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Our journey to net zero 2050

Dr. Martin Brudermüller
Chairman of the Board of Executive Directors

BASF Capital Markets Day, March 26, 2021

Cautionary note regarding forward-looking statements

This presentation contains forward-looking statements. These statements are based on current estimates and projections of the Board of Executive Directors and currently available information. Forward-looking statements are not guarantees of the future developments and results outlined therein. These are dependent on a number of factors; they involve various risks and uncertainties; and they are based on assumptions that may not prove to be accurate. Such risk factors include those discussed in Opportunities and Risks on pages 158 to 166 of the BASF Report 2020. BASF does not assume any obligation to update the forward-looking statements contained in this presentation above and beyond the legal requirements.

Our commitments to reaching the Paris Climate Agreement

25%
CO_2 emissions reduction
(compared with 2018)[1]

net zero
CO_2 emissions[1]

[1] Scope 1 and Scope 2; 2030 target compared with 1990: 60% CO_2 reduction

Our journey to net zero 2050

1 **The levers for our transformation**

2 The transformation is underway on our sites

3 Capex plan and prerequisites

4 Business opportunities through low-carbon products

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Leading the journey to transform the chemical industry

- BASF Verbund
- BASF data
- BASF expertise
- BASF technologies

We create chemistry for a sustainable future

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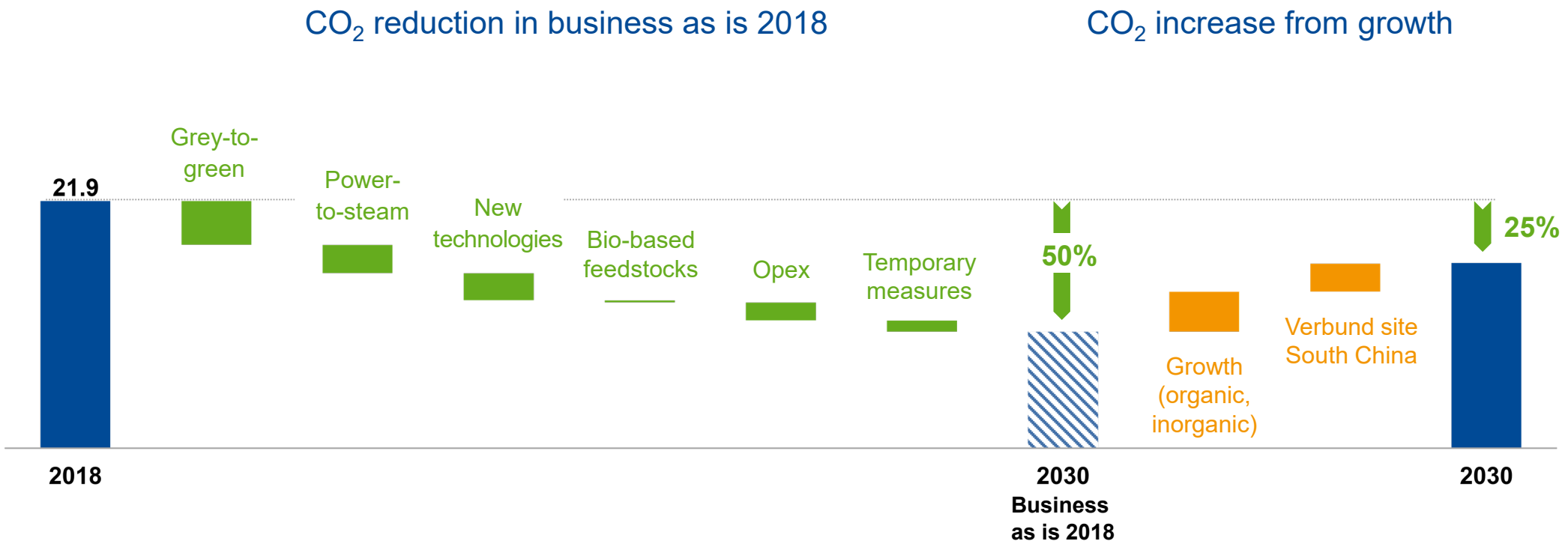
Our path to reduce BASF emissions from 2018 to 2030

BASF greenhouse gas emissions (Scope 1 and Scope 2) 2018–2030



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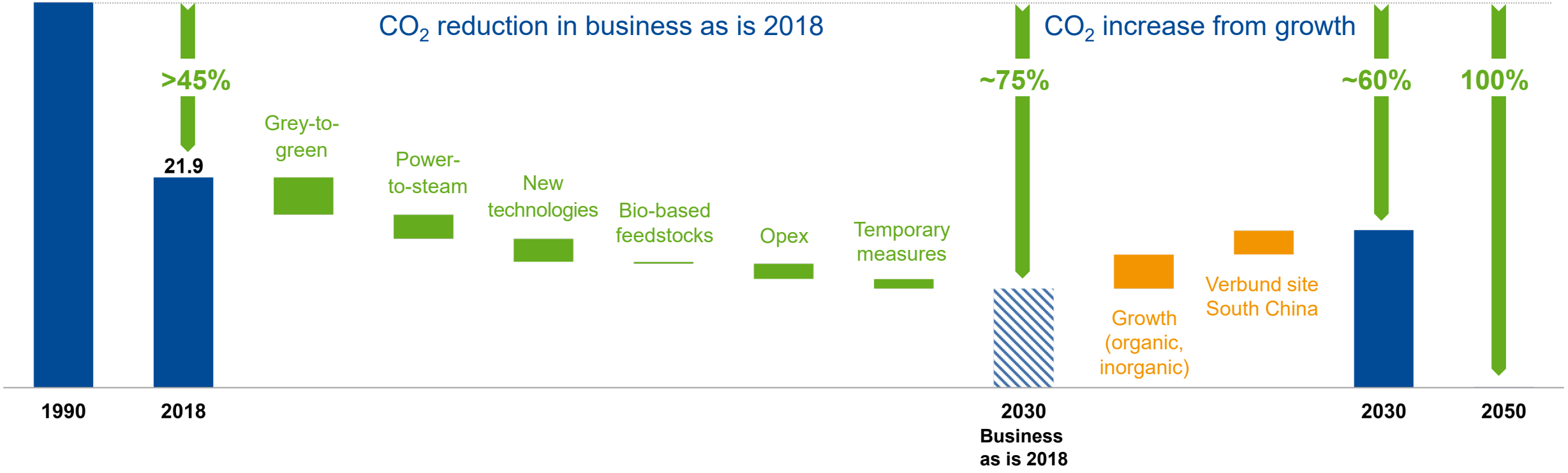
Our path to reduce BASF emissions from 1990 to 2050

BASF greenhouse gas emissions (Scope 1 and Scope 2) 1990–2050



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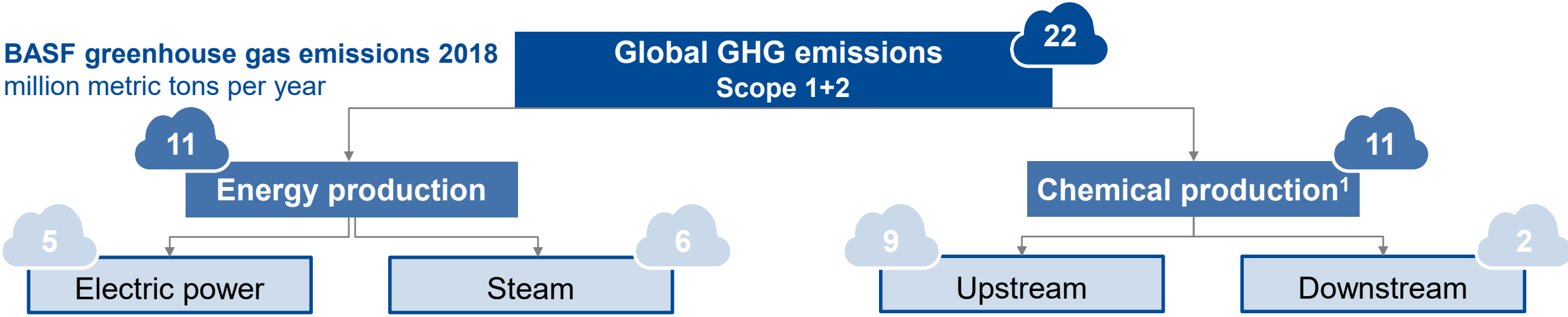
No downstream decarbonization without upstream decarbonization

