Your journey to more sustainable packaging continues here.

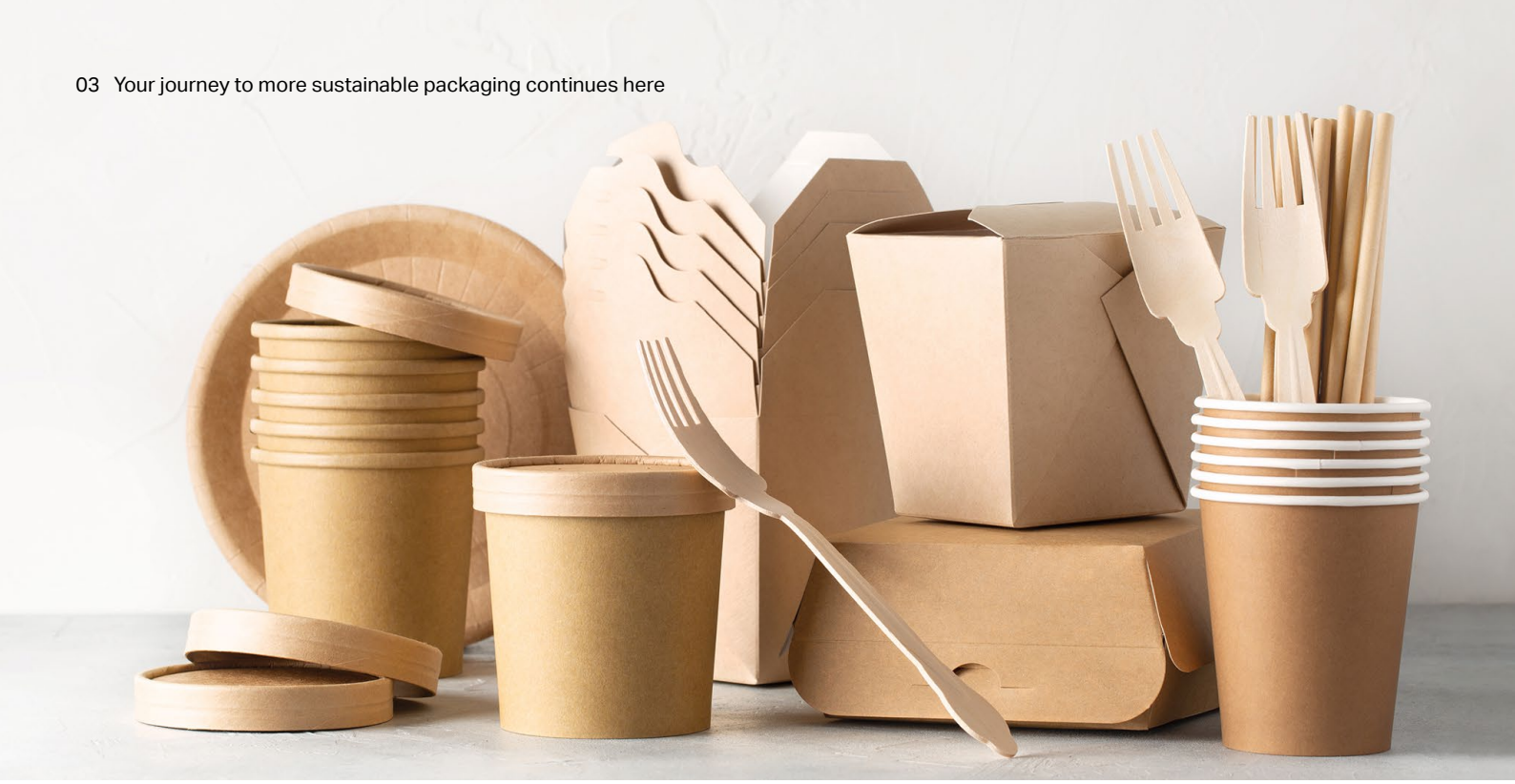
covestro

The need for alternatives to oil is nothing new

Henry Ford, the famous American inventor, was obsessed with the soya bean.

