DEEP – DYNAMIC ELOPAK ENVIRONMENTAL PERFORMANCE

DEEP v13 (DEEP Europe) and v6 (DEEP Americas) Tool Description

DEEP is a tool developed to calculate the specific carbon footprint of the various products offered by Elopak. This document provides a description of Elopak's products, the methodology, process map, system boundaries, inclusions, cut-offs and allocation rules relevant for the calculations provided in DEEP.

The methodology used is in line with the ISO standards for Life Cycle Assessments (ISO 14040 and 14044). The Product Category Rules for beverage cartons were followed where relevant to the carbon footprint calculation methodology (PCR Beverage Cartons 2011:04 Version 1.0, developed in accordance with ISO 14025:2006, and valid until 2019). The PCR applies to beverage carton packaging systems for liquid food.

ELOPAK'S PRODUCTS

Elopak produce beverage cartons (packaging containers made of polymer-coated liquid packaging board) for liquid foods.

The illustration below shows the value chain of the beverage carton, from raw material to end of life, indicating the scope of DEEP. The footprint is given as a "cradle-to-gate" calculation, considering all emissions connected to the production of all raw materials, Elopak's own operations (coating, printing and conversion), and all transportation up to the delivery at Elopak's customers' gate. The scope covers all of Elopak's operations apart from Elopak's joint ventures in Mexico and Dominican Republic. There are two versions of DEEP that follow the same methodology: DEEP Europe and DEEP Americas but cover different regions.

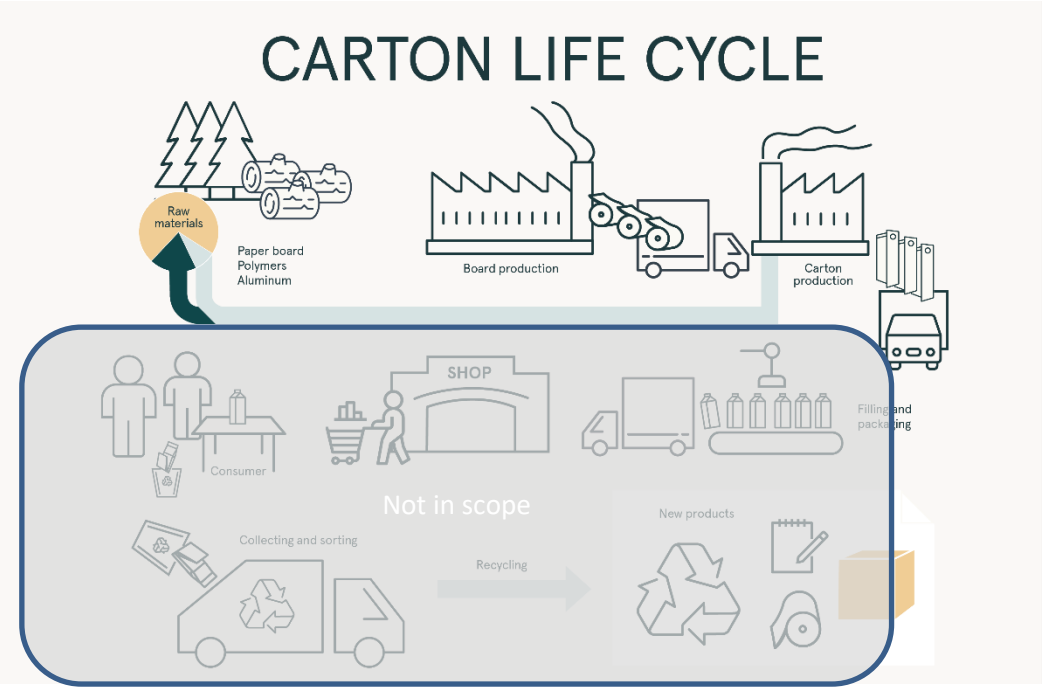

Figure: The beverage carton value chain

The figure below shows the main components of Elopak's products. For each of the components, Global Warming Potential (GWP)[1] or Greenhouse Gas (GHG) emission data (provided in CO_2e[2]) from suppliers or from databases are collected and entered into the DEEP tool. When choosing a product type, configuration, size, cap and production site, the correct CO_2e figure is found, depending on the actual amount of material in each product type.