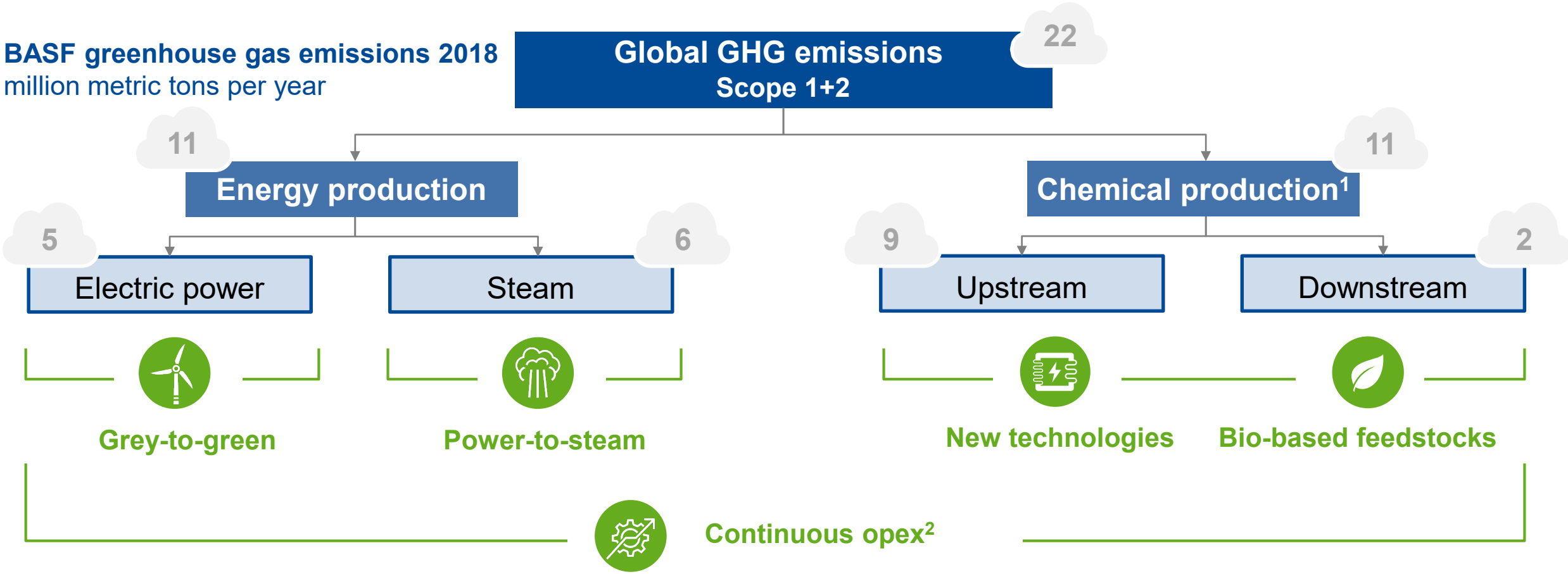
BASF greenhouse gas emissions 2018
million metric tons per year



[1] Includes emissions from process energy

No downstream decarbonization without upstream decarbonization

BASF greenhouse gas emissions 2018
million metric tons per year



[1] Includes emissions from process energy [2] Operational excellence measures

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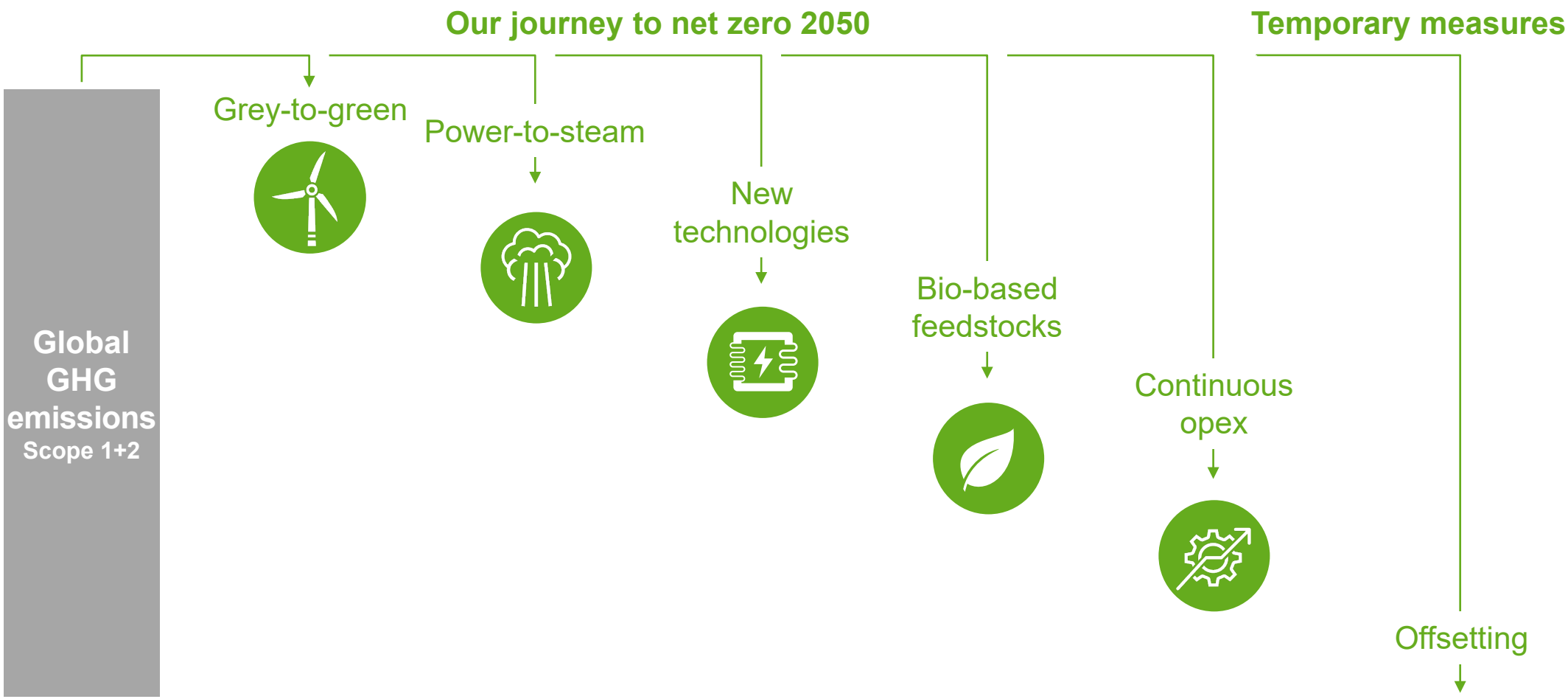
Our levers to reduce BASF's CO_2 emissions



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The ultimate lever for CO_2 reduction is electrification with renewable energy

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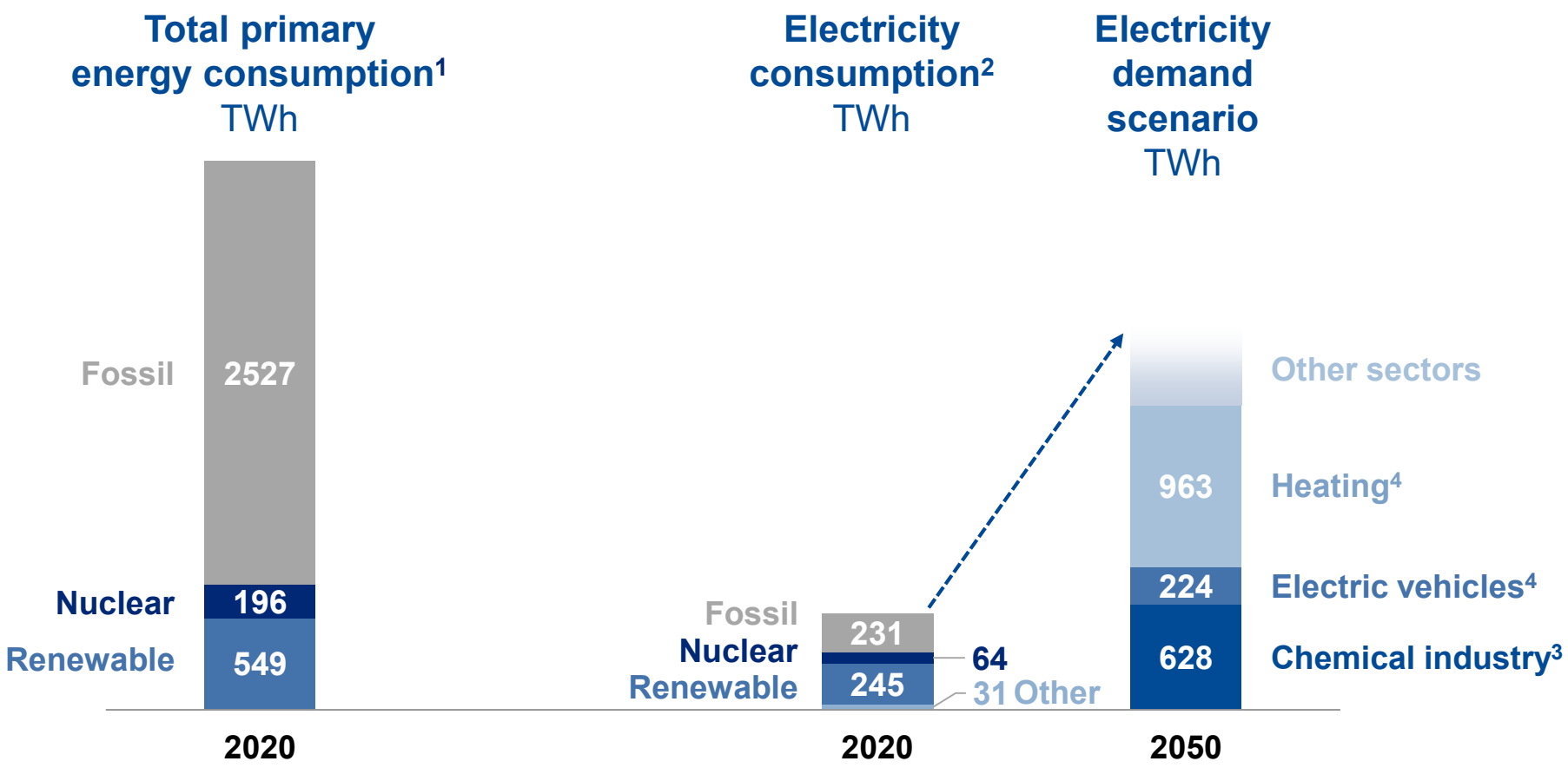
Build-up of renewable energy production must be accelerated to meet demand

