

The carbon footprint of corrugated packaging 2021

Background

The carbon footprint for corrugated packaging presented here has been calculated in accordance with the frameworks set out in the CEPI’s “*Framework for Carbon Footprints for Paper and Board Products, April 2017*” and the subsequent CITPA “*Guidelines for calculating carbon footprints for paper-based packaging, March 2018*”. As recommended by these documents, the value calculated covers the cradle-to-grave carbon impact of corrugated packaging, taking account of fossil and biogenic greenhouse gas (GHG) emissions and removals and emissions from direct land use change (dLUC). The CEPI and CITPA frameworks have been subject to an independent peer review by ifeu – Institute for Energy and Environmental Research Heidelberg GmbH, Heidelberg, Germany – and have been found to be compatible with the requirements of the “Product Life Cycle Accounting and Reporting Standard” of the Greenhouse Gas Protocol by the World Resources Institute.

Results

The cradle-to-grave carbon impact has been calculated at 491kg CO₂equivalents per tonne of corrugated packaging, as summarised in the table below:

Fossil GHG emissions	Biogenic GHG emissions	GHG removals	Direct land-use	Total
669 kgCO ₂ e	442 kgCO ₂ e	-624 kgCO ₂ e	4 kgCO ₂ e	491 kgCO₂e

In addition to the quantitative results, attention is also drawn to the following statements that should be considered when evaluating the carbon impact of paper-based packaging.

- 1) All paper and board products have two unique positive attributes: they are based on a renewable raw material, using as a starting point the capacity of forests to bind CO₂; the recycling of paper and board products delays this CO₂ from returning to the atmosphere.
- 2) When forests are managed sustainably, carbon stocks are growing or at least stable. According to the European GHG inventory¹, forests of the EU-28 are a net carbon sink, with net CO₂ removals by forests having increased by over 19 % between 1990 and 2014.

Interpretation

Primary data for production of liner and fluting materials and for conversion of these into corrugated boxes was sourced from the 2021 European Database for Corrugated Board Life Cycle Studies. Secondary data for other unit processes was derived from publicly available databases, as detailed in an Annex to the CITPA guidelines. Many of the corrugated base paper grades considered in this life cycle database incorporate recovered fibres (on average 88%). The main raw material for the recovered paper mills producing corrugated base papers is used corrugated board. Therefore, a closed loop approach to recycling has been considered.

Compared to the 2018 calculation, the result for 2021 represents a 7% reduction in the footprint of corrugated products. These reductions have been achieved through a combination of efforts by the papermills and the corrugated converters (for example, reductions in fossil fuels consumed in favour of other sources of energy) and through changes in emission for upstream processes and suppliers (for example, decarbonisation in the power sector).

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¹ Annual European Union greenhouse gas inventory 1990–2014 and inventory report 2016, https://acm.eionet.europa.eu/reports/EEA_Rep_15_2016_annualGHGinv