

Carbon reduction on paper

The European kraft paper and paper sack industry has put further efforts into improving its carbon footprint. The latest carbon impact analysis on European paper sacks carried out by the Swedish research institute RISE on behalf of the European Paper Sack Research Group (ESG) - a collaboration between EUROSAC and CEPI Eurokraft - shows the significant progress made in recent years.

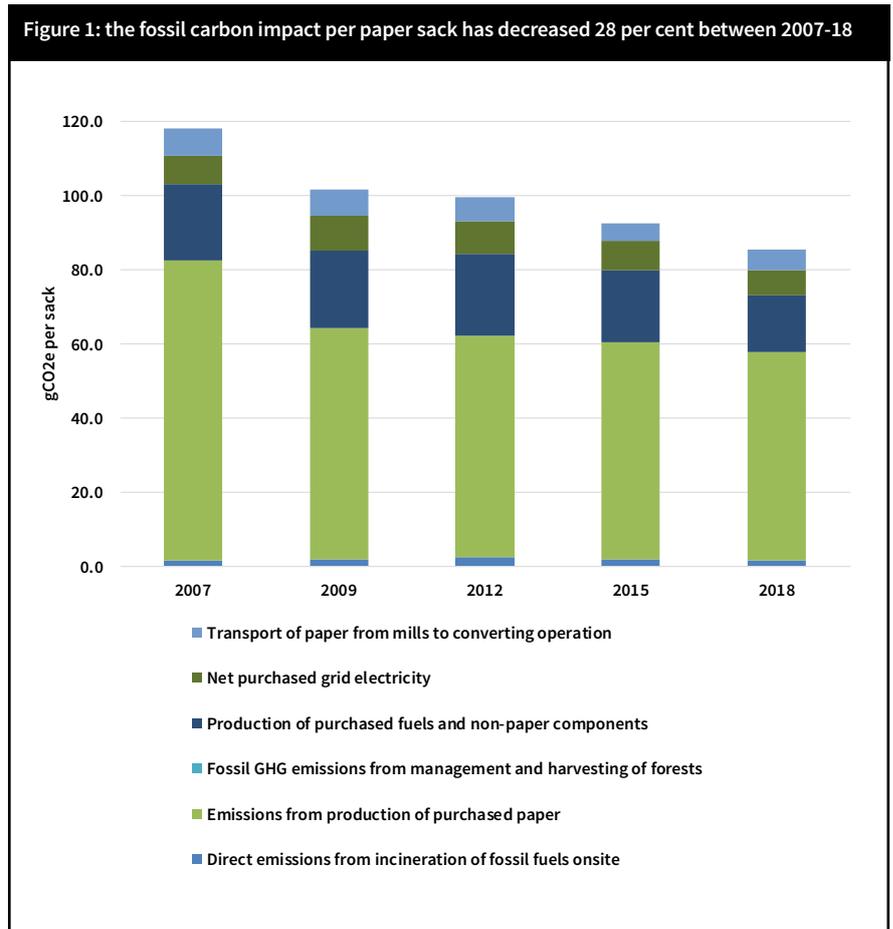
■ by **EUROSAC**, France

Analysis into the carbon footprint of European paper sacks has been carried out by the Swedish research institute RISE using two different methods. Both calculations are based on tools developed by the International Confederation of Paper and Board Converters in Europe (CITPA) and by the Confederation of European Paper Industries (CEPI).

- As the first step, a cradle-to-gate calculation of the fossil carbon impact of sack kraft paper and paper sacks was carried out following the CEPI and CITPA guidelines established in 2007.
- In the second step, the study included the total carbon impact (ie, fossil carbon emissions, biogenic carbon emissions and biogenic carbon removals).

Data sources

The calculations make use of the gate-to-gate life cycle inventory data covering sack kraft paper production and paper sack converting compiled by CEPI Eurokraft and EUROSAC for 2018 from representative European mills and converting facilities. Fossil GHG emissions factors for electricity are sourced from the International Energy Agency (IEA) Emissions Factors 2019. Carbon factors for emissions and removals have been sourced from the recognised life cycle



inventory databases ecoinvent, GaBi professional, and the European reference Life Cycle Database (ELCD).

