



The Role of Chemical Company to Advance Sustainability in the Construction Sector

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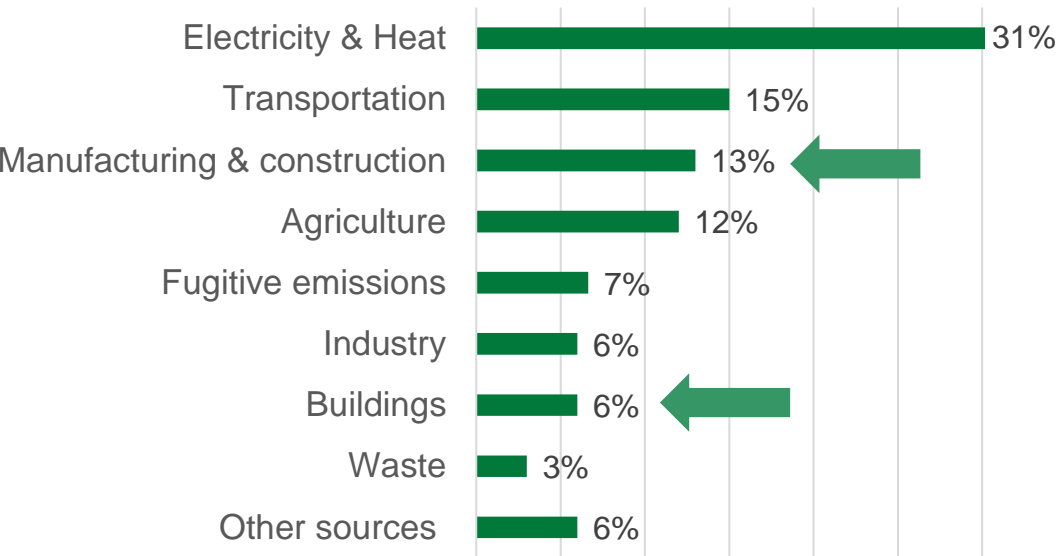


Climate change is the most threatening problem of mankind, mainly driven by excessive CO₂ emissions

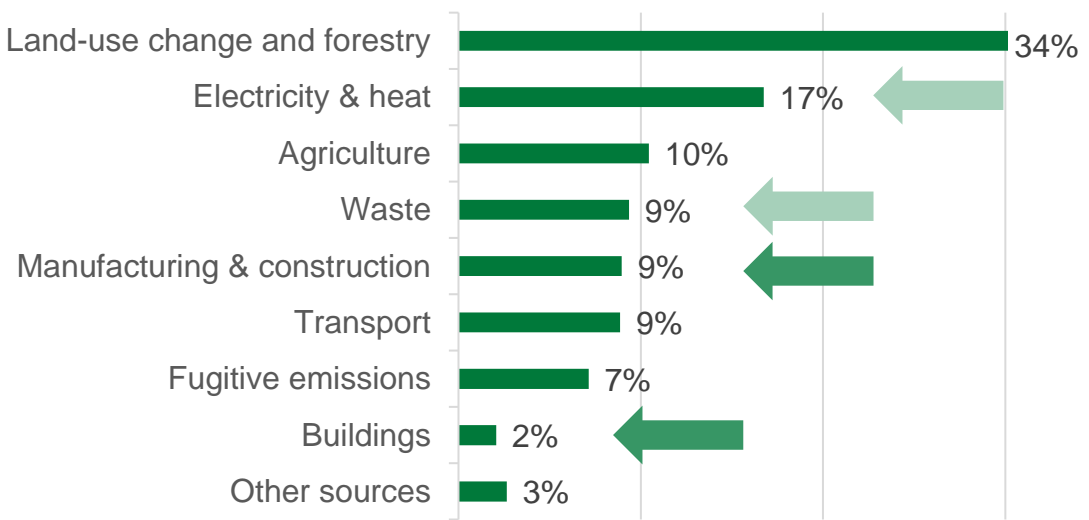


Economic sector overview of emission drivers shows several sectors emitting CO₂ at high level

