



Sustainability

 **BASF**

We create chemistry



Our purpose:

We create
chemistry for a
sustainable future

Agenda

1	Climate Protection	slides	4–14
2	Carbon Management	slides	15–26
3	Circular Economy	slides	27–39
4	Responsible Sourcing	slides	40–43
5	Biodiversity and Agricultural Solutions	slides	44–46
6	Efficient, Safe and Responsible Production	slides	47–50
7	Creating Value for Society	slides	51–61



 **BASF**

We create chemistry

Climate Protection

We create chemistry for a sustainable future – BASF's emission targets

2030

25%
CO₂ emissions
reduction
(compared with 2018)*

2050

net zero
CO₂ emissions*

Our journey to net zero 2050

- As an energy-intensive company, we take **responsibility** for **global climate protection**
- Products and **innovations based on chemistry** are the **key** to a **climate-neutral future**
- We are pursuing our **climate protection targets** with a comprehensive **carbon management**
- We align our product portfolio even more strongly with **climate protection, carbon neutrality** and **circularity**
- To shape the transformation toward a **climate-neutral society**, we need a **political and regulatory** environment that promotes **innovation in climate protection**

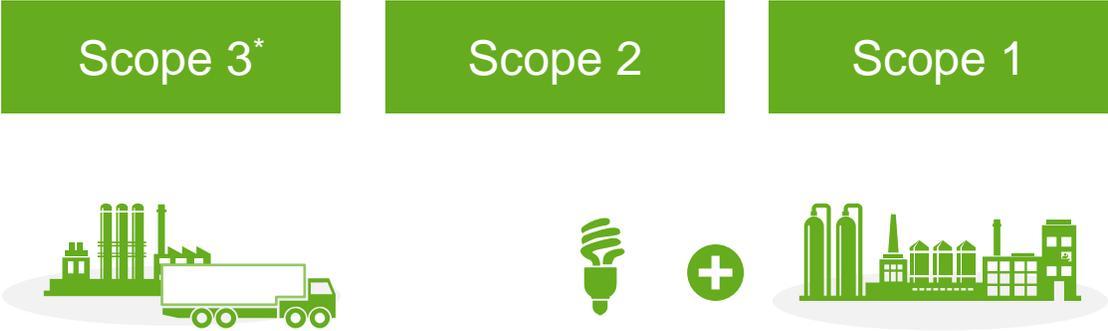


Our two perspectives on emission reductions

BASF Group targets

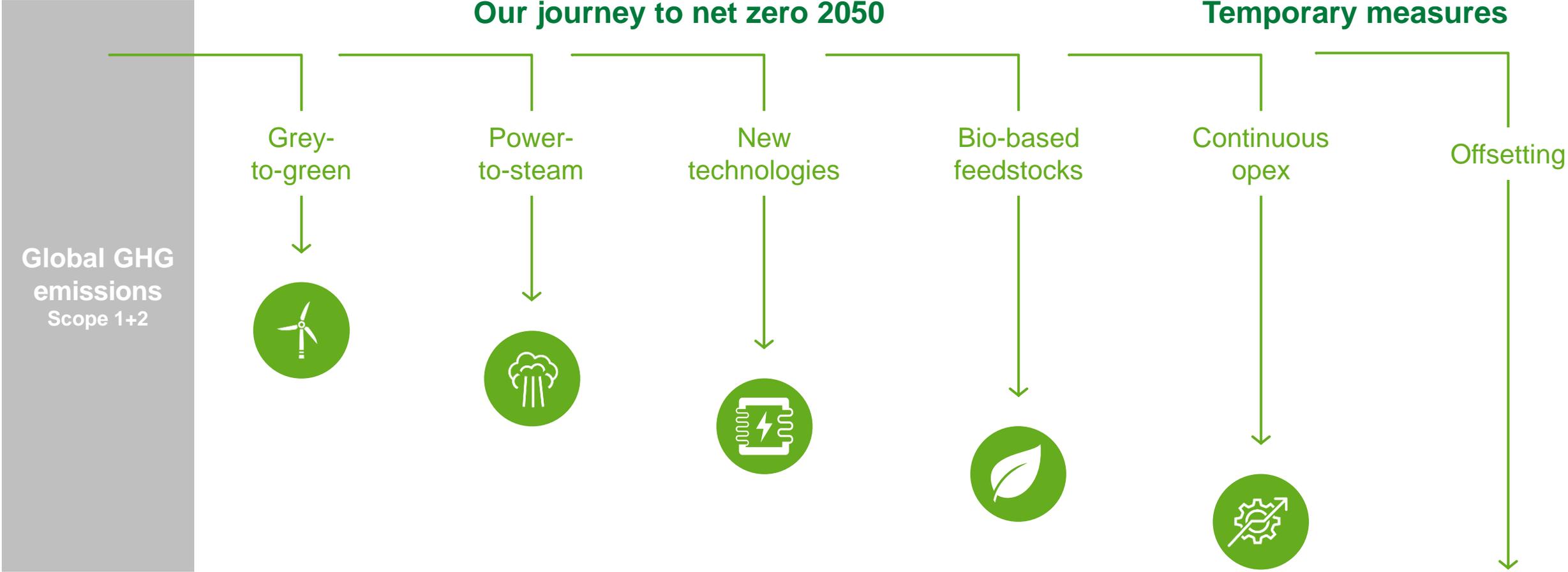


Product carbon footprint (PCF)



7 * Scope 3 emissions from raw materials production by suppliers

Our levers to reduce BASF's CO₂ emissions and reach net zero 2050

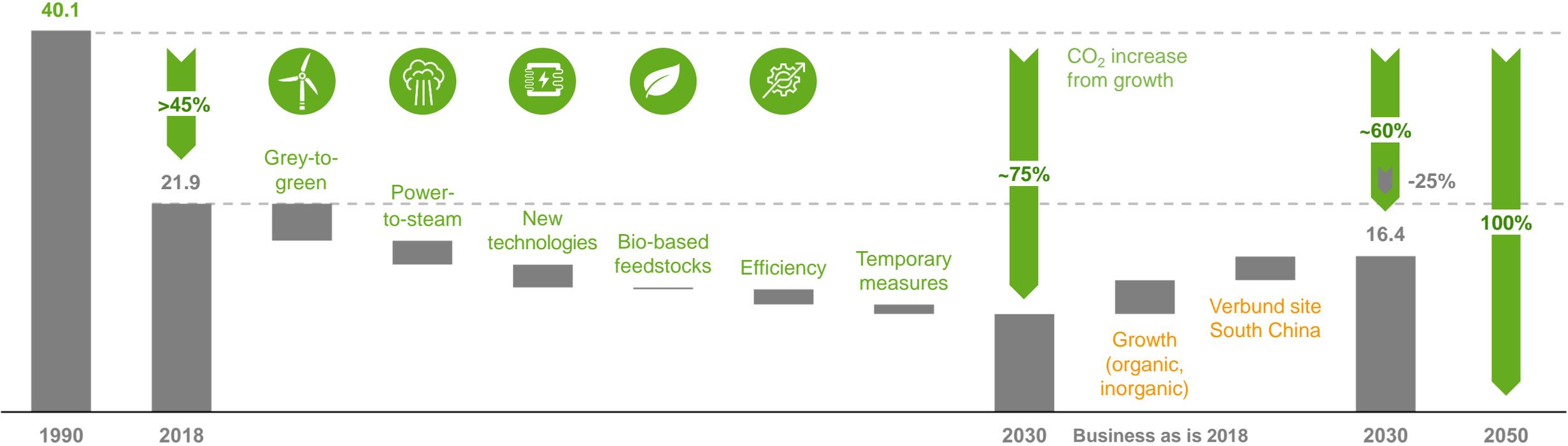


Our path to reduce BASF emissions from 1990 to 2050

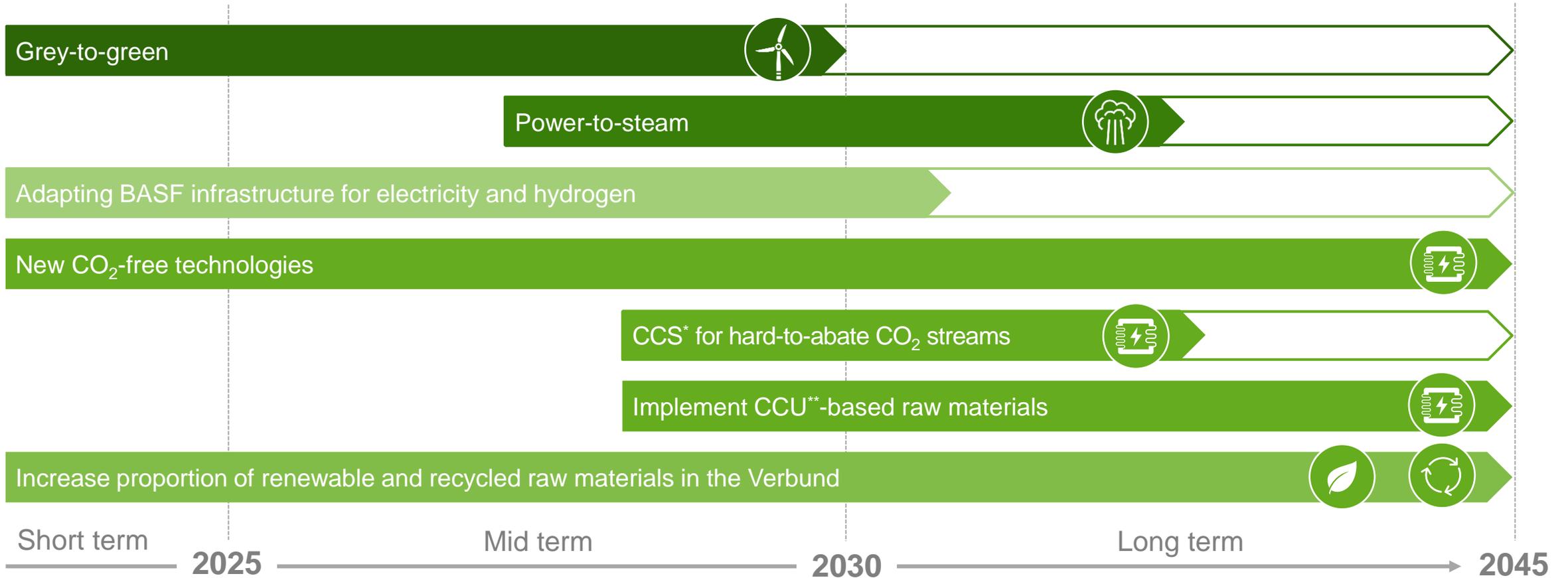
BASF greenhouse gas emissions (Scope 1 and Scope 2)

