

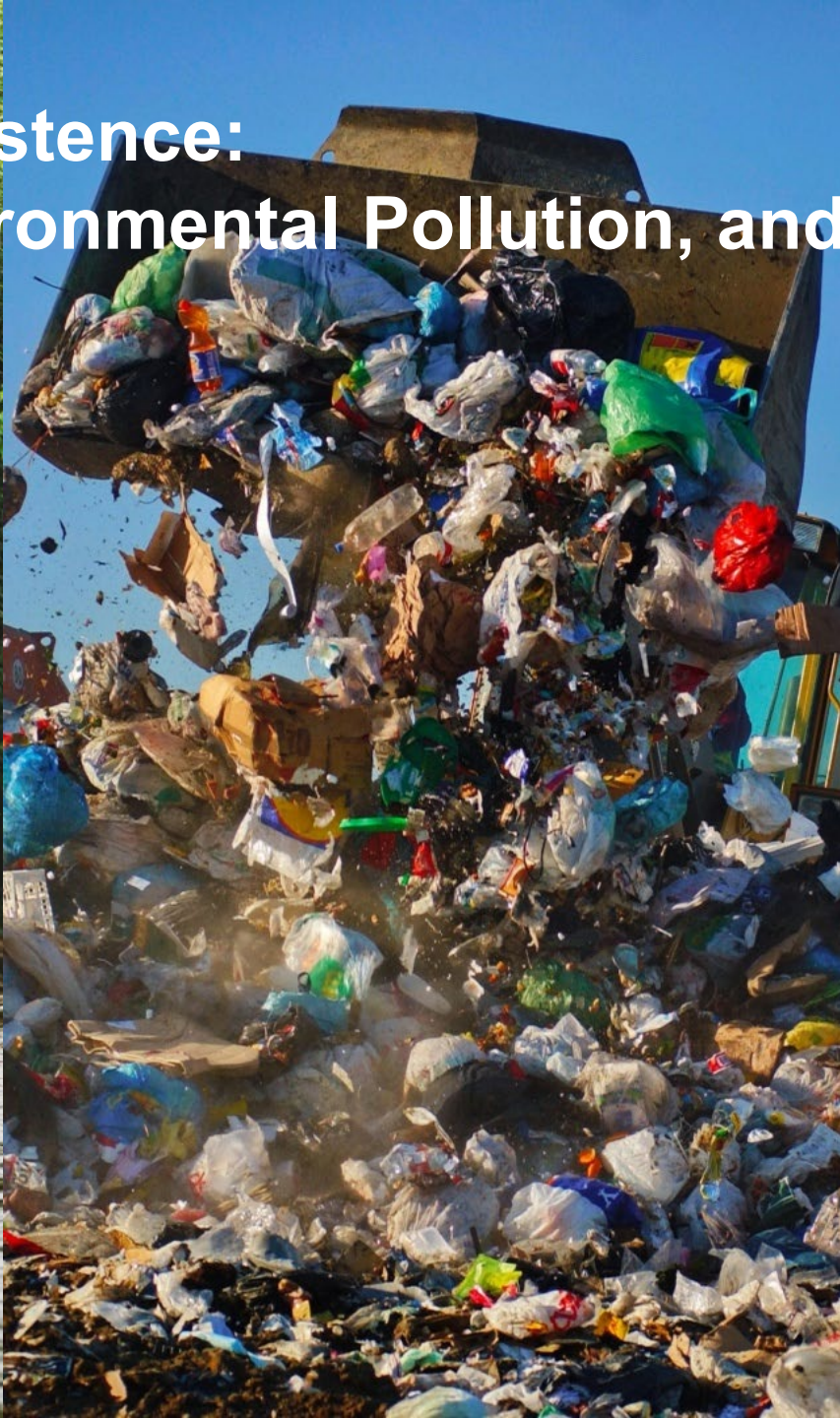


We create chemistry

Circular Economy

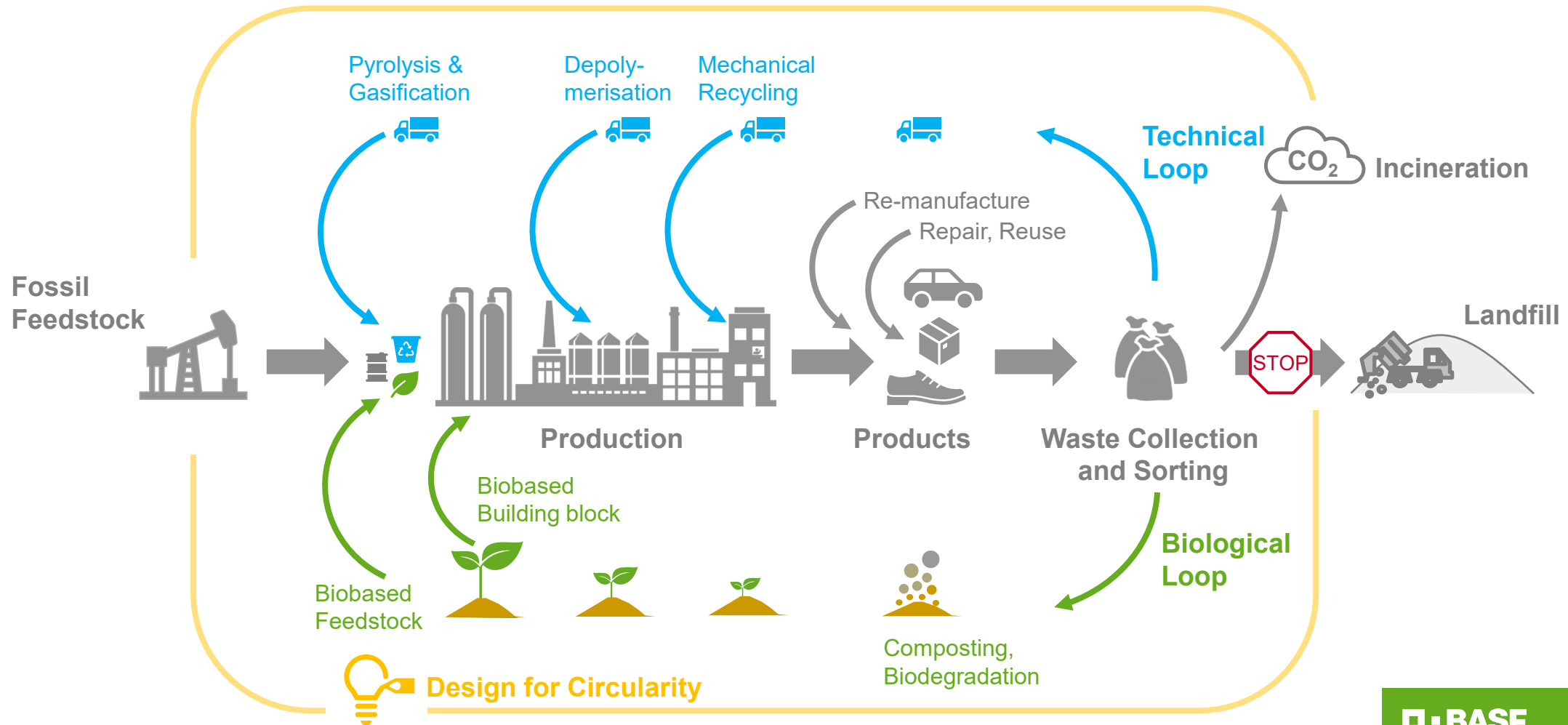
Ludwigshafen, September 2024

Threats to Human Existence: Climate Change, Environmental Pollution, and Biodiversity Loss

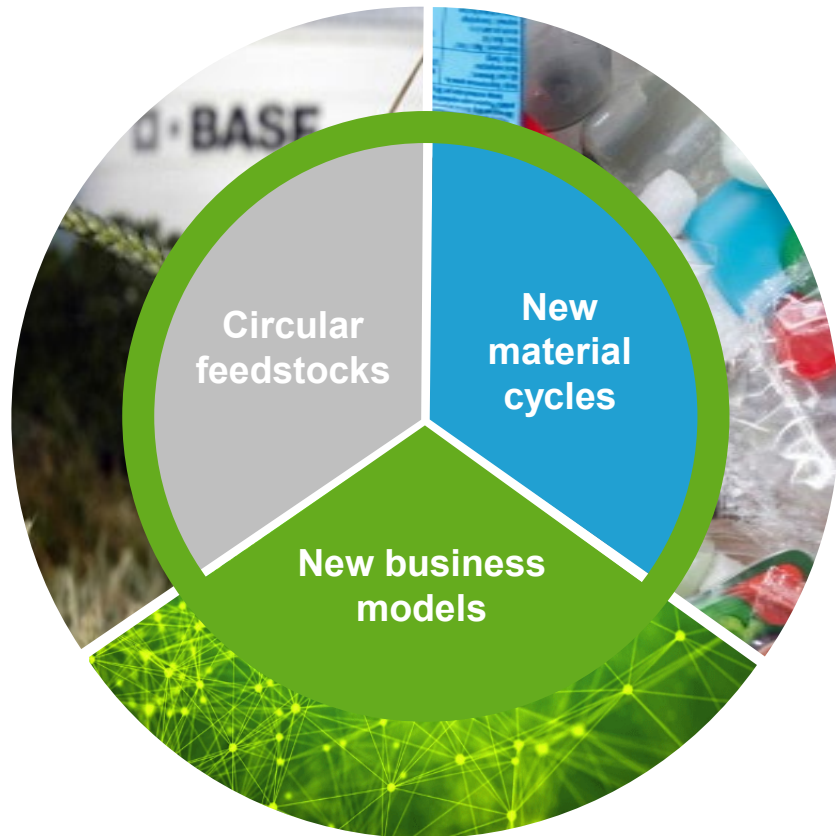


We strive to close the loop and extend the loop

by transforming from fossil to renewables and recyclates; enabling circularity, higher durability and prolonged lifetime of products



We have three areas of focus: new business models enable circular feedstocks and new material cycles



Circular feedstocks

We will increase the volume of renewable and recycled feedstocks from sustainable sources, also via the certified mass balance approach.

