

Sustainable solutions from Kuraray

# Innovative packaging for coffee beans

KURARAY POVAL™

EXCEVAL™

PLANTIC™

EVAL™

MonoSol

# Sustainability: the most urgent trend in packaging

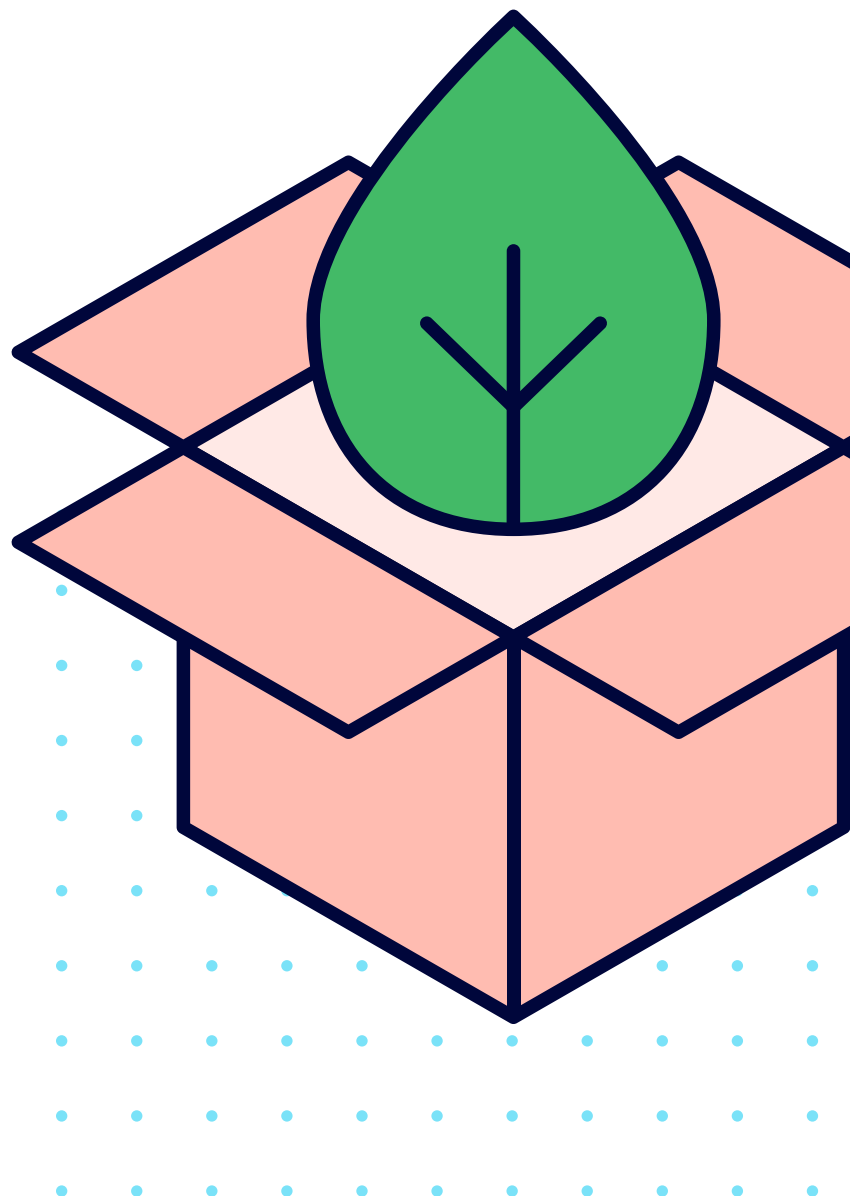
*Various trends and requirements are currently transforming the packaging market: renewable raw materials, reducing the amount of packaging material, cutting CO<sub>2</sub> emissions, monolayer products, recyclability, repulpability or biodegradability – to name a few.*

## Consumers and brand owners driving the trend

Greater sustainability and circularity are an urgent issue for the whole of society and are being driven forward by legislators and consumers as well as brand owners and industry. The objective is to find circular packaging solutions. This also applies to plastics. Several major players in the food sector, from Danone and Mondelez to Nestlé and Unilever, have already published voluntary commitments or pledges.