Million metric tons

net zero



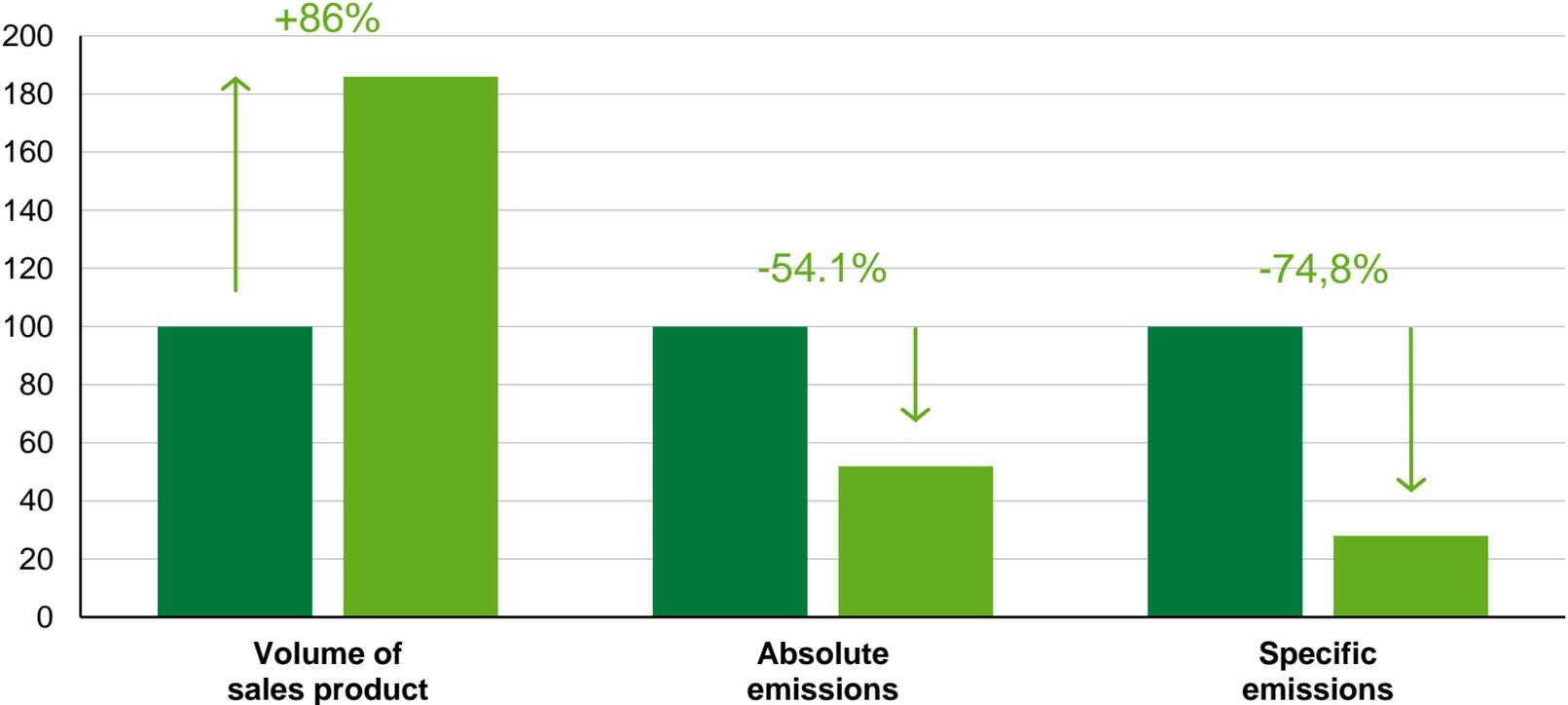
Key pillars to transform the Ludwigshafen Verbund site to net zero by 2045



Reduction of greenhouse gas emissions with increased production

Development since 1990

Index 1990 = 100%



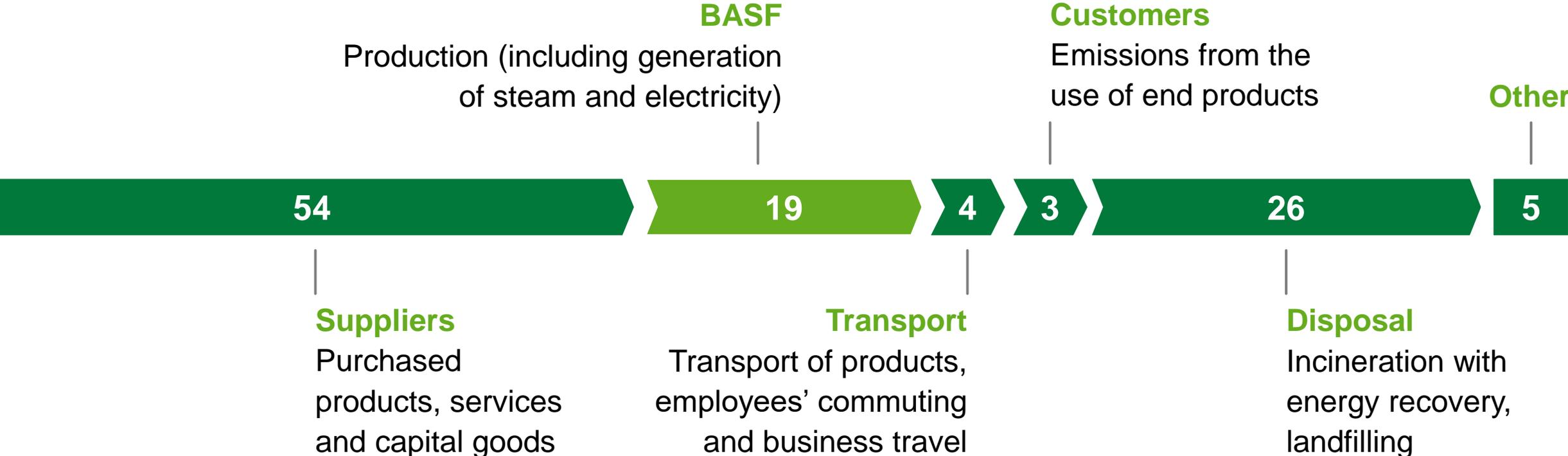
■ 1990 ■ 1921

- Since 1997 we have been using proprietary catalysts in our plants that decompose the greenhouse gas nitrous oxide (N₂O)
- We generate electricity and steam in highly-efficient combined heat and power (CHP) plants
- We continuously improve the energy efficiency of our processes and in our Verbund system
- We shift our energy supply to renewable sources

We assume responsibility along the entire value chain

Greenhouse gas emissions along the BASF value chain in 2022

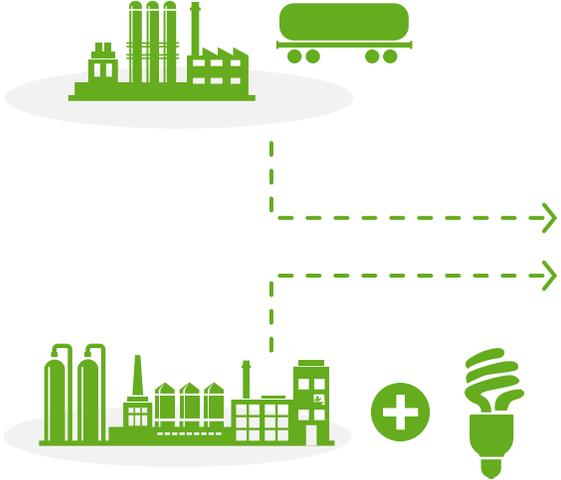
(in million metric tons of CO₂ equivalents)



We have built an industry-leading system enabling us to provide product carbon footprints calculated with a certified digital solution

Scope 3

Emissions caused by suppliers and generation of raw materials



CO₂



Product carbon footprints of sales products

Customer benefits

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

Scope 1 + 2

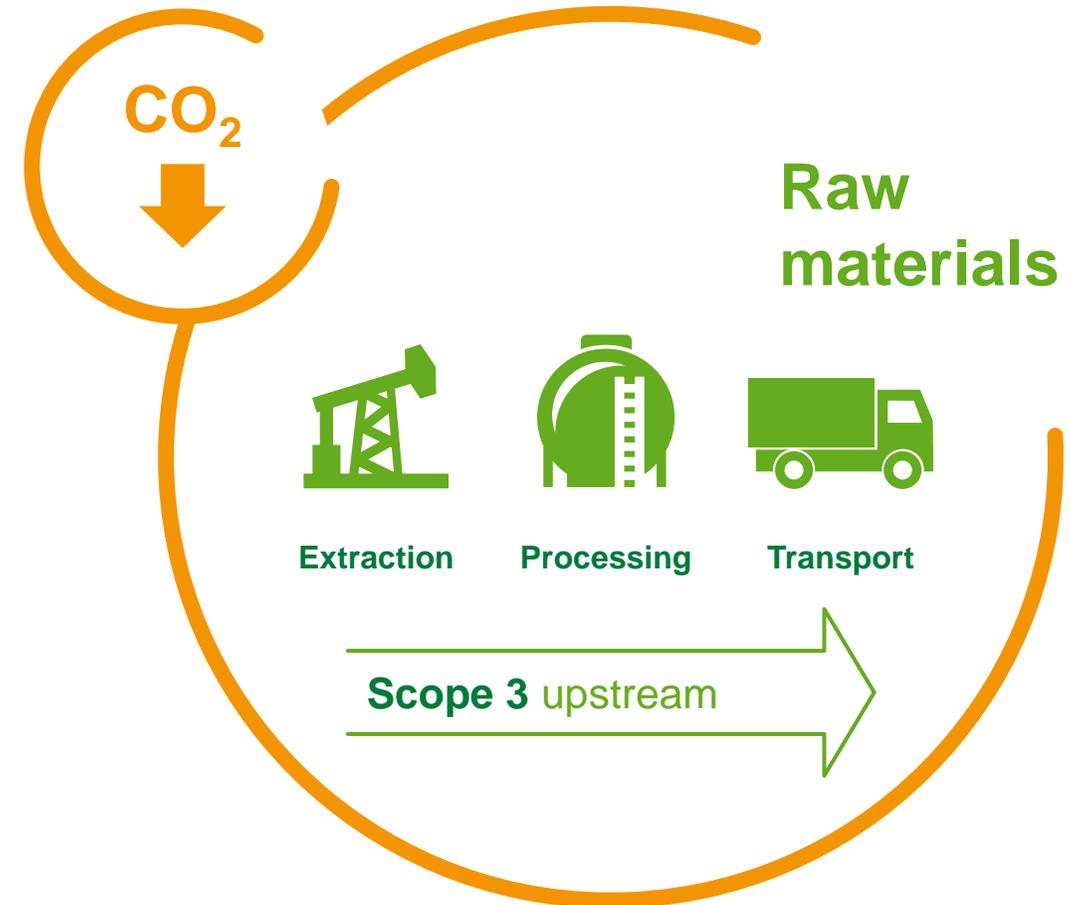
Emissions caused by own operations*

- TÜV-certified**
- Meets ISO standards***
- Calculates product carbon footprints cradle-to-gate

