



ACCELERATE

COLLABORATE

ONE
CIRCULAR
VISION

INNOVATE

The circular economy is becoming a global guiding principle. There is plenty still to be done if it is to be achieved: from recycling all waste to abandoning fossil raw materials and energy sources. Plastics play a key role in this endeavor. Covestro wants to drive the industry forward. We will become fully circular.

This is our vision.



ACCELERATE

GAINING TRACTION TOWARDS
BECOMING FULLY CIRCULAR

Humanity is pushing the planet to its tipping point. Unsustainable production and consumption patterns must become a thing of the past. It is essential that businesses and society become climate neutral and resource conserving – and fast. For Covestro, this means rethinking waste. It means switching to renewable energy. And it means a profound culture change.

PARADIGM SHIFT

Plastics are indispensable in modern life. Many advances in medical technology and sustainable construction, and many products, from renewable energy to electronics, would not be possible without them. It is therefore hardly surprising that 8.3 billion metric tons of plastics were produced worldwide between 1950 and 2015. At the same time, today's consumer behavior and throwaway society are placing a massive burden on the planet. More than 40 percent of the plastics currently produced are used just once and then thrown away, ending up in landfills or in the environment. Fewer than 20 percent of all waste is recycled. One of the benefits of plastic, its durability, also makes it a long-term problem when discarded inappropriately.

"Plastic waste in the environment has become a global challenge. Solving it is both extremely complex and urgently needed," says Prof. Volker Sick from the University of Michigan, who specializes in the use of CO₂ as a raw material. "In order to address this challenge and make a circular economy become reality, companies and every single one of us must completely rethink waste. Generating and dumping waste can no longer be considered appropriate."

WASTE AS A RESOURCE

This ties in with the concepts of value and prosperity. On the one hand, waste must be seen as an asset, a valuable resource. On the other hand, the most profitable production methods and products currently used are not always the most sustainable. In short: A paradigm shift is needed.

The world must make a circular economy the guiding principle. This can only work if the economy acts in close cooperation across all sectors, with a tailwind from politics, as well as the awareness and conscious support of each individual. As the basis of modern life, plastics play a key role in this endeavor. And Covestro is a driving force.



Video on the circular economy:
report.covestro.com/short/acc1

What do you think?

By what percentage could environmental pollution with plastic waste be reduced by 2040 through consistent circularity?

50%

70%

80%

Answer: 80%



Martin Neubert, CEO of Ørsted Offshore-Wind, discusses renewable energy with Covestro's Chief Technology Officer (CTO) Dr. Klaus Schäfer:
report.covestro.com/short/acc2

ALL SIGNALS SET TO GREEN

The circular economy is only really sustainable if green electricity is used in production processes and in the supply of energy in general. For this reason, Covestro is investing in alternative energies and optimizing its infrastructure with a view to making production as environmentally compatible as possible.

We are gradually integrating green electricity into our production mix. The first milestone: Starting in 2025, Danish electricity supplier Ørsted will cover part of our German electricity requirement with North Sea wind power for a ten-year period. The agreement for a capacity of 100 megawatts – sufficient to meet the electricity needs of 300,000 people – is one of the world's biggest industrial green power purchase agreements for offshore wind energy.

CONSUME LESS, SWITCH SUPPLY

To support and accelerate this process, we are also steadily making our production processes more energy-efficient. New technologies and artificial intelligence are helping us here. For instance, the energy efficiency system STRUCTese® developed by Covestro uses data from our plants to optimize their energy usage. And at our Spanish site in Tarragona, we will soon produce basic chemicals via a process that can reduce energy usage by one quarter. In Brunsbüttel, Germany, we are manufacturing the rigid foam component MDI via a new technology that also uses up to 25 percent less electricity than before.

Thus, step by step, we are coming closer to achieving both our short-term and long-term goals: to halve the 2005 level of greenhouse gas emissions per metric ton of product by 2025, and to gear all our operations to the circular economy – with the increasing use of green electricity.

What do you think?

By when does the European Union aim to become climate-neutral?

2035

2050

2075

Answer: 2050

THE STRENGTH WITHIN

Becoming fully circular is the challenge of a century. The challenge and responsibility, for us as company and as individuals, is to leave the planet inhabitable for our children and future generations. It is a challenge that we can only meet together. A responsibility that we can only live up to if we act as one, and if we all contribute. It is in pursuit of this vision that Covestro is re-aligning its strategy and its corporate culture.

CULTURE AS THE BASIS FOR OUR VISION

To develop our new strategy, we asked ourselves who we want to be and how we can achieve our vision, while remaining a reliable supplier, an appreciated partner in the value chain and a respected employer. We want to become the best version of ourselves that we can possibly be – and to do so as one. We understand that this journey starts with us – with strength from within and with a powerful culture.

We have weathered the challenges of 2020 under the flag of our “We are 1” culture. We will further incorporate this culture into our recruitment and personnel development processes and our daily corporate practices. We will be supported by a model based on the pillars of “acting responsibly”, “wanting better”, “winning together” and “leading forward”. With our common understanding, and our diverse and engaged 16,500-strong workforce acting as one, Covestro can become circular. We can then leverage our potential, be a motor for innovation, combine sustainability and profitability, and ensure our place in a world without fossil energy and resources. This is our goal.