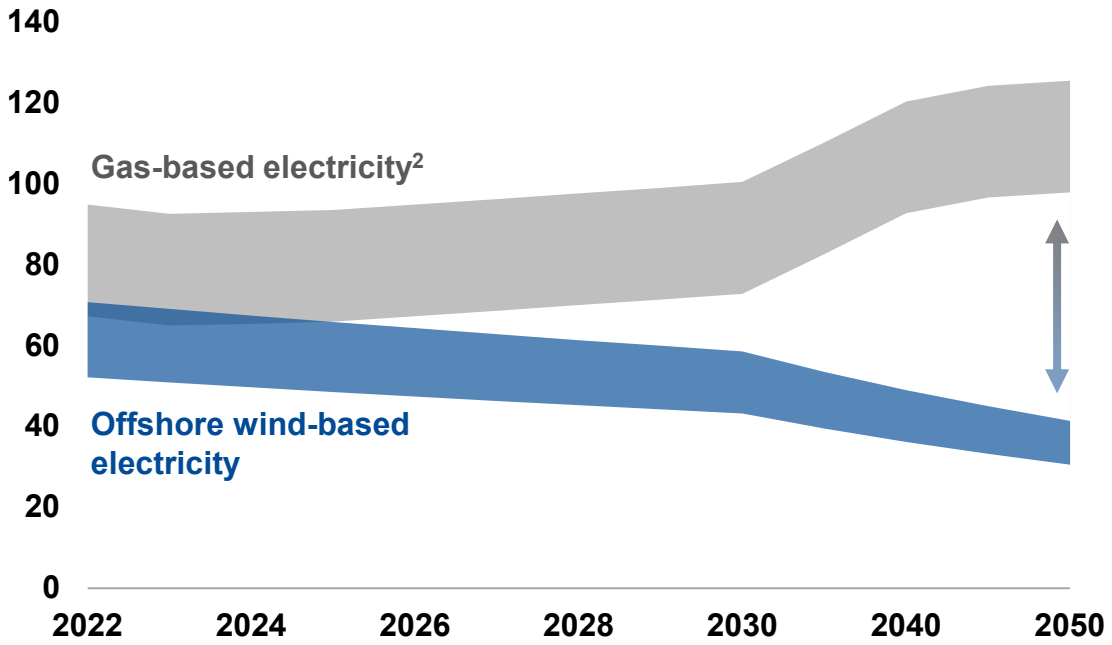
Example: Germany



[1] AG Energiebilanzen e.V. [2] Federal Ministry for Economic Affairs and Energy (BMWi) [3] VCI [4] Strategy&

Offshore wind energy is a cost-competitive technology today and will be even more attractive in the future

Expected electricity cost development (LCOE[1])
€ per megawatt hour



- Non-subsidized offshore wind parks are already **competitive today**
- Offshore wind parks **will become even more competitive** going forward
- **Cost reductions** for offshore wind parks mainly driven by technology improvements, increased capacities and longer service life, as well as lower installation and running costs

Source: THEMA Consulting Group – European Power Market Outlook February 2021
[1] Levelized cost of electricity (LCOE): Cost of producing a megawatt hour of electricity over the life of a power station
[2] CCGTs (combined cycle gas turbine plants)

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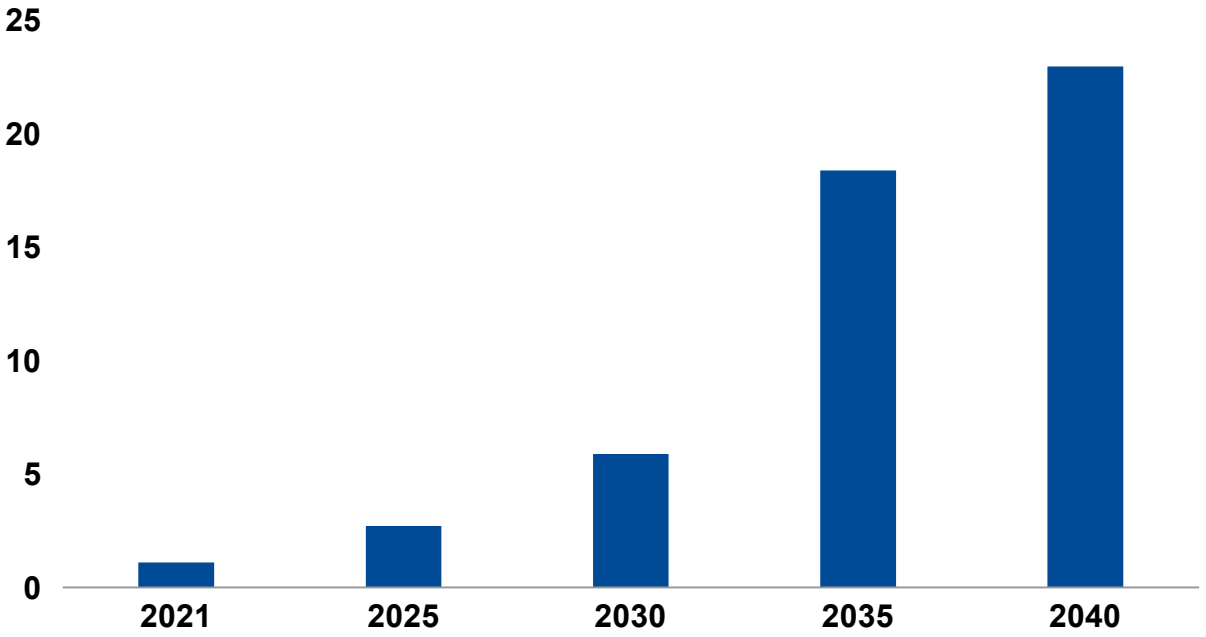
To meet our high demand for renewable energy, we will focus on two pillars ensuring additionality

BASF's additional green power demand for large European sites
Ludwigshafen, Antwerp and Schwarzheide, terawatt hour per year



Make: Invest in own assets

- Building up portfolio of own assets
- Goal: Secure long-term supply at producer economics

Buy: Purchase green power from third parties

- Contracting power purchase agreements and renewable energy certificates (PPA/REC)
- Goal: Diversified portfolio (technologies, regions) at current, attractive prices

We will combine both pillars – make and buy – to one diversified portfolio taking into account costs, flexibility and availability

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Capturing the energetic potential of waste heat for steam production

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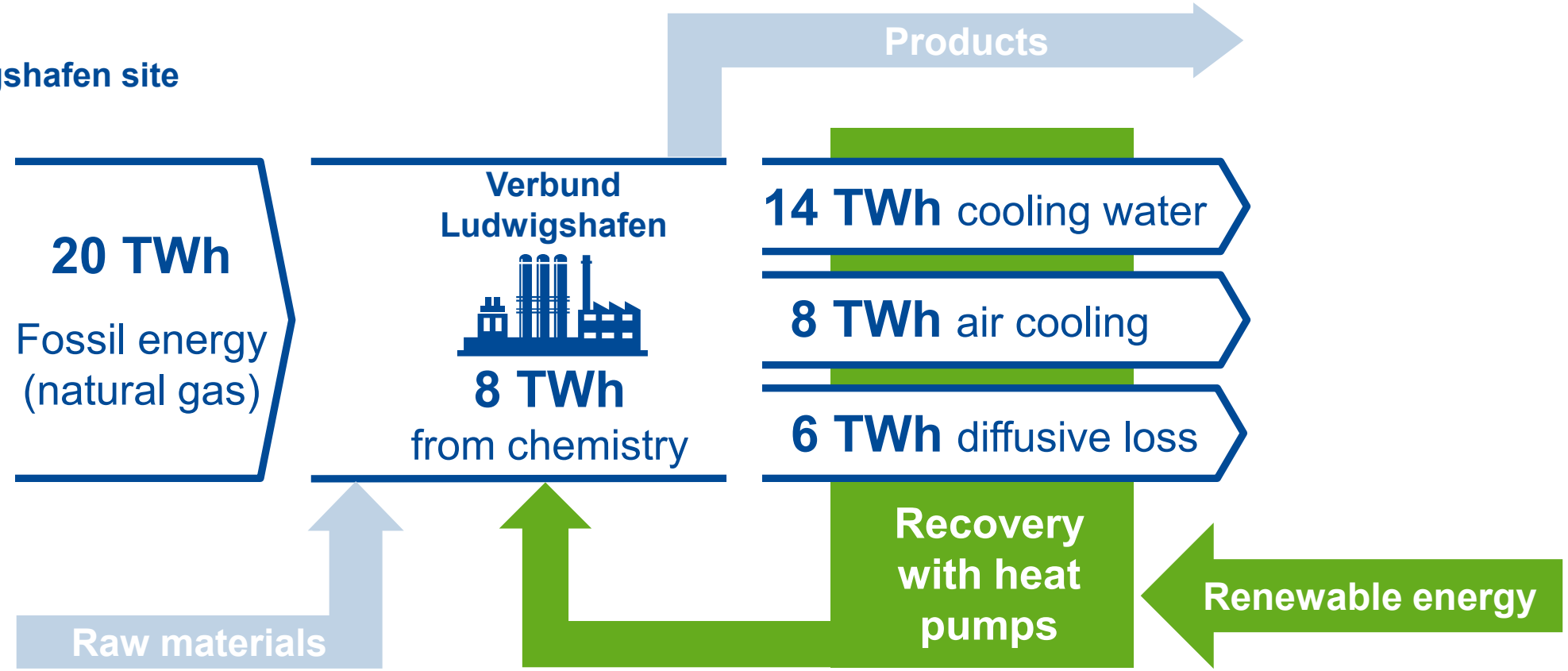
CO_2-free steam production in the BASF Verbund with heat pump technology at unprecedented scale

Energy flow at Ludwigshafen site



BASF will install heat pumps and steam compressors to use waste heat from chemical plants for steam production