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

What we expect from our suppliers: Transparency on and reduction of CO₂ emissions

- BASF is establishing certified, product-level CO₂ transparency for its customers and is engaging its suppliers
- To support its suppliers and the industry, BASF shares its knowledge to create an international standard for the calculation of CO₂ transparency tools
- BASF works together with its suppliers and expects them to reduce the CO₂ footprint of their products

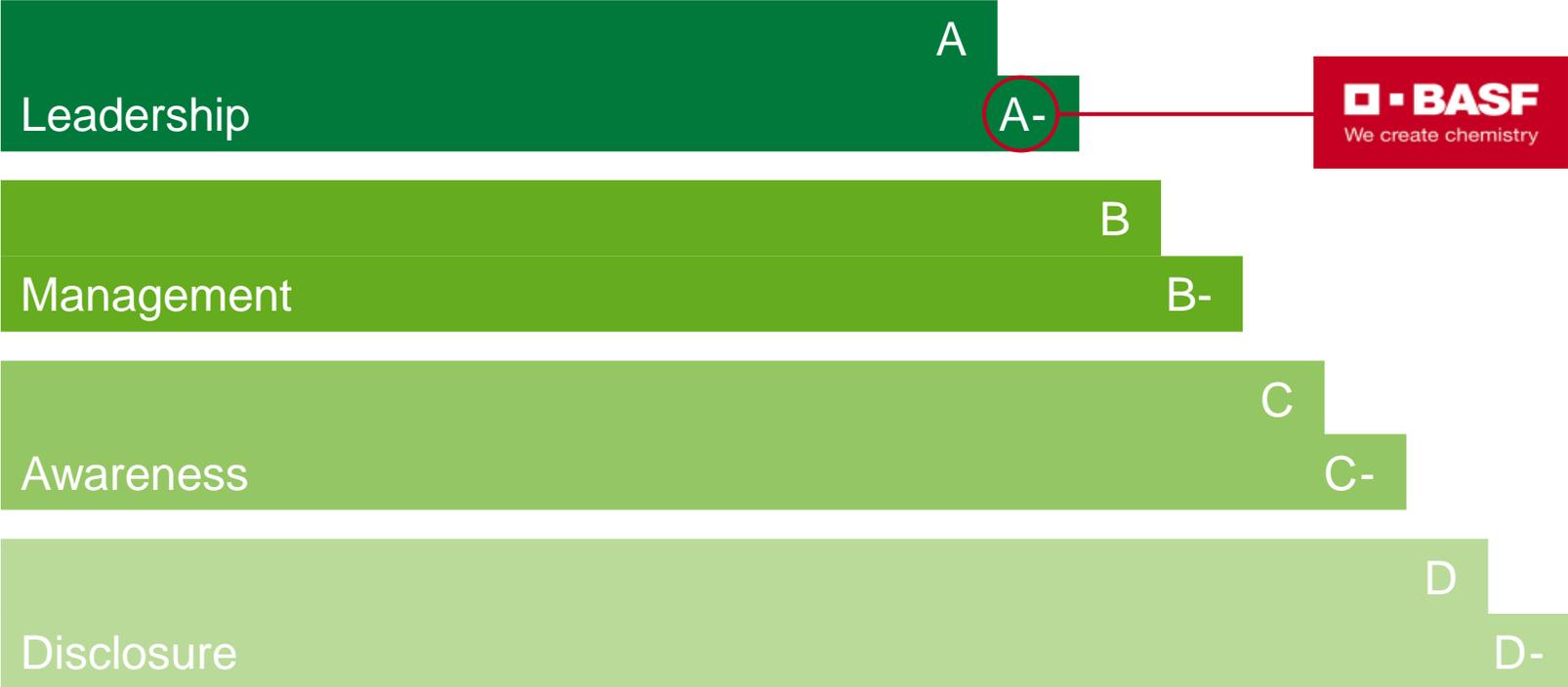


BASF will work all levers to reduce CO₂ emissions

BASF once again achieved leadership status on CDP's climate list



CDP represents more than 680 institutional investors who manage over US \$130 trillion in assets; BASF reports to CDP since 2004



BASF achieved the **top grade “A”** for **sustainable water management** and the rating **“A-”** for **forest** and **climate protection** measures. BASF achieved an **“A-”** rating on **CDP’s climate list** and thus **leadership status** for 18th time already.

Source: CDP 2022; BASF is among the top 8% assessed for supplier engagement on climate change, based on the 2022 CDP disclosure.

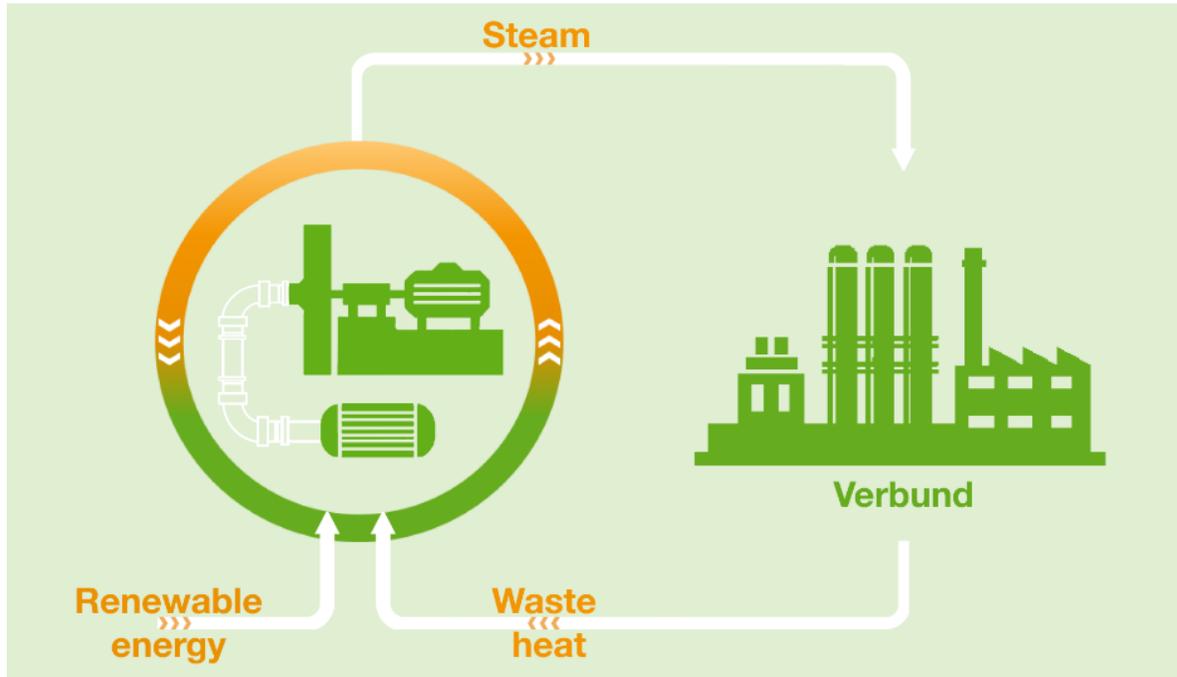




Carbon Management

Electrifying steam generation to reduce emissions

CO₂ – free steam production with heat pump technology



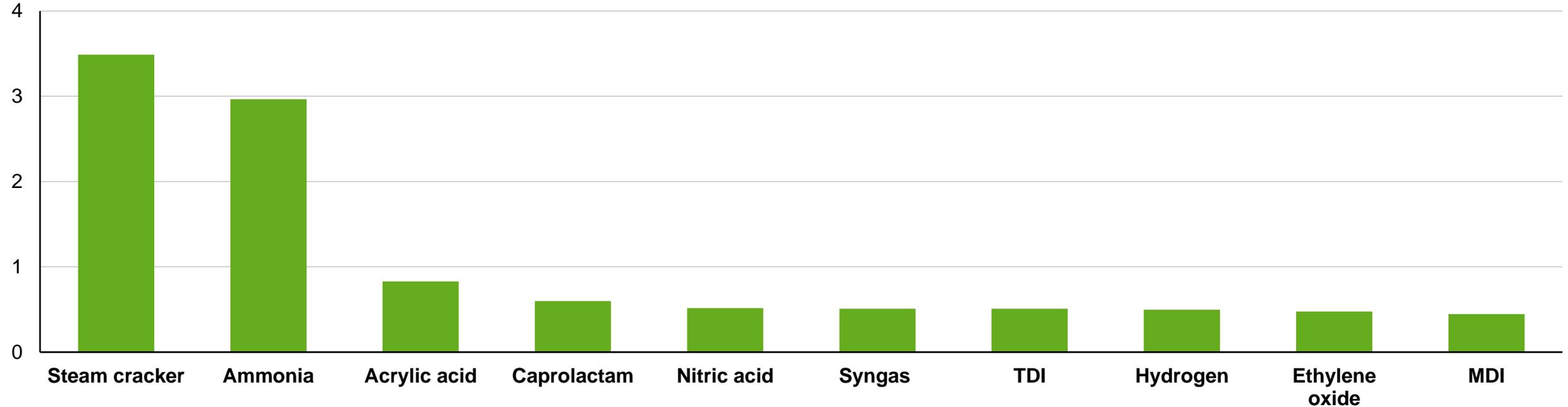
- New ways to generate steam will play a significant role in reaching our climate targets
- BASF will install technologies like industrial-scale **heat pumps**, **e-boilers** and **heat storage** systems to replace fossil-generated steam from today's power plants and capture the energetic potential of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

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



Greenhouse gas emission profile of BASF technologies

Energy and chemistry emissions, million metric tons per year*

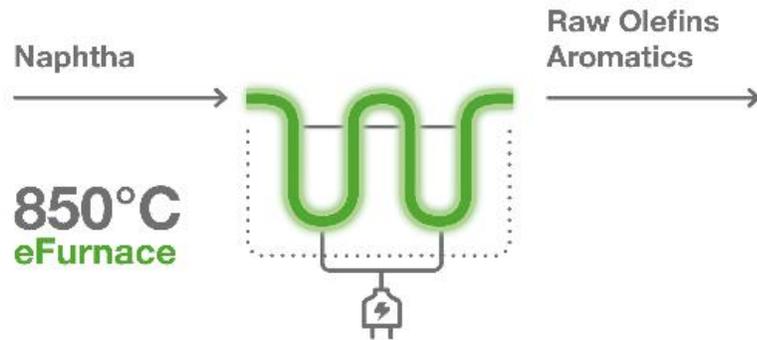


BASF has identified its CO₂-intensive processes and is addressing them.