Global CO₂ Emissions 2020 by economic sector¹



Indonesia CO₂ Emissions 2020 by economic sector¹



Manufacturing and construction accounts for **132.36 million tons CO₂** in 2020

Construction sector has direct & indirect impacts

Source: Our World in Data

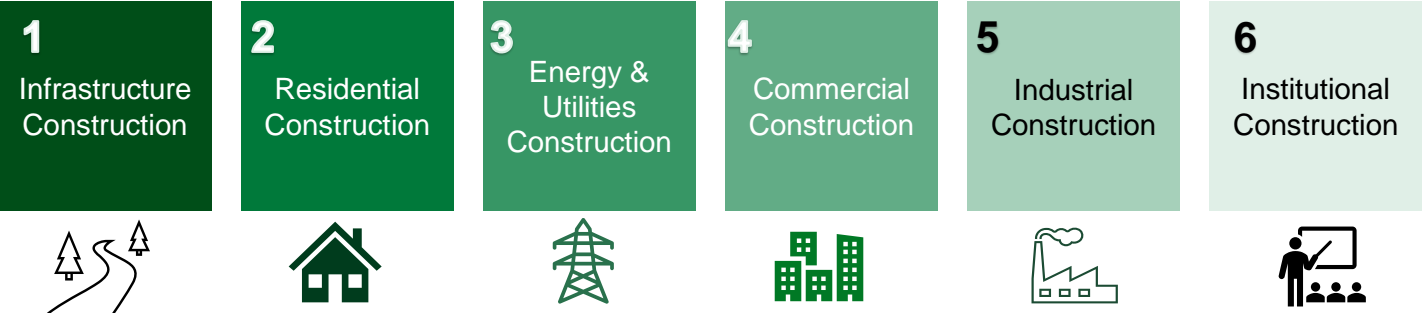
► Importance of emitting economic sector varies from country to country

Indonesia: Construction & Sustainability

- ▶ Indonesia accounts for biggest market size (**51%**) for construction in ASEAN region an infrastructure development budget of **110 billion Euro**^[1]
- ▶ Growth in Indonesia, the Philippines, and Vietnam will be much more persistent, driven by **strong population growth, rapid urbanization and private sector support**

 **Emerging Asia** will be fastest growing construction market over the next 15 years^[1]

Construction Market Segmentation ^[2]



Top 3 largest segments in ASEAN: Infrastructure, Residential and Energy Utilities



CAGR² of construction sector (ASEAN) forecasted to be
5.1% over 2020 – 2025
4.0% over 2025 – 2030
 valuing **US\$450.1 bio³** in 2023