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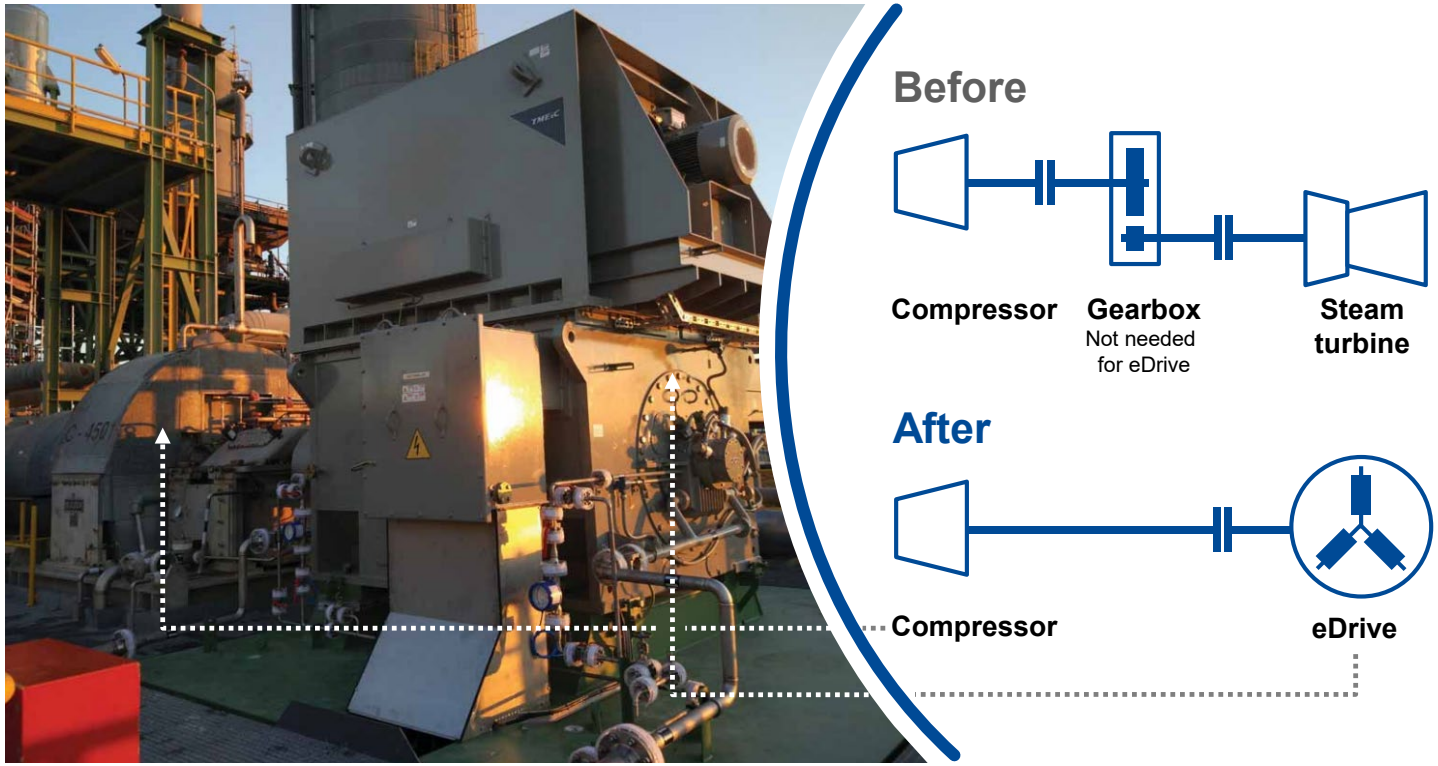
Competitive green energy in Tarragona enabled value-adding replacement of steam turbine with an eDrive



- The **propane dehydrogenation plant operates an eDrive**, which replaced a steam turbine in 2018
- **Investment recovered in less than two years** thanks to reduced energy costs
- **CO_2 emissions reduced by 34 kilotons per year**, production increased by freed-up cooling capacity

Commercially available technologies can be adapted to local needs and opportunities – the right mix makes the difference

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We focus on scaling up low-emission technologies to industrial levels

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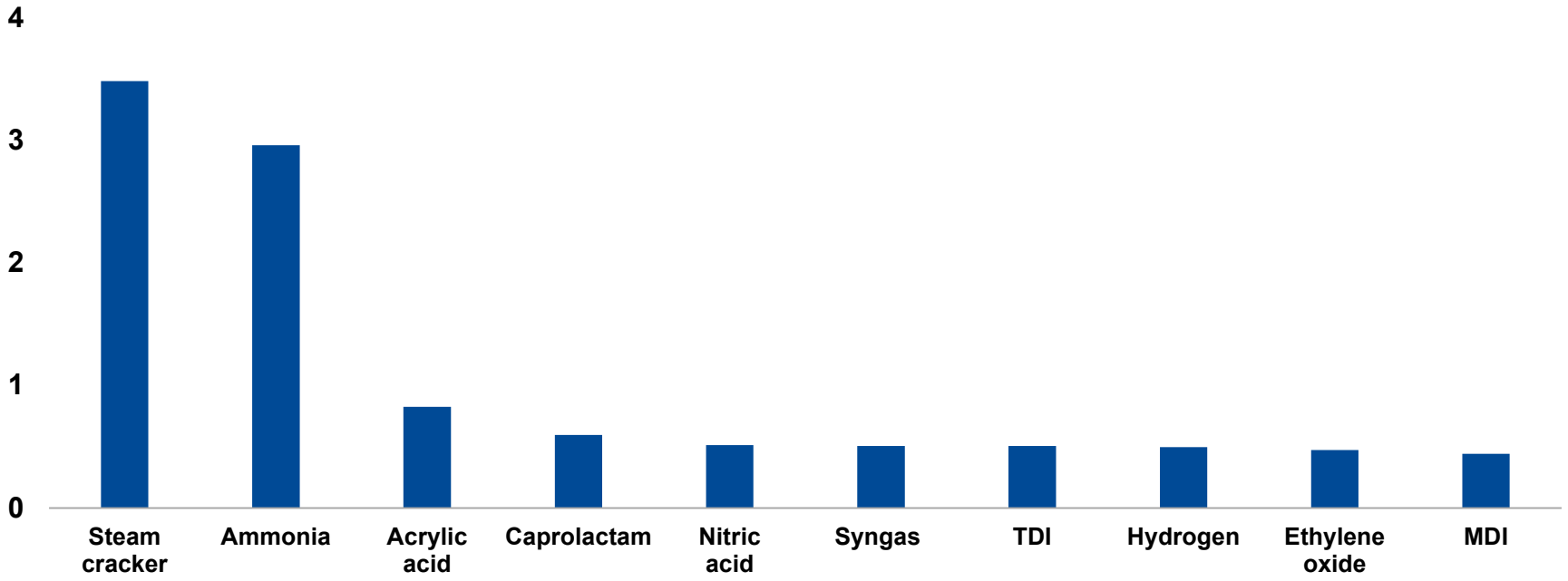
Ten base chemical production technologies cause the majority of BASF's CO_2 emissions

Greenhouse gas emission profile of BASF technologies

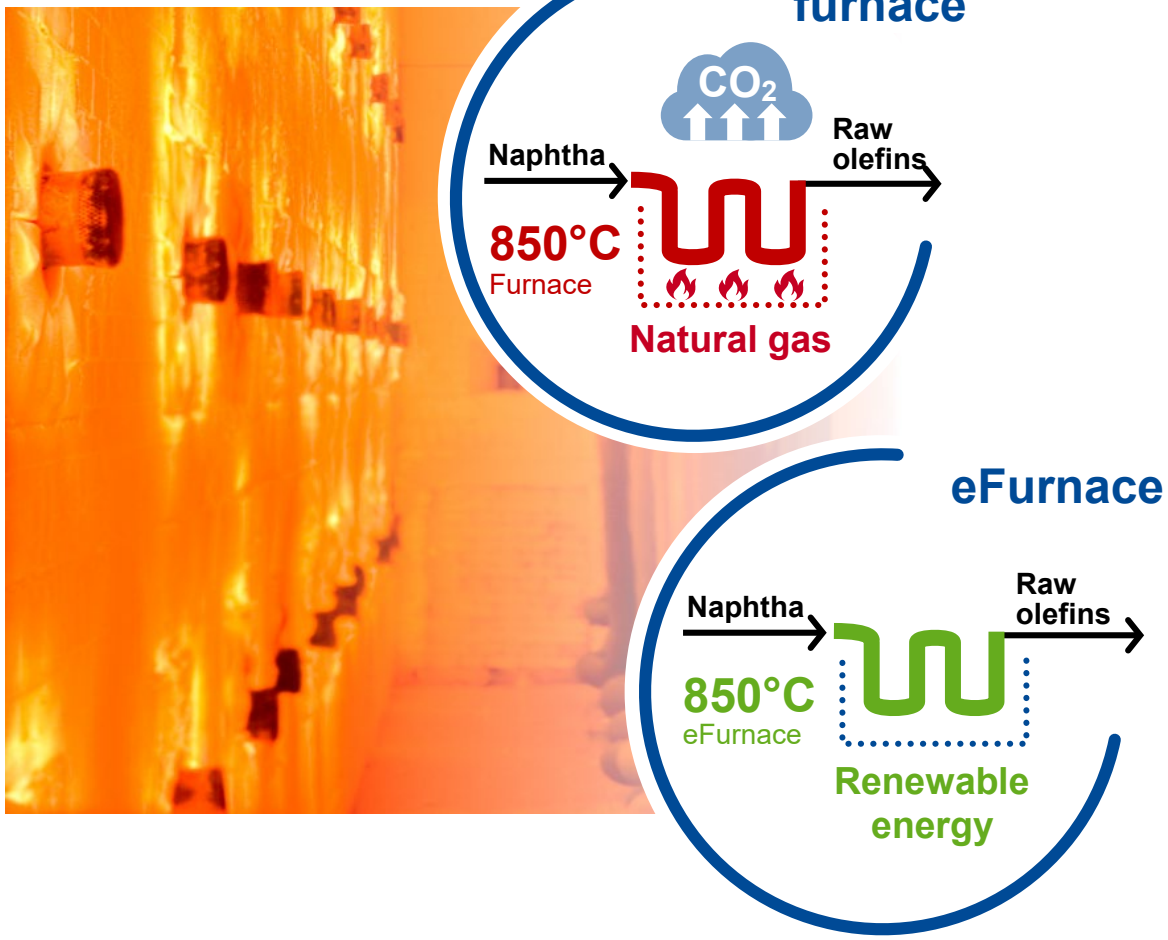
Energy and chemistry emissions, million metric tons per year[1]



