



Our Journey to Net Zero 2050


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October 24, 2023





The chemical industry is an essential part of the solution and will require the industry to intensify effort and Innovation



No downstream effect without upstream decarbonization



Energy intensive processes impose huge potential for innovation

Carbon is in our DNA, however, we shall capture and re-use it



Our purpose:

We create chemistry for a sustainable future



The Chemical industry with BASF as thought leader and action contributor is part of the solution to transform our way of thinking and acting



We have ambitious CO₂ reduction targets...

From 1990 to 2018, BASF has already **reduced GHG emissions by 45%** despite growing the business!

2030

25%
CO₂ emissions
reduction
(compared with 2018)¹

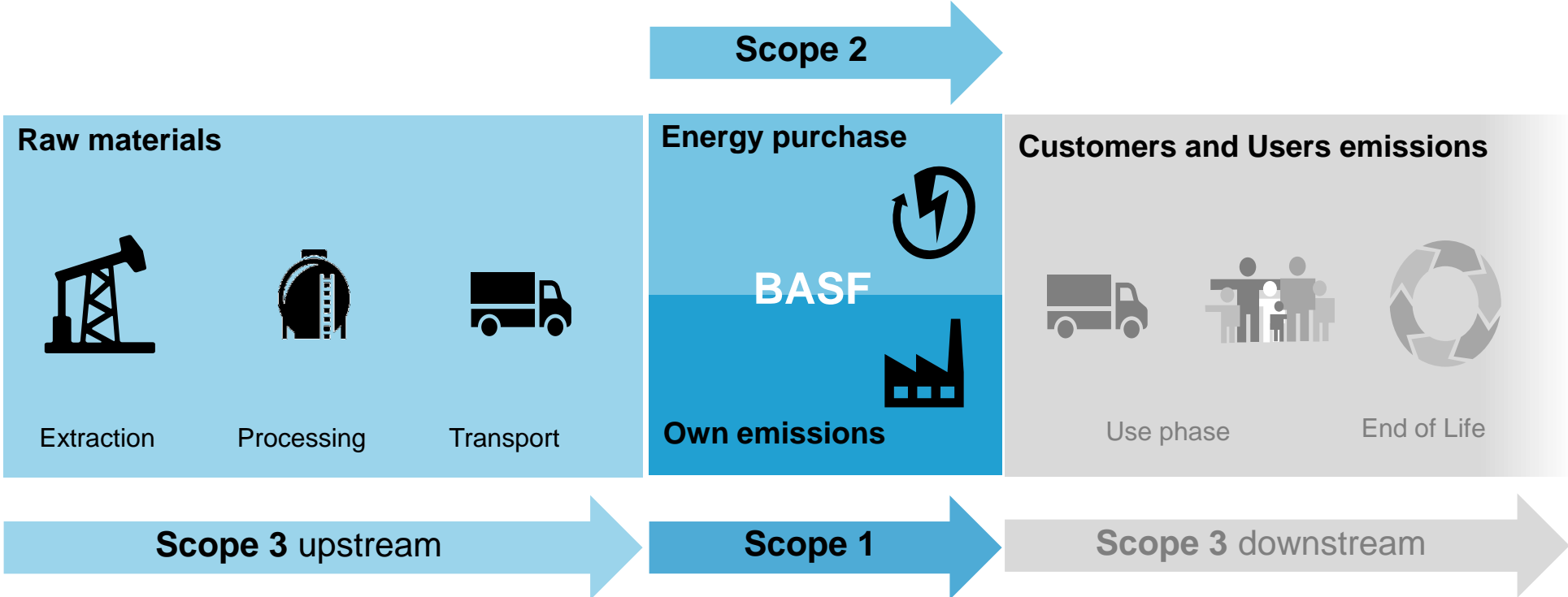
2050

net zero
CO₂ emissions¹

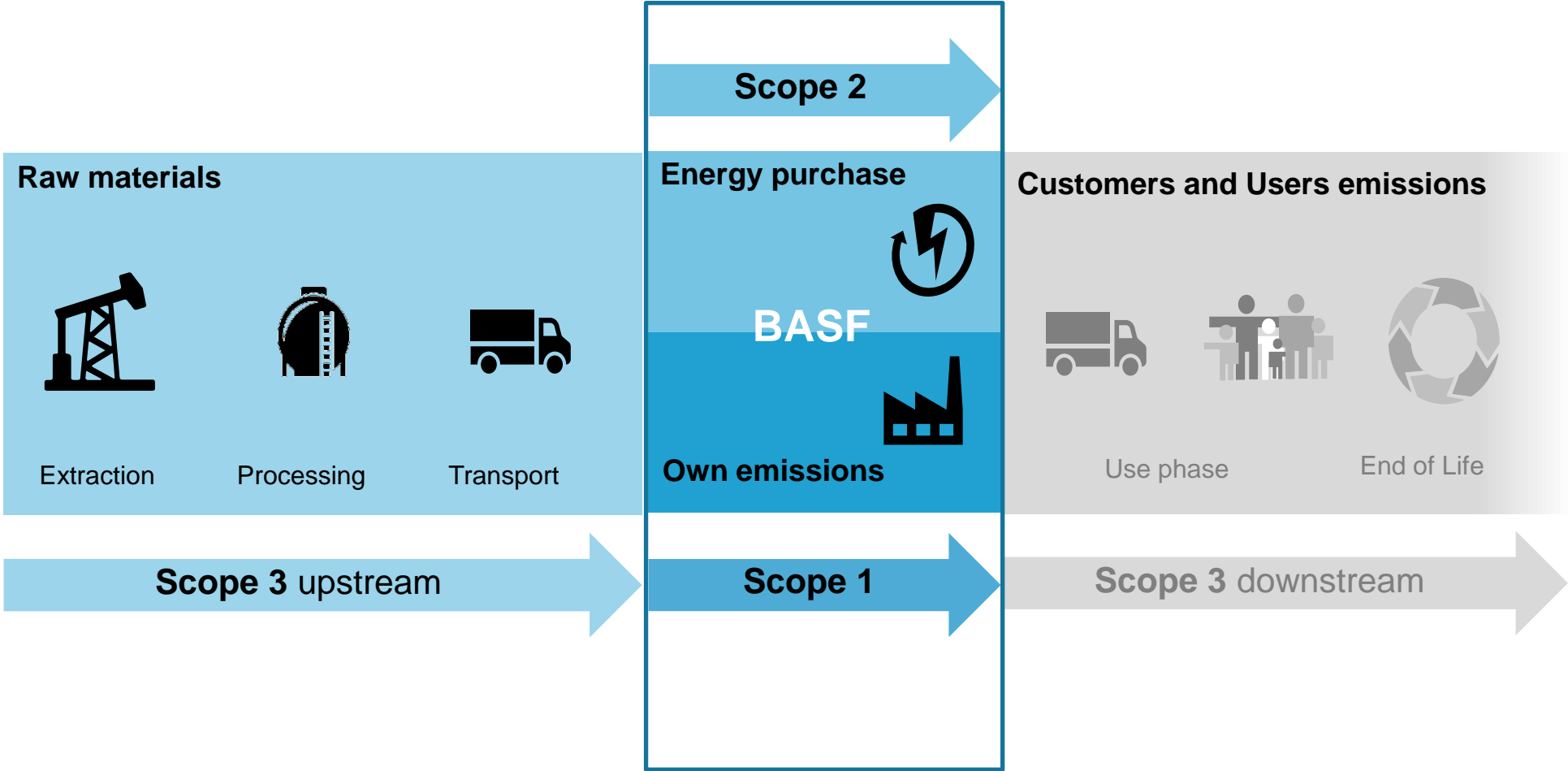
...for Scope 1 and 2

¹ Scope 1 and Scope 2; 2030 target compared with 1990: 60% CO₂ reduction

We are looking at reducing our environmental impact by looking at emissions along our entire value chain: Scope 1, 2 and 3



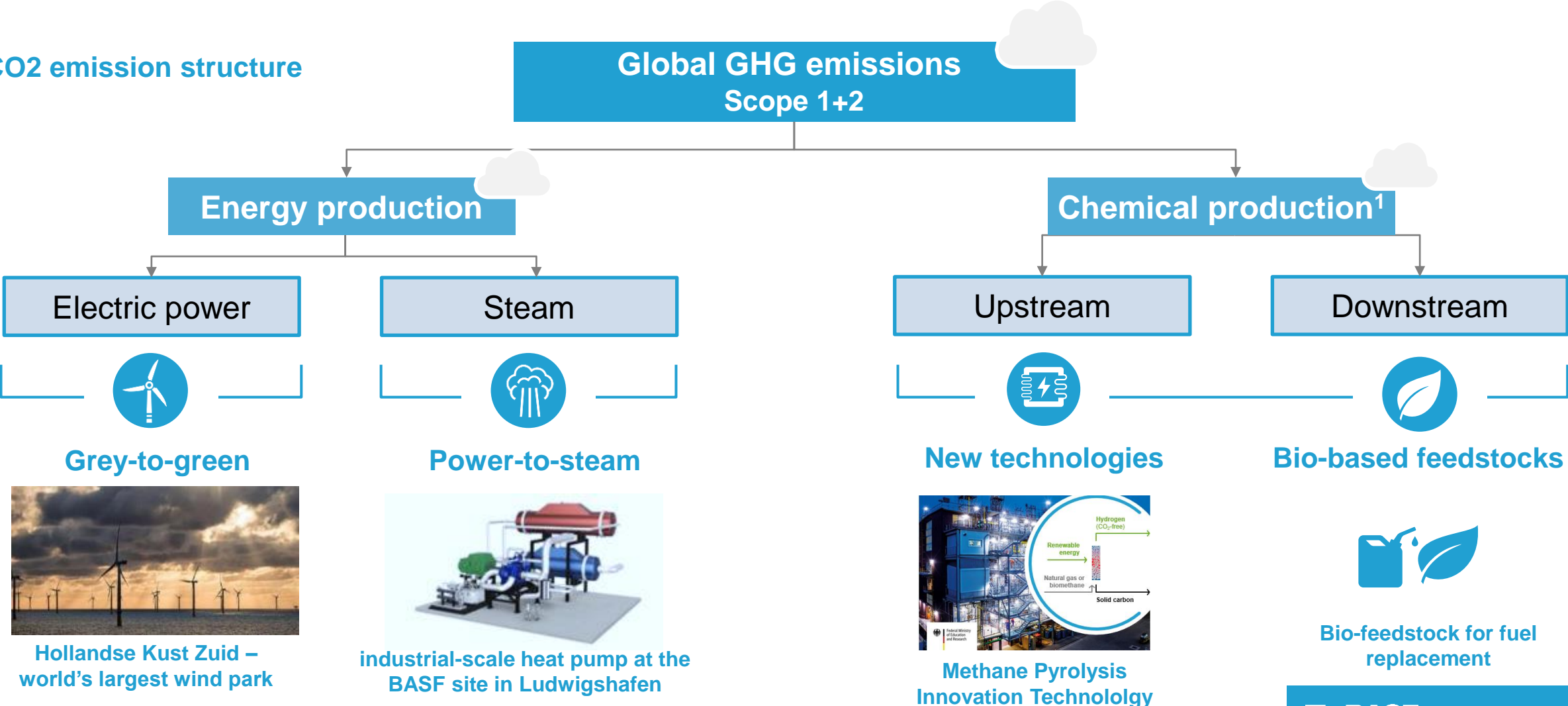
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Internal