»Our corporate culture will be key in our efforts to become fully circular.«

Dr. Markus Steilemann,
CEO of Covestro

COLLABORATE

TO PROTECT THE PLANET,
THE WORLD MUST ACT AS ONE



No single entity can become fully circular alone. For this challenge of the century, stakeholders must unite to fight waste in the Alliance to End Plastic Waste. They must establish new value chains to recycle water barrels in China, and add blockchain technology to plastic waste to make it traceable and reusable. And this is only the start.

FROM WASTE TO WORTH

No single entity can become fully circular alone; the challenges to be solved and the tasks involved are simply too complex. These include building awareness of the value and correct end of life treatment of plastics, establishing infrastructures to enable the collection and recycling of plastic waste, and identifying and nurturing promising ideas. Whatever the endeavor, the collective action and leadership of stakeholders across the plastics value chain is required. The Alliance to End Plastic Waste (AEPW), of which Covestro is a founding member, serves precisely this purpose.

STAKEHOLDERS NEED TO UNITE

Numerous success stories can be found across the globe less than two years after its launch. In Ghana, for example, where women are being empowered to start their own plastics recycling businesses. Or in India, where the Alliance has joined forces with German partner 'Deutsche Gesellschaft für Internationale Zusammenarbeit' (GIZ) to test approaches for various solutions that prevent plastic waste from leaking into the Ganges river.

Wherever it gets involved, the AEPW and its members seek support from leading global organizations as well as collaboration with local governments, companies and communities. Member companies of the Alliance, including Covestro, have a collective target of USD 1.5 billion of investment over the next five years. By enabling local solutions and helping them to become "investment-ready", the aim is to attract independent capital investments, thereby making the initiatives capable of sustaining and scaling themselves. Step by step, the Alliance and its members are bridging the gap between private sector financial commitment and concrete, scalable actions on the ground – in order to end plastic waste and foster a circular economy.



»The plastic waste challenge is solvable. Our member companies are deeply committed to this vision. As one of our founding members, Covestro is helping to make it possible.«

**Jacob Duer, President & CEO,
Alliance to End Plastic Waste**



FROM SPRING TO SOUND

“Innovative recycling” and “joint solutions” are two of the four pillars of Covestro’s circular economy approach. A prime example of what they entail can be found in China, where we integrate recycled 19-liter water barrels, such as those used in water dispensers, into our polycarbonate blends. Our cooperation with Chinese bottled water manufacturer Nongfu Spring and plastics recycling company Ausell marks the first of its kind in the industry.

“As the inventor of polycarbonate, Covestro has been focusing on developing recycling solutions for polycarbonate that has reached the end of its life cycle. This waste material is extremely valuable, so we are committed to working with our partners in the value chain to enable its upcycling and prevent it from going to waste, thereby fostering a circular economy,” says Holly Lei, President of Covestro China.



Video about the recycling process:
report.covestro.com/short/col1



**of certain polycarbonate
blends already consist
of recycled material**

NEW PRODUCTS WITH RECYCLED MATERIAL

Every year, Nongfu collects over one million discarded barrels, weighing around 1,000 metric tons in total. These are made of transparent polycarbonate and, as such, are both a prime source of waste and easy to recycle. The barrels disposed of to date are now sent by Nongfu to Ausell, where they are washed and re-pelletized into granules before being transported to Covestro’s site in Shanghai, China.

There they are mixed with virgin polycarbonate to tweak the material’s properties to customer requirements. Some blends contain up to 70 percent recycled material. They are used in automotive applications, home appliances and electronic devices, such as smart loudspeakers. Another step towards a circular economy taken. Thousands more to go.

»This collaboration promotes the sustainable use of polycarbonate.«

Zhou Li, Secretary of the Board of Directors, Nongfu Spring



TRACING THE ORIGINS OF RAW MATERIALS

The recycling of plastics is a key pillar of a future circular economy. But there is a major challenge to be overcome: Recyclers generally have to process waste that consists of a mix of plastics, and these plastics may also be contaminated or difficult to identify. Separating and recycling them is a highly complex task.

But what if plastics could be traced back to their raw materials? Recycling companies could always use the appropriate methods and get the most out of the recycling process. Dutch start-up Circularise has joined forces with us and material manufacturer Domo Chemicals to create this transparency – with the aid of blockchain technology.

TRANSPARENCY THROUGH BLOCKCHAIN TECHNOLOGY

Put simply, Circularise is building a platform for the exchange of detailed and confidential data. Information from every process step in the value chain is collated and linked in a blockchain, with each partner supplying a separate information block from its process area. Such a block contains information on materials used, precursors, processing steps and the like. Digitalizing this information enables the entire, often severely fragmented supply chain to be bound together with a “digital thread.” At the end of this chain, recycling companies are provided with an overview of the origin and composition of plastic waste, giving them important information on what can be recycled and how. It’s an entirely new approach – and Covestro is leading the way.