BASF has identified its CO_2-intensive processes and is addressing them

[1] Based on nameplate capacities, excluding at-equity consolidated companies

BASF, SABIC and Linde join forces to realize the world's first electrically heated steam cracker furnace



- Goal is to drive concepts and faster implementation through combined strengths
  - BASF and SABIC: extensive know-how and intellectual property in developing chemical processes; long-standing experience and knowledge in operating steam crackers
  - Linde: expertise and intellectual property in developing and building steam cracking furnace technologies and driving future industry commercialization
- Construction of a demonstration plant depending on funding granted – application to E.U. Innovation Fund and German funding program "Decarbonization in Industry"
- If funding is granted, startup could happen as fast as 2023

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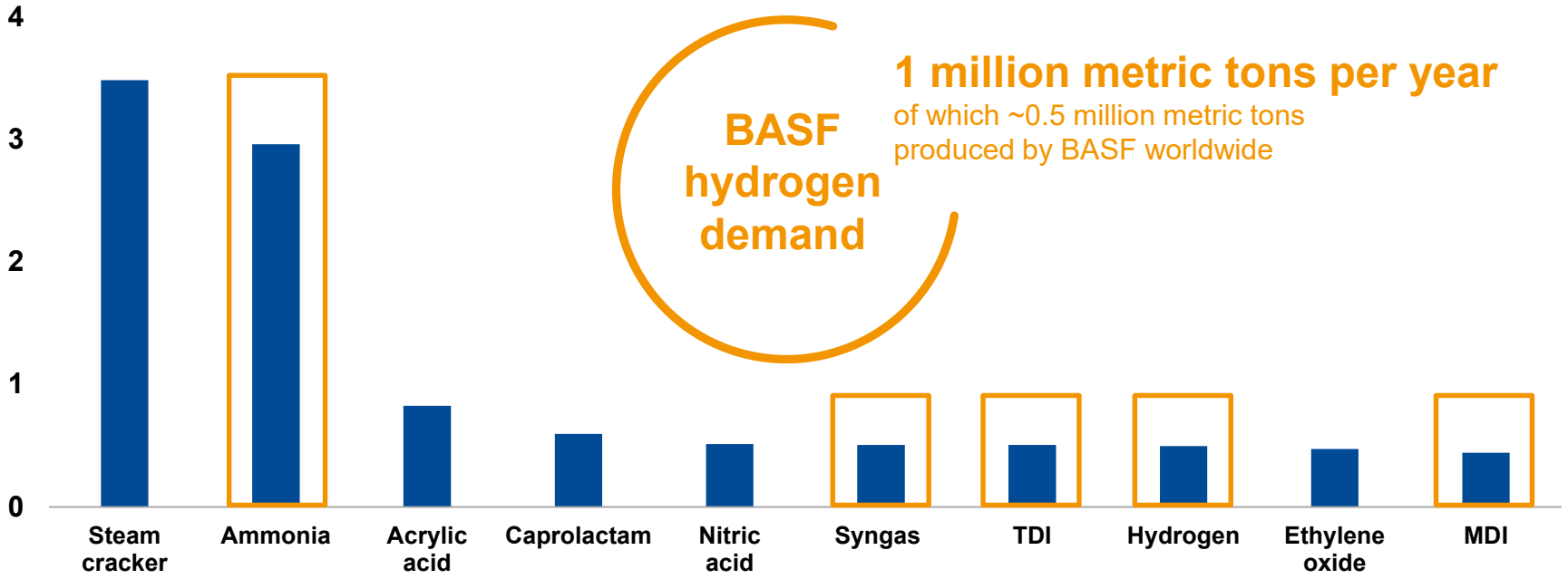
The use of hydrogen as a raw material is a key lever for CO_2 emissions reduction across several technologies

Greenhouse gas emission profile of BASF technologies

Energy and chemistry emissions, million metric tons per year[1]



Achieving CO_2-free hydrogen production will tackle 2 to 3 million metric tons of our CO_2 emissions across several technologies

[1] Based on nameplate capacities, excluding at-equity consolidated companies

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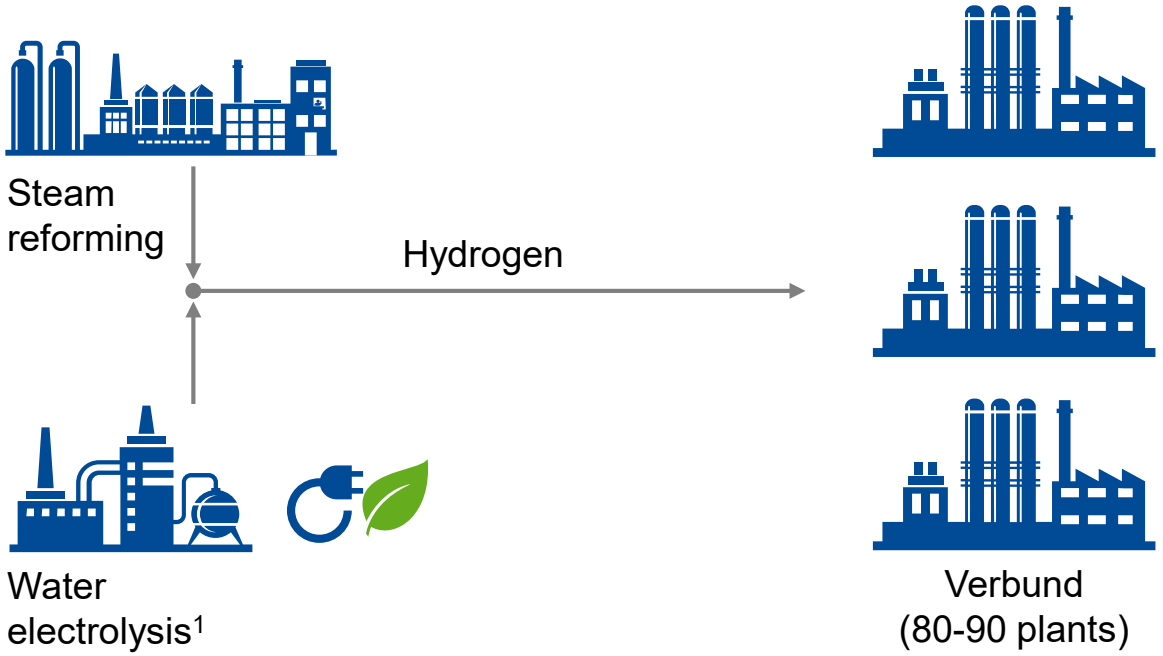
Water electrolysis plant will integrate internally produced green hydrogen into our Verbund

Seamless integration into BASF Verbund
Schematic



- Application for funding through **IPCEI** Hydrogen Technologies and Systems (Important Project of Common European Interest) **has been submitted**
- **Start-up** of water electrolysis **targeted for 2024**, investment of €90 million, capacity of 8,000 metric tons
- Hydrogen to be used in **BASF Verbund** and for **local community hydrogen mobility market**

Water electrolysis is a commercially available technology but consumes large amounts of electricity

[1] PEM technology

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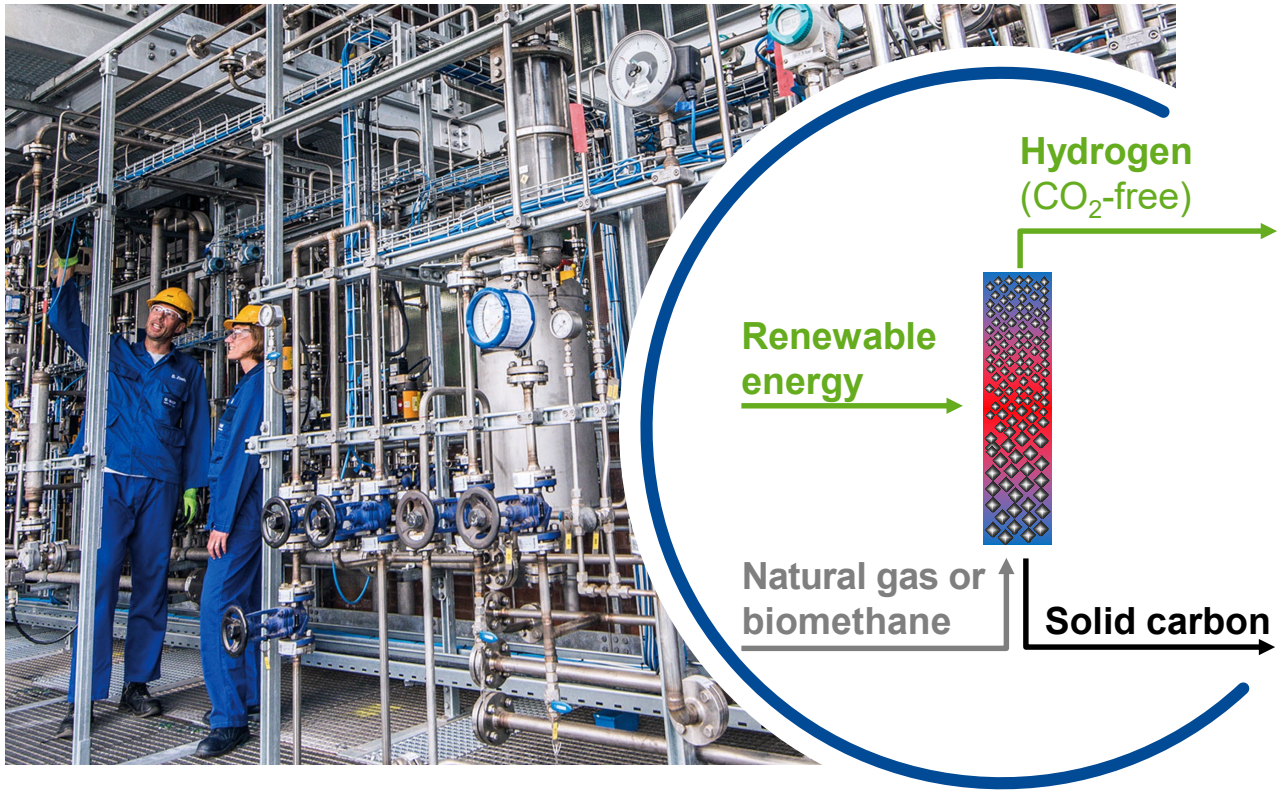
Methane pyrolysis combines low emissions with low energy demand