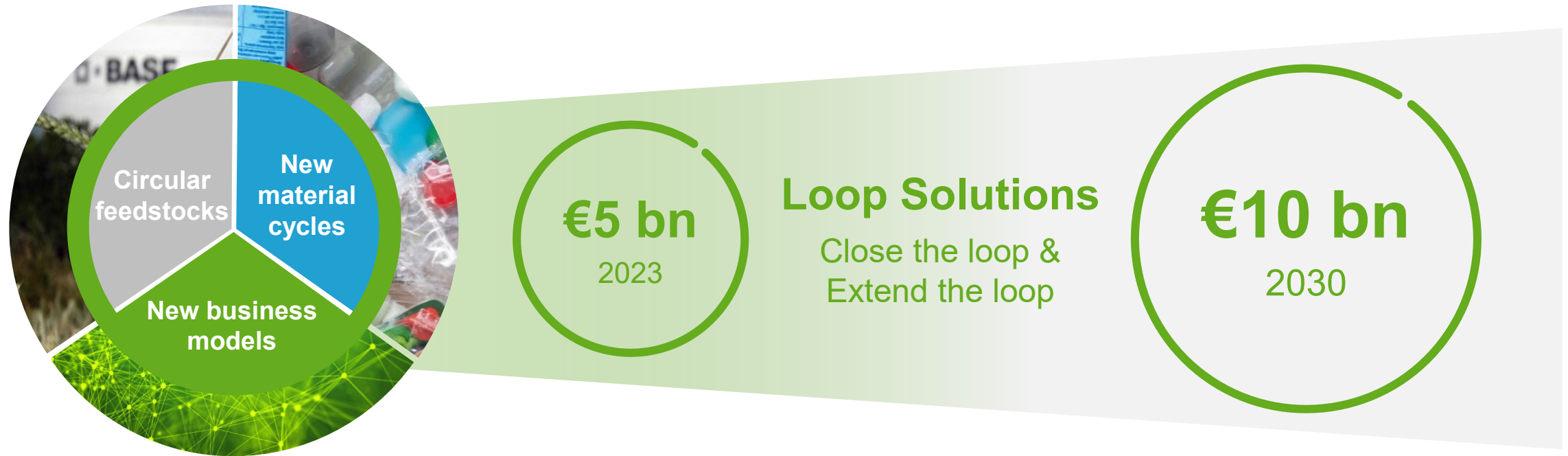
New material cycles

We design materials for circularity, develop solutions which improve or enable recycling, enable higher durability and prolonged lifetime/use phase of products, and establish product-specific recycling loops.

New business models

We enter new markets, create smart digital solutions and offer new services which allow a decoupling of growth from resource consumption.

We aim to reach €10 billion sales from Loop Solutions for our customers by 2030



Loop Solutions:

Sales of Circularity products (“close the loop” and “extend the loop”) based on [TripleS](#) (Sustainable Solution Steering) Portfolio Assessment

We aim to reach €10 billion sales from Loop Solutions for our customers by 2030

CLOSE THE LOOP



Renewable-based feedstocks

Products derived from sustainably sourced bio-based resources, or biomethane and bionaphtha from biomass (waste) via the certified mass balance approach: CathoGuard® 800 ReSource protects the car body from corrosion.



Recycled-based feedstocks

Products derived from pyrolysis oil made from mixed plastic waste or end-of-life tires, via the certified mass balance approach (ChemCycling®) / or from specific waste streams: Neopor® F 5 Mycled™ from certified post-consumer packaging EPS.



Enabling recyclability and/or biodegradability

Products focusing on the value chain for plastics and/or the recycling of mineral raw materials: Epotal® adhesives for the recycling of multi-layer packaging materials.



EXTEND THE LOOP



Higher durability

Products enabling higher durability of materials: Ultrason®, offering high material strength, design freedom, and high heat resistance for a broad range of applications.



Prolonged lifetime/use phase of products

Products that increase lifespan of materials, extend service life and/ or reduce maintenance intervals: Tinuvin® light stabilizers protect plastics against all sorts of weather conditions.