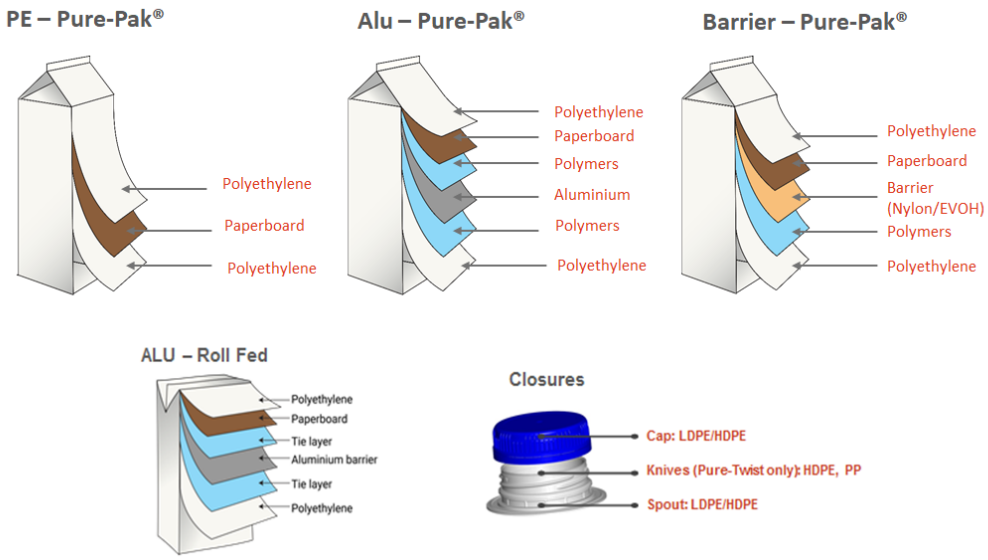

Figure: Main components in Elopak's products

The table below lists the main components in our products with reference to source of data.

Component	*Description of data source/reference*
Paperboard	Primary data from suppliers, with a weighted average for Elopak's purchase (for the preceding year), is calculated. American and European suppliers are differentiated. All suppliers have provided specific LCA information on the paperboard's GWP, which is reviewed against the scope and boundaries of the DEEP tool. Data from paperboard suppliers is updated on an annual basis. Elopak only purchase paperboard which contains fibre sourced from acceptably managed forests; either from forests certified according to the FSC "Forest Stewardship Council" standard or FSC controlled wood sources.

[1] Global warming potential (GWP) describes the radiative forcing impact of substances with the ability to absorb infrared radiation from the earth. The main substances contributing to global warming are carbon dioxide, methane and dinitrogen oxide.

[2] CO_2e means CO_2 equivalent, which is a calculated equivalent to CO_2 for other relevant greenhouse gases with global warming potential (such as methane, dinitrogen oxide, etc.)

