Pro Carton Information

Sustainability and Cartonboard Packaging

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An introduction to cartonboard packaging's perspective on sustainability

Update 2010 An introduction to cartonboard packaging's perspective on sustainability

PRO CARTON

Association of European Cartonboard and Carton Manufacturers

Respecting the Environment



Packaging helps the environment by preventing waste and hence the loss of resources used to grow or manufacture the packaged product. If there were no packaging, food and other goods would be lost due to handling damage, lack of hygiene and insufficient information on product use. Using folding cartons to package goods has many advantages:

Recovery, Recycling, Composting Cartons

The paper and board industry has a well established recovery infrastructure in Europe. Cartons are collected from the home or kerbside and sent via waste paper merchants to mills for recycling. In 2007, paper and board packaging achieved a recycling rate of 80% in Europe.

Around 60% of cartons in Europe are made from recycled cartonboard. Wood fibres can be recycled several times before an input of virgin fibre is needed to maintain board strength.

Cartonboard is ideal for composting as wood fibre is biodegradable. It is most suitable for that part of the waste stream that cannot be recycled due to technical and cleanliness reasons.

Energy Use in Cartonboard Production

Approximately 50% of all primary energy used in the European pulp, paper and board industry is biomass based, with the wood by-products providing renewable energy in the form of electricity and steam for the manufacturing process. The industry is the largest producer and consumer of biomass based energy – 25% of the EU total – thus avoiding the use of non-renewable energy sources such as fossil-based oil, coal or gas. This also means the industry is more carbon efficient. Fossile CO2 emissions per tonne have fallen by 29% since 1990.

Over 90% of European mills have installed combined heat and power (CHP) plants, mainly based on biomass and natural gas. Combining the production of electricity and heat provides savings in fuel consumption in the order of 30-35% compared to separate production.



Biomass: Paper and Board Production or Energy Production?

At first glance, burning wood to generate energy for a national grid is an easy solution to meet demand. But it is not efficient or sustainable, as it would lead to pressure on forests and higher costs. Using wood as a raw material for the paper and board industry creates four times more value and retains six times more jobs than the energy sector would by burning wood.

Water Use in Cartonboard Production

Water is an essential element for paper and board production. Water acts as a bond between the fibres and in the production process, is needed for transporting, cleaning, as a solvent, carrying energy in the form of steam and is used in cooling process units. Water is usually taken from a nearby surface source such as a lake or river. 95% of the water used in the industry is cleaned and reused on site. All waste water is purified at the mill in accordance with European regulations and standards, before being returned to the environment. Mills are working to reduce process water use as this makes good economic as well as environmental sense. Over the past thirty years, use of water has reduced by around two thirds.

Sustainable Forest Management

Cartons' raw material is cartonboard made from wood fibres. Around 80% of the wood used to make paper and board in Europe, comes from European forests, with the remainder coming from outside the EU. No tropical rainforest wood is used.

European forests used by the paper and board industry are sustainable, since every year, new growth exceeds the wood harvested by an area equivalent to 1.5 million football pitches. Forests offer a natural habitat to vast numbers of different species of plants and animals. Management of the forest for timber production and leisure activities provides economic benefit to the owners and local communities.

Forest owners and operators carefully manage their forests and can prove that their forests are well managed through certification schemes, such as PEFC (Programme for the Endorsement of Forest Certification Schemes) and FSC (Forest Stewardship Council).

A "chain of custody" certificate provides traceability at each stage of processing of the wood. However, for many years, forest operators have been able to demonstrate full traceability and that their wood comes from well managed and legal sources.

Climate Change

The forest plays an important role in climate change mitigation. Forests are a growing raw material source and using the renewable material from the forest is part of nature's cycle. Carbon dioxide is absorbed in the trees as they grow and is also fixed in the ground via roots and stumps. Wood fibres from the forest which are made into cartonboard, store carbon in the converted product – the carton. In addition, recycling cartons keeps the carbon dioxide locked up and prevents it returning to the atmosphere. Cartonboard products therefore provide better packaging solutions from a carbon footprint perspective, than products which are made from fossile – based materials.

Carbon Footprint

In 2008, Pro Carton, representing the European cartonboard and carton industry, calculated an industry average carbon footprint, beginning at the forest and ending at the exit door of the carton converter. It showed that carbon stored in cartonboard products is 1474kg/tonne. Fossil CO_2 emissions from cartonboard produced and converted is 964 kg/tonne. This is a 7% improvement in the industry's environmental performance when compared to its Carbon Footprint measured in 2005.

The process whereby trees absorb and store carbon is measured in terms of biogenic carbon. The carton industry commissioned IVL, Swedish Environmental Research Institute, to explore the link between the forest and the folding carton and to develop an approach for including biogenic flows of carton products into carbon footprints for cartons. IVL's Report[1] proposes that consumer demand for cartons stimulates demand for timber (wood fibre to make cartonboard) which in turn encourages the sustainable management of forests. IVL suggests that the net biogenic sequestration in the forest (i.e. removals from the atmosphere) is 730 kg / CO_2 equivalents per tonne of cartons. Therefore choosing cartons encourages the capturing of CO_2 to make a renewable material.