Paper sack specifications

Paper sacks are manufactured from sack kraft paper combined with other components to deliver an effective, lightweight and functional package. The sack kraft paper is made from newly-sourced fibres. The paper sack composition considered in the research by RISE is summarised in Table 1.

Research results

The recently-published report by RISE on the fossil carbon footprint of average European paper sacks summarises an impressive achievement. Between 2015-18, the industry improved its carbon

Table 1: paper sack components		
Component	Composition (g)	Composition (%)
Paper	117.2	92.7
Film (HDPE/LDPE)	5.0	4.0
Glue (starch & PVA glues)	2.6	2.0
Ink	1.4	1.1
Other components	0.2	0.2
Total	126.4	100

Table 2: CO₂e emissions per paper sack

Description	Fossil GHG emissions (g CO ₂ e)	Share in production (%)
Production of purchased kraft paper	56	66
Production of purchased fuels and non-paper inputs	15	18
Production of purchased electricity	7	8
Transport to converting operation	5	6
Direct emissions from production site	2	2
Total	85	100

emissions during the subsequent stages of production from cradle to the factory gate by eight per cent: from 92g CO₂e to 85g CO₂e.

The result is partly due to lighter paper weights based on improved paper quality and a reduction in the share of other materials (such as plastic films) in the paper sack.

As Table 2 shows, emissions arising during kraft paper production account for 66 per cent of the total carbon footprint for each individual paper sack and improvements in paper have a significant impact on overall carbon emissions of the paper sack.

Per tonne of sack kraft paper, the fossil carbon impact fell by 0.5 per cent from 458kg CO₂e in 2015 to 455kg CO₂e in 2018.

Climate-friendly and efficient production

One key factor is climate-friendly production. Sack kraft paper production is already, to a high degree, energy self-sufficient: 77 per cent of all energy needs

(heat and electricity) are generated on-site.

Moreover, renewable energy sources form a considerable part of the process. To generate heat, steam and electricity, 89 per cent of the fuels used are from renewable sources. The majority of them (ie, 81 per cent) are produced as side streams from the pulp and paper-making process. Fossil fuels only account for 11 per cent of the fuel mix.

Positive climate impact with extended system boundaries

When extending the analysis to include biogenic GHG emissions and removals in the calculation, paper sacks are already climate-positive packaging solutions. Biogenic emissions arise from the combustion or degradation of biofuels and bio-based products. The removals refer to the carbon sequestration that is associated with forest management, the production of biofuels and of bio-based non-fibre inputs such as starch. These cradle-to-gate biogenic removals

are -447g CO₂e per paper sack while the cradle-to-gate biogenic emissions associated with the combustion of fuels are 327g CO₂e per paper sack. This results in a net biogenic carbon footprint of -120g CO₂e per paper sack in 2018. In combination with the cradle-to-gate fossil carbon footprint of 85g CO₂e per sack, the result is -35g CO₂e per paper sack, therefore having a positive impact on the climate.

EU action plan target exceeded

When looking at long-term data, there is a consistent downward trend in the cradle-to-gate fossil carbon impact of average European sack kraft paper and paper sacks. It even exceeds targets set by the EU climate action plan for reducing GHG emissions by 20 per cent between 1990 and 2020. In just 11 years (2007-18), the fossil carbon impact per tonne of sack kraft paper has been lowered by 20 per cent (from 570 to 455kg CO₂e). With a 28 per cent improvement (from 118 to 85g CO₂e), the result for paper sacks is even more significant (see Figure 1).

Continued drive

The European kraft paper and paper sack industry expects to continue improving its imprint in the future. "With a reduction of the emissions by 40 per cent to even 55 per cent, the EU has set an ambitious target for 2030," says Catherine Plitzko-Kerninon, EUROSAC's general delegate. "Paper sacks are a low-carbon, circular and bio-based packaging solution – this is a good starting point for our industry to contribute to its achievement." ■