During the 1930s, he spent many hours in his Detroit laboratory trying to turn this humble bean into an affordable plant-based material to lower the price of his Model T car. By 1941, Ford had developed a handmade car, and its coating was made completely from plant material. Reports at the time described it as **“part salad, part automobile”.**

As is often the case when commercializing plant-based innovations, the Ford Motor Company was never able to produce a soya-bean-based solution that could compete with oil-based equivalents on functional performance or cost-effectiveness. Nevertheless, with the world facing defining environmental challenges and technological advances unlocking higher plant-based material performance, Ford’s ambitions of making bio-based materials mainstream are now more within reach than ever before.



The search for more sustainable packaging

Packaging, of course, needs to perform the key function of protecting or preserving the product it contains. But, all too often, it uses oil-based raw materials. Based on hydrocarbons, these materials not only produce high CO_2 emissions during manufacturing; they also damage the natural environment as a result of increasingly invasive exploration and extraction methods.

What's more, conventional packaging often uses complex combinations of materials that cannot be easily separated or broken down. This, in turn, can make recycling difficult or too expensive – resulting in packaging being incinerated or sent to landfill and contributing to the world's growing man-made waste crisis.

As public awareness around these issues grows, the demand for more sustainable packaging solutions – that produce less CO_2 emissions, are more recyclable, and enable greater circularity – is increasing. End-consumers are a significant driver of this demand – in fact, research found that almost 90% of people say they are willing to change their behavior to help fight climate change. Regulatory and legal developments are another key factor. In response, some brands are experimenting with solutions such as barrier coating resins, recyclable monomaterials, degradable packaging layers, and plant-based raw materials – and often setting ambitious sustainability targets for their packaging.

According to the Ellen MacArthur Foundation, PepsiCo, Coca-Cola and Unilever are among a growing number of leading manufacturers planning to make their plastic containers reusable, recyclable or compostable by 2025. Meanwhile, L'Oréal reduced its consumption of raw materials by over 13,200 tonnes in 2019, thanks to its packaging optimization initiatives – in particular, by integrating recycled material into its packaging's plastic. But, while many brands are implementing bio-based and recyclable materials into their packaging substrates, the inks and coatings used on these substrates are often overlooked. As such, enabling more sustainable coatings for the packaging market has great potential to reduce the environmental impact of packaging.

> Research found that almost 90% of people say they are willing to change their behavior to help fight climate change*

*Source: IKEA Climate Action Research Report, 2018.

Where experience meets commitment

Our extensive experience in coatings for packaging applications, combined with our commitment to sustainability, makes us well-placed to address this issue. Indeed, our family of resin solutions for packaging already includes durable resins that deliver strong adhesion to a wide range of packaging substrates, including metal for cans, flexible film packaging, labels and paper and board.

Our portfolio covers all packaging layers, and even includes innovative textured resins to drive product differentiation.

We believe we have a responsibility to use these skills and resources to enable a more sustainable future. Specifically, driven by our vision of a world where high-performance coatings and inks have no impact on the health of people and the environment, we aim to accelerate the transformation toward plant-based inks and coatings.

"The majority of the printed food packaging designs you see on supermarket shelves could be produced using our resins."

Introducing **Decovery®**

The plant-based alternative to oils

Decovery® is a family of partially plant-based resins designed to deliver high-performance products across the coatings and inks industries while treating our planet gently.

It's made from partially plant-based materials that are sustainably sourced. The Decovery® portfolio includes products with as much as 52% plant-based content – as verified by the 14C analysis standard for complete transparency.

