



PURE FACTS

Why the circular
economy matters

Contents



Creating a better future for our planet



An industrial system that is restorative by design

Improving resource efficiency by recycling rubbish

Plastics – too valuable to throw away

The chemical industry and the circular economy



The key role we are playing

Creating a better future for our planet

If today's linear "take, make, dispose" economy is not replaced by an eco-efficient closed-loop approach, it will be impossible to sustain our planet's finite reserves for future generations and avoid further damage to flora and fauna, human health, society, and the environment. That is why we need to work towards a circular economy.



What is the circular economy?

Today's industrial economies are mostly made up of linear "take, make, dispose" production processes. The problem is that such a linear economy depletes finite resources such as fossil fuels to make products that are simply thrown away, often with negative effects on the environment or human health (or both). Decades ago, the limits of a linear economy became apparent to a number of far-sighted individuals. A circular or closed-loop economy, in contrast, is regenerative and restorative by design. After identifying the biological and synthetic materials used by industry, a circular economy seeks to optimize their use.

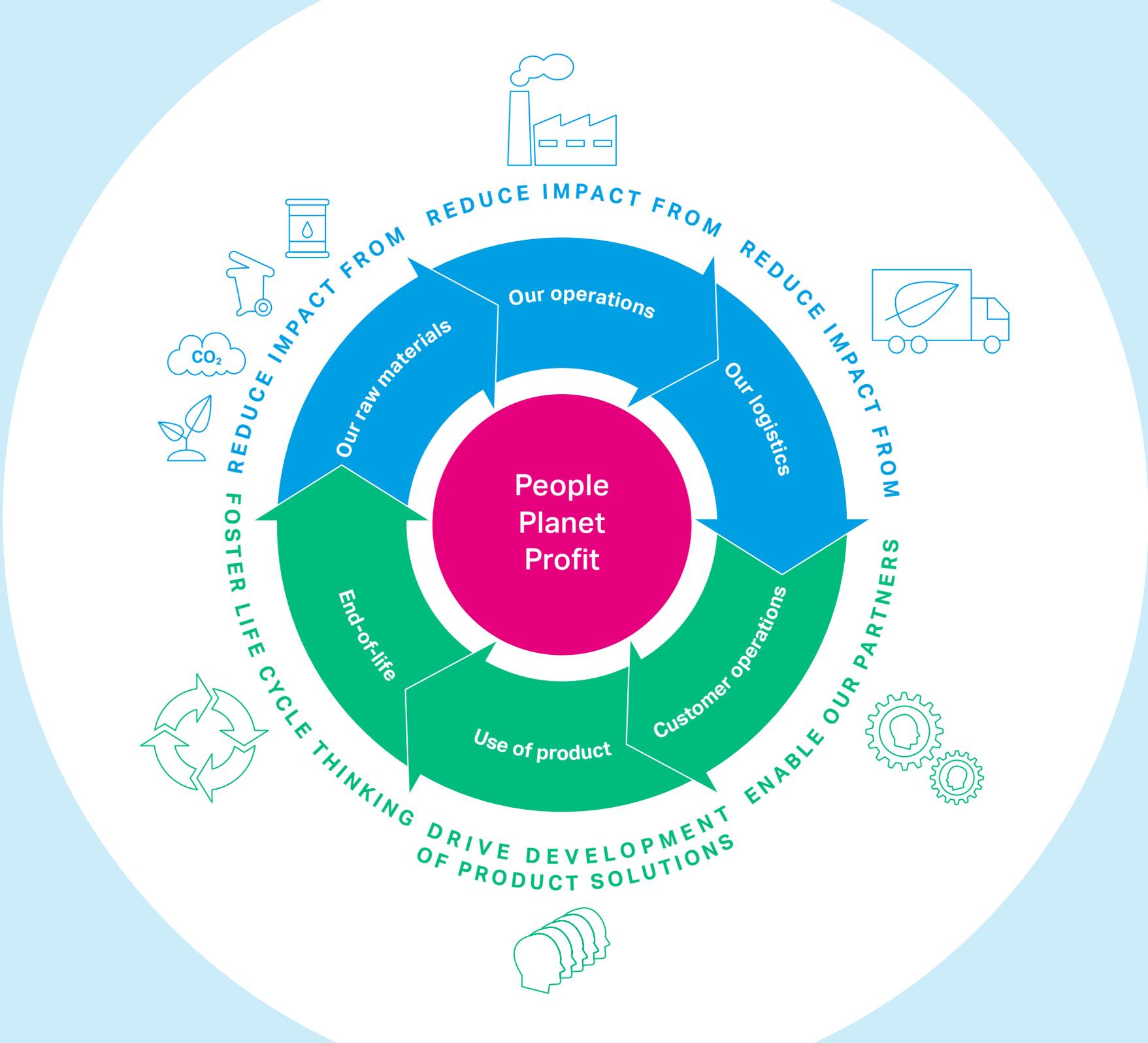




Biological materials are returned to the environment in an eco-friendly manner. Synthetic materials are designed to be of high quality and greater longevity than was often the case in the past. Once products created from these synthetic materials reach the end of their life cycle, they are disassembled and their components reused. Moreover, a truly circular economy encompasses more than the mere production and consumption of goods and services, it also involves a fundamental shift from fossil fuels to renewable energy, for example.

'Once products created from these synthetic materials reach the end of their life cycle, they are disassembled and their components reused.'





The EU's perspective on the circular economy