- **Methane pyrolysis** requires around **80% less electricity** than water electrolysis
- **Funding** for pilot reactor **was granted** by German Federal Ministry of Education and Research
- **Pilot reactor** at the Ludwigshafen site is **being started up**
- Start-up of **first commercial plant projected for 2030**

We have achieved a milestone in scaling up our groundbreaking methane pyrolysis process for hydrogen production

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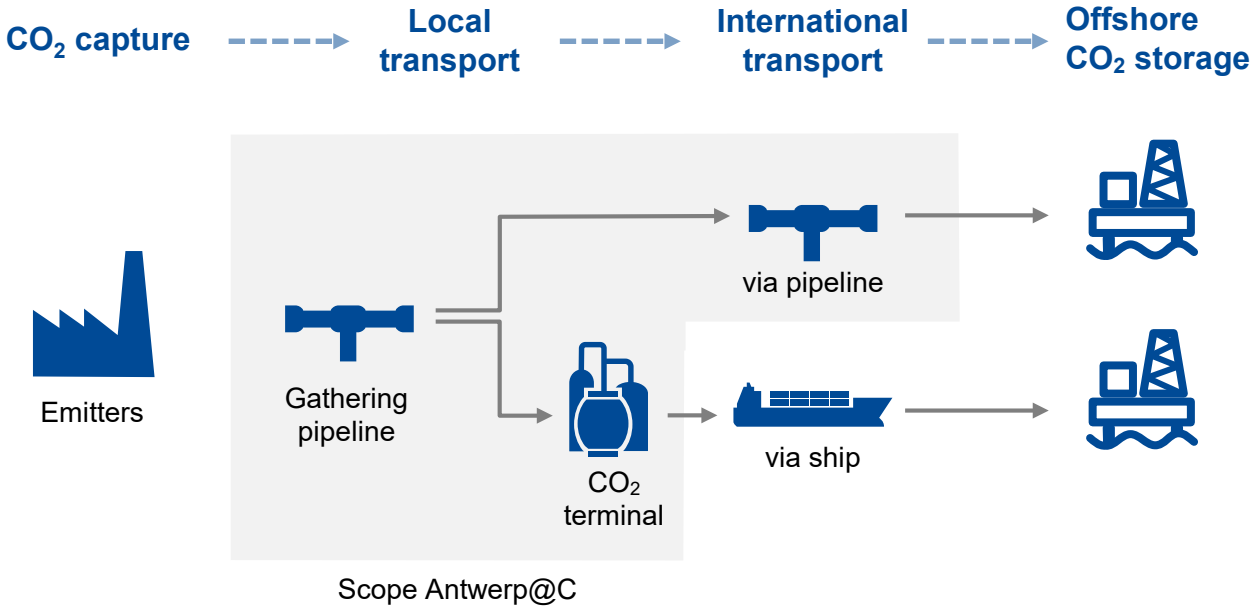
Carbon capture storage technology being evaluated at our Antwerp Verbund site

Antwerp@C – CCS value chain in Port of Antwerp



- BASF is supporting a feasibility study evaluating **carbon capture storage (CCS) installation** through project consortium Antwerp@C
- Opportunity to reduce CO_2 emissions on an **industrial, cost-efficient scale** with partners
- CCS initiatives in port of Antwerp recognized as **Projects of Common Interest (PCI)** by the European Commission
- Final investment decision targeted for **2022**, depending on public funding granted

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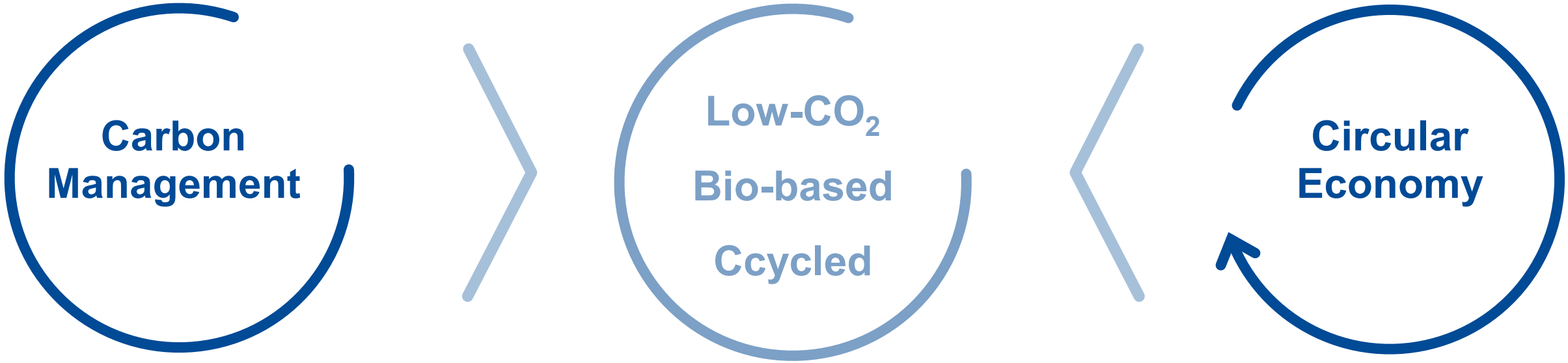
Decarbonization requires a broad technology portfolio



CO_2 avoidance potential per megawatt hour of electrical energy used (metric tons of CO_2/MWh)

- Methane pyrolysis ~0.9
- Heat pumps ~0.6-1.0
- eDrive NH_3 ~0.7
- eFurnace ~0.2
- Water electrolysis ~0.2

Target: We aim at doubling our circular sales to reach €17 billion by 2030

Focus on closing the loops

- Renewable-based feedstocks
- Recycled-based feedstocks
- Enable recyclability and/or biodegradability

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Bio-based raw materials can be used as feedstocks, partially replacing fossil feedstocks

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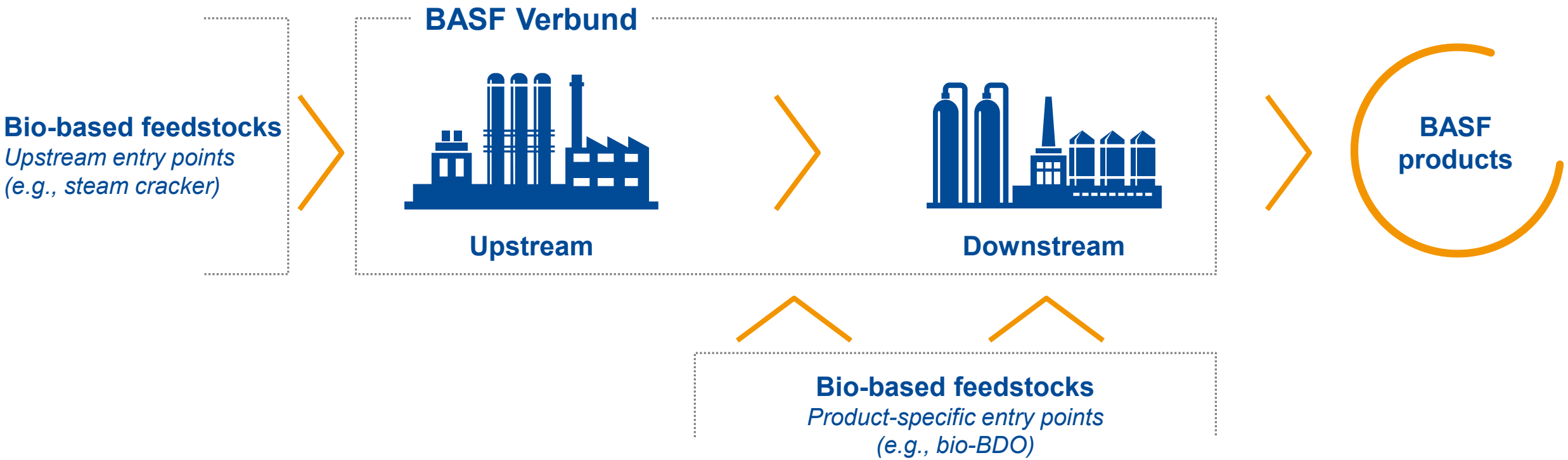
Entry points for bio-based feedstocks in BASF value chains



In the BASF Verbund, bio-based feedstocks can be used as a drop-in solution, in part using new, dedicated processes