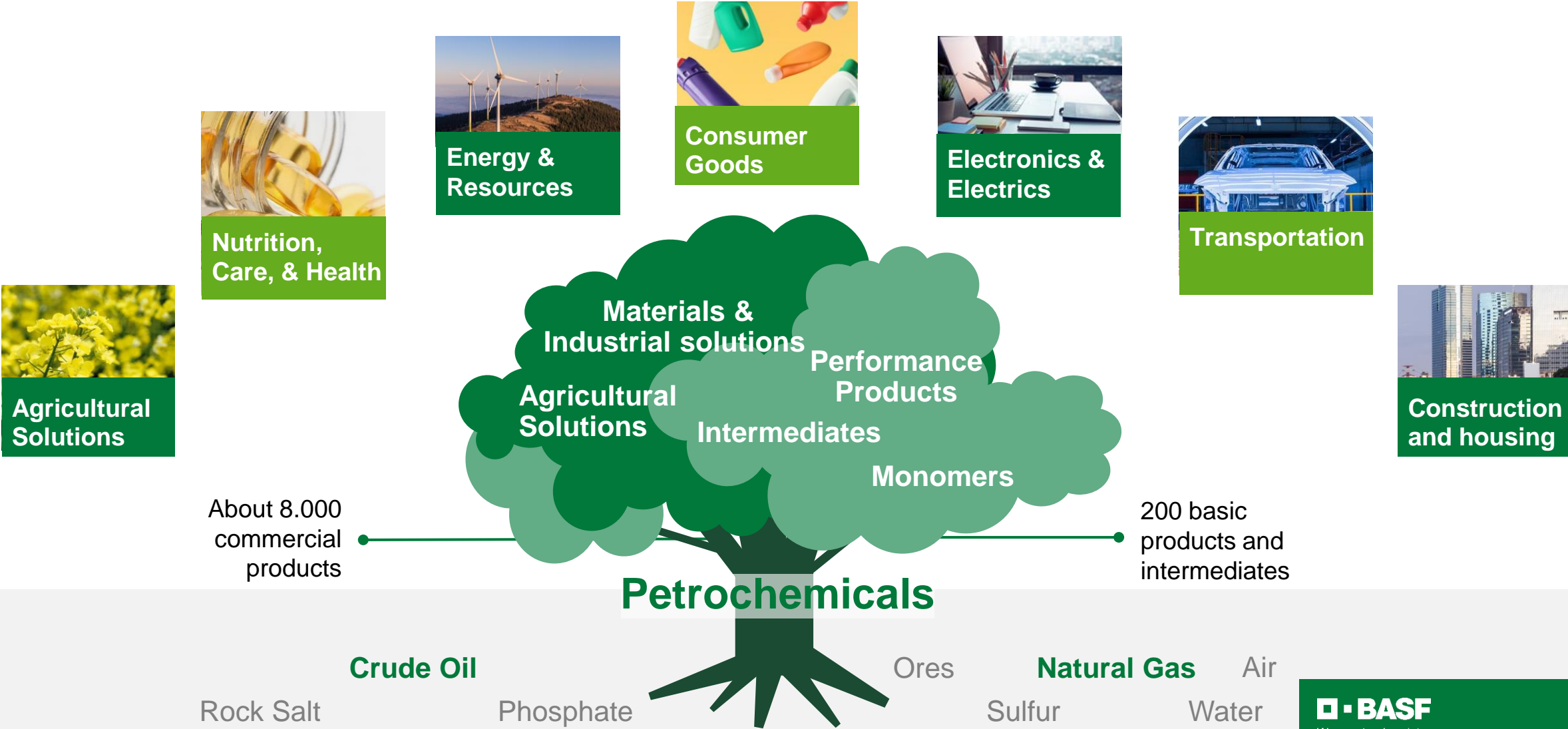
Infrastructure

is the main driver with expected expansion of **4.8% (2022 vs 2023)** to develop **regional transport connectivity²**



About BASF – we are in almost everything you see and touch

We combine economic success, social responsibility and environmental protection



Sustainability – We are shaping the transformation towards climate neutrality and a circular economy

2030

25%

Scope 1 and Scope 2
CO₂ emission reduction ²

15%

Specific Scope 3.1
CO₂ emission reduction ¹

2050

Net zero

Scope 1, Scope 2
and Scope 3.1
CO₂ emissions

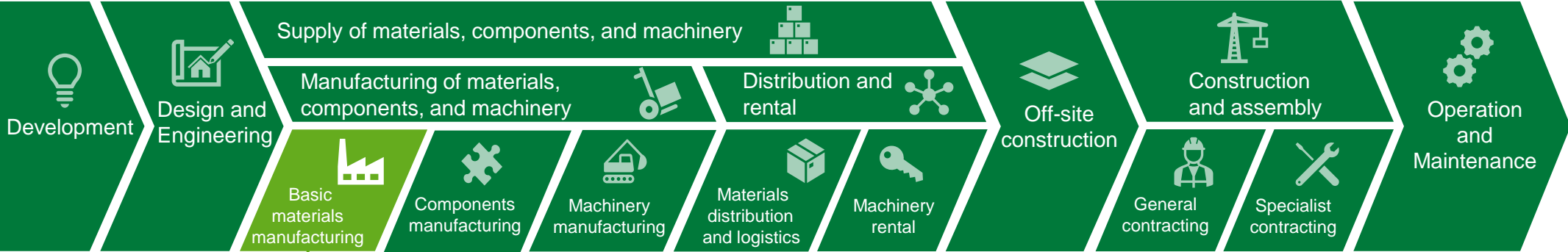
We create
chemistry for
a sustainable
future