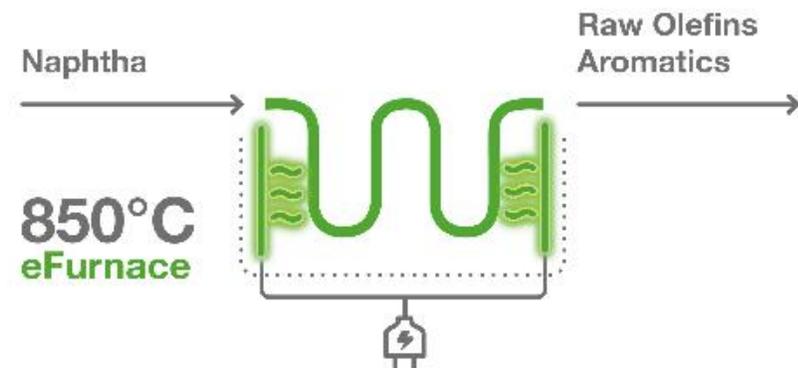
The world's first demonstration plant for large-scale electrically heated steam cracker furnaces



Direct Heating



Indirect Heating



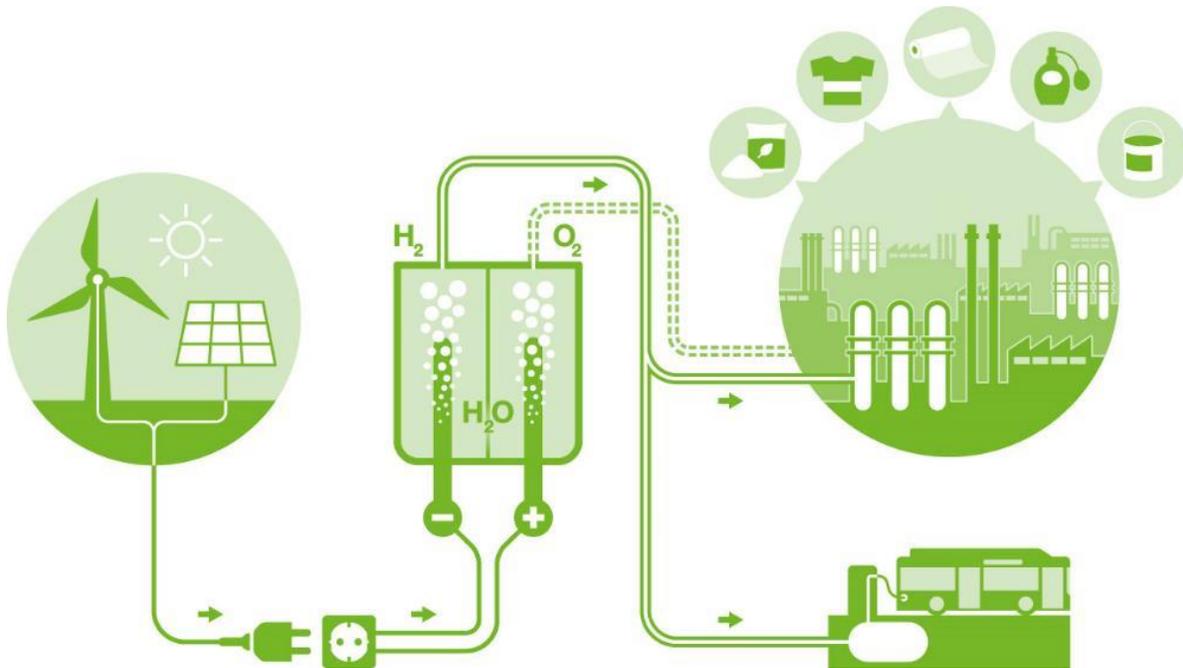
- BASF, SABIC and Linde **have started construction of the world's first demonstration plant** for large-scale electrically heated steam cracker furnaces (eFurnace)
- Demonstration plant with 6 megawatts **input of renewable electrical energy to be fully integrated into a steam cracker** at BASF's Ludwigshafen 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

Water electrolysis in Ludwigshafen – BASF's Hy4Chem project



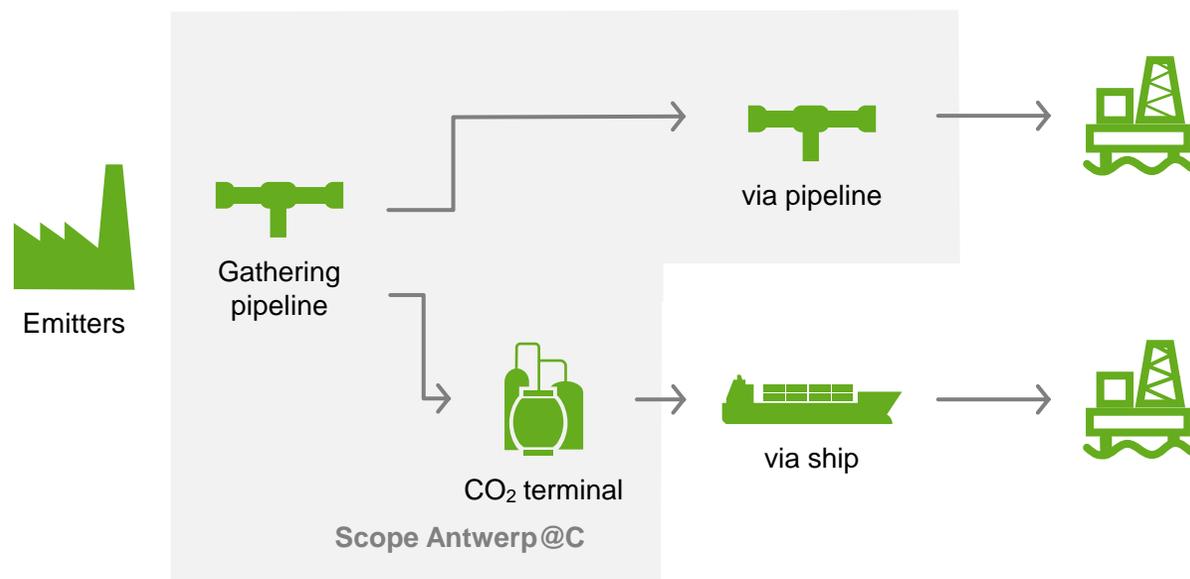
- In **water electrolysis**, water is split directly into its two components, hydrogen and oxygen
- If the required energy comes from **renewable sources**, the process is **carbon-free**
- We are working with Siemens Energy **on a project for the construction of a PEM** (proton exchange membrane) water 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)

Verbund site Antwerp: CCS is a mature drop-in solution for large-scale process emission abatement



Full cross-border CCS value chain

CO₂ capture -----> Local transport -----> International transport -----> CO₂ storage

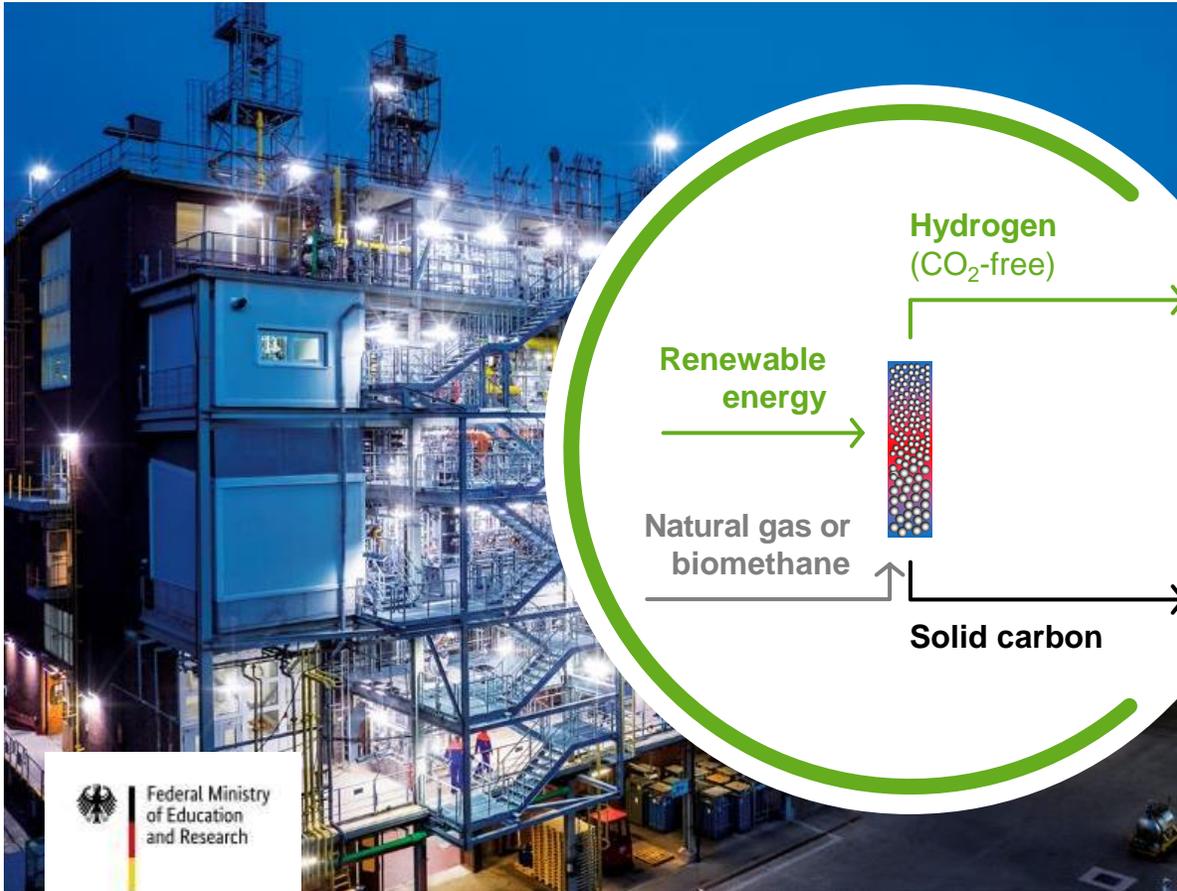


- Project consortium **Antwerp@C** has entered the FEED phase for CO₂ infrastructure in the port of Antwerp; BASF is one of the founding members
- Project **Kairos@C** – a consortium of BASF and Air Liquide – has entered the project engineering phase at BASF's Antwerp Verbund site
- International **cross-border CCS value chain** aiming to reduce BASF's CO₂ emissions in Antwerp by about 1 million tons per year in a first step
- Planned to be **operational by 2026**



