

Science for Environment Policy

Recycled plastic reduces carbon footprint of packaging

Increasing the use of recycled materials could substantially reduce the carbon footprint of plastic packaging, research suggests. A new study of the life-cycle of plastic trays has shown that increasing the proportion of recycled material could lead to a significant reduction of greenhouse gas emissions.

More than half of all goods in Europe are packaged in plastic; on average, 29 kg per person each year. Of the 57 million tonnes of plastics produced in Europe annually, 39% is packaging. Achieving reductions in [greenhouse gases](#) and landfill waste therefore requires a sound understanding of the life-cycle of plastic packaging.

A detailed life-cycle assessment was conducted to calculate the carbon footprint of 85% recycled polyethylene terephthalate (PET) food trays manufactured by a company in Ireland. Greenhouse gas emissions - measured in terms of impact equivalent to kilograms of CO₂ (CO₂e) - were calculated at each stage of the life-cycle and options for reductions were identified.

Researchers examined all stages of manufacture, from transport and usage to waste management. Primary data, such as metered electricity usage, were collected for the manufacturing stage, and secondary data, such as previously published estimates of emissions from crude oil extraction and transportation, were used to assess pre-manufacturing emissions. Assumptions and data sources were in accordance with British Standards and Publicly Available Specifications.

The carbon footprint of 1kg of PET trays was 1.54 kg CO₂e. Despite being made from 85% recycled PET, the greatest proportion of greenhouse gas emissions of any life-cycle stage (45%) were attributed to the supply of the raw material (15% virgin PET and 85% recycled PET). The results indicate that if trays were made of 100% recycled materials, carbon footprint would be reduced by 24%. However it is worth noting, that by changing the assumptions in the study, the results might have been different - particularly the allocation of emission for the End of Life/recycling life cycle stage.

After raw materials, tray manufacturing produced the most emissions (38%). Potential savings were identified through avoiding unnecessary sealing processes (which require virgin PET to make the packaging airtight), thus increasing the proportion of recycled PET with consequent emissions, resulted in reductions of up to 24%, with no sealing. Lighter trays and faster production lines also promised notable footprint reductions of up to 28% and 14% respectively. The footprint of materials used to package the trays, such as wooden crates, cardboard, and shrink-wrap, was relatively minor (5% of emissions), as were the transportation stages (3% of emissions).

The study illustrated the potential for major improvements in carbon footprint resulting from life-cycle assessment. The methods outlined could help identify the best ways of reducing the environmental impact of packaging. The authors suggest their approach will also be particularly useful to the industry if in future plastics producers have a legal obligation to measure the carbon footprint of their products.



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