No downstream decarbonization without upstream decarbonization

CO2 emission structure



¹ Includes emissions from process energy ² Operational excellence measures

BASF drives forward renewable energy projects across the globe



Hollandse Kust Zuid – world's largest wind park



On-site solar park Schwarzheide, Germany



25 years onshore wind power from Spain



25 years offshore wind power from Germany



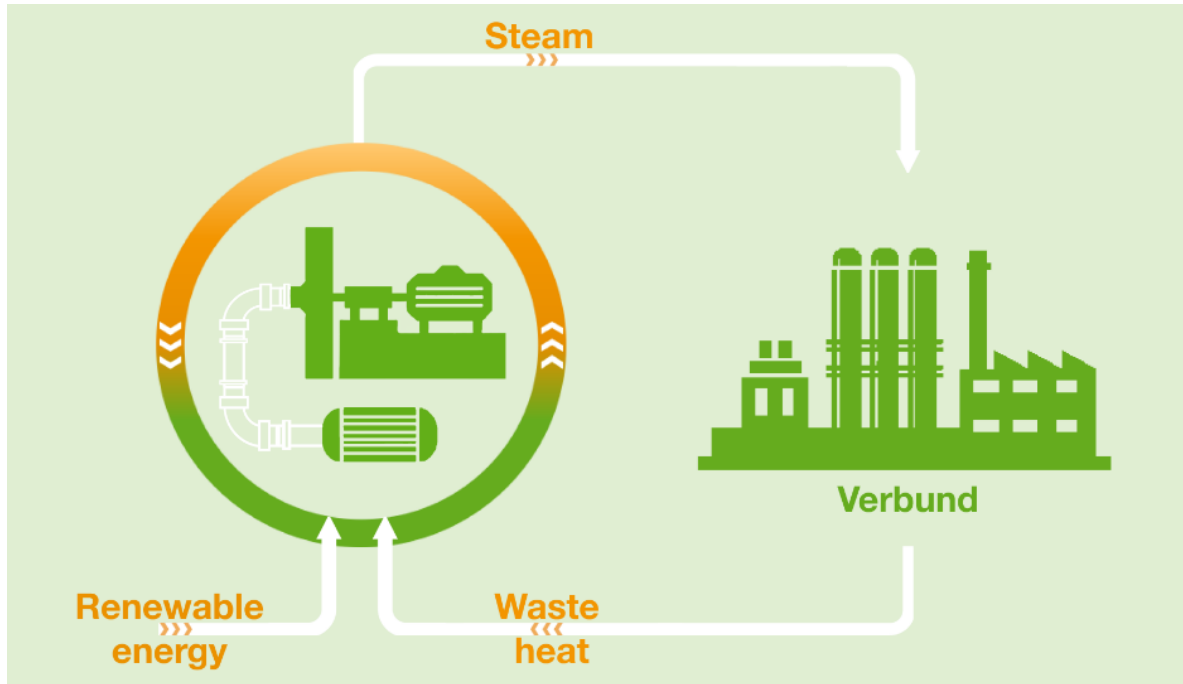
Wind and solar power for sites across US



Renewable power for several Chinese sites

Electrifying steam generation to reduce emissions

CO₂ – free steam production with heat pump technology

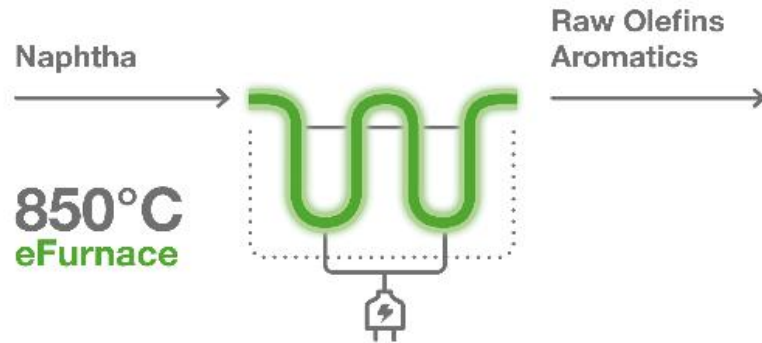


- New ways to generate steam will play a significant role in reaching our climate targets
- BASF will install technologies like industrial-scale **heat pumps**, **e-boilers** and **heat storage** systems to replace fossil-generated steam from today's power plants and capture the energetic potential of waste heat
- **E-drives** will replace existing steam turbines, reduce our steam demand and allow us to replace steam directly with electricity

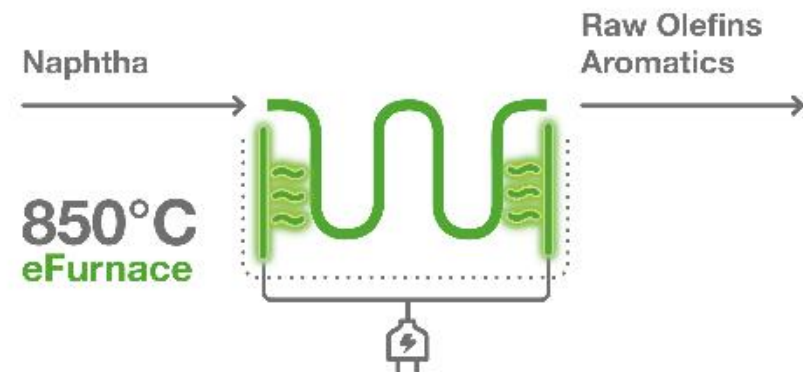
The world's first demonstration plant for large-scale electrically heated steam cracker furnaces



Direct Heating



Indirect Heating



- BASF, SABIC and Linde **have started construction of the world's first demonstration plant** for large-scale electrically heated steam cracker furnaces (eFurnace)
- Demonstration plant with 6 megawatts **input of renewable electrical energy to be fully integrated into a steam cracker** at BASF's Ludwigshafen Verbund site
- Technology has the **potential to reduce CO₂ emissions by at least 90%** compared to conventional steam crackers
- Project **has been awarded funding** by the German Federal Ministry for Economic Affairs and Climate Action
- **Startup** of the demonstration plant is **targeted for 2023**