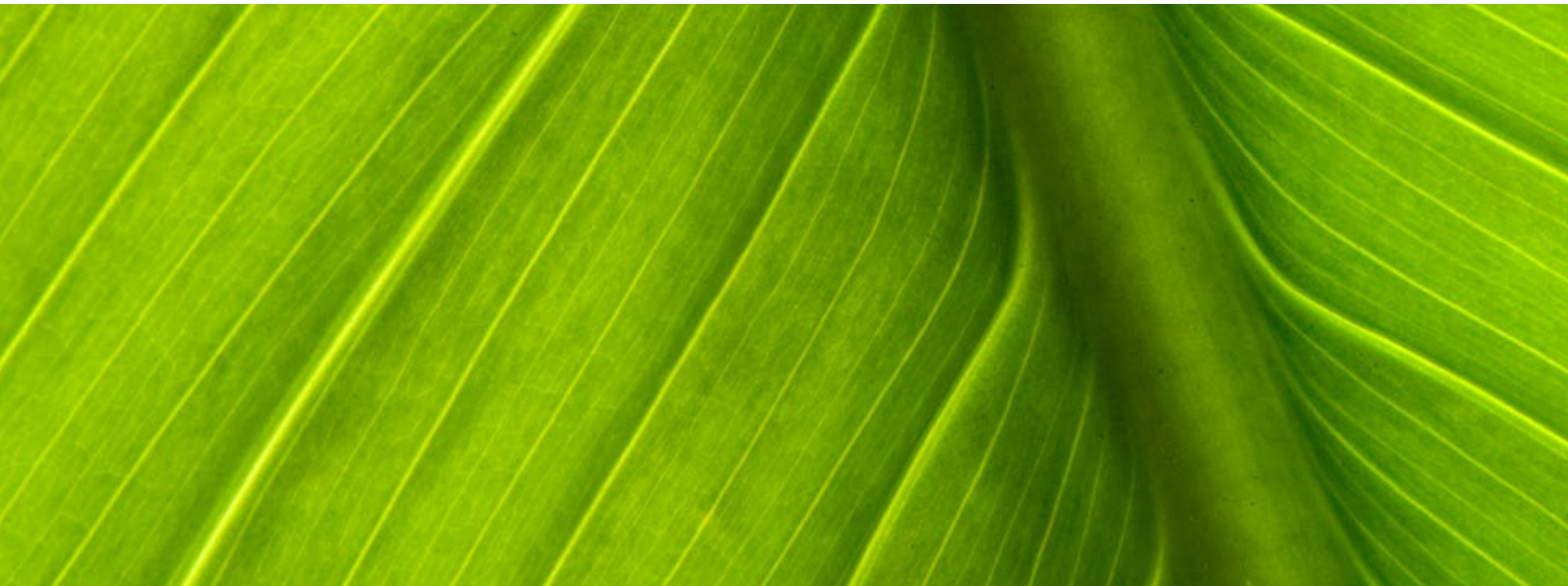
We have used our unique capabilities and long track record in materials science to develop and successfully market our family of plant-based Decovery® resins. In line with our organizational ambition to deliver sustainable solutions that outperform conventional market alternatives, these resins are produced by converting plant materials into the bio-based building blocks of environmentally friendly coating solutions.

“Sustainable solutions that outperform conventional market alternatives”

These foundational structures are used to create high-performance, bio-based polymers with a wide range of properties, which are, in turn, used to form the final resins. Comprising up to 52% plant-based content (verified by 14C analysis), **Decovery® resins enable the creation of more sustainable paints, printing inks and coatings.** These are all applied in a wide range of applications, across the decorative, furniture and architectural markets, among others.

Like our other **Decovery®** resins, their ingredients consist of plants such as tree bark, castor beans, that don’t compete with the food chain. These natural ingredients can be obtained and used far more sustainably than fossil-fuel-based materials. Meanwhile, the resulting **Decovery® resins contain very low VOCs,** making them better for human health as well as for the planet.