Co-funded by
the European Union

Methane pyrolysis* – process innovation to reduce CO₂ emissions



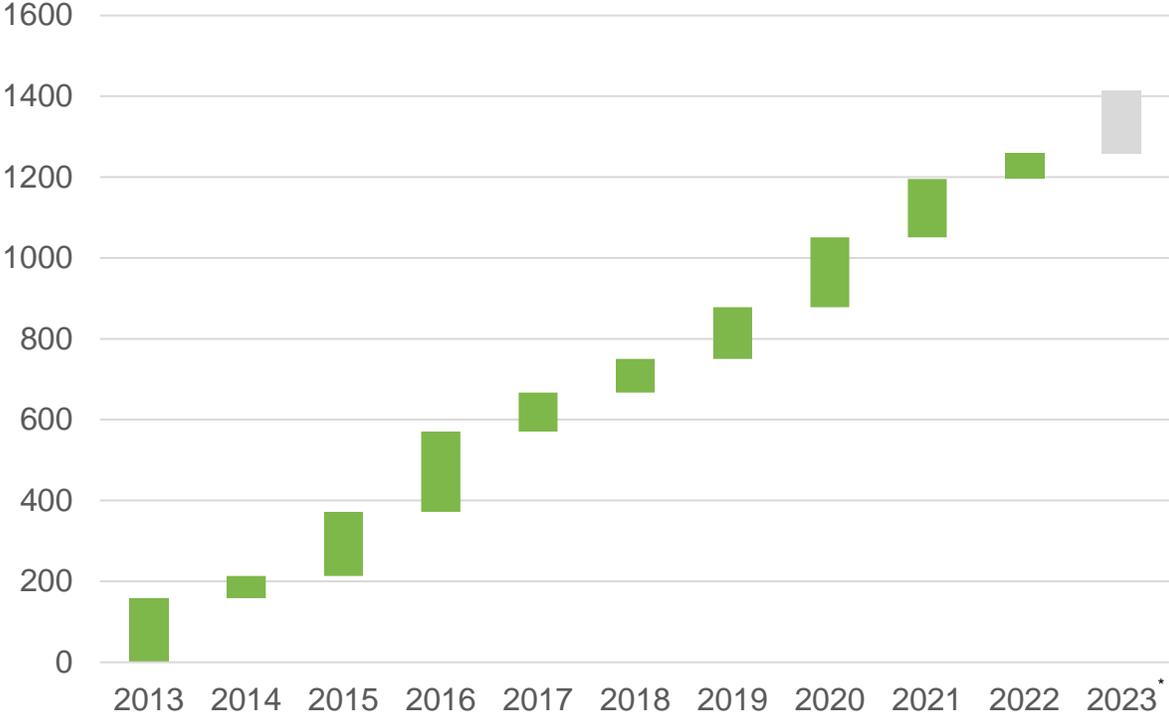
- Methane pyrolysis is a **low-emission technology**. In this innovative process, (bio)methane is split directly into hydrogen and solid carbon
- **Test plant** at the Ludwigshafen site **in trial operation**
- Key challenges are **process technology and control**
- **Methane pyrolysis** requires around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

Operational excellence – a lever to continuously increase our energy efficiency and avoid CO₂ emissions



Reduction of CO₂ emissions through operational excellence measures

Kilo tons per year, cumulative



- Opex measures helped to **reduce CO₂ emissions** by more than **1.2 million tons** from 2013 to 2022
- In 2022, more than **500 opex measures** were realized that reduced CO₂ emissions
- Examples:
 - Modification to wastewater treatment process **reduced heat demand** and resulting **CO₂ emissions** by more than **2,500 tons per year**
 - New residue incineration line allows more efficient steam production, **avoiding more than 5,000 tons of CO₂ emissions per year**



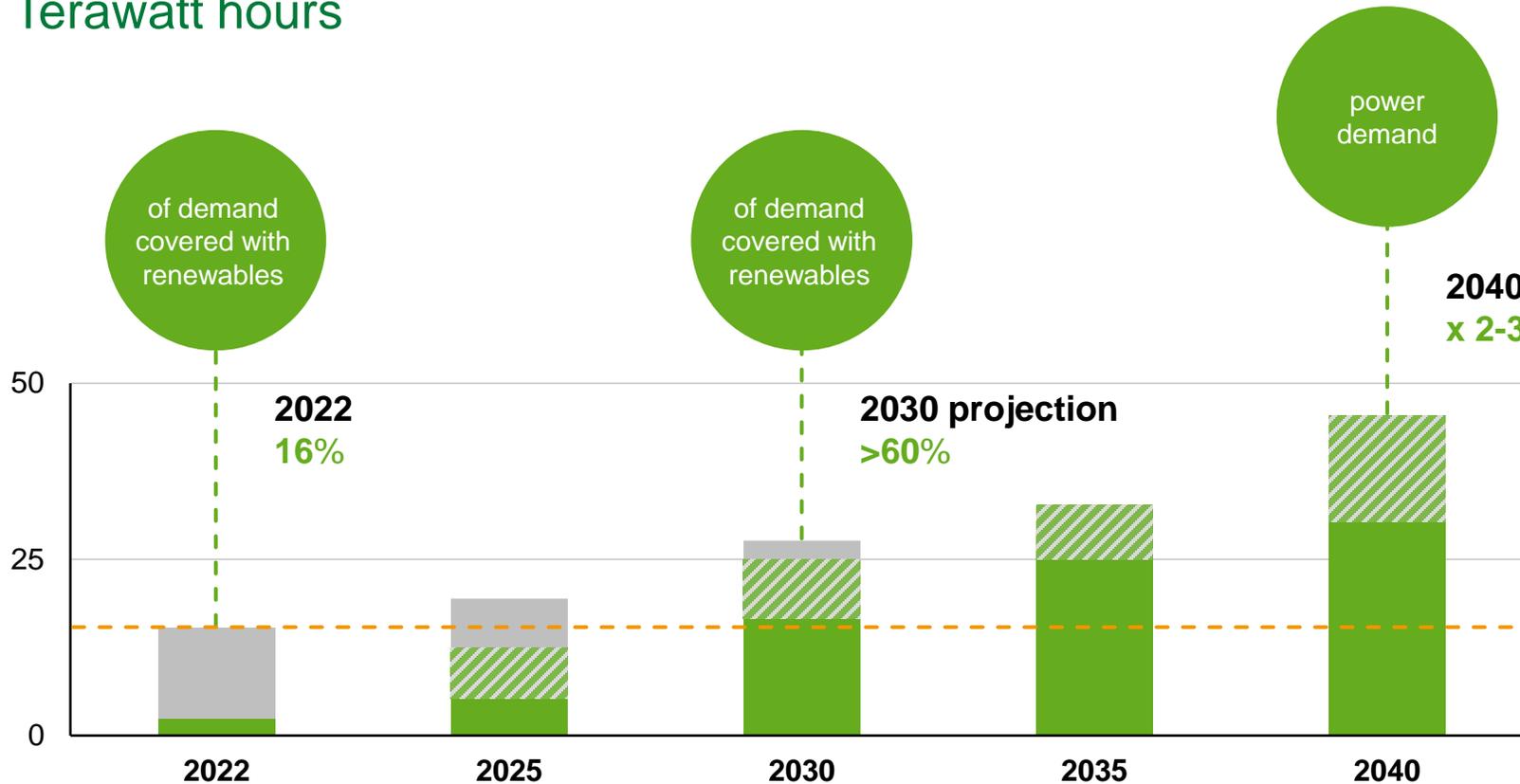
Increasing importance of renewable energy

- The replacement of grey by **green energy** will have the largest impact on **reducing our emissions** in the until 2025
- At the end of 2022, **108 BASF sites worldwide** were already partially or fully powered by **emission-free energy**
- The electrification of our processes will significantly **increase** our **green power demand** over the coming years
- **Availability** and **price** of renewable power as critical success factors

Switching our power to renewable energy will be the main driver of emission reduction until 2025



BASF global power demand and renewable supply projection Terawatt hours



- BASF aims to source **more than 60%** of its power needs from **renewable sources** by **2030**
- BASF **power consumption** expected to **increase strongly** due to electrification on our journey to net zero
- BASF pursues a **make-and-buy strategy** to secure access to renewable power
- Early investments in renewable power assets expected to offer **advantageous economics in the future**

■ Grey energy ■ Green energy ■ Additional need for green energy for electrification, depending on availability

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



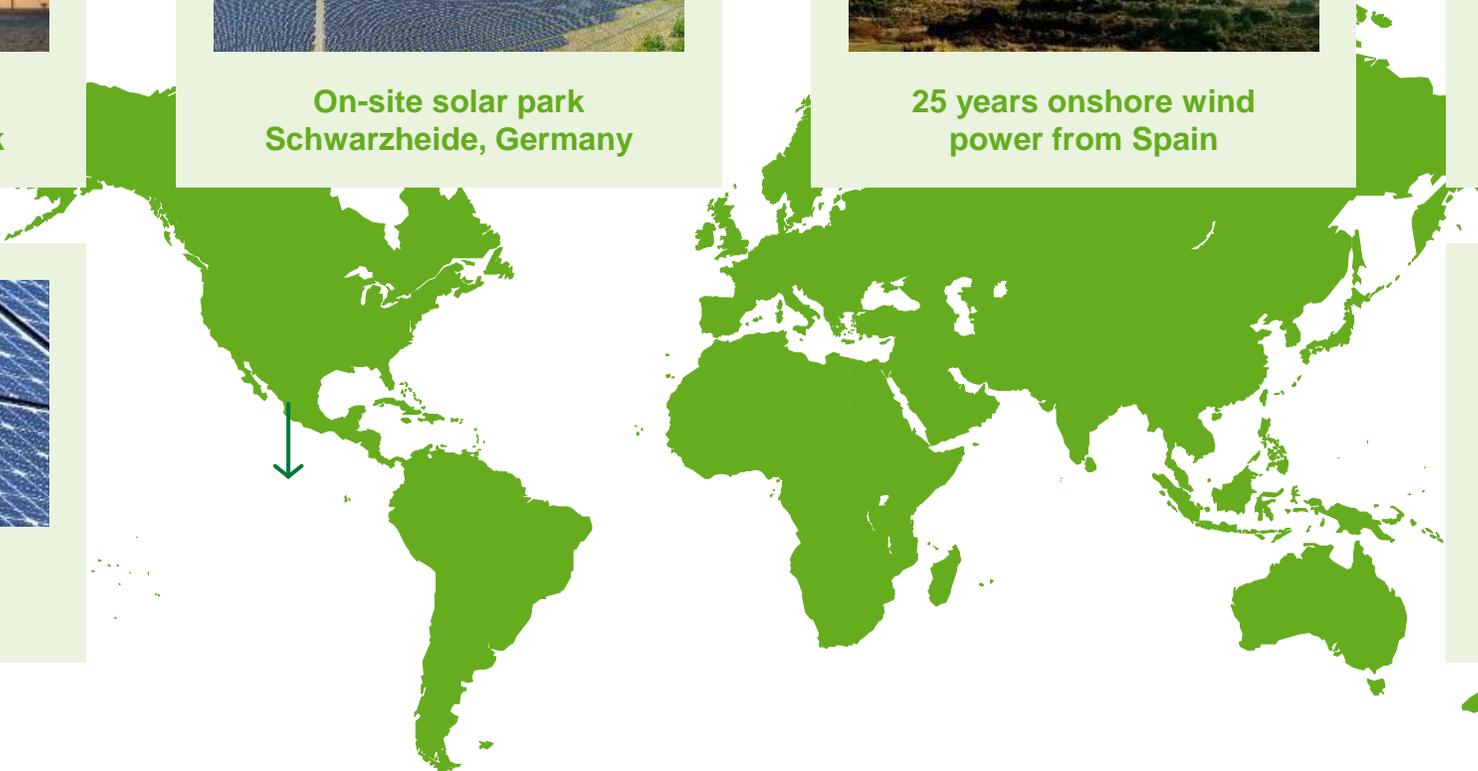
25 years offshore wind power from Germany