## Revision of the PPWD in the EU

The trend towards sustainability also has a political dimension. An example from the European Union: in conjunction with the “European Green Deal” to reduce CO<sub>2</sub>, the “Packaging and Packaging Waste Directive” (PPWD) is intended to ensure a high level of environmental protection. The latest amendment to the directive contains, among other things, updated measures to promote reuse, recycling and other forms of recovery of packaging waste as an alternative to disposal. The EU Commission intends to publish a proposal on further tightening of the PPWD before the end of 2022.





## International complexity

Sustainability is a global megatrend in the packaging industry. However, there are significant differences in national and regional legislation and regulatory requirements. Internationally, in some instances, the disparity between packaging and recycling regulations is as big as the difference in the available recycling infrastructure. Nevertheless, the overriding global trend

is the same: reducing and recycling packaging are on the agenda everywhere and legislation is becoming more stringent. For brand owners and manufacturers, the extremely heterogeneous regulatory landscape is a major challenge. A conventional packaging concept that can still be used in some countries may no longer be acceptable in other states and regions. However, they all agree that the objective is to protect food and avoid waste.

## Combining functionality and sustainability

It is vital to ensure that new, more sustainable packaging solutions continue to meet the full range of functional requirements for food packaging. All the Kuraray innovations outlined below combine these two objectives: as well as focusing on sustainability, they provide reliable protection for food. These packaging ideas based on Kuraray's products point the way to circular packaging. Every packaging problem is specific. Therefore, Kuraray's experts are committed to helping their customers and the entire supply chain find packaging solutions that meet their specific needs and ensure compliance with specific regulatory requirements.



# Innovative pouches for coffee beans

Laminated pouches with an aluminium foil layer have been one of the most common forms of packaging for roasted coffee beans for many years. The big drawback of this multilayer packaging is that the presence of an aluminium layer in a multi-material structure makes mechanical recycling impossible. Moreover, production of aluminium is highly energy-intensive, and demand in sectors other than packaging has increased significantly. As a result, more sustainable alternatives to such traditional packaging for coffee beans are being developed. These need to provide the same level of protection, in other words, a similar barrier to oxygen and moisture as well as preserving the aroma of the beans. Below we present six packaging innovations that pursue precisely this goal. Some of them have already been launched on the market. Thanks to the use of future-oriented products from Kuraray, those innovative material combinations provide both superior sustainability and the required functionality.



## 1. EXCEVAL™-coated polyolefin film

*Example of a conceptual structure for such packaging:*

**Biaxially-oriented polypropylene (BOPP) / EXCEVAL™ coating / laminated cast polypropylene**

The excellent barrier properties of EXCEVAL™ come into their own in this constellation. Polypropylene is used as the inner layer of the pouch but does not have sufficient gas barrier properties. However, coating it with just 1g per m<sup>2</sup> of EXCEVAL™ provides outstanding gas barrier properties. Since it accounts for less than 5% of the total packaging material, the packaging is classified as a monomaterial. It can therefore be recycled in the polyolefin stream. The film can be completely transparent if required but it can also be printed. Standard coating machines and drying equipment are used to manufacture these films.

## 2. EXCEVAL™-coated paper bags

*Example of a conceptual structure for such packaging:*

**Paper / moisture barrier coating / EXCEVAL™ coating / heat-sealable coating**

This type of packaging has already proven effective commercially – not just for coffee beans. A thin, water-soluble EXCEVAL™ coating acts as an oxygen and aroma barrier. The EXCEVAL™ is applied by conventional coating equipment, for example rotogravure coaters or rod coaters. Dispersions, e.g. polyolefin or other polymer dispersions, are used as a heat-sealable coating on the inside of the packaging. These paper packaging structures can be repulped without problem in standard paper mills. This type of packaging is based on a technology approach that has been established in the paper industry for many years.