Motivated by the goals of achieving zero waste to landfills by 2030 and making more efficient use of resources, the European Commission (EC) is committed to supporting the transition to a circular economy. The EU Action Plan for the Circular Economy published in December 2015 sets out a "concrete and ambitious EU mandate" to close the loop and develop "a sustainable, low-carbon, resource efficient and competitive economy" in line with the UN's Sustainable Development Goal 12: Ensuring sustainable consumption and production patterns.

The economic gains resulting from pursuing circular economy investment opportunities are outlined in a report published in January 2017 by the Ellen MacArthur Foundation: an additional 7% increase in GDP, raw material consumption reduced by an additional 10%, and annual CO₂ emissions by an additional 17%. In this circular economy context, the Strategy on Plastics in a Circular Economy published by the EC in January 2017 aims to decouple plastics production from virgin fossil feedstock and reduce its life-cycle greenhouse gas impacts; improve the economics, quality and uptake of plastic recycling and reuse; and reduce plastic leakage into the environment.





Getting the most out of carbon

Our products are based on carbon. In order to achieve added value from this element, we are working with recognized institutions and non-profit organizations along our value chain.

With the help of our carbon productivity initiative, we aim to increase the added value of the carbon used by us along the value chain.

Using carbon for the production of polyurethane insulation foam, for example, allows us to save up to 70 times more energy over the course of the entire product lifecycle. This is due to lower energy consumption and reduced emissions.

'In a world with growing pressures on resources and the environment, the EU has no choice but to go for the transition to a resource-efficient and ultimately regenerative circular economy.'





Carbon4PUR

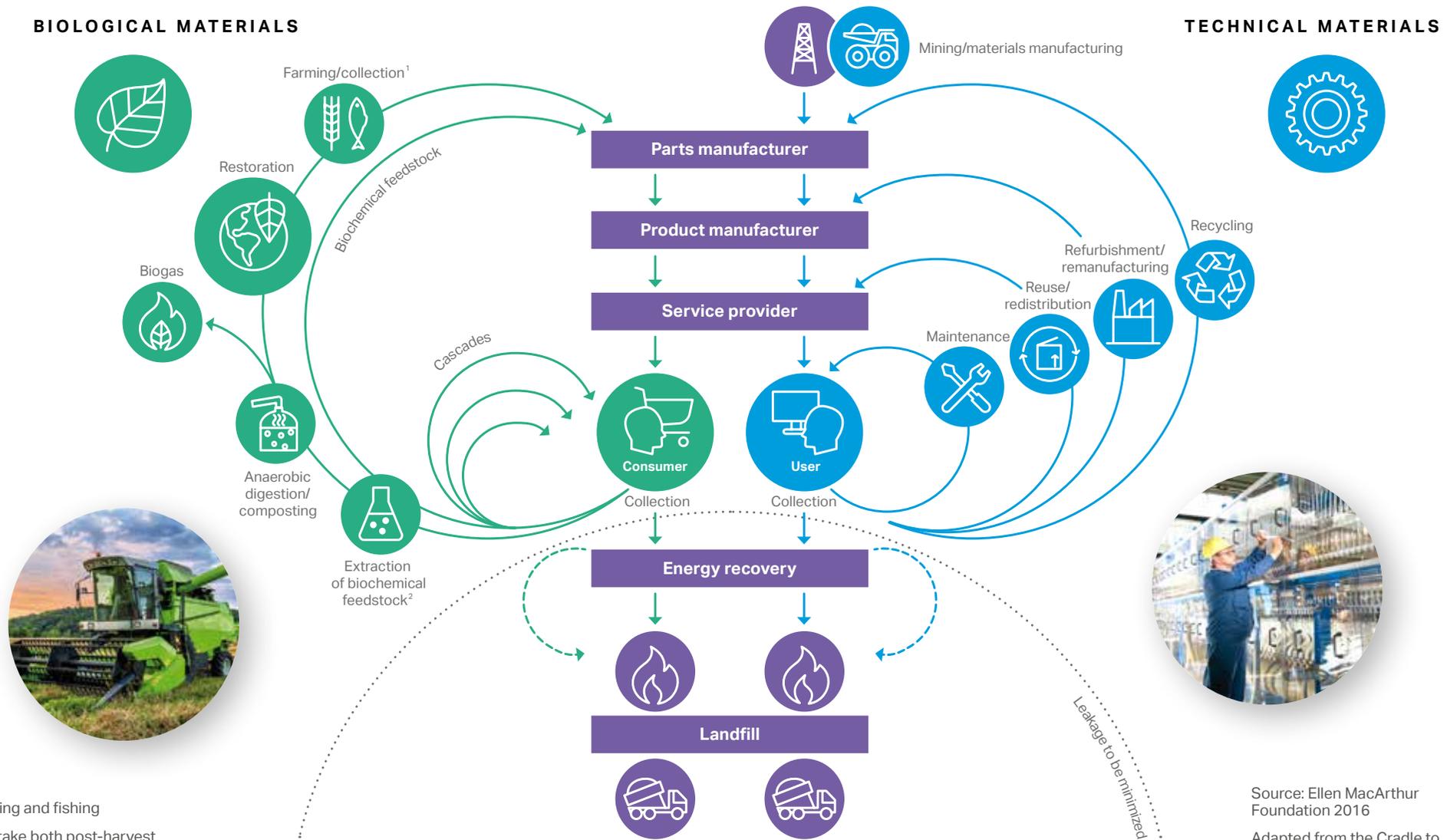
A consortium of 14 partners from seven countries, led by Covestro, is now planning to investigate how flue gas from the steel industry can be used to produce plastics in a particularly efficient and sustainable way. This will save crude oil, the raw material used in conventional methods. The cross-sector project called Carbon4PUR receives funding from the European Union.