★ ★ ★
★ ★ ★
1.5
★ ★ ★
million Euro

**in funding did
Circularise receive
from the European
Union’s “Horizon 2020”
programme**

INNOVATE

DEVELOPING A CIRCULAR FUTURE



To become fully circular, it needs developments and advances in various areas. We need the ability to recycle any given material, for example. Raw materials must be based on renewable feedstock so as not to deplete the planet's resources. And existing energy- and resource-intensive plants must be further optimized.

MORE THAN ONE LIFE

The figures are shocking: Between 1950 and 2015, around 4.9 billion metric tons of plastic waste ended up in landfills and in the environment. And this problem will only get worse unless the world changes its approach radically. The solutions are obvious: We must make every effort to prevent waste by reusing it repeatedly over a long period. Unavoidable waste should not be carelessly discarded, but disposed of sensibly – and recycled wherever possible.

RETHINK RECYCLING

What sounds simple is, in fact, anything but: Only a tiny proportion of plastic waste can be easily recycled in the usual way – by mechanical means, which involves crushing, melting down and reforming the material. What's more, some plastics can no longer be used for their original purpose following mechanical recycling. And mechanical recycling may not even be possible, for instance in the case of mixed plastic waste.

An alternative is available in these instances: reducing old materials to their chemical components, from which new raw materials can be obtained. Covestro intends to pursue both options in a bid to give plastics more than one life: "We are researching new technologies for the chemical recycling of our materials in several projects, and are expanding established mechanical recycling in various markets," says Covestro expert Dr. Catherine Lövenich.

The chemical approach is being explored by the PUReSmart European research project, among others. This involves six countries, three universities and six companies, including Covestro, and focuses on the recycling of flexible polyurethane foam, commonly used in mattresses and the like. The ambitious target: to recycle 90 percent of this material.



Only

14%

of the 300 million
metric tons of
plastic waste are
recycled each year.

»We are researching new technologies for the chemical recycling of our materials in several projects.«

Dr. Catherine Lövenich, Covestro expert



Video about waste and recycling:
report.covestro.com/short/inn1

THREE CLEAN ALTERNATIVES

Ideally, cars should no longer emit any CO₂ whatsoever. On the contrary: They should be able to incorporate some instead – as an element of numerous automotive components. This is possible thanks to an innovative Covestro technology. We are now using CO₂ to manufacture a key chemical in the production of foams, from which the Swiss company FoamPartner has recently started making components for automotive interiors, including arm rests and seat covers.

CO₂, BIOMASS AND WASTE AS RAW MATERIALS

After mattresses and sports floors, the car is the latest field to be tapped for our CO₂-based materials. Textiles and building insulation will follow. "With CO₂ as a new raw material, we can save on crude oil in production, which benefits the climate," says Covestro researcher Dr. Christoph Gürtler. "We are also circulating carbon – a significant contribution to the circular economy."

Covestro is also committed to the use of plants as another environmentally friendly source of carbon and a substitute for crude oil. Films and coating components produced in this way are already on the market. At the same time, the company has joined forces with partners to research further applications and sources for biomass, including municipal waste and wood waste. This trio of alternative raw materials is rounded out by end-of-life product waste. Because plastics are far too valuable to be simply discarded.



1%

of all the world's
plastics were based
on biomass in 2019



Video on biomass as raw material:
report.covestro.com/short/inn2

What do you think?

By what percentage is the global share of bio-based plastics set to increase annually by 2024?

1%

3%

6%

Answer: 3%



LESS IS MORE

The rigid foam component MDI ensures that refrigerators and buildings worldwide are insulated in an energy-efficient manner. Accordingly, worldwide demand for MDI is growing steadily – and with it the requirements for energy-efficient and environmentally friendly production.

In 2020, Covestro reached an important milestone in this regard: The first industrial pilot plant for the production of MDI based on the novel AdiP technology opened in Brunsbüttel, Germany. AdiP stands for adiabatic-isothermal phosgenation and describes the technology's main advantage: It uses process heat generated during the reaction, eliminating the need for external energy input.

ENGINEERED SUSTAINABILITY

As a result, the production process significantly reduces energy consumption and CO₂ emissions in MDI production. Thanks to the AdiP technology, up to 40 percent steam and 25 percent electricity can be saved per metric ton of MDI produced. CO₂ emissions are thus reduced by up to 35 percent. At the same time, the production output of the plant increases by up to 50 percent. Thus, production plants can be built smaller to achieve the same output in future.

Teamwork made the dream work: "Innovations, especially in the field of process technology, are an important pillar in Covestro's strategy to become fully circular. We worked intensively across sites on the development of AdiP," says Dr. Klaus Schäfer, CTO at Covestro. "And I am convinced that together we will also successfully complete the pilot phase to enable the technology to be used in our global production network."



Video about the AdiP technology:
report.covestro.com/short/inn3



**of CO₂ emissions can
be saved by Covestro's
new MDI production
technology**