Amid growing resource scarcity, the use of renewable, plant-based building blocks will help ensure the availability of key raw materials and ingredients. For the packaging value chain in particular, this means the best of both worlds, with a reduced environmental impact set to go increasingly hand in hand with business continuity in the years ahead. And with current **Decovery®** resins containing up to 52% plant-based content, we are also striving to increase this to 100% – aligning with targets being implemented by authorities around the world, such as the European Commission’s target for 30% bio-based coatings by 2030.



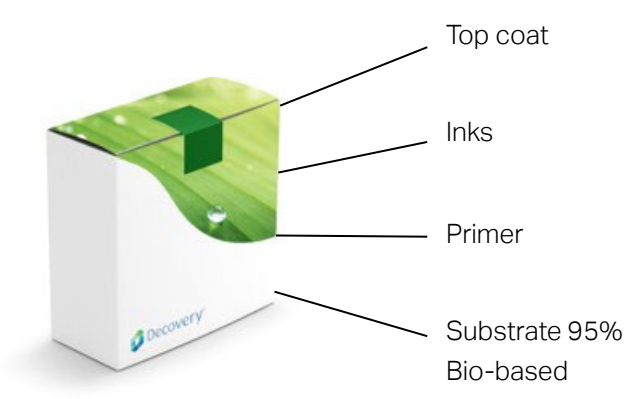
Decovery® resins are more than a match for oil and plastic

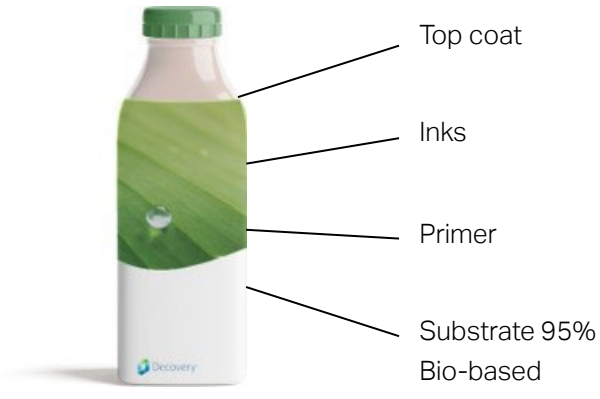
In tests and live in the field, products created using **Decovery®** resins have shown to be equally as effective as those made with traditional, less eco-friendly materials. Our stringent testing procedures ensure that all our products offer a high level of performance. So they make the transition to bio-based products an easier journey to embark on.