Continuous improvements that make a difference today

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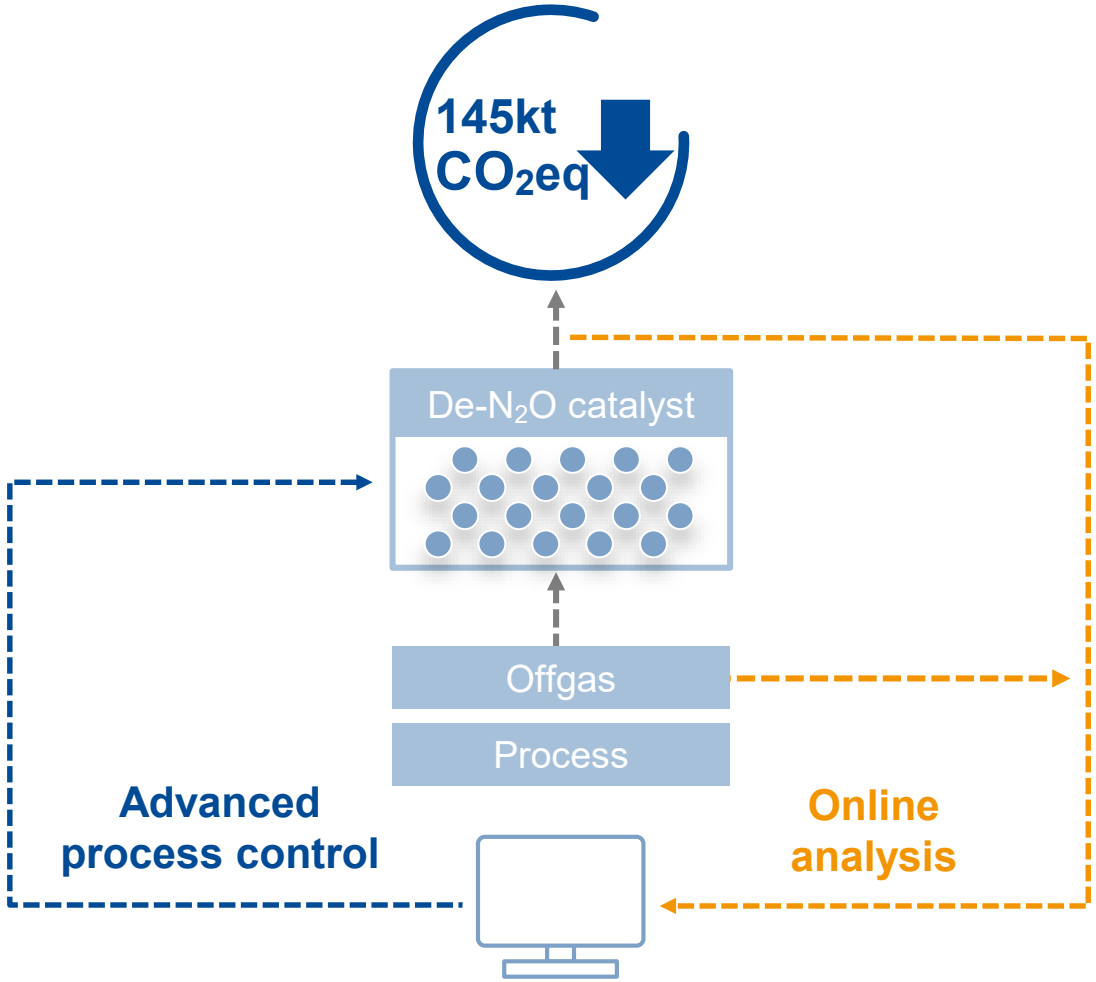
Our upstream integration allows large improvements with single measures



- **Avoiding 145,000 tons of CO_2 equivalents** per year through optimized process control
- **Nitrous oxide (N_2O) decomposition** in nitric acid cluster was **further improved from 99% to 99.9%,** residual N_2O was reduced by a factor of 10 to 0.1%
- Key to success were state-of-the-art process modelling capabilities; improvement could be achieved **without major plant modifications or investments**
- One of more than 1,500 operational excellence measures we are currently pursuing to reduce CO_2 emissions and improve energy efficiency

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Our journey to net zero 2050

1 The levers for our transformation

2 **The transformation is underway on our sites**

3 Capex plan and prerequisites

4 Business opportunities through low-carbon products

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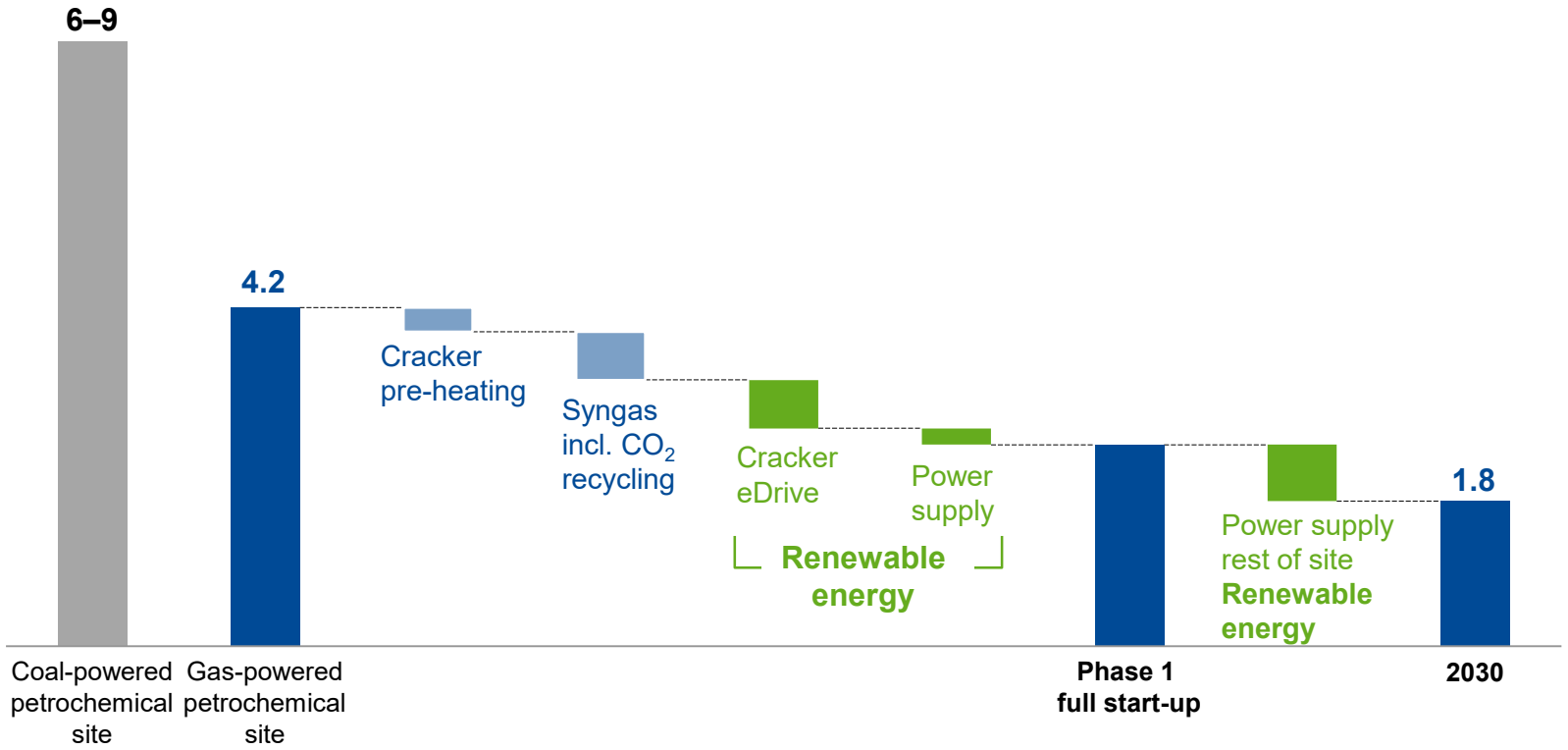
New Verbund site in South China – the integrated chemical complex with the lowest projected CO_2 emissions in the world

Projected BASF CO_2 emissions of Verbund site in South China
million metric tons



- Guangdong Verbund site will emit **50% less CO_2** than gas-powered petrochemical sites
- Targeted use of **state-of-the-art technologies** and **supply with renewable energy** as main levers
- Renewable energy supply ensured through **direct power purchase**
- Connected **investment of local energy provider** in onshore wind farm and photovoltaic facilities

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Integrating renewable energy and stabilizing supply at the Schwarzheide site

- **Proof of concept for energy transformation** at mid-sized chemical sites
- **Modernization of BASF cogeneration plant** on site
  - Investment of €73 million enables start-up within minutes to buffer fluctuations in electricity supply
  - CO_2 emissions reduced by 16%
- BASF is **considering investing in its own solar farm** with more than 20 MW to supplement local electricity supply
- Concept under development to **integrate industrial-scale batteries** based on BASF technology for energy storage

Our journey to net zero 2050

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Major capex for further transformation only expected beyond 2030

Projected capex	billion €
2021–2025	<1
2026–2030	2–3
2030+	>10

The transformation requires a supportive legislative and regulatory framework

Focus E.U./Germany:

- **Cooperation:** Ensure close interaction between policy makers and business to support the implementation of the European Green Deal
- **Competitiveness:** Design an E.U. Industry Policy that strengthens industry through a predictable climate and energy policy framework
- **Innovation:** Remove policy-induced costs to incentivize large-scale investments in CO_2-neutral production technologies – at German level, e.g., EEG reform, funding programs, contracts for difference
- **Infrastructure:** Speed up capacity expansion for generation and transportation of electricity from renewable energy sources
- **Allocation:** Prioritize industrial hydrogen use over energy and heating, secure hydrogen and green energy supply for industrial users