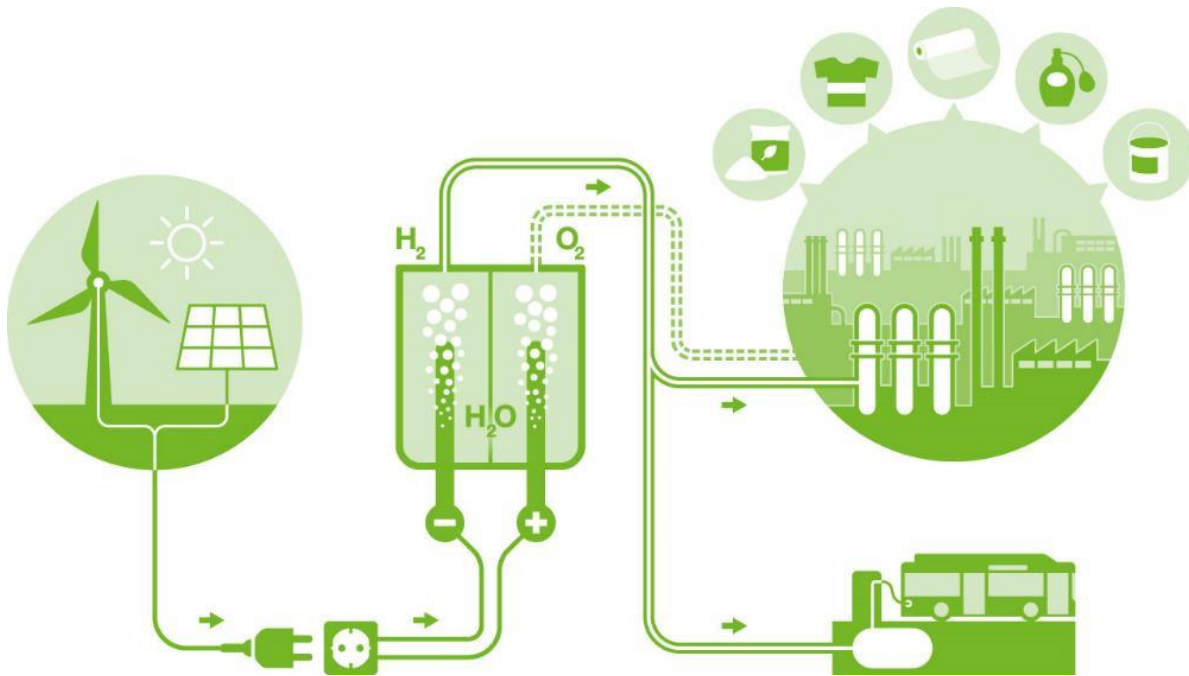
Supported by:



on the basis of a decision
by the German Bundestag

BASF
We create chemistry

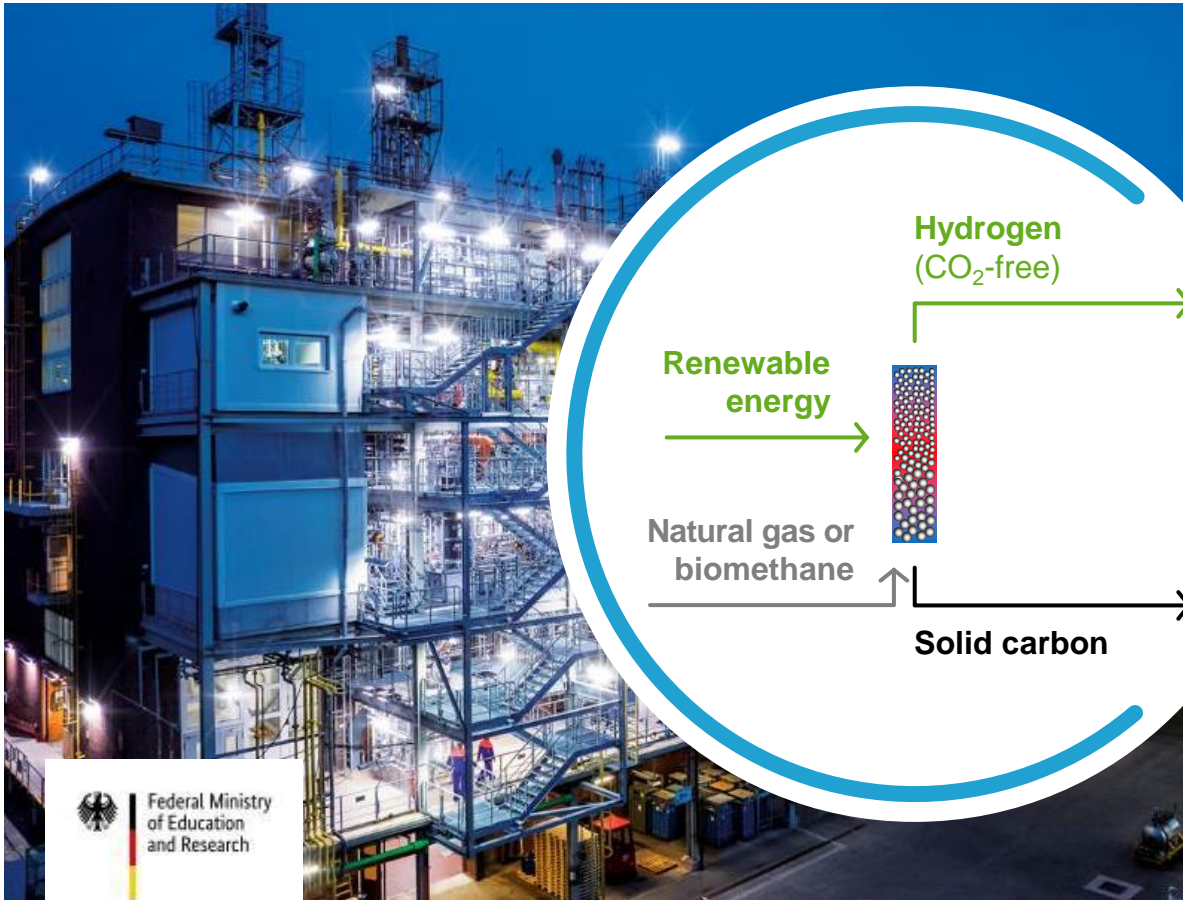
Water electrolysis in Ludwigshafen – BASF's Hy4Chem project



- In **water electrolysis**, water is split directly into its two components, hydrogen and oxygen
- If the required energy comes from **renewable sources**, the process is **carbon-free**
- We are working with Siemens Energy on a **project for the construction of a PEM** (proton exchange membrane) water electrolyzer with a **capacity of 54 megawatts**
- Hydrogen to be used in **BASF Verbund** and for **local community hydrogen mobility market**
- BASF applied for funding by the German Federal Ministry for Economic Affairs and Climate Action (BMWK)