Cost savings of
\$1 trillion p.a.
from transition to a circular
economy in the EU
manufacturing sector by 2025

Ellen MacArthur Foundation, Jan 2014



The circular economy – an industrial system that is restorative by design



1 Hunting and fishing

2 Can take both post-harvest and post-consumer waste as input

Source: Ellen MacArthur Foundation 2016

Adapted from the Cradle to Cradle Design Protocol by Braungart & McDonough



Improving resource efficiency by recycling rubbish

More and more rubbish is being generated in Europe. The latest Eurostat statistics show that in 2014, the total waste generated in the EU amounted to around 2.5 billion tonnes, the highest amount recorded over the previous decade. The amount of waste recovered (i.e. incinerated with energy recovery, recycled or used for backfilling) rose significantly from 2004 to 2014, accounting for over half of the waste treated in the EU.



Only **40%** of EU household waste is recycled



EU **2.5 billion tonnes**

Waste prevention and management



Additional **600 million tonnes** of Europe's total waste could be recycled or reused



Recycling and energy recovery



EU Action Plan waste reduction targets

65% of municipal waste by 2035

75% of packaging waste by 2030

Reducing landfill to no more than

10% of municipal waste by 2030



Plastics – too valuable to throw away

By landfilling almost 8 million tonnes of plastics waste a year, Europe is wasting economically valuable resources. Every piece of plastic waste is valuable – not least because plastics are basically 'solid oil'. Europe's chemical industry and its value chain are working hard to improve the management of end-of-life plastic products to ensure fewer of them end up in landfills.



Eco-efficient use of natural resources

The current trends in the recycling and energy recovery of plastics in the EU are positive, with more plastics being recovered and less being landfilled. But in order to achieve the challenging goals of the European Commission's Circular Economy Package, recycling (including that of feedstocks) and energy recovery must be deployed as complementary solutions.

Making the most eco-efficient use of the natural resources tied up in plastic waste involves utilizing all the available options: reuse, recycling and energy recovery. The European Association of Flexible Polyurethane Foam Blocks Manufacturers (EUROPUR), for example, expects a number of end-of-life options will continue to co-exist for polyurethane (PU) foam and sees a welcome change in that vast tonnages will be diverted away from landfills. Since plastics have a relatively high calorific content, residual waste can be efficiently used in a wide range of energy-recovery options. This is why energy recovery will continue to play a key role for PU foams that, as yet, cannot be reused or recycled if consideration is given to economic and ecological requirements.



Europe's chemical industry supports a flexible waste management hierarchy that enables the most eco-efficient waste management solution to be chosen for each specific case. Any legislation introduced in the future should ban landfilling of recyclable, high-calorific plastic waste. This rubbish is just too valuable to be simply dumped.