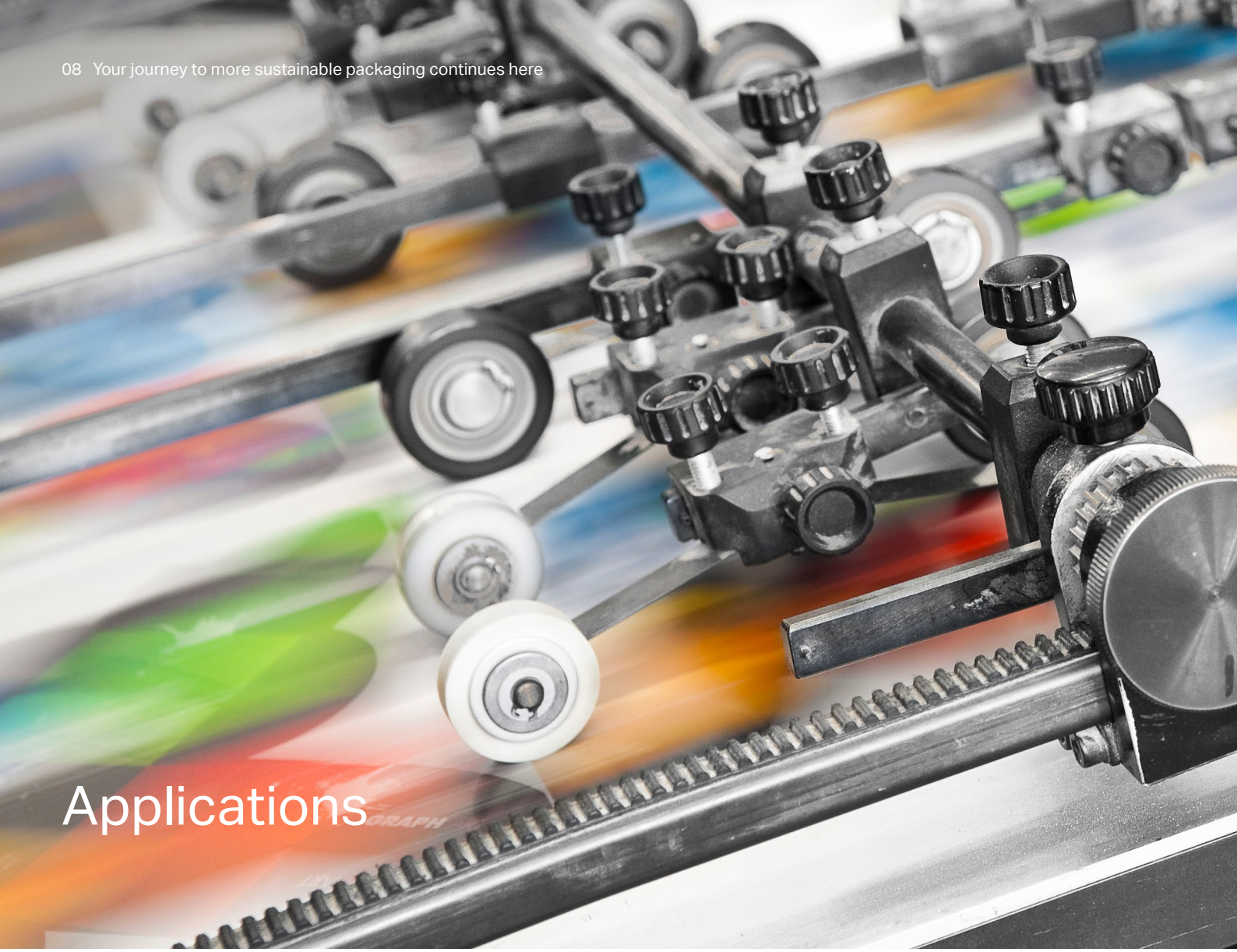
In practical terms, Decovery® resins are easy to use as they are compatible with the processing equipment of conventional water-based coatings.

A **Decovery®** solution for each layer

From primers, through to inks and top coats, **Decovery®** resins will help you achieve the look you want from your packaging. When used to create top coatings, our resins have durability to preserve the finish of the printing and protect it while products are in transit or storage.







Applications

Decovery® resins have been created to be applied using the most commonly-used printing methods, ensuring a smooth and swift integration into your existing processes, with minimal downtime and **no need for expensive re-tooling.**

Gravure print technique

Flexo print technique

Roller Coating

Digital printing

Decovery® SP-6400

Decovery® SP-6400 is a low NaOH alkali-soluble acrylic copolymer dispersion with high clarity and flexibility. It is particularly suited to adhesive application, such as removeable paper labels for bottles and domestic adhesives.

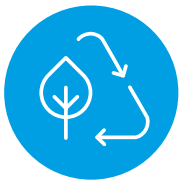
Decovery® SP-6400 has a significantly lower carbon footprint than conventional, oil-based alternatives, while also being highly flexible, meaning it can be deployed to adhere to a wide range of substrates. It is clear to view, non-tacky to touch and will adhere to a variety of substrates including glass and PET.

At the end of its use, low temperature wash-off properties make **SP-6400** less energy-consuming in the recycling process.

Decovery® SP-6400 in profile

A bio-based resin for label adhesives with 20°C lower wash off temperature reduction which uses less NaOH and results in energy saving.