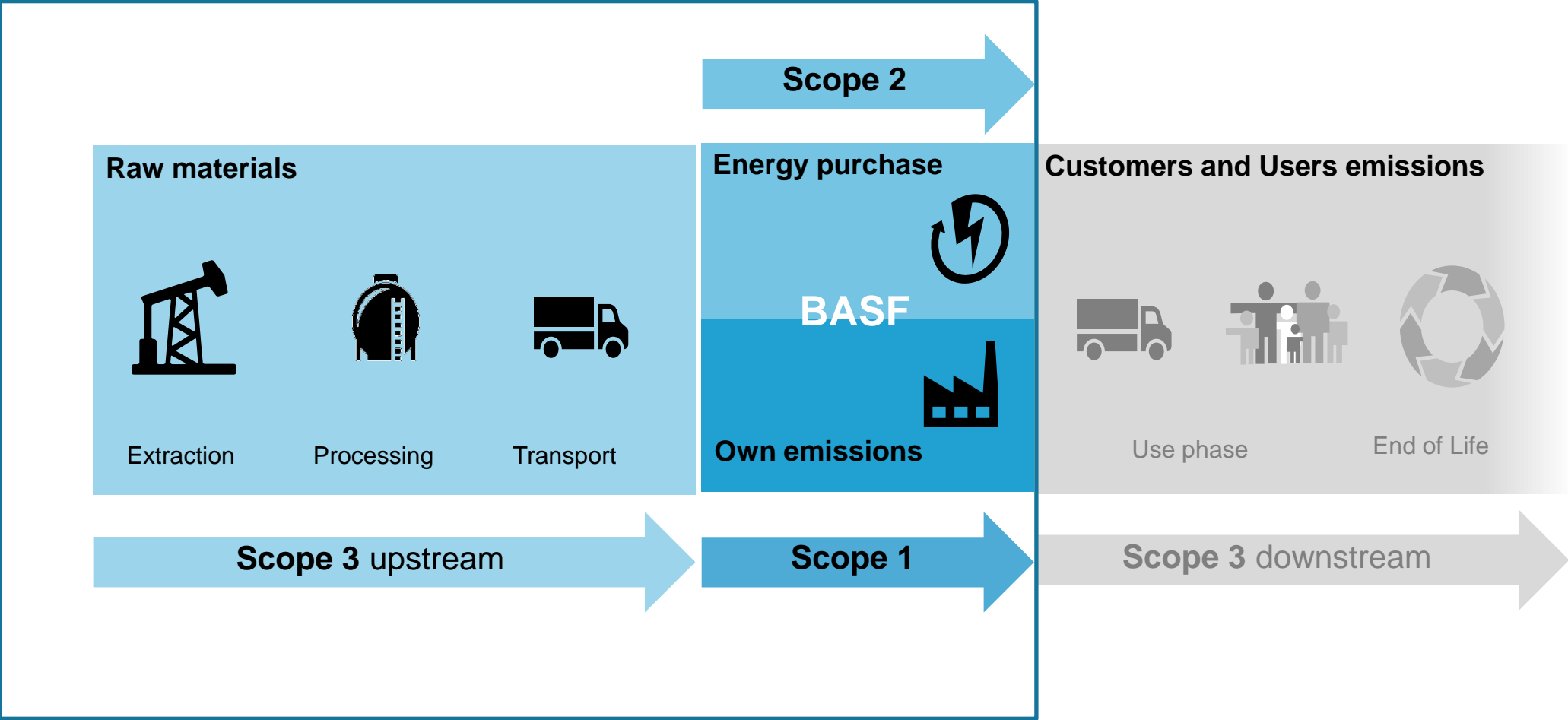


Methane pyrolysis* – process innovation to reduce CO₂ emissions



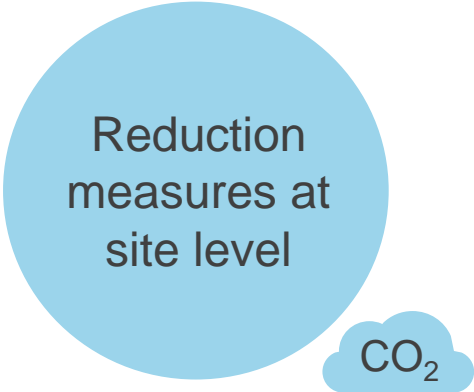
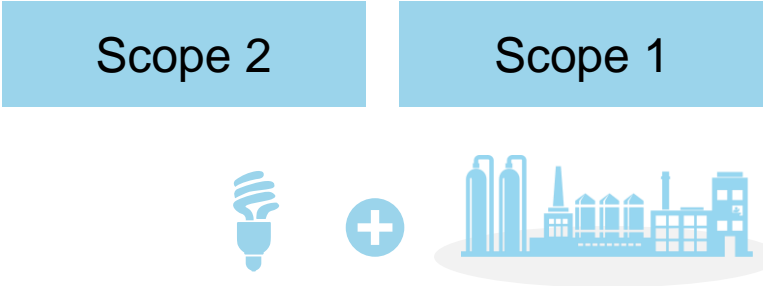
- Methane pyrolysis is a **low-emission technology**. In this innovative process, (bio)methane is split directly into hydrogen and solid carbon
- **Test plant** at the Ludwigshafen site in trial operation
- Key challenges are **process technology and control**
- **Methane pyrolysis** requires around **80% less electricity** than water electrolysis and is virtually **carbon-free if renewable energy is used**

In addition to CO₂ emission reduction in our own operations, we look into our suppliers' value chain (scope 3 upstream)...

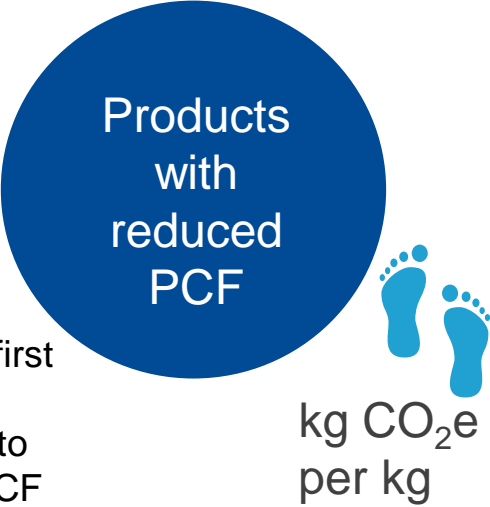


...which enable us to provide Product Carbon Footprint PCF calculation and reduction to our customers

BASF Group targets



Product carbon footprint (PCF)



