Beverage cartons have been collected in Germany and recycled in paper mills since the beginning of the 1990s – over three million tons until today!

Many other countries in the European Union also achieve high recycling rates today. Beverage cartons are listed as a separate grade in German and European recycled paper lists. There are now around 20 paper mills throughout Europe using this raw material and processing it with standard techniques. The cellulose fibres recovered are longer and stronger than from most other grades of recycled paper. They are therefore particularly well suited to the manufacture of corrugated board.

Detaching the paper fibres creates residual materials in the paper mill.

This material consists predominantly a foil mixture of polyethylene (PE) and aluminium (AL) as well as high density polyethylenes (HDPE) originating from the caps with which most beverage cartons are fitted. Added to this are impurities and extraneous materials made of plastic, metal, textile fibres, wood, etc. – components which have nothing to do with the beverage carton but which cannot be completely separated in the automatic sorting of yellow bags and bins. Most of these residual materials have so far been thermally recycled in cement plants.

The Palurec process enables these residual materials to be separated. The secondary raw materials produced can be used in many products.

Palurec GmbH

Palurec GmbH was founded in December 2017. Fachverband Kartonverpackungen für flüssige Nahrungsmittel e.V. (FKN - Association for Beverage Cartons), based in Berlin, is the sole shareholder.

There are three companies in the Association, Elopak GmbH (Speyer), SIG Combibloc GmbH (Linnich) and Tetra Pak GmbH & Co. KG (Hochheim am Main), which have invested around 8 million euros in the construction of the Palurec recycling plant on the site of the Knapsack Chemical Park near Cologne. The first stage will provide capacity for around 18,000 tons input. Commissioning: Spring 2020.

The companies belonging to the FKN produce around 95% of all beverage cartons sold in Germany and have been instrumental in setting up and expanding the recycling infrastructure for used beverage cartons since the start of the Dual System. ReCarton GmbH was set up for this purpose as early in 1991; as a service provider to dual system companies, this company organises the marketing and distribution of used beverage cartons from household collections.

Implementation:
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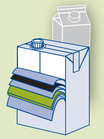
PALUREC

PE-Alu-Recycling of used beverage cartons

PALUREC

Recycling paper fibres

in paper mills



Cartonboard 75%
Polyethylene 21%
Aluminium 4%

1

There are hundreds of different packaging and closure alternatives on the market. The type of composite structure to be used depends among other things on what is to be filled: packaging for fresh products does not contain any aluminium foil.

COLLECTING / SORTING

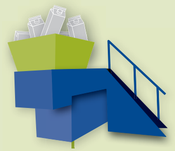
2

In Germany, beverage cartons are collected in yellow recycling bins together with other packaging and then sorted as a separate category in sorting facilities using infrared technology.

SHREDDING

3

The packs are put through a shredder in the paper mill. This enables water to penetrate the cut edges more easily during further processing.



DRYING

Water

Drum pulper

SEPARATING

5

The paper fibres are cleaned, pumped to a mesh, the water removed and formed to a paper web which runs over numerous hot cylinders and dried in the process. The paper is delivered to companies which use them to make packaging paper among other things.

4

The centrepiece of the system is a rotating drum which separates the composite material mechanically by adding water. No separating chemicals are used. The method is comparable to a washing machine. The paper fibres dissolved in water pass through the holes in the wall of the drum while the PE-AL residual foil and closures are discharged at the end of the drum and supplied to Palurec.

Secondary raw materials

Paper fibres: The fibrous material produced from used beverage cartons when processing paper is of high quality. The average fibre length is 1.55 mm. By comparison: fluted board: 1.15 mm, recovered graphic paper: 0.99 mm.
If all the fibres are not separated from the foil in the paper mill, they will be washed off in the Palurec recycling plant and are then available as a raw material.

LDPE: Low density polyethylene is suitable for injection moulding applications, for manufacturing foil or compounding.

HDPE: High density polyethylene can be used in HDPE applications (non-food) after cleaning.

Aluminium: Suitable as an additive for castings or as an aggregate in the varnish and construction material sectors.

PE-Alu-Recycling

The Palurec process

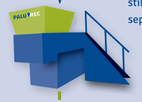
Low prices for virgin plastics pose a particular challenge to manufacturers of recycled plastics: After the failure of various processing concepts to establish themselves on a sustainable basis, Palurec GmbH set itself the goal of producing viable secondary raw materials, even in a tough market environment.

For that reason, the first stage of the process deliberately refrains from producing recycled material and products of the very highest quality. Instead of developing new system components, aggregates are used which have proved themselves in practice over many years and which are capable of separating such material mixtures mechanically and physically.

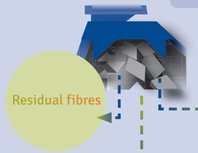
SHREDDING

1

The reject material supplied by paper mills is first shredded and washed. In the process, paper fibres still adhering to the plastic foil are separated.

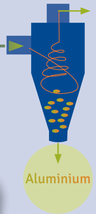


WASHING



2

Aluminium is separated in a hydrocyclone using the interplay of centrifugal forces and fluid pressure.



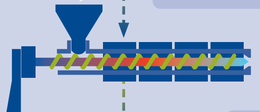
DRYING

SIFTING

3

The dried foil is separated in a so-called zigzag sifter which exploits the different rates of fall of PE and HDPE in currents of air.

EXTRUDING



4

In the extrusion process, the LDPE turns to a viscous substance under heat which is pressed through a round opening in a melt filter. After cooling, the extruded plastic is formed into granulates.

GRANULATING