PE (LDPE, HDPE, PP)	Ecoinvent database: polyethylene production, low density, granulate; kg; RER; EI3.71 cutoff polyethylene production, high density, granulate; kg; RER; EI3.71 cutoff
Renewable PE	Primary data from two suppliers, weighted average for Elopak's purchase is calculated. Suppliers have provided specific LCA information on GWP. All data is separately evaluated by a third party and calculated to comply with Elopak's methodology in DEEP. See below for treatment of biogenic carbon.
EVOH	A proxy factor of EVA, a precursor of Ethylene Vinyl Alcohol Copolymer (EVOH), is used since Europe-wide data is not available for EVOH. (Ecoinvent, EI3.8 cutoff).
Nylon	BASF Product Carbon Footprint of UltramidB33 L BMB (2019) 6
Aluminium	GWP from an International Aluminium Institute publication, and other impacts are from LCI data the IAI published characterised by Recipe Midpoint Data (NREL calculated figure)
Tie layers (different materials)	Calculations made based on data from PlasticsEurope (for some materials, EcoInvent 3.1 is used)
Ink	1 kg toner production, colour, powder, GLO (Ecoinvent 3.71)
2nd packaging – wrap or box around blanks	Europe: EcoInvent; 'Kraft paper, unbleached, RER (virgin)', and 'Solid unbleached board, RER, European average share (recycled and virgin)' Americas: EcoInvent; Corrugated board box, global Flat cartons (blanks) are packed either in a paper wrap or in a corrugated box. This is chosen at the report configuration.
2nd packaging – PE wrap around pallet	Calculations based on data from PlasticsEurope. Wraps or boxes with cartons are stacked on pallets and wrapped in plastic/cling film prior to shipment. Film extrusion processes are applied using Ecoinvent processing factors Film extrusion, RER, EcoInvent 3.1.
Closures	Calculations made based on data from PlasticsEurope (Europe) or Ecoinvent (Americas), see above. Renewable caps are available; these apply the renewable plastics factors as above. The caps were treated as a component part and as such the environmental impacts were calculated for the embodied impact of the raw materials and the transportation of the final caps from supplier to converting factory. No utility data from the cap manufacturing factory was included; the environmental impacts associated with a typical injection moulding process are accounted for in the LCI data set from PlasticsEurope and in Ecoinvent (Injection moulding, RER, Ecoinvent 3.71, with uplift)
Production	Figures based on Elopak's externally audited annual environmental reporting. The data is taken from Elopak's reporting tool "Footprinter" (data from the year before the DEEP version) and is including Elopak's purchase of renewable energy certificates (Guarantees of Origin). Elopak purchase certificates to ensure 100% renewable electricity throughout all plants.
Transport	Figures based on Elopak's externally audited annual environmental reporting. Both inbound transport, internal transport between sites and transport to the customer's gate, are included. Transport data is calculated based on reporting from Elopak's units (data from the year before the DEEP version). Google Maps and searates.com was used to determine distances, assuming the fastest route. DEFRA factors for transport were used in the calculation: DEFRA updated 2022 emission factors / Road - HGV (all diesel) / Articulated (>33t) / 100% laden; DEFRA updated 2022 emission factors / Rail

	/ Freight train; and DEFRA updated 2022 emission factors / Cargo ship / Container ship.

METHODOLOGY

The scope of DEEP only covers GHG emissions presented as CO_2e per package, not other environmental impact categories.

System boundaries:

LCA are commonly divided into three life cycle stages. The figure below shows the full system boundary as described in the PCR. The upstream stage includes raw material supply and transport, the core stage includes manufacturing (coating and converting) of the paperboard and transport between these two stages and the only downstream process included is transport to the filling factory.