BASF as first chemical company to provide PCF

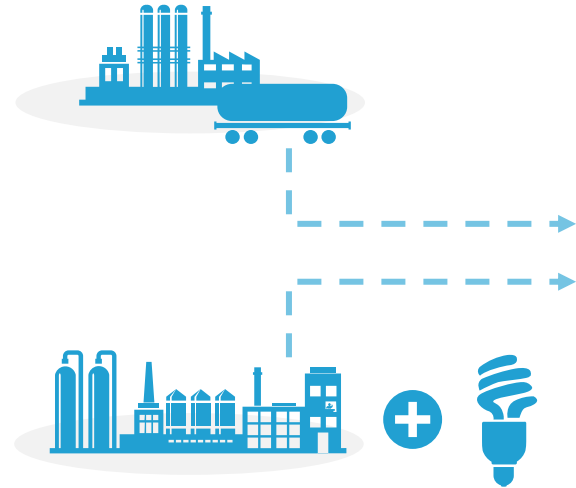
¹ Scope 3 emissions from raw materials production by suppliers AND emissions by our customers & consumers

Together for Sustainability (TfS) agreed on global guideline for PCF calculation

TfS initiative is a global, procurement-driven initiative by chemical companies to improve sustainability practices in line with e.g. UN Global Compact.

Scope 3

Emissions caused by suppliers and generation of raw materials



Scope 1 + 2

Emissions caused by own operations¹

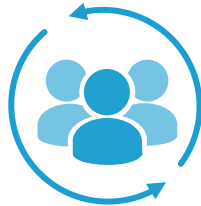


- TÜV-certified²
- Meets ISO standards³
- Calculates product carbon footprints cradle-to-gate