Good wet tack

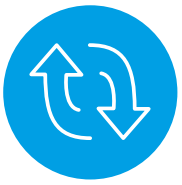


Accommodates recycling processes, ease of label removal

Highly flexible, clear and non-tacky (dry film)

Easy to formulate

Adhesion to a variety of substrates (glass and PET)



Alkaline soluble, high reversibility

Low odor

Glass labeling

PET labeling

Environmental impact of resin: **Decovery® SP-6400**

Decovery® SP-6400

1kg Decovery® Resins saves[1]
0.3kg CO_2

The adressable **ink market**
consumes around
48 kilotons of resins

CO_2 savings from Decovery® resins
for this market could be approx
15 kilotons of CO_2

This is equivalent to 248,000 trees[2]
for 10 years cleaning that CO_2 up[3]

1. Verified by Beta Analytic Inc. (Biobased and Biogenic Carbon Testing Laboratory), according to ASTM D6866-16 Method B (AMS)
2. Data based on internal calculation. Results may slightly vary compared to final 3rd party reviewed LCA report. Lifecycle assessment is currently being conducted according to ISO-14040-14044, IPCC 2013 GWP 100a standard and the WBCSD chemical sector guidance; Data expressed in kg CO_2 / kg resin; absolute CFP SP-6400: 1.71 kg CO_2 / kg resin
3. Calculation based on data from United States Environmental Protection Agency

Decovery® SP-6200

The rub resistance queen of inks!

Welcome to Decovery® SP-6200. When it comes to performance, this self-crosslinking emulsion is a match for any of the bio-based offerings in the market. Its impressive rub resistance properties to keep printed surfaces looking as sharp as the day they came off the press!

When tested against starch-based ink formulations, its rub resistance qualities in Dry Satra Rub Tests proved consistently superior, demonstrating better protection of colors and finishes when product packaging is in storage or on the shelf.

Decovery® SP-6200 is designed for surface printing in secondary and tertiary packaging, particularly food packaging. Its application is intended for deep freezer packaging, coffee cups, hamburger boxes, wraps, drink cartons, dry cartons as well as many other high sheer, high temperature-resistance applications.

SP-6200 has been created to be easy to formulate with no loss in performance. Furthermore, it offers low foaming in formulation, plus water, heat and chemical resistance once in use.

Good adhesion to most paper & filmic substrates

Water resistance

Mechanical resistance

Heat resistance

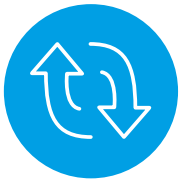
Chemical resistance

Good Anti-blocking

Low odor

Applicable with common print techniques

Low foaming



Good reversibility

Food contact compliant

It's essential for an ink or varnish film to be durable and not become marked, scuffed or smudged when handled or when the printed or varnished surface comes into contact with other surfaces (like metal or plastic).

This can happen in the print and finishing when printed surfaces are on machines such as gluers or packaging machines. Rubbing can also occur during shipping and in storage, where products are on shelving.

So we rub-tested bio-based **SP-6200** against starch-based inks formulations on plain paper using a 2.5kg weight.

Environmental impact of resin: **Decovery® SP-6200**

When packaged products are stacked on each other for long periods of time, the printed surface can become compromised and inks can detach from the paper before the stock is separated for final use or transfer onto adjoining stock. So, as part of our rigorous testing, we placed stock prepared with Decovery® SP-6200 under a load of 1kg/cm² at 52°C for 16 hours, to ensure that the finish, color and presentation of the packaging remained as we would like it – looking as sharp and colorful as they day it was printed and prepared!