Our journey to net zero 2050

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4 **Business opportunities through low-carbon products**

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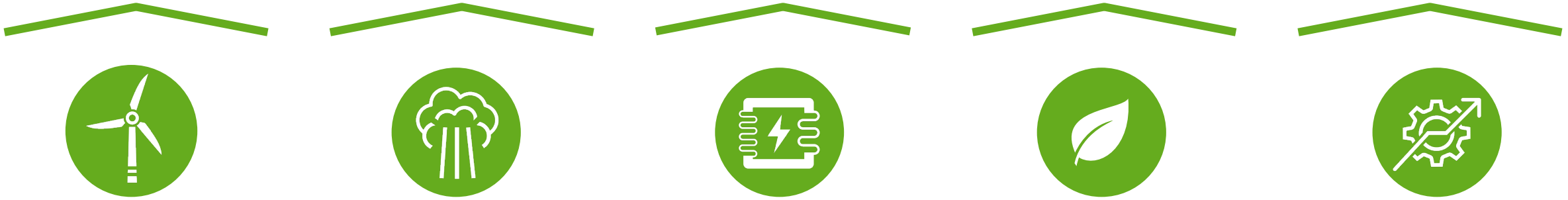
We are a key enabler to help our customers decarbonize their value chains

Low-carbon products



- Grey-to-green
- Power-to-steam
- New technologies
- Bio-based feedstocks
- Continuous opex

Turning Carbon Management into business opportunities

Cradle-to-gate Product Carbon Footprints for BASF's portfolio available by end of 2021 based on process emissions, energy demand and upstream emissions

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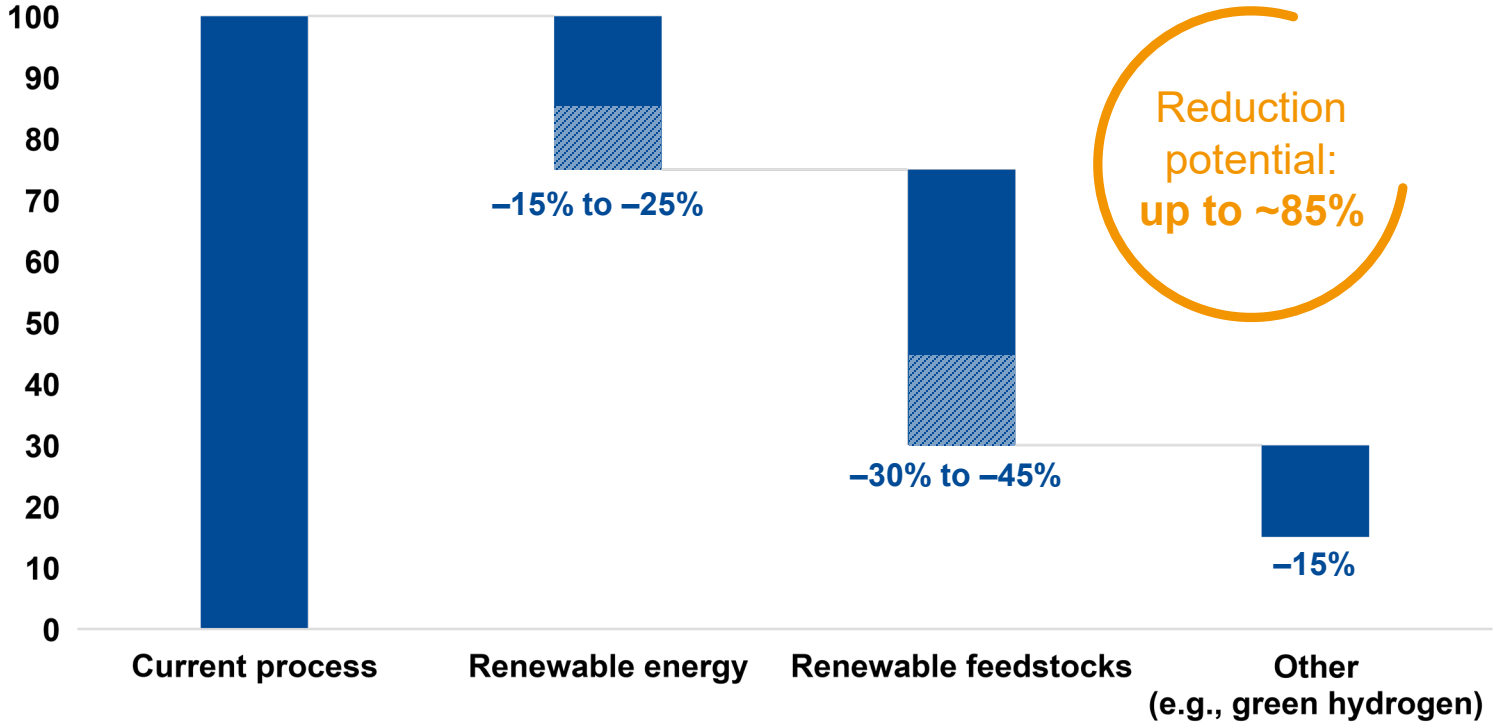
Offering our customers choices to reduce their CO_2 footprint

Product Carbon Footprint allows targeted discussions with customers on desired sustainability properties of products

Aroma ingredient example
Cumulative reduction of CO_2 emissions, %



- Product Carbon Footprint ensures **unprecedented transparency** along the value chain
- Choice of raw materials, technology or energy supply helps **tailor product properties to customer needs**
- **Cross-industry standardization required** around calculation of CO_2 footprints of products

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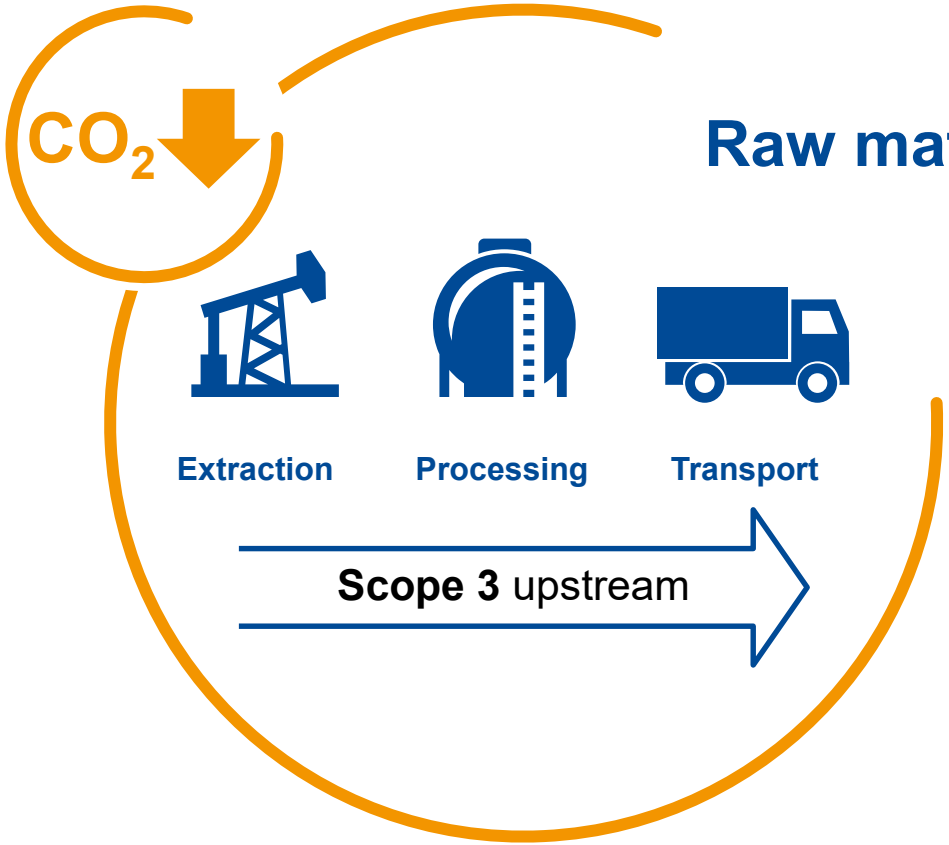
What we expect from our suppliers: Transparency on and reduction of CO_2 emissions



- BASF is establishing certified, full CO_2 tracing (Product Carbon Footprint) and needs transparency from its suppliers for this
- To support its suppliers and the industry, BASF will share its knowledge to create an international standard for CO_2 transparency tools
- BASF will work together with its suppliers and expects them to reduce the CO_2 footprint of their products

BASF will work all levers to reduce CO_2 emissions

Economics of decarbonization

Impact on sales and profitability

- Above-average volume growth of products with low carbon footprint due to rising demand
- Customers' willingness to pay higher prices for low-emission products
- Higher margins expected for products with low carbon footprint produced in BASF's Verbund

Impact on capex and costs

- Increased capex partially mitigated through public funding for pioneering, new technologies
- Minor incremental costs of mass balance approaches in existing Verbund assets

Impact of external environment

- High initial variable costs for renewable energy have to decline with increased availability and favorable regulatory changes
- A supportive overall regulatory environment will drive positive economics and accelerate transformation

BASF's journey to net zero 2050: Key takeaways

- We are a **key enabler** in the net zero transformation of base chemicals and downstream value chains
- Globally, we want to reduce our absolute CO_2 emissions **by 25% by 2030 compared with 2018**
- This means that, **compared with 1990**, we aim to reduce our global **CO_2 emissions by 60% by 2030**, exceeding the European Union's target
- We aim to achieve **net zero CO_2 emissions at BASF by 2050**
- We are a **front-runner** in offering our customers a portfolio of products with lower carbon footprints to enable their decarbonization

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