Wind and solar power for sites across US



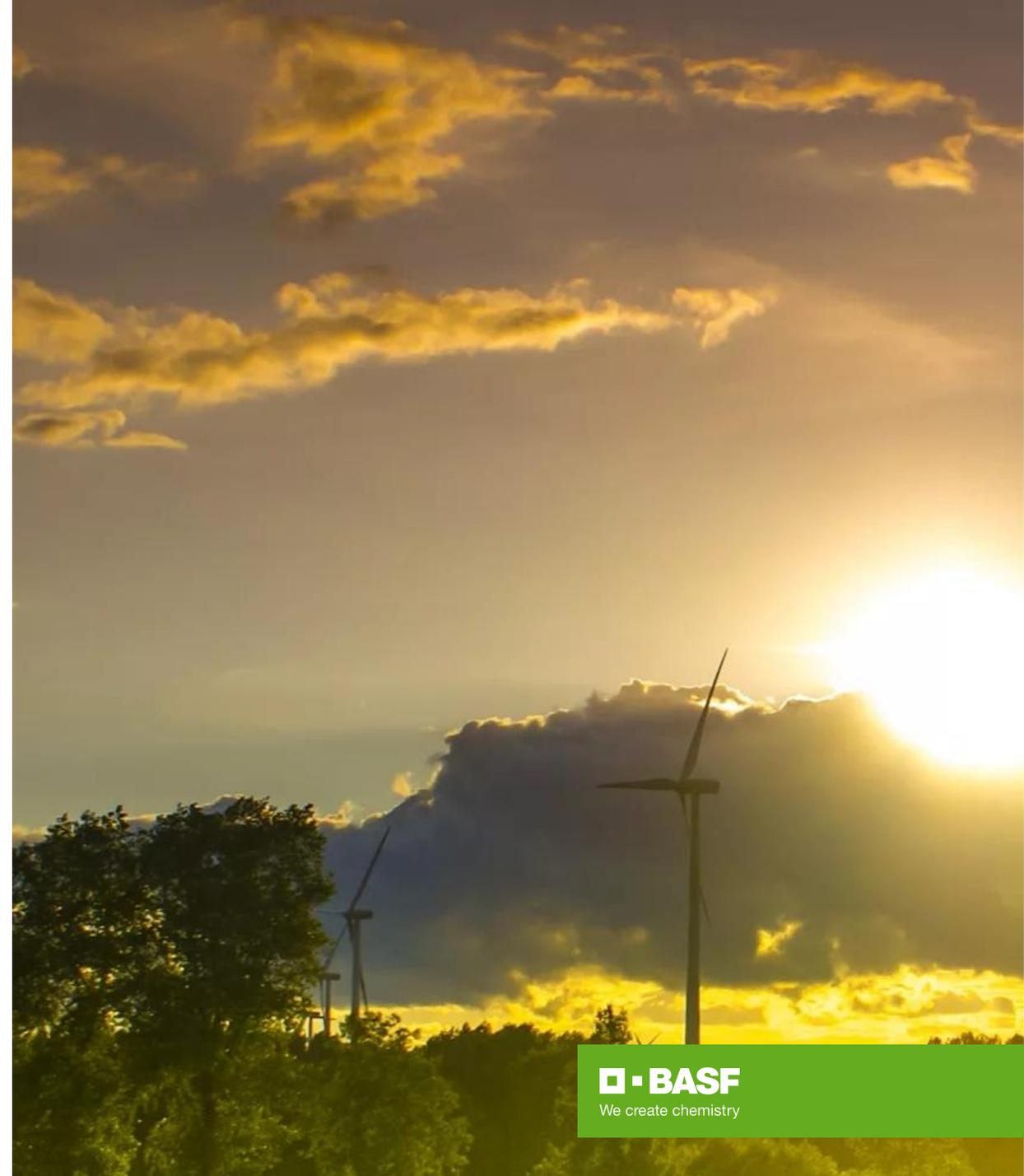
Renewable power for several Chinese sites



Sustainable Solution Steering (TripleS) Update 2022/2023

- Our target: reaching €22 billion in Accelerator sales by 2025
 - ▶ Accelerator sales in **2021** of €24.1 billion, thus **achieving our target for 2025**
- Taking the opportunity
 - ▶ We are **revising our method and target** for managing our product portfolio
 - ▶ In the future, the focus of our product portfolio will be even more strongly on **climate protection, climate neutrality and the circular economy**

We will not report any TripleS-relevant data for 2022 data – neither externally nor internally.



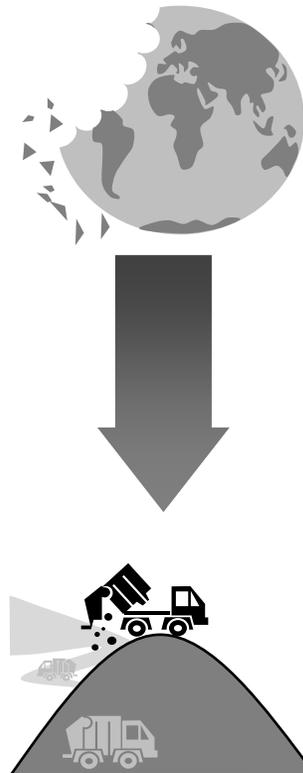
Circular Economy



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
- **Avoid waste** and **pollution** and **protect natural systems**

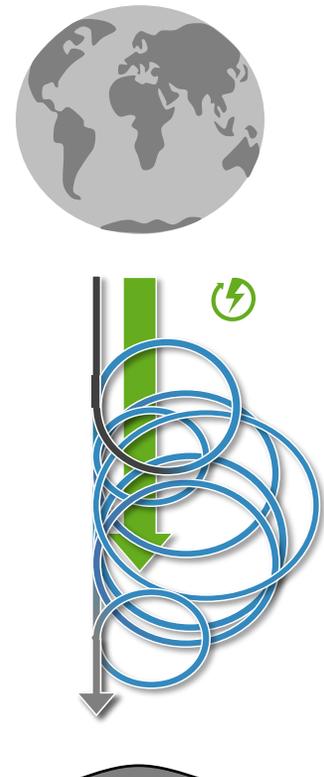
Linear economy



Recycling economy



Circular economy



How do we drive circular economy?



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



We commit to use **250,000 metric tons** of **recycled feedstock** by **2025** globally



We run a **Circular Economy Program** to accelerate the transition

We aim to achieve our circular sales target based on two portfolio concepts



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

Close the loop

Products which enable the closing of the recycling loop and/or are based on recycled or renewable feedstocks

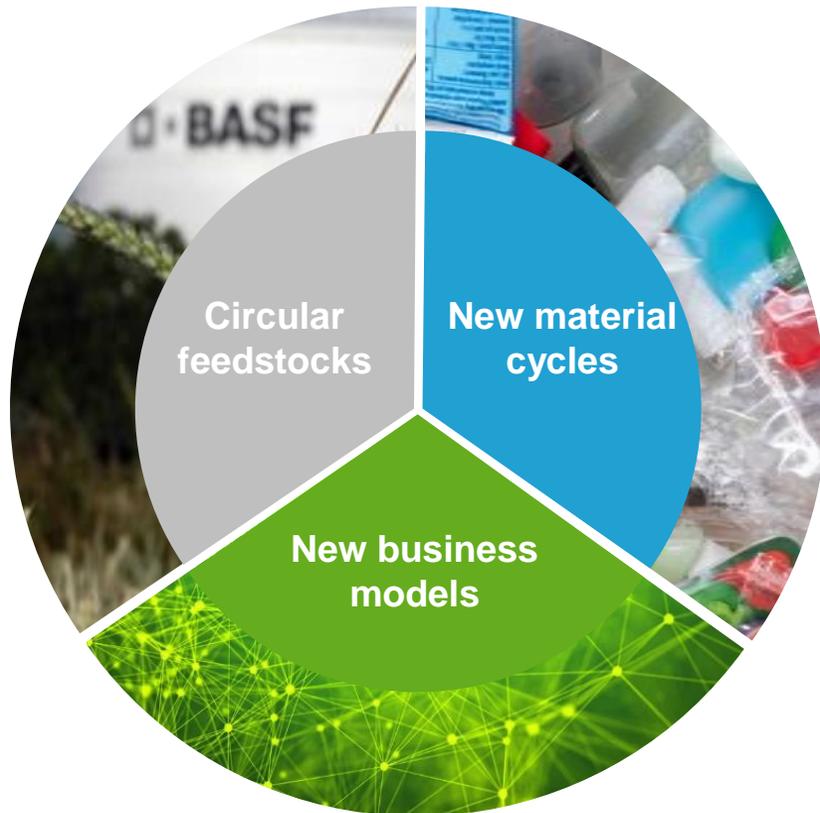
-  Renewable-based feedstocks
-  Recycled-based feedstocks
-  Enable recyclability and/or biodegradability

Extend the loop

Products that perform best with less, and thus help to decouple growth from material consumption

-  Save resources and reduce waste along the value chain
-  Higher durability to enable product sharing and reduce maintenance

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



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 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

By using alternative raw materials, we can manufacture products in a more sustainable way

Recycled feedstock

Renewable feedstock

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

Biomass balance



Biomethane or bio-naphtha derived from biomass (waste)