CO₂



Product carbon footprints of sales products

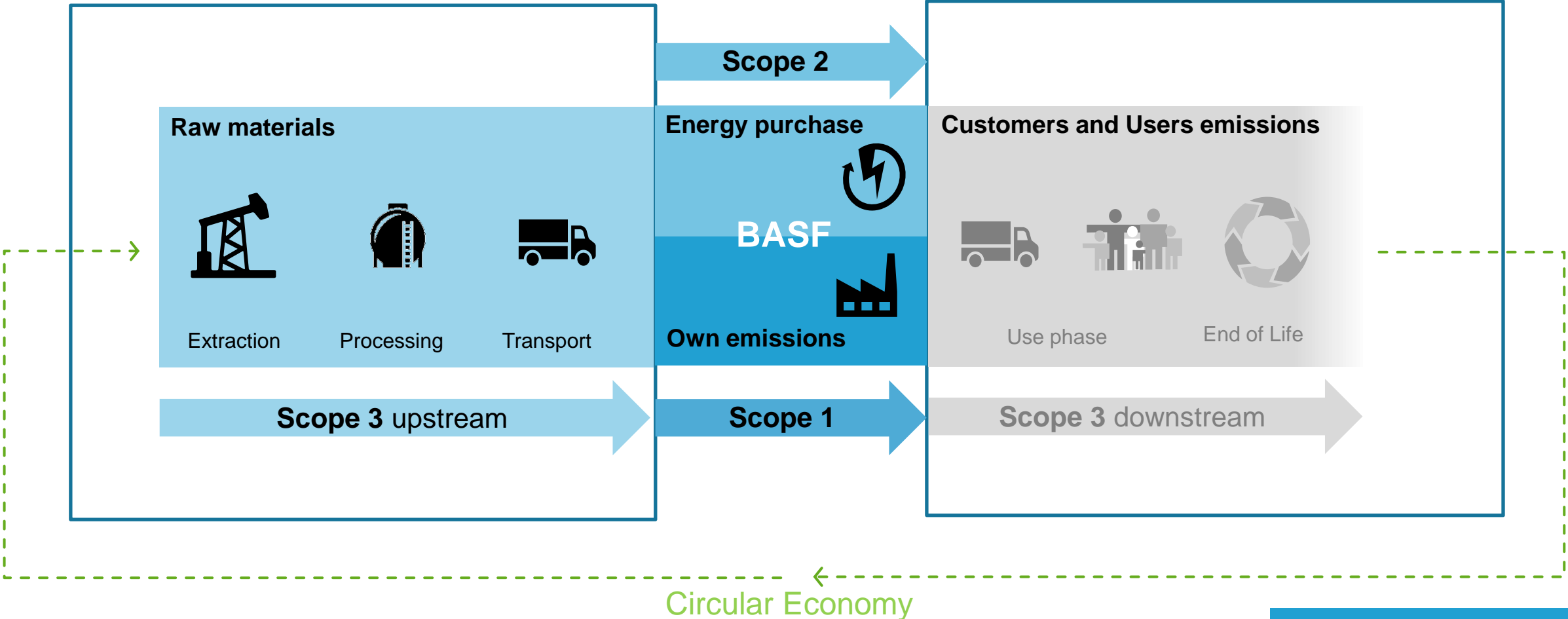


Customer benefits

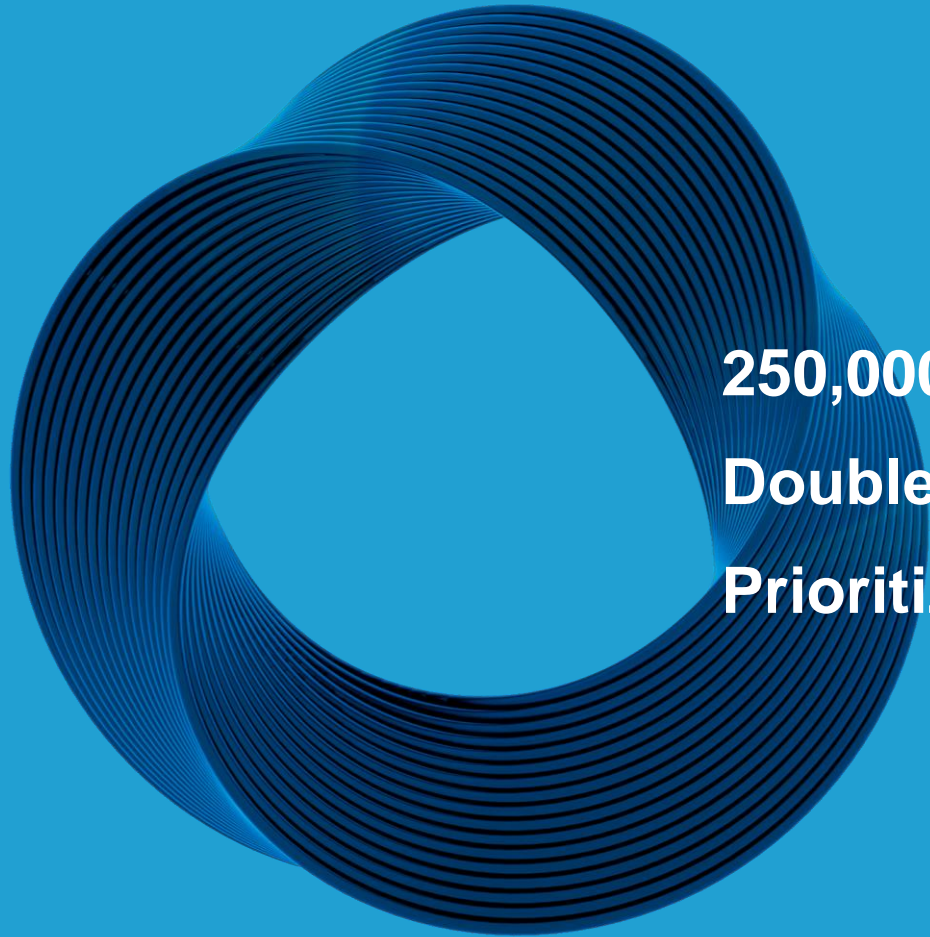
- Transparency on CO₂ emissions
- Identification of main reduction levers
- Certified software
- Transparent documentation

¹ Energy generation and chemical processes
² ISO 14067:2018
³ ISO 14040:2006, 14044:2006, 14067:2018, GHG Protocol Product Standard

To further reduce scope 3 emissions downstream as well as upstream, Circular Economy models are key



Our commitments towards Circular Economy



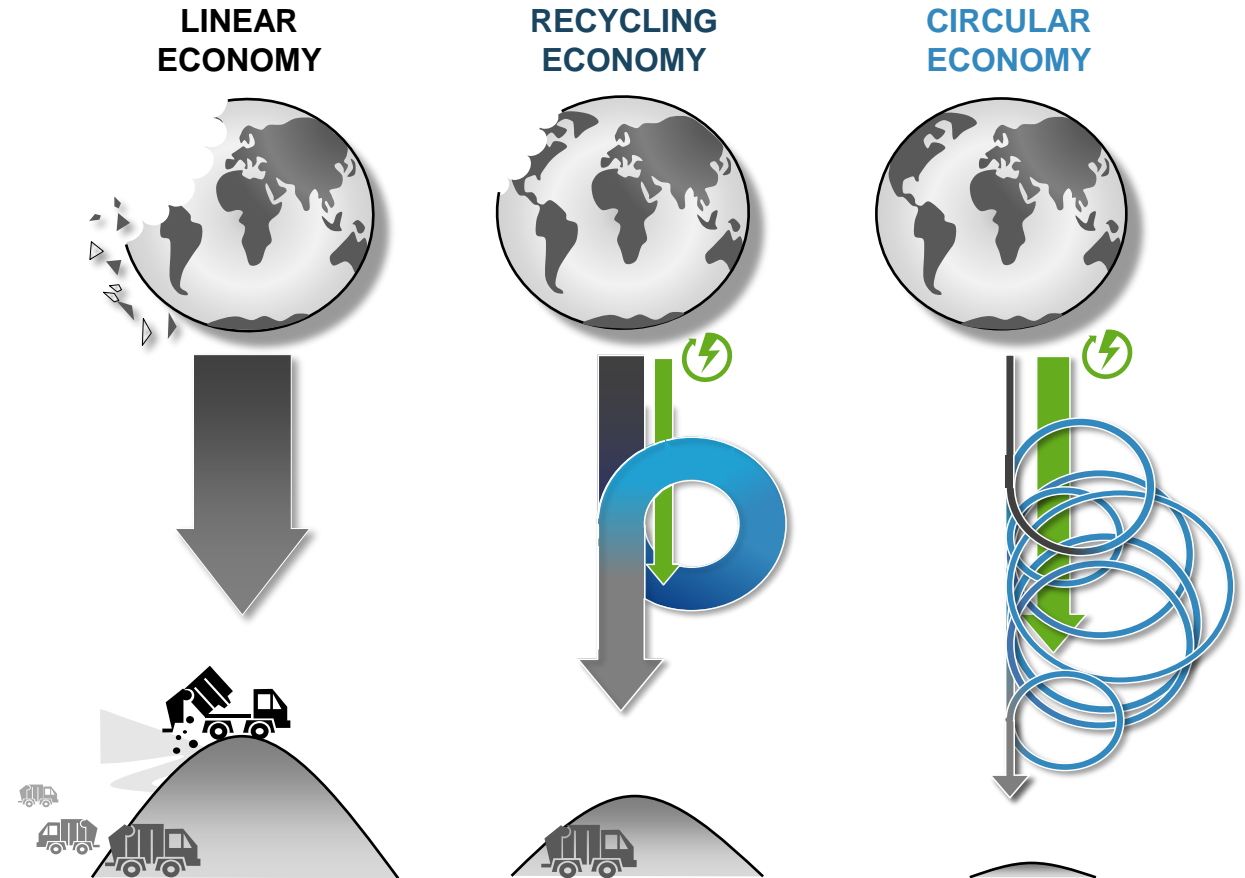
250,000 metric tons of circular feedstock by 2025