Loop Solutions: Sales of Circularity products (“close the loop” and “extend the loop”) based on [TripleS](#) (Sustainable Solution Steering) Portfolio Assessment Baseline 2023: €5 bn sales.

Circular Feedstocks

By using alternative raw materials, we can reduce fossil feedstock demand and contribute to a circular economy

Recycled feedstock

Dedicated mechanical recycling



e.g., mechanically recycled feedstock from expanded polystyrene (EPS) waste

Chemical recycling (e.g. ChemCycling®)



e.g., pyrolysis oil derived from plastic waste or end-of-life tires

Biomass balance



e.g., biomethane or bio-naphtha derived from biomass (waste)

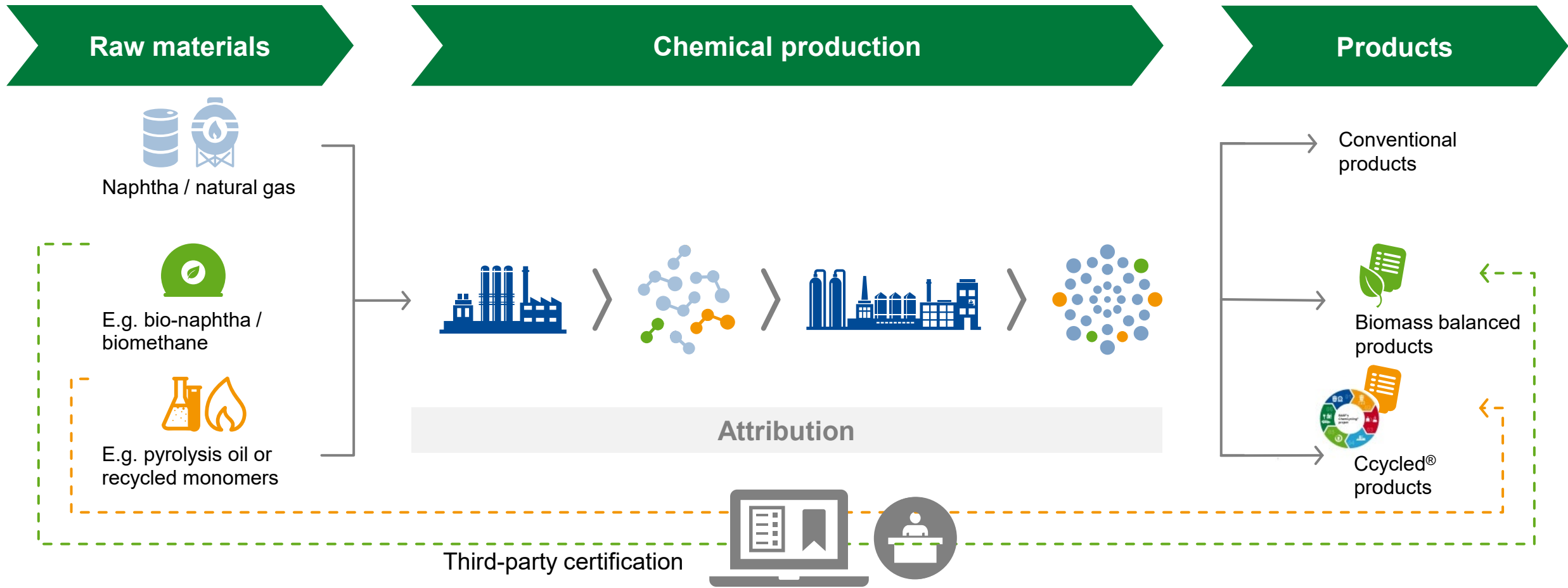
Dedicated bio-based production



Sustainably sourced bio-based resources, e.g., RSPO-certified palm oil

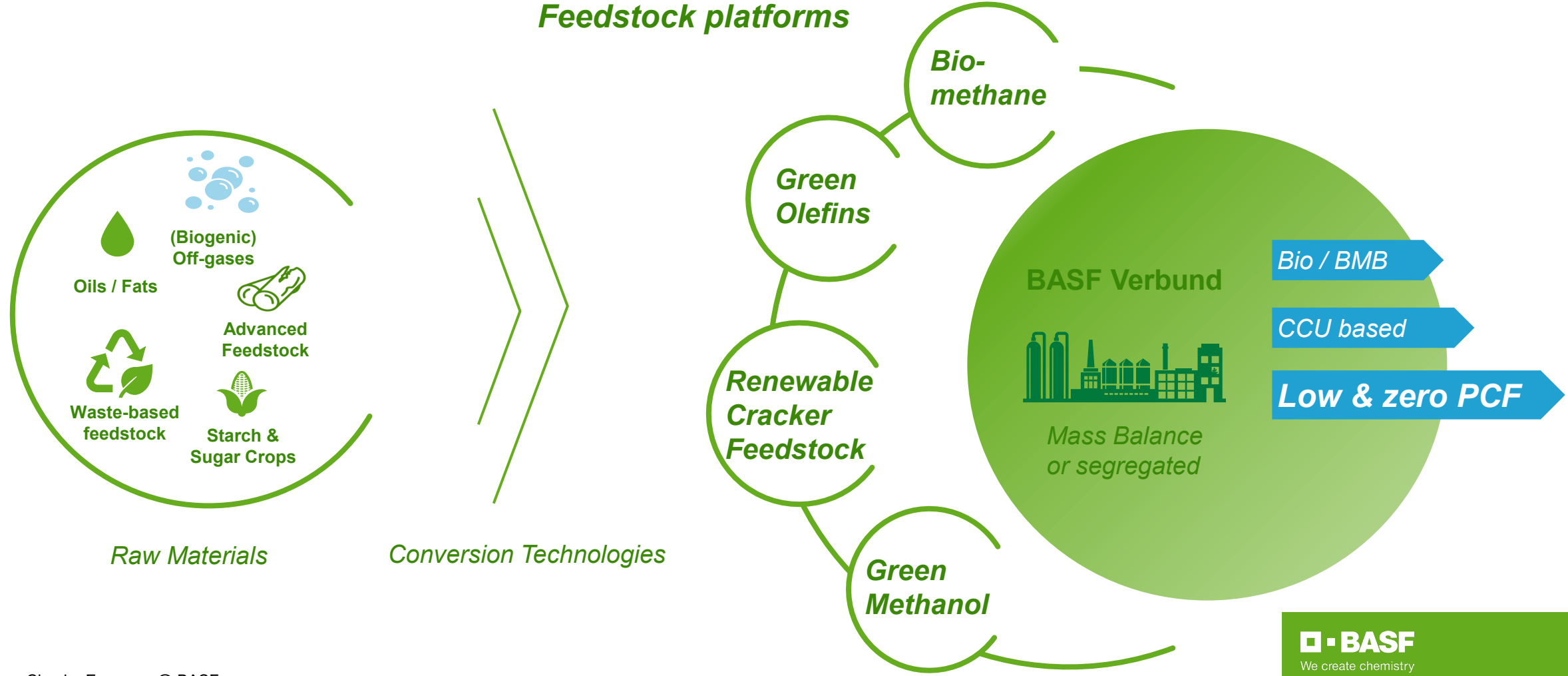
Mass balance approach

The alternative feedstock is attributed to certified products through the mass balance approach (credit method, according to ISO 22095)



Renewable Carbon will be scaled to provide low & zero PCF products

Several feedstock platforms targeted entering BASF value chains





BASF's biomass balance approach

- **Saves fossil resources** and **reduces the carbon footprint (PCF) of BMB products** compared to the conventional equivalent
- **Waste and residues** are the **preferred sources** of renewable feedstock (e.g., from municipal, agricultural and food waste or used cooking oils)
- The **correct attribution of renewable feedstocks** is ensured via certification according to known certification standards, e.g., **REDcert²** and **ISCC+**
- Requires **no reformulation** – identical product performance
- **Available** easily and fast for nearly all our products in industries like home care, automotive, construction and consumer goods

