging in order to be recycled



A study has been undertaken to determine whether there is a minimum thickness rigid plastic packaging should be for it to be recycled effectively. Light weighting through the reduction in material usage has a positive impact as less raw material is used, however there are concerns that some packaging may be so thin that it cannot be recovered and recycled.

This document provides a short summary of the project. For more information the full report is available [here](#).

To determine what impact light weighting has had on the recycling process, feedback has been obtained from 11 different Materials Recycling Facilities (MRFs) and six Plastics Recycling Facilities (PRFs).

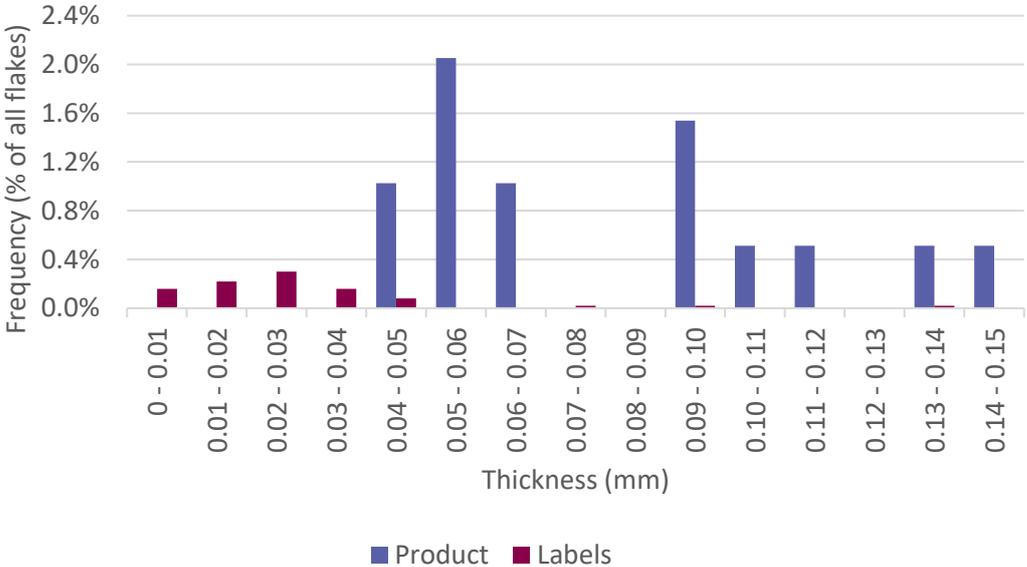
As well as obtaining qualitative feedback, sampling from three MRFs (two lots of sampling on PET bottles and one on HDPE) and two PRFs (both recycling PET) was carried out.

All MRFs felt that thin packaging was not more difficult to recover than thicker packaging. The most important thing for effective recovery is the presentation of the material to the Near Infrared (NIR) sorters. Packaging should be flattened to enable effective sorting as this creates a more stable area for ejection using air jets. If the material is round it can roll on belts leading to a loss in efficiency during sorting.

The sampling from the MRFs showed that the thin material was recovered to the product stream effectively and from a sorting point of view there is unlikely to be the need for a minimum thickness specification.

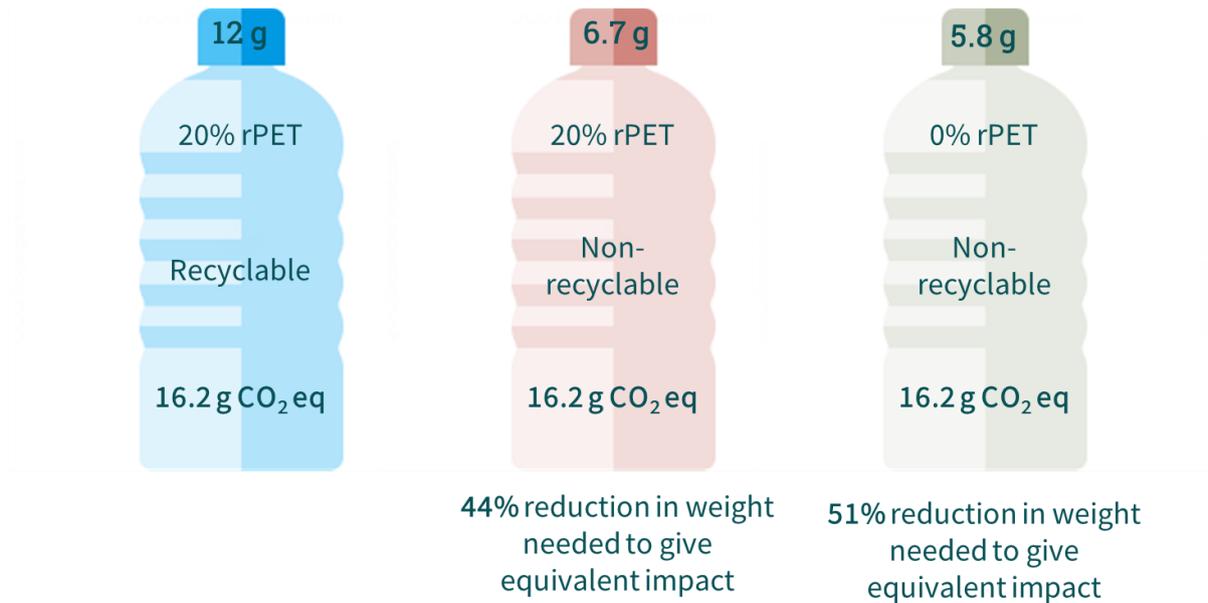
Surveys of the UK PRFs also suggested there was no negative impact from light weighting, however sampling and analysis was carried out at two PET PRFs.

The assessment showed that flakes with a thickness of <0.05 mm were not recovered to the product stream and were removed with the label material. Therefore, to be recycled, material should be 0.05 mm or thicker. The graphs below show that material <0.05 mm thick was rejected with labels.



A high-level carbon footprint comparison shows that to justify reducing the thickness of a PET bottle beyond 0.05 mm, a weight reduction of 44% - 51% is required. Since only 2% of bottles have a mid-section of <0.05 mm currently, this level of further light weighting would be very extreme, and not likely to be feasible.

The graphic below compares what weight bottles with various recyclability and recycled content would need to be to maintain the same carbon footprint.



This study provides qualitative and quantitative evidence that packaging designers and specifiers should aim to achieve a minimum thickness of 0.05 mm for the packaging to be recycled. This is based on the data obtained for the PET bottle recycling process, but can be applied to HDPE and PP also.



Light weighting will have an indirect impact on the recycler, in that moisture and contamination which sticks to the surface will account for more of the input material by mass. In addition, as recycling processes work on volume and number of items, throughput can also reduce as a result of light weighting. This leads to more challenging economics for the recycler, which in the long term may need subsidy through Extended Producer Responsibility (EPR)

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