Globally, we have reduced our emissions from **21.2 million tons** of CO₂e in **2018** to **16.9 million tons** in **2023**

¹ (compared with 2022). Corresponds to a reduction from 1.57 to 1.34 kilograms of CO₂e per kilogram of raw material bought; calculated on the basis of relevant Scope 3.1 emissions of 48 million metric tons

² (compared with 2018)

Chemical Company in the Construction Value Chain

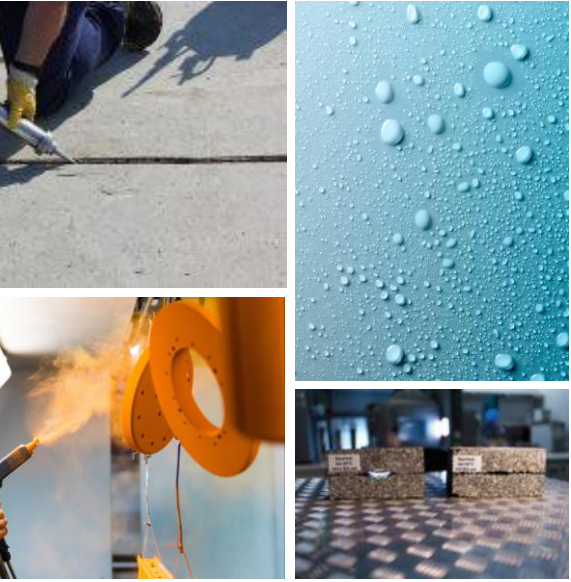


► **Upstream involvement in manufacturing**

Chemical company contributes to the raw materials needed in construction

BASF construction solutions

- Waterproofing
- Flexible roof coating
- Formulation additives
- Architectural coatings
- Spray coatings
- Bitumen additive
- Acrylic polymers for water-based coatings
- Cable antioxidant
- Aluminium finishing & coating
- Pipe Insulation
- Roofing & Outdoor
- Sound and thermal insulation
- SPF Insulation
- PU panel and board insulation
- Gypsum wallboard additives
- Sandwich plate system
- Concrete additives



So, BASF plays a big part in emission reduction with

By using **alternative raw materials**, we can manufacture products in a low emission way



Recycled content



Dedicated mechanical recycling

Mechanically recycled feedstock derived e.g., from waste polystyrene (PS)



Chemical recycling (e.g. ChemCycling®)

Pyrolysis oil derived from plastic waste or end-of-life tires



Renewable raw materials



Dedicated bio-based production

Sustainably sourced bio-based resources, RedCert & ISCC Plus certified



Biomass balance

Biomethane or bio-naphtha derived from biomass (waste)



Environmentally friendly products with attention to quality and safety

- ▶ Reducing environmental footprint by creating **safer products**
- ▶ High quality and durable products requiring **less maintenance**