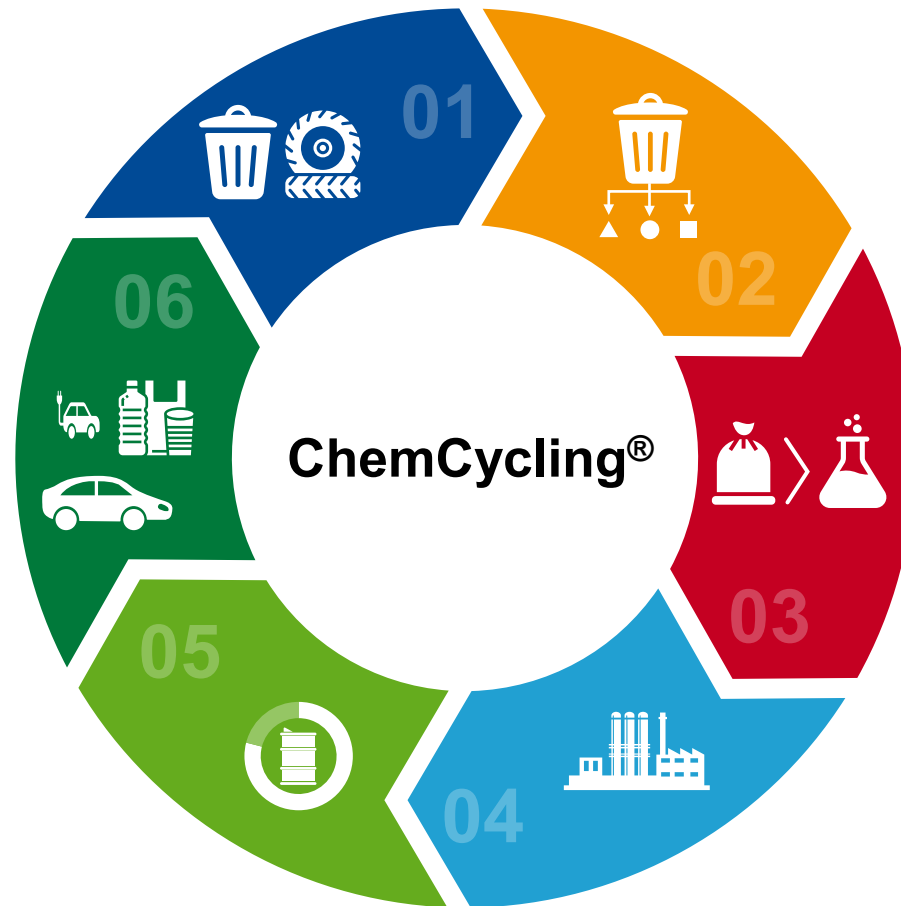
ChemCycling®

A solution for plastics waste recycling

Consumers use and dispose of plastic products (e.g., packaging, tires)

Our customers use these chemicals to make their own products

BASF can attribute the recycled feedstock to all chemicals produced in the Verbund via a certified mass balance approach



Waste companies collect and sort the waste and supply it to BASF's technology partners

Our partners convert the plastic waste into pyrolysis oil through a thermochemical process

Pyrolysis oil is purified to be used as feedstock at the beginning of BASF's Verbund production

Circular economy contribution of ChemCycling®

- **Complementary approach** to existing recycling methods, **increasing** overall **recycling rates** of plastic waste
- Our technology partners pyrolyze mechanically hard-to-recycle or otherwise incinerated **mixed plastic waste and end-of-life tires** generating feedstock for chemical production
- **Recycled feedstock replaces virgin fossil resources** at the beginning of BASF's value chain
- BASF sites and Ccycled® products are **third-party certified** according to **internationally recognized sustainability certification schemes** like REDcert² and ISCC PLUS and meet the definitions by ISO 22095:2020