Double circular sales to €17 billion by 2030

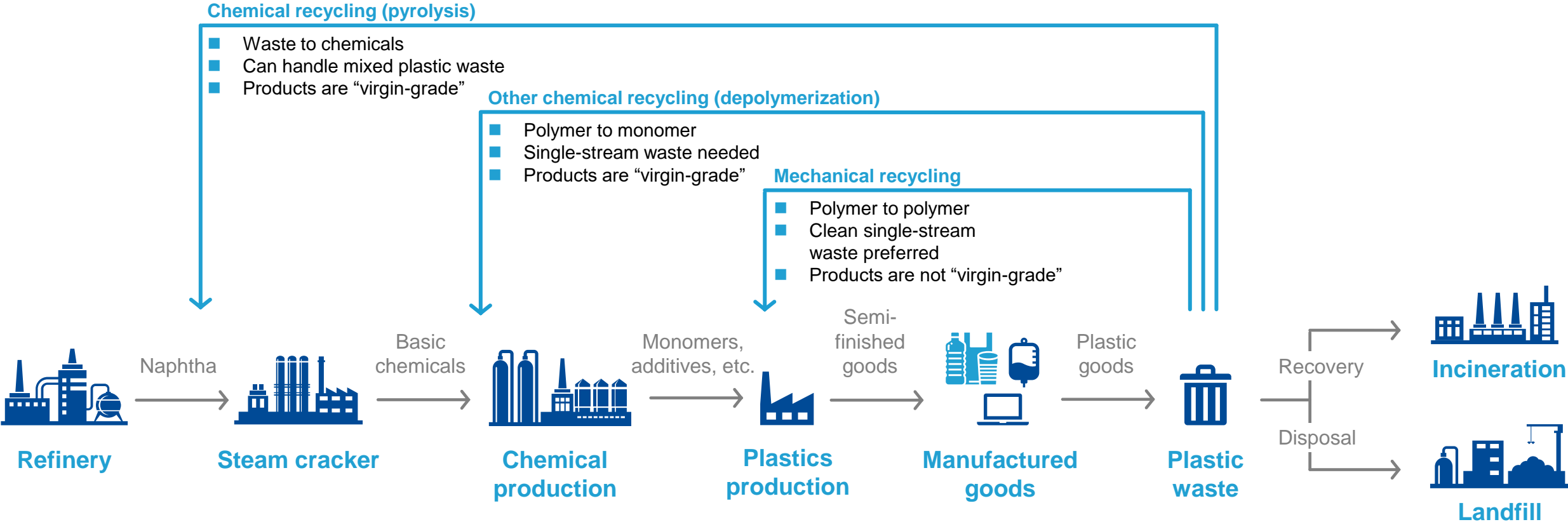
Prioritize related capex, M&A, R&D

A Circular Economy aims to decouple growth from resource consumption and is regenerative by design

- **Rethink design** and use of resources and **keep** them in **use as long as possible**
- **Recover and recycle** products and materials, regard waste as **raw material**
- **Avoid waste** and **pollution** and **protect** natural systems

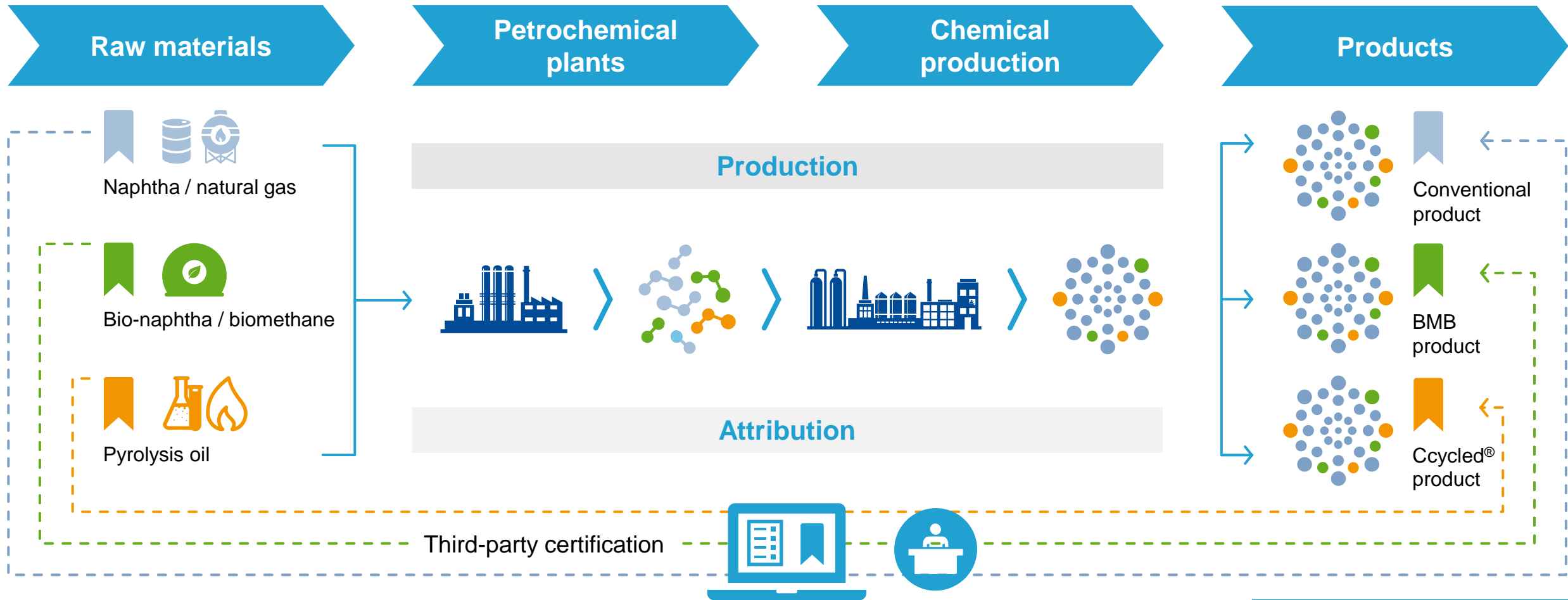


Circular Economy in plastics : Different loops are necessary for a successful transition towards circularity




→ ChemCycling™ is complementary to mechanical recycling


Mass Balance approach enables the replacement of fossil feedstock, the transition to circular and low PCF/ net-zero products




Our innovative solutions reduce CO₂ in our customers' applications and during consumer use phase



 BMW Group is the first OEM to use BASF paints certified according to biomass balance approach

 Ultraform[®] BMB (POM) ensures the use of certified renewable resources in the production chain

 Polyamides based on chemically recycled tires form the basis for robust outdoor pants from Vaude

Let's join forces to turn challenges into opportunities and enable a transition towards a more sustainable economy and industry



Mindset shift towards sustainable future and sustainability as a must



Cross value chain collaboration for solutions and standards



Support global certifications and regulations (e.g. PCF, Mass Balance)



Infrastructure and access to renewable Energy



Open loop setup of recycling solutions



Financing the transition (e.g. Incentives for carbon-neutral tech)



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