### Sustainability benefits of EXCEVAL™

EXCEVAL™ is water-soluble and repulpable and can be recycled in the paper stream of standard paper mills.

In addition, EXCEVAL™ is inherently biodegradable.

### EXCEVAL™:

**Excellent resistance to water, oil and grease**

EXCEVAL™ is Kuraray's halogen-free, hydrophobically modified polyvinyl alcohol (PVOH). It has been specifically developed to improve the water resistance of PVOH. An Exceval™ coating provides an excellent barrier to oxygen, nitrogen and carbon dioxide gas, even at elevated relative humidity. Using EXCEVAL™, packaging manufacturers can improve the functionality of their paper by giving their packaging excellent oxygen barrier properties and very good resistance to oil and grease.

### 3. Vacuum metallized film packaging with EVAL™

*Example of a conceptual structure for such packaging:*

#### Vacuum metallized EVAL™ EVOH BOPP / laminated cast polypropylene

EVAL™ is the brand name of the ethylene vinyl alcohol copolymers (EVOH) produced by Kuraray. A film made from EVAL™ EVOH and biaxially-oriented polypropylene (BOPP) is metallized under vacuum with a very thin layer of aluminium, creating a barrier to aroma, oxygen, light and moisture. A simple cast polypropylene film is laminated onto the inside of the pouch to act as the sealing layer. A tenter frame orientation process is used after coextrusion of the PP and the EVOH is applied as a skin layer. This packaging concept avoids the use of a far larger amount of aluminium foil and EVAL™ EVOH is an excellent substrate for vapour deposition of aluminium. It also provides an extremely reliable aroma and oxygen barrier. Reducing the amount of aluminium makes this packaging recyclable. Several recycling guidelines classify this type of packaging as a recyclable monomaterial.

### 4. Vacuum metallized film packaging with EVAL™ and MDO-PE film

*Example of a conceptual structure for such packaging:*

#### Polyethylene / vacuum metallized EVAL™ EVOH MDO-PEE

This packaging uses the monomaterial approach described in the previous structure. In this case, the ethylene vinyl alcohol copolymer (EVOH) is combined with polyethylene instead of polypropylene. The inner sealing layer is made of polyethylene and the vacuum metallized film is deposited on the EVAL™ EVOH layer in the machine-direction oriented polyethylene film (MDO-PE). The structure produced is known as “VM-EVOH/MDO-PE”. Thanks to the tremendous technological advances that machine manufacturers have made in production equipment for multilayer film in recent years, multilayer films with MDO-PE have become an attractive alternative. Using MDO technology, both cast and blown co-extruded films can be uniaxially oriented to improve performance, for example, through better barrier effects and mechanical properties. In addition to the fact that it does not use aluminium foil and the packaging is recyclable as a monomaterial under most recycling guidelines, the big advantage of this concept is that the packaging becomes part of the most advanced polyethylene recycling stream.



#### EVAL™ EVOH: Functional barrier in a very thin layer

Kuraray's EVAL™ ethylene vinyl alcohol copolymer (EVOH) helps the food and healthcare sectors develop packaging that protects product quality for a prolonged period. Recyclable multilayer structures with EVAL™ EVOH meet the most stringent hygiene conditions and food contact standards and regulations. In packaging applications, a layer of EVAL™ EVOH just one millimetre thick creates a functional barrier equivalent to a ten metre thick wall of polyethylene.



#### Sustainability benefits of EVAL™

A thin EVAL™ EVOH layer allows the production of particularly lightweight, resource-saving packaging and therefore helps to reduce waste. Moreover, EVAL Europe N.V.'s EVOH production site in Belgium has ISCC PLUS certification. Certification is based on the mass-balance approach and documents the fact that the ethylene monomer in Kuraray's “biocircular EVOH” is produced from renewable resources.