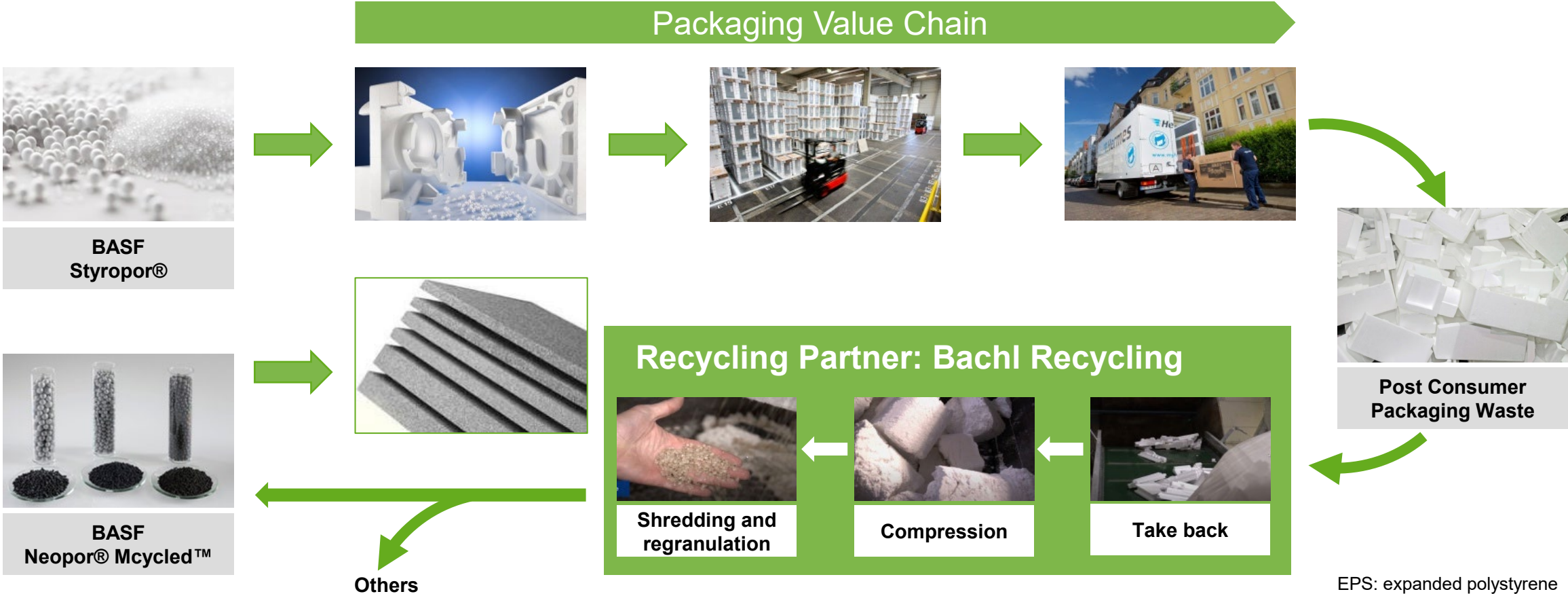


Benefits of Cycled[®] products

- **Reduced fossil resource consumption**
- **Reduced product carbon footprint** compared to conventional grades according to life cycle assessment
- **Virgin-quality material for sensitive products**, including food contact, temperature-sensitive and safety-relevant applications
- About **240 mass balanced Cycled[®] products certified** according to REDcert² or ISCC PLUS
- **Commercial applications** realized by our customers **in industries** like food packaging, textile and automotive

Circularity in Styrenics Value Chain: Neopor® F 5 Mcycled™

Saving fossil resources through mechanically recycled EPS from packaging waste, a drop-in solution for our customers, REDcert² certification for recycled content



EPS: expanded polystyrene



New Material Cycles



Breakthrough

Zara's capsule jacket made from loopamid[®] is entirely based on textile waste and demonstrates that textile-to-textile recycling is possible.

Closing the loop with loopamid[®]

loopamid[®] is the first Polyamide 6 entirely made from textile waste.

- BASF's unique recycling technology tackles one of the most pressing challenges the fashion industry is facing: textile waste.
- loopamid[®] realizes textile-to-textile recycling by overcoming limitations of other nylon recycling processes.
- From end-of-life textiles to virgin-like materials: Textiles are recycled at a molecular level ready to be transformed into brand new, premium fabrics.
- Collaboration with major players along the textile value chain ensures specific requirements of textile production are met.

Building a Circular Economy

Battery Recycling in Europe

- Using metals from recycled batteries to make new battery materials **offers significant CO₂ reduction potential** in the production of electric vehicles and supports the growing metals demand and ambitious requirements of the **circular economy policies**.
- In Schwarzheide, Germany, BASF operates **the first co-located center for battery materials and recycling in Europe**. The black mass plant is one of the largest commercial plants in Europe and BASF is able to process 15,000 tons of end-of-life batteries and production waste.
- Moreover, BASF operates a **prototype refining facility in Schwarzheide** for the extraction of lithium, nickel and cobalt.
- Thus, together with its strong partner network, BASF has taken important steps towards **a circular economy for battery materials in Europe**.





Washing solutions by Chemetall

Adding sustainable value and reducing your carbon footprint at the same time

- High cleaning efficacy at reduced temperatures
- Delamination of **multilayer plastics**
- Effective **deinking**
- Efficiently removing **glue and label residue**
- Compatible with the requirements of the **food industry**
- **Purification of wastewater** and recirculation



IrgaCycle® - Novel plastic additive combinations for recyclers, compounders and converters

- Improves processability and stabilizes melt flow of recycled polymers
- Mitigates mechanical failures and gel formation
- Rejuvenates additive package and optimizes recyclates for the next life
- Tailored to **enhance the quality of post-consumer and post-industrial polyolefin material** for re-use in rigid and flexible applications

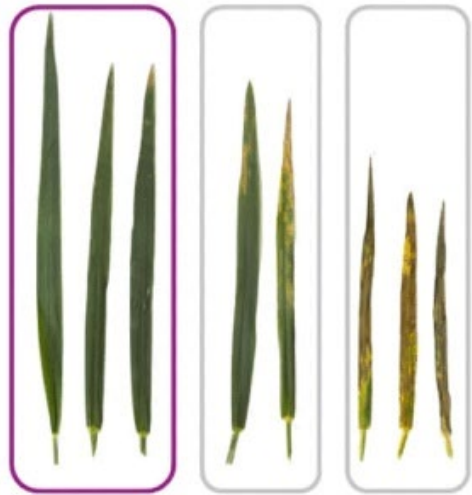
New Business Models

trinamiX Mobile NIR Spectroscopy

- trinamiX GmbH was founded in 2015 as a wholly owned subsidiary of BASF SE
- trinamiX mobile Near-Infrared (NIR) Spectroscopy Solution **identifies plastics anywhere, anytime, in seconds**
- trinamiX' solution
 - ▶ consists of a portable handheld device, trinamiX cloud-based data analysis, a mobile app and customer portal
 - ▶ determines diverse compositions of different plastics
 - ▶ supports design for recycling, cleaner sorting and quality control
- **Recycling and recyclability are improved**, paying off for both the environment and businesses alike



Selling “healthy plants” instead of crop protection products



1 Klasse 100–80%
2 Klasse 79–70%
3 Klasse 69–0%

Leaf health level

- Product-service combination for winter wheat and barley in DE and FR
- Offers a tailored, field-specific fungicide strategy, guaranteeing leaf health at the end of the season
- Farmers follow the strategy and monitor leaf health at certain growth stages by uploading notes and images to xarvio® FIELD MANAGER
- If the guaranteed leaf health level is not reached on assessment at season’s end, **BASF pays the customer compensation**

The xarvio® business model aligns objectives of customers and BASF, incentivizing both to be as resource efficient as possible.