Decovery® SP-6200

1kg Decovery® Resins saves[1]
0.7kg CO_2

The adressable **ink market** consumes around
357 kilotons of resins

CO_2 savings from Decovery® resins for this market could be approx.
232 kilotons of CO_2

This is equivalent to ~3,800,000 trees[2] for 10 years cleaning that CO_2 up[3]

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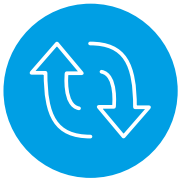
2. Data based on internal calculation. Results may slightly vary compared to final 3rd party reviewed LCA report. Lifecycle assessment is currently being conducted according to ISO-14040-14044, IPCC 2013 GWP 100a standard and the WBCSD chemical sector guidance; Data expressed in kg CO_2 / kg resin; absolute CFP SP-6200: 1.71 kg CO_2 / kg resin
3. Calculation based on data from United States Environmental Protection Agency

Decovery® D-2105
A bio-based inkjet ink resin

Our **Decovery® D-2105** is an acrylic dispersion that can be solubilized by neutralization with a range of neutralization agents. The resin is very flexible and extremely resoluble resulting in good open time that can be enhanced further by the selection of the neutralization agent. The main application for this product is in printing on absorbent substrates, such as paper and corrugated board.

Decovery® D-2105 in profile

Alkali soluble binder



Excellent reversibility

Inkjet printable

Highly flexible, clear and non-tacky

Mainly suitable for absorbing substrates as paper & board

End use packaging and commercial print

Low odour (if neutralized with metal hydroxide)

Food contact compliant

Decovery® SP-6000 XP

All the performance, less of the oil

Meet Decovery® SP-6000 XP – the partially bio-based barrier coating resin with great grease resistance. This resin keeps more oil out of flexible paper packaging, making it ideal for both food and non-food applications. And, with properties designed for easy processing – such as repulpability on different paper thicknesses – it also offers the flexibility you need to meet your application requirements!

With 29% bio-based content (C14-certified), **Decovery® SP-6000 XP** was designed to enable a high-performance alternative to polyethylene- and PFAS-based barrier coatings for flexible paper substrates. It has demonstrated excellent grease resistance and water barrier properties in Kit and Cobb testing. Together with its flexibility and direct food contact compliance*, these properties make **Decovery® SP-6000 XP** effective in both food and non-food applications – including sandwich wraps, folding board boxes, takeaway packaging, and recyclable paper pouches.

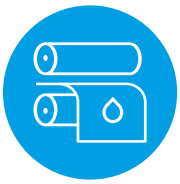
Decovery® SP-6000 XP also enables flexible formulation and application. The resin works well with all application methods, especially flexo and gravure, so can be easily used with existing coating equipment. Its low foaming (when used with an anti-foaming agent) enables long machine runs. And it's also repulpable on different paper thicknesses – for maximum flexibility.

Decovery® SP-6000 XP in profile

29% bio-based
C-14 certified content

Repulpable on different paper thickness

Long machine runs due to its low foaming behavior with anti foaming agent

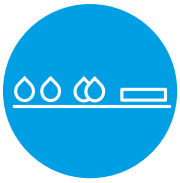


Product remains flexible for converting

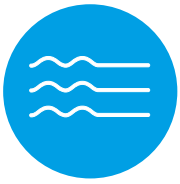
Scalable and adaptable using existing paper coating equipment

No blocking tendency on the line

Easy to formulate



Good film forming



Smooth surface for printing

Perfect for flexible paper

Direct Food Contact Compliant on 7 gr/m^2 dry

Environmental impact of resin: **Decovery® SP-6000 XP**

Decovery® SP-6000 XP

Reduced carbon footprint
vs water-based fossil alternative[1]
0,56 kg CO_2

The adressable **barrier coating market** consumes
2.029 kilotons of resins

CO_2 savings from Decovery® resins
for this market could be approx.
1.136 tons of CO_2

This is equivalent to[2] ~18,784,001 trees for 10 years cleaning that CO_2 up[3]

* EU-region FCC requirements

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3. Calculation based on data from United States Environmental Protection Agency

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[1] Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

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