## 5. Film pouches made from fully compostable plastics

*Example of a conceptual structure for such packaging:*

**Biopolymers such as PBS, PLA and PBAT laminated onto PLANTIC™ film**

This structure uses a multilayer concept, where all the materials are compostable biopolymers. The core layer is PLANTIC™ gas barrier film produced by Kuraray from starch. This has an excellent gas barrier and good rigidity. Other biopolymers such as polybutylene succinate (PBS), polylactic acid (PLA) and polybutylene adipate terephthalate (PBAT) are laminated to the inner and outer sides. Overall, this material combination gives the packaging the required properties. This type of packaging is produced by extrusion coating and/or dry lamination using compostable adhesives. Industrial compostability is not yet recognized as an alternative to plastic recycling everywhere in the EU. However, by 2023, all EU member states have to implement organic waste collection and this combination of materials is likely to be permitted in organic waste recycling.

## 6. Repulpable paper packaging with PLANTIC™

*Example of a conceptual structure for such packaging:*

**Paper / PLANTIC™ film / biopolymer sealing layer**

This packaging is already being used very successfully by a coffee roasting company in South Korea. PLANTIC™ film laminated onto the inner side of paper packaging creates a barrier to aroma and oxygen. An additional heat-sealable layer acts as a moisture barrier. The heat-sealable layer may be made of biodegradable polyethylene (PE), polybutylene succinate (PBS) or compostable polybutylene adipate terephthalate (PBAT). The production technologies used for this type of packaging are extrusion coating, lamination and extrusion lamination. Since PLANTIC™ is soluble in water, the inner sealing layer and adhesive can easily be separated from the paper in the repulping process. Moreover, thanks to the water solubility of PLANTIC™, the repulping yield is higher than e.g. with a conventional PE layer. Consequently, the paper fibre can be repulped without difficulty. Consumers generally consider paper packaging to be sustainable and particularly high quality and are likely to prefer this type of packaging to all-plastic packaging, even if it is recyclable or compostable.

### PLANTIC™:

**The biopolymer that keeps oxygen out and preserves aroma**

PLANTIC™ is a high-performance film manufactured by Kuraray using more than 80% renewable raw materials. It is produced from thermoplastic starch and is biodegradable and compostable (home and industrial composting). Due to its high gas barrier properties, this biopolymer from Kuraray can be used in packaging that preserves aromas and effectively keeps out oxygen. PLANTIC™ is therefore ideal for both MAP packaging for food with a short shelf life and packaging solutions for dry goods such as coffee, tea and animal feed.



### Sustainability benefits of PLANTIC™

PLANTIC™ is made from plant-based starch and has a water content of around 12%. This biopolymer is dispersible in water, which makes it possible to separate multilayers and allows simple repulping of paper packaging. PLANTIC™ is certified for both industrial and home composting and can be used in the manufacture of completely compostable multilayer packaging.



Possible starts here

Established in 1991, Kuraray Europe GmbH is based in Hattersheim, near Frankfurt am Main, Germany. In 2021 the company generated annual sales of EUR 1.1 billion. It has more than 820 employees in Germany at its sites in Hattersheim, Frankfurt and Troisdorf. Kuraray is a global speciality chemicals company and one of the largest suppliers of polymers and synthetic microfibres for many sectors of industry. Examples are KURARAY POVAL™, MOWITAL®, TROSIFOL® and CLEARFIL™. Kuraray Europe also has around 215 employees at six other European sites. They are also working on the development and application of innovative high-performance materials for a wide range of sectors, including the automotive, paper, glass, and packaging industries, as well as for architects and dentists.

Kuraray Europe is a wholly owned subsidiary of the publicly listed Kuraray Group, which is based in Tokyo, Japan, and has more than 11,200 employees worldwide and sales of EUR 4.8 billion.

Kuraray's current slogan is: "Possible starts here."