Responsible Sourcing

We source responsibly

Improve sustainability performance in the supply chain



- **2030 Goal:** By 2030, 80% of our suppliers with unsatisfactory **sustainability results improve** their performance
- **Supplier Code of Conduct** rooted in internationally recognized standards such as the principles of the UN Global Compact and the International Labor Organization and updated according to the latest due diligence regulations (e.g., German Supply Chain Act)
- Engaged in **global initiatives** to improve sustainability performance in the supply chain, e.g., Global Battery Alliance (GBA), Responsible Minerals Initiative (RMI), Roundtable on Sustainable Palm Oil (RSPO)
- Founding member of the **“Together for Sustainability”** initiative for the joint evaluation of suppliers

Principles for the responsible sourcing of renewable raw materials



- To improve the sustainability of our value chains and mitigate environmental and social risks, we strive to source certified renewables and engage in smallholder community projects.
- We source in line with all applicable responsible sourcing legislations.



Environmental principles

- We source renewables to lower the **carbon footprint** of our products and to contribute to our transition to a **circular economy**. Sourcing waste-based renewables is part of this effort.
- We strive to minimize the environmental impact and maximize the efforts to halt and reverse **biodiversity and ecosystem loss** within our spheres of control and influence. We adhere to the country-specific access and benefit sharing regulations (Nagoya Protocol).
- We support the conservation of High Carbon Stock or High Conservation Value **forests**, peatlands and equivalent ecological and culturally important landscapes connected to the origins of our supply chains. In our sourcing we implement the BASF forest protection position.
- We expect good agricultural and forestry practices, especially to maintain **soil health**, minimize **water use**, reduce **eutrophication** risks and other negative effects on **water quality** along the supply chain.



- We regularly **assess and review sourcing risks** in light of these principles and take actions to mitigate those risks.
- Our principles for the responsible sourcing of renewable raw materials are reflected in our **Supplier Code of Conduct**.



Social principles

- We respect **human rights, including labor rights**, in our operations and embrace the responsibility to foster respect for human rights in relationships with our business partners along the value chain (ILO).**
- We object to any form of **land right** abuse including the abuse of indigenous people's land rights. We expect our suppliers to not tolerate and actively work against any form of such conduct.
- We strive to improve **food security** by sourcing responsibly and to avoid negative impacts on food supply. This includes integrating food security aspects in our procurement assessments and engaging in smallholder community projects.

*Definition „renewables“:

- Biogenic material, includes feedstock derived from plants or animals, such as agricultural and energy crops, wood and forestry residues, organic waste from municipal and industrial sources (including manure), and algae

** See policy statement on human rights for more information

Sustainable sourcing of renewable feedstock

Voluntary commitments and initiatives for oleochemistry – Palm (kernel) oil



Voluntary commitment to source palm products sustainably

- Goal 1: **Only source RSPO certified palm oil and palm kernel oil** by 2020 achieved and met again in 2023
- Goal 2: Expand these commitments to the significant **intermediates** based on palm oil and palm kernel oil by 2025. These include fractions as well as primary oleochemical derivatives plus vegetable oil esters
- RSPO-certified production of palm kernel oil shows around 36 percent **lower global warming impact** than non-certified production
- 25 production sites worldwide **RSPO certified** in 2023

Protecting Biodiversity through Circular Economy

Biodiversity

Circular Economy as key lever to halt and reverse biodiversity loss



- **Biodiversity provides essential ecosystem services** like water, carbon storage and raw materials; but is under threat.
- **The five main drivers of biodiversity loss are**
 - climate change
 - land use change
 - pollution
 - overexploitation
 - invasive species
- **Circular economy reduces pressure on biodiversity and dependencies on natural resources**, by keeping resources in the loop and decreasing the need for virgin material.

Example for Starting Ventures: Project Standing Forest

Sustainable use of non-timber forest products from the Amazonian Bioeconomy



Innovative and responsibly sourced solutions for our customers

- Using Amazonian biodiversity as new **raw materials** for the development of innovative ingredients
- Contributing to the **conservation of the Amazon Rainforest**
- Strengthening the bioeconomy and contributing to the **development of the region's communities**

Part of our [Starting Ventures Program](#)



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