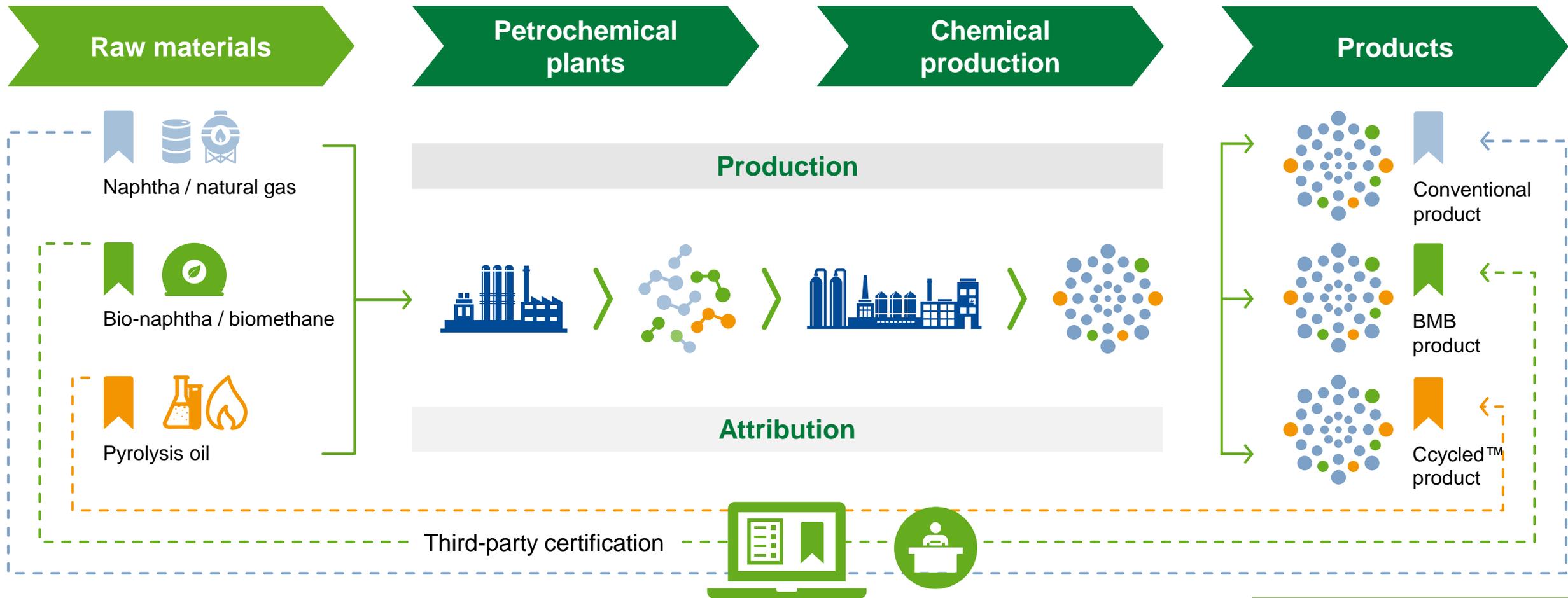
Dedicated bio-based production



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

Mass balance approach

The alternative feedstock is attributed through the mass balance approach (credit method)



BASF's biomass balance approach

- Requires **no reformulation** – identical product performance
- **Available** easily and fast for nearly all our products
- **Saves fossil resources** and **reduces greenhouse gas** emissions
- Drives the use of sustainable **renewable feedstock**
 - ▶ Independent sustainability certification from recognized schemes, e.g., REDcert² and ISCC+
 - ▶ Securing the minimum sustainability criteria defined in the EU Renewable Energy Directive (RED)



Biomass balance portfolio from renewable resources

Certified biomass balanced portfolio saves fossil resources and reduces greenhouse gas emissions

- ~ 1,000 biomass balanced (BMB) products (“drop-in products“) are already **certified**
- The **correct attribution of renewable feedstocks** in BASF’s value chains is ensured via certification according to known certification standard schemes
- For biomass balanced products **certification standards** in use are **REDcert²** and **ISCC+**
- **Waste and residues** are the **preferred sources** of renewable feedstock (e.g., from municipal, agricultural and food waste or used cooking oils)



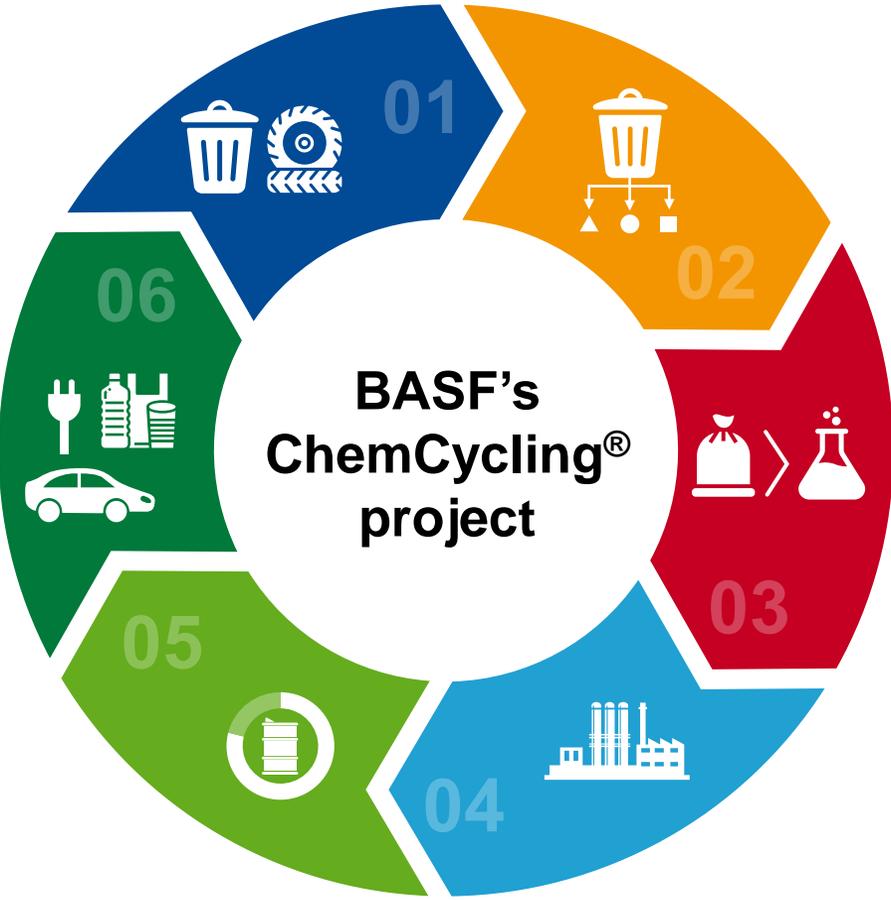
BASF's ChemCycling® project

Breaking new ground in 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
- **Replacing fossil resources and saving CO₂ emissions** against conventional plastics production
- Process and products are third-party **audited and certified** according to a **mass balance approach**



Benefits of Cycled[®] products

- More than **200 mass balanced Cycled[®] products certified** according to REDcert² or ISCC+
- **Commercial applications** realized by our customers **in industries** like food and medical packaging, textile and automotive
- **Virgin-quality material for sensitive products**, including food contact, temperature-sensitive and safety-relevant applications
- **Reduced product carbon footprint** compared to conventional grades according to life cycle assessment



Closing the loop

Battery Recycling

- Using metals from recycled batteries to make new battery materials **offers significant CO₂ reduction** in the production of electric vehicles and is essential to **meet the growing demand for scarce metals**
- BASF is building a **commercial black mass plant for mechanical recycling of batteries** in Schwarzheide, Germany, next to its battery materials plant; it is able to process 15,000 tons per year of batteries and production scrap. Start up is planned for 2024
- For the development and scale-up of the hydrometallurgical battery recycling step, BASF is building a **battery recycling prototype plant** next to the commercial recycling plant; it will deliver high returns of lithium, nickel and cobalt. Start of operations is planned in 2023
- With this, BASF will be able to offer **a highly efficient “closed loop” for battery materials in Europe**





Responsible sourcing

We source responsibly

Increase impact of evaluations and improve sustainability performance in the supply chain



- 2025 Goal: **Cover 90% of our relevant spend*** with **sustainability evaluations by 2025**, and have **80% of our suppliers improve their sustainability performance upon re-evaluation**
- **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

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 2022
- 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 2022

Sustainable sourcing of renewable feedstock

Voluntary commitments and initiatives for oleochemistry – castor oil



Build-up of sustainable castor in India

- BASF, Arkema, Jayant Agro-Organics Ltd. and the international civil society organization Solidaridad launched **project 'Pragati'** (Hindi for progress) to improve working conditions, create awareness for sustainable farming and increase yields due to more efficient farming practices
- The project established the first unified sustainability code for castor farming: **SuCCESS – a standard for certified sustainable castor farming**
- BASF has one of the first sites in the industry certified according to the SuCCESS Code and is the first chemical company to start the **supply of sustainable castor** in its products

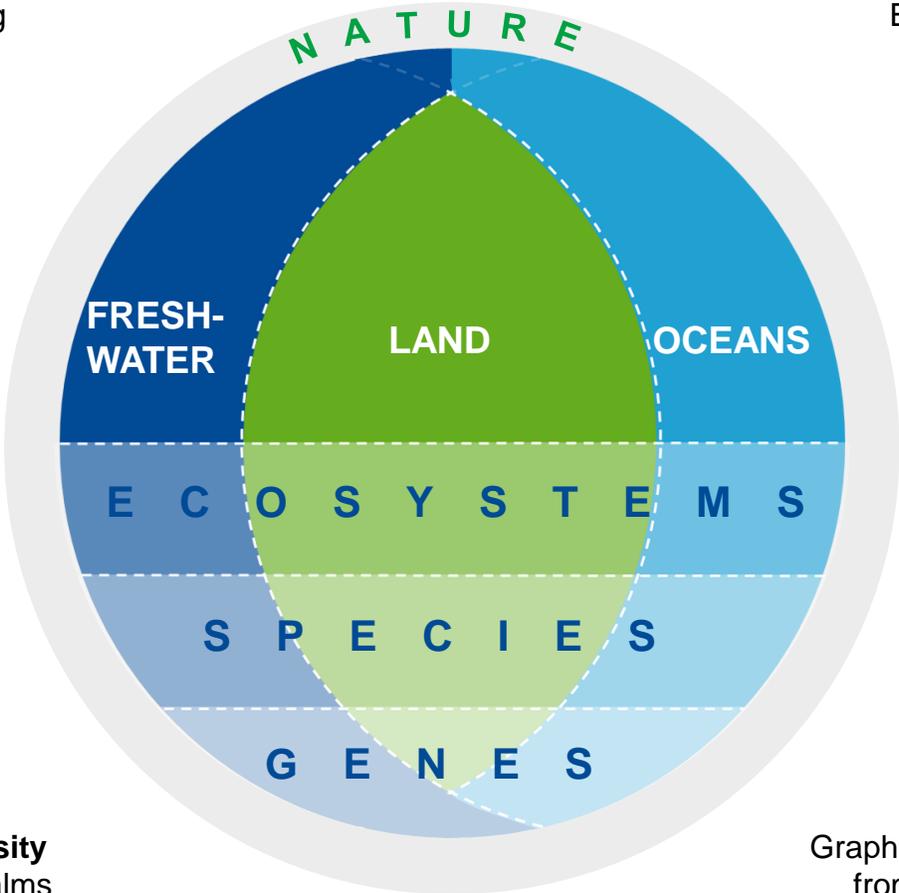
A close-up photograph of a moth with light-colored wings and a dark body, perched on a cluster of small, pink and white flowers. The background is a soft, out-of-focus green field.