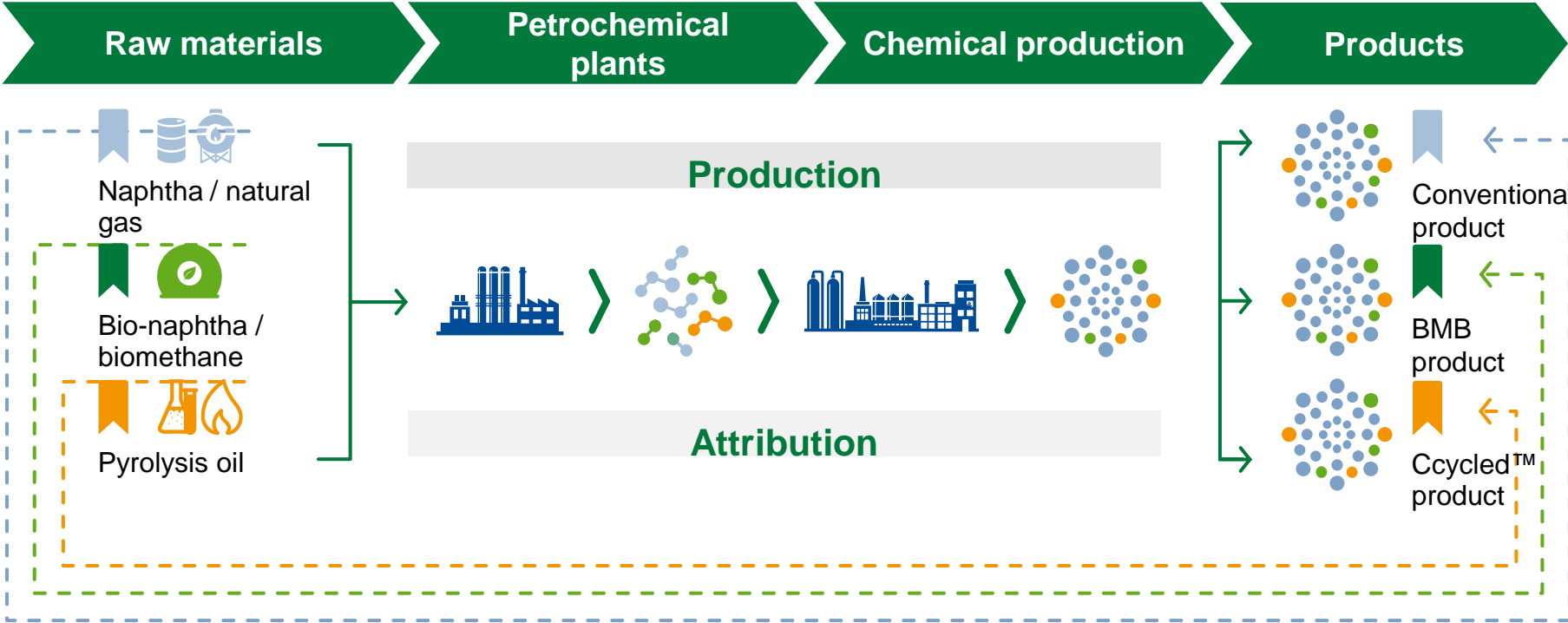
Process efficiency

- ▶ Processes which uses **less chemicals**, generate **less waste**, and utilizes **less resources**



BASF's Mass Balance approach enables the replacement of fossil free transition to circular and low PCF/net-zero products

An open loop Mass Balance approach is the strongest driver to replace fossil feedstock and accelerate the use of circular feedstock



► Mass Balance approach applies to renewable and recycling based feedstock

BASF targets to utilize **renewable raw materials** when readily available



We've reduced **carbon footprint** of some of our products by **100% replacing fossil-based material** with sustainably sourced & certified renewable feedstock

BASF's polyurethane rigid foam systems: **Elastopir® BMB** & **Elastopor® BMB**

BMB & Bio-based Acrylic Monomers

BASF's biomass-balanced monomers are applicable in

- ❖ Industrial Coating
- ❖ Window frames
- ❖ Construction adhesives
- ❖ Road markings
- ❖ Architectural coatings

BMB binders, used in Architectural Coatings

which help reduce **62% CO₂ emission** compared to standard binder



BASF concerns itself with **environmentally friendly** products with attention to **safety**

Volatile Organic Compounds (VOC), found in paint and varnishes, not only contribute to CO₂ emission but also may pose serious health concerns*

...which is why it is imperative to drive for a VOC-reduced future

BASF offers VOC-free solution such as:

Pluriol® A 520 PE

EO/PO copolymers

More environmentally-friendly chemicals:

Pluronic® and **Plurafac®**



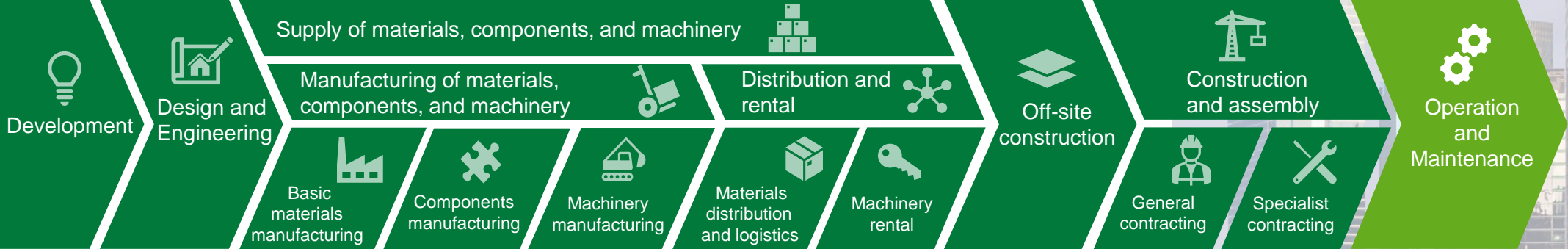
Chemetall's thin organic **Permanent Coatings** improve the formability of metal sheets without the use of additional lubricating oils.

Gardobond® PC Permanent Coating technology offers...

- ✓ **Chrome free process**, making it environmentally friendly
- ✓ High performance, meaning **less chemical usage**
- ✓ **Water-based property**, meaning no organic solvent

BASF
We create chemistry

Supporting green construction with the right technology



High-performance material solutions are essential for the construction of long-lasting and safe structures for future-proof construction

Chemistry enables buildings to be...

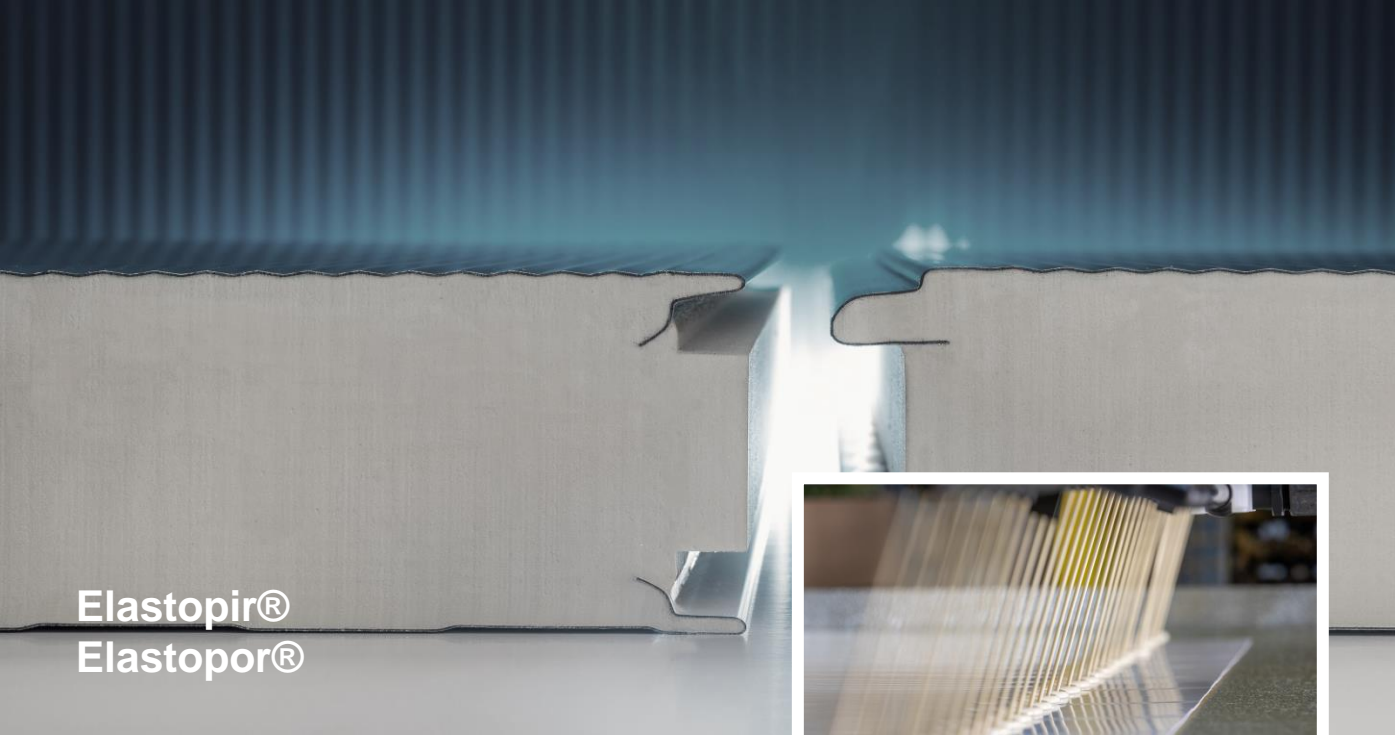
- ▶ more durable and require fewer resources for maintenance
- ▶ more energy efficient