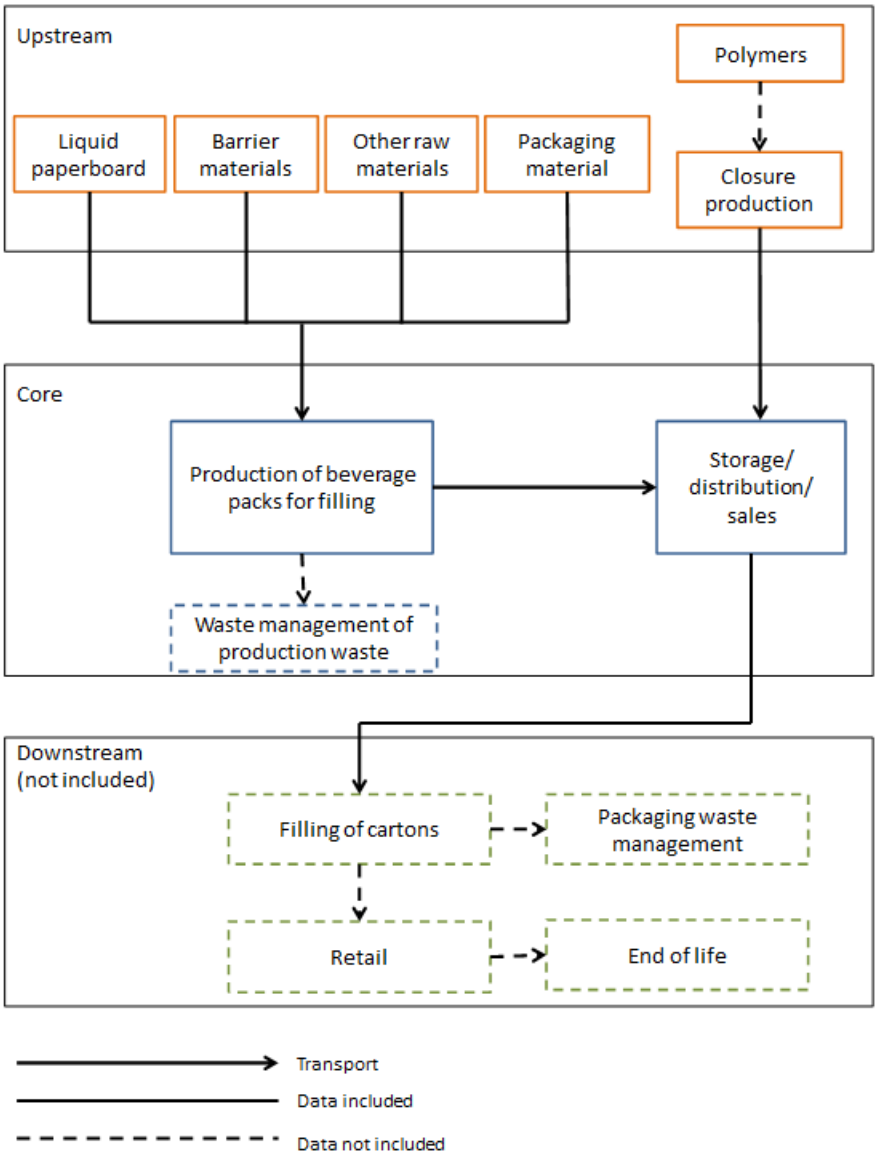

Figure: System boundaries in DEEP

Cut-offs & exclusions

The cut off point for this project is the entry gate of the beverage filling factory; this means the environmental impacts associated with the operations inside the filling factory are not included in DEEP.

The PCR states that any material which accounts for less than 1% of the functional unit, by weight, does not need to be reported. Still, Elopak has chosen to include some elements not strictly required in DEEP. Ink accounts for less than 1% of the functional unit by weight; however, it has been included in the calculation. The polyethylene wrap used for packaging the finished blanks is made of low-density polyethylene, this material is less than 0.001% of the final weight, however LCI data has been included for this material as it is made of the same type of low-density plastic used to coat the blank (PE).

Pallets are not included in the footprint.

Treatment of biogenic carbon

Biogenic carbon is carbon which is part of the natural carbon cycle (sometimes called the short-term carbon cycle). It refers to carbon that is taken up (or released) by plants.

When renewable materials are sourced for our products, some of the carbon absorbed from the atmosphere while they are grown is not released back into the atmosphere in the medium term (within 50 years). This happens when our products end up in secondary products or landfill. We are able to account this uptake as net negative emissions. To calculate a fair and conservative amount of negative emissions, we use an assumption of 51.4%[4] of the product ending up in landfill and assume all the remaining product is incinerated. Recycling benefit is treated as allocated to the follow-on product system (a 'cut-off' approach), i.e. potential credits are excluded.

In DEEP calculations, we currently only include this carbon uptake credit for the use of renewable plastics. We do not include these benefits from the paperboard itself. We do this as this sequestration benefit is a key specific benefit of using renewable plastic (over conventional plastic) and it is therefore important to represent the difference when comparing with the conventional plastic product.

For more information about this subject or to find out the effect that including net-negative emissions for paperboard has on the overall product's impact, please request the Elopak factsheet on biogenic carbon.

References

1. Product Specification Criteria for Paper Beverage Cartons, UN CPC 32153. The International EPD System. (2011)
2. Defra's Greenhouse Gas Conversion Factors Spreadsheet. Defra and Decc.
3. 'Plastics Europe' Association of Plastic Manufacturers http://www.plasticseurope.co.uk/
4. Average global landfill rate, based on UNSD/UNEP Questionnaires on Environment Statistics, Waste section; Eurostat Environmental Data Centre on Waste; and OECD Environmental Data Compendium, Waste section. https://unstats.un.org/unsd/environment/wastetreatment.htm

VERIFICATION STATEMENT

Elopak developed this tool in cooperation with Anthesis, who advised on calculations and secondary sources of data. Anthesis is confident that, at the time of review, the tool provided a fair representation of the carbon footprint of Elopak's cartons in line with the methodology described above. This applies to version 13 (DEEP Europe), June 2023, and version 6 (DEEP Americas), June 2023.

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