In a cradle-to-gate approach, the emissions of 964 kg/tonne fossil CO_2e per tonne of cartons is significantly compensated by the figure of -730 kg biogenic CO_2 sequestration

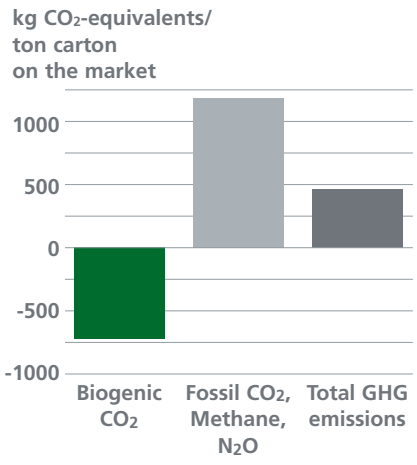
Summary Chart

The Carbon Footprint proposed by IVL presents the net flows as CO_2e. (The delay in emissions according to PAS 2050 at use and in landfills are not included)

Description of carbon footprint of 1 tonne of converted Carton. Given as GWP 100	GHG emission (kg CO_2/tonne Carton)	Biogenic CO_2 (kg CO_2/tonne Carton)
Biogenic CO_2 net sequestration in managed forests		-730
GHG emissions from production and transport of converted cartons	964	
Summary Cradle to Gate	**964**	**-730**
Emissions associated with end of life	308	
Avoided emissions at end of life	-145	
Summary Cradle to Grave including avoided emissions	**1127**	**-730**

Source: IVL Report

The results proposed by IVL for the cradle-to-grave approach can be illustrated:



[1] The IVL Swedish Environmental Research Institute report "Carbon Footprint of Cartons in Europe – Carbon Footprint methodology and biogenic carbon sequestration" can be downloaded as a pdf from: www.procarton.com / Sustainability / Environment / Carbon Footprint

Cartonboard Packaging and Society

Without packaging it would simply not be possible for consumers to have access to, and use most of the products which are available today. Folding cartons are the most versatile of packs.

Cartons are used to package a wide range of products, from foodstuffs to non food products such as pharmaceuticals. 40% of folding cartons in Europe are used for non-food packaging and 60% for food and other applications.

Innovative packaging solutions with eye-catching designs ensure that cartons are the natural choice on the supermarket shelf. The versatility of cartonboard packaging is ideally suited to promote the packed product:

- creative, innovative designs can be achieved through print, surface texture and structural shape.
- prototypes can be quickly and effectively produced
- flexibility is available in choice of cartonboard material, carton making and packaging operations
- short production lead times enable goods manufacturers to respond to changing market conditions such as surges in volume and the need for promotions
- efficient use of space in palletisation, transportation and in merchandising at point of sale

The carton through its graphics, structure and material can reflect brand values and help brands to get "top of mind" positioning with consumers when they are ready to buy at point of sale. A recent study by TNS Dimarso showed that "cartonboard communicates brands a lot better than other packs".*

Consumers like cartons

Cartons are well known and liked by consumers. They elicit a warm, emotional response and studies have shown that consumers like the feel of cartons. Research has also shown that consumers appreciate that cartons are made from a naturally renewable resource and are easy to recycle. They are easy to open and to close again and offer good legibility of product information due to the smooth printing surface. This is of particular importance to the older shopper.

*** www.tns-global.be**
"Cartons Promote Brands" A European report commissioned by Pro Carton

Value Creation

Cartonboard and carton manufacturers are continuously researching new technologies to improve the performance of cartonboard packaging and respond to the demands of the market.

Cartonboard mills aim for continuous improvement to use less wood and energy and so become more resource-efficient.Computer controlled processing and on-machine quality monitoring has led to productivity improvements and more consistent quality. The development of lighter base weights means the use of less packaging overall and less waste. New forming and press section techniques have resulted in improved strength characteristics, while developments in surface coating methods have helped to improve visual appearance and printing capability.

The carton manufacturing industry also continuously looks at improving its processes and has identified waste reduction as a significant contribution of the printing process to environmental protection, which also brings economic benefits.

Carton manufacturers can offer flexibility and speed in getting new designs or promotions to market, with printing technology developments such as digital imaging, computer-to-plate processing and pre-press proofing bringing advantages in cost and time.

Carton manufacturers provide convenient and innovative packaging solutions to help consumers use products. For example:

- Beer can be stored in a refrigerator in a carton multipack which can then be used as an ice bucket when the beer is consumed
- Ready meals can be taken from the fridge and heated in a microwave or oven. The incorporation of susceptors in the cartons can cause a desirable localised browning and crispness of the food
- Cartons can incorporate time/temperature devices to indicate the freshness of a product
- Pharmaceutical cartons containing an embedded microchip, antenna, electronic circuitry and printed with conductive ink will record the time and date when a pill is removed and "bleep" when the next pill should be removed
- Pharmaceutical cartons can help patients provide feedback on side effects by using buttons built into the pack. When the course of treatment has been completed, the information can be downloaded for analysis by the patient, medical advisor or product manufacturer
- Cartons for high value products can incorporate a coin-reactive ink panel for covert security, or an embossed hologram on a varnish layer which can show overt security features
- Cartons can offer printed RFID systems for authentication and track-and-trace of product. The electronic element is produced with conductive inks and can be integrated with the carton structure so that it is highly secure and tamper evident

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Pro Carton is the Association of Cartonboard and Carton Manufacturers. Its main purpose is to promote the use of cartons and cartonboard to brand owners and retailers as well as designers, the media and regulatory decision-makers as an economically and ecologically balanced packaging medium which plays an important role in society

For further information, please visit **www.procarton.com**

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Thanks to Stora Enso, M-real, MM Karton and Chesapeake for images provided
Printed on Ensogloss 220g/m² by STORAENSO – cartonboard produced from a renewable source