Resource-conserving and energy efficient building materials are the challenge and the benchmark for future construction



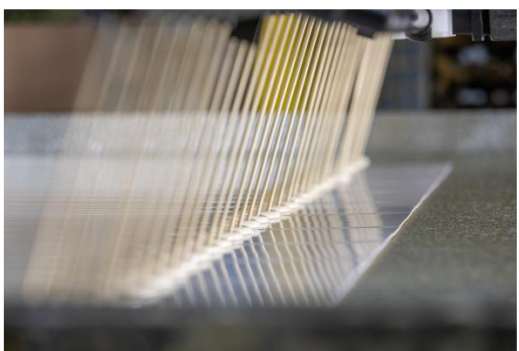
How we actively contribute to climate protection and the achievement of key climate targets in the construction sector



Elastopir®
Elastopor®

PU rigid foam system based on extra heat-resistant PIR
effective fire protection properties and energy efficiency

Material of multi-layer construction elements and is used with a diffusion-tight metal cover layer for wall, floor and roof elements in industrial hall, refrigeration and warehouse construction



Closed-cell rigid polyurethane foam with a diffusion-tight metal facing

High insulation performance can be achieved with low material thicknesses makes highly energy-efficient construction possible



BASF in renewable energy adoption

We play a role in **supporting green building practices** to integrate renewable energy in the construction sector

Indonesia outlook



Goals

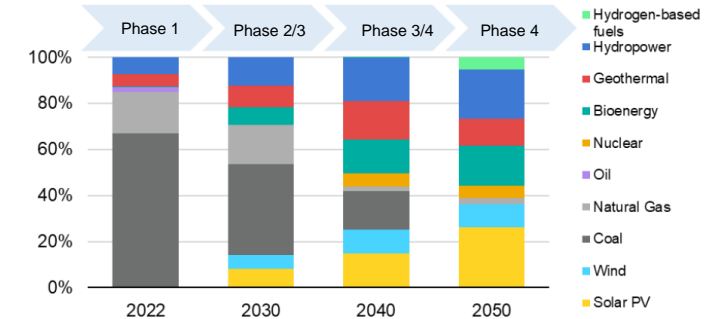
Ambition to achieve 34% renewable energy by 2030
Achieve net zero emissions in the power sector by 2050



Opportunity

Solar PV, Hydropower, Bioenergy, Geothermal, Wind

Energy transition phases in the JETP scenario



Source: (JETP Secretariat and Working Groups, 2023)

- ▶ **NAS® Battery**
- ▶ Plastic additives to withstand heat & sunlight – **Irgafos®**, **Irganox®**, **Chimassorb®**, **Tinuvin®**, and **Uvinul**
- ▶ Epoxy curing agent raw material (amine) for wind turbine – **Baxxodur®**
- ▶ Custom-made wafer cutting fluids – **Pluriol®**





BASF aims to support sustainability across the construction value chain





We create chemistry