Significant gains

If Europe exploits the full potential of plastics for recycling and recovery while applying existing best practices in an eco-efficient manner, significant gains may be expected. In its Action Plan for the Circular Economy, the European Commission announced it would prepare a strategy to address the challenges posed by plastics throughout the value chain and take their entire lifecycle into account. Innovative types of plastics, the Action Plan says, "can contribute to the circular economy by better preserving food, improving the recyclability of plastics or reducing the weight of materials used in vehicles" – achievements that will bring welcome socio-economic benefits.

According to figures published in 2015 by PlasticsEurope, the Association of Plastics Manufacturers, preventing the 8 million tonnes of plastics from being landfilled would deliver significant savings:

Free up space equivalent to
 800 Eiffel Towers

Save the
10 Million 
barrels of oil needed to produce those plastics

To achieve these gains, landfilling plastics has to be banned.



The waste hierarchy

Preferred environmental option

Reduction

Reuse

Recycling

Energy recovery

Disposal

Least preferred environmental option

The aim of the European Commission's waste hierarchy is to extract the maximum practical benefits from products and generate the minimum amount of waste.



The chemical industry and the circular economy

Europe's chemical industry is committed to improving resource efficiency throughout the plastics value chain. Having recognized the sustainability challenges of our day and age, the industry is collaborating with other key players to advance the first steps being taken towards a circular economy.



The challenging goal is

0 Tons of
plastics

to landfills by 2020

Concerted action and collaboration

The closed-loop approach to the circular economy can only be achieved through networks and collaborations covering the entire lifecycle of plastic products. The key challenge is to set up smoothly functioning material streams incorporating the necessary logistics, varietal purity of waste products, and a state-of-the-art sorting infrastructure. This is a challenge that can only be mastered through concerted action and collaboration between all players in the value chain.

Enhancing resource efficiency

Europe's chemical industry is playing a key role in enhancing the efficient use and reuse of resources, which is an integral feature of the circular economy. The decision on whether recycling or thermal recovery is the more sensible solution in economical and ecological terms depends on the material-specific properties of each waste product. Thermal recovery is usually the preferable solution for high-calorific thermoset plastic waste, as it can be used to replace primary raw materials such as oil or gas.



'Europe's chemical industry is playing a key role in enhancing the efficient use and reuse of resources, which is an integral feature of the circular economy.'



The key role we are playing

We fully support the European Commission's Paper on the Circular Economy and the zero-waste-to-landfill approach, while supporting the energy recovery option for high-calorific thermoset plastic waste, such as polyurethane. Right now, the circular economy is still a perspective for the future, but we are proactively striving to implement all the potentials in this field. Thinking in product lifecycles is how we are plotting its path to the future.



Recovering energy from plastic waste

From a lifecycle perspective, not all plastic waste is suitable for recycling. In some cases it may actually consume more energy than producing new materials. That is why, for the time being, we are supporting the energy-recovery option for highly calorific materials such as polyurethane. However, the choice of the most suitable option for recycling or recovery is always governed by factors such as the properties of the initial polyurethane, the intended application of the recyclates, the market's capacity to absorb the recycled material, and eco-efficient waste management.

Dreams coming true

For decades, we have been developing and evaluating ecologically worthwhile recycling solutions for polyurethane. The CO₂ technology developed by us is one option to partially close the carbon loop by creating a circular economy in plastics production. By using an alternative carbon source, this CO₂ technology reduces our dependence on fossil-based raw materials without competing with the food chain. It is also a genuinely sustainable solution because the carbon footprint and fossil resource depletion involved in CO₂ technology are lower than with conventional products. Since 2016, Covestro has been manufacturing innovative polyether carbonate polyols – branded as cardyon® – at its production facility in Dormagen, Germany.



'Since 2016, we have been manufacturing innovative polyether carbonate polyols – branded as cardyon® – at our production facility in Dormagen, Germany.'

Implementing the circular economy

Right now, a great deal is already being done to implement the circular economy in certain industries, such as plastics. Feedstock recycling is a particularly attractive option for turning difficult-to-recycle plastics (e.g. laminated and composite plastics or plastics contaminated with food or soil) into valuable chemical building blocks – to close the loop in plastics production. Depolymerization, the conversion of polymers back into monomers for the production of virgin plastics, has been a challenge for decades and we are proactively exploring the technical possibilities in this field. The route to a circular economy is seen in partnerships along the value chain, choosing the right recycling technology and managing waste streams. However, a supportive regulative framework is needed and the solutions must be economically feasible.





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