Biodiversity and sustainable agriculture

Nature and biodiversity

Protecting biodiversity is a key element of our commitment to sustainability

Non-living realms



Ecosystem services

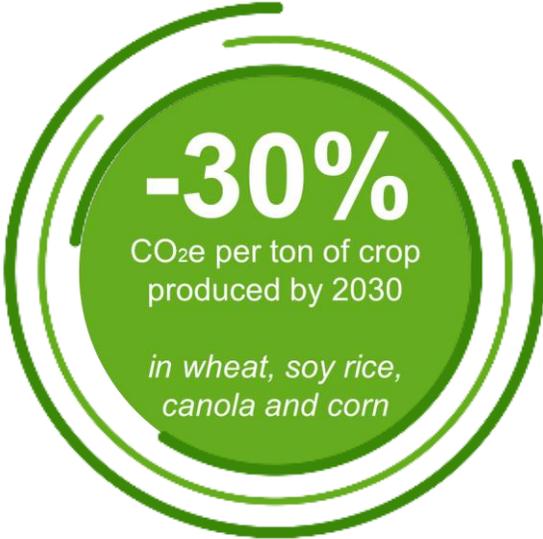
Biodiversity
Living realms

Graphic adapted from WBCSD

- Biodiversity is the foundation of various **ecosystem services**, e.g., availability of renewable resources, the preservation of air, water, and soil quality
- As a chemical company, we **influence and depend on** these services
- We identified BASF’s impact on biodiversity loss along the value chain. **Habitat transformation, climate change, overexploitation and pollution** are the drivers * with the largest impact
- We integrated biodiversity in our **sustainability assessment criteria** in various tools like Eco-Efficiency Analysis, AgBalance® and Sustainable Solution Steering
- We **assess our production sites** adjacent to Internationally Protected Areas (GRI 304-1)

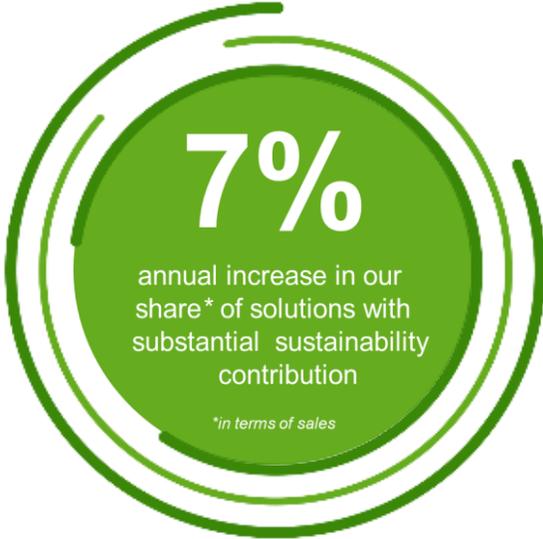
Our sustainability commitments as a leader in agriculture

Climate Smart Farming



Supporting farmers to become more **carbon efficient** and **resilient** to volatile weather conditions

Sustainable Solutions



Steering our portfolio **systematically** to increase the share of **sustainable solutions** we bring to farmers year by year

Digital Farming



Helping farmers to grow **profitably** and reduce their **environmental footprint**

Smart Stewardship



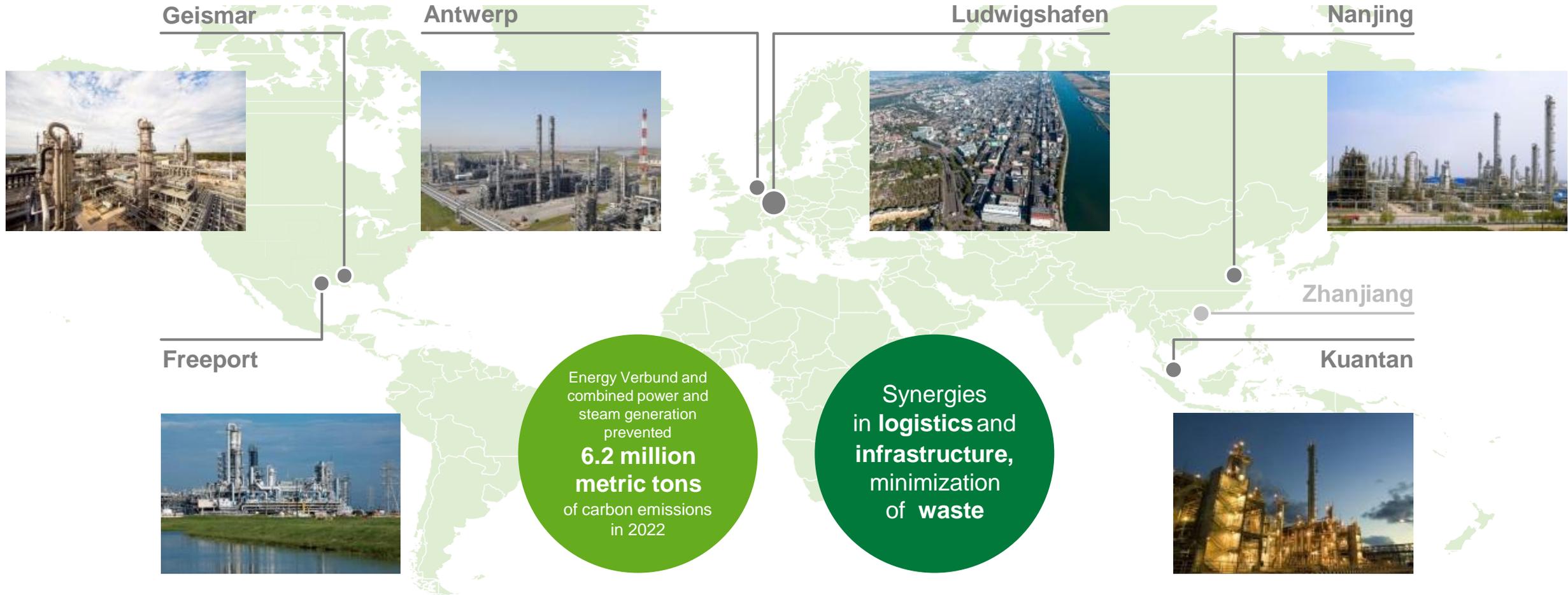
Striving for **zero farming incidents** that impact human health and the environment



Efficient, Safe and Responsible Production

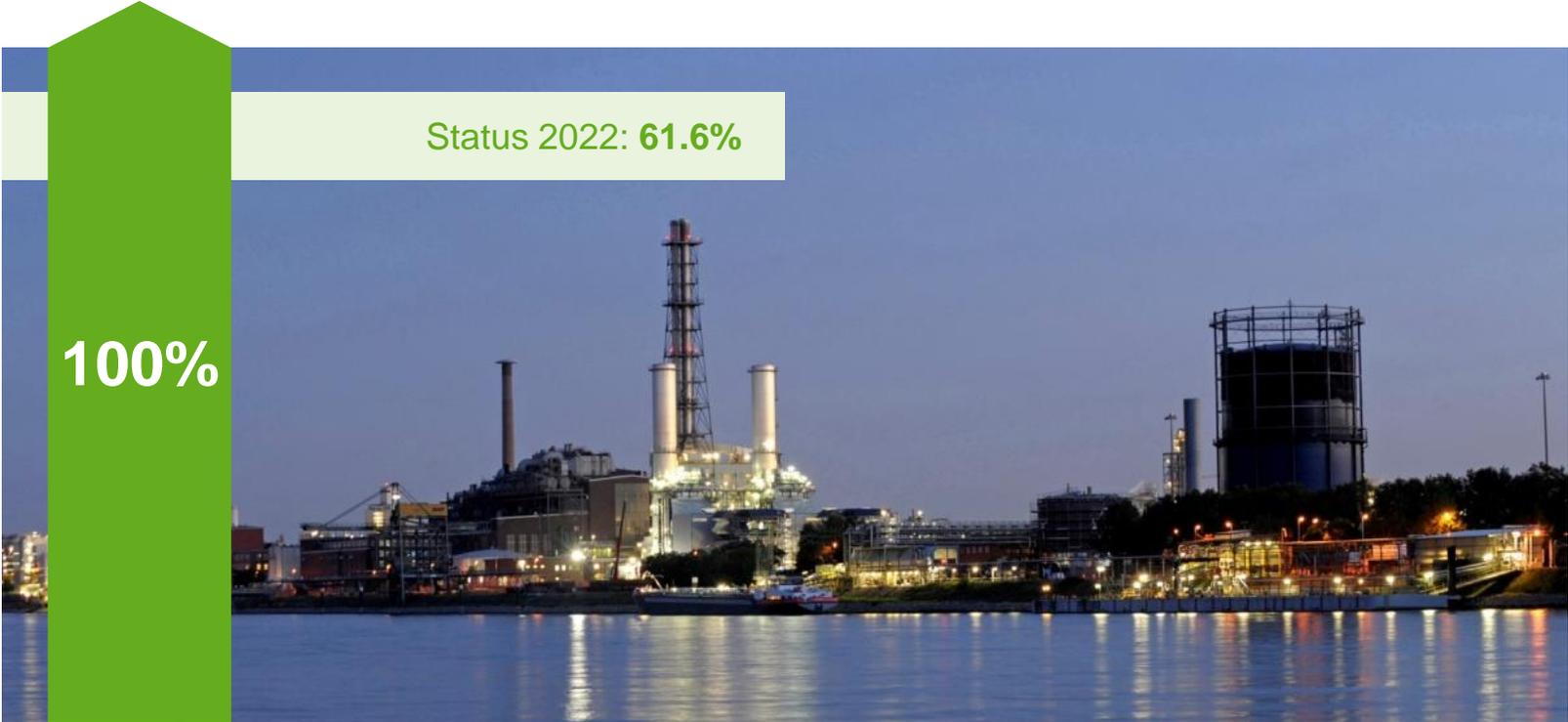
Resource efficiency in the Verbund

Ideal for CO₂ emission reduction



Sustainable water management

Introduce sustainable water management at all relevant BASF sites by 2030
(water stress areas and Verbund sites)



Occupational safety and process safety

Lost-time injuries

per 200,000 working hours by 2025



Process safety incidents

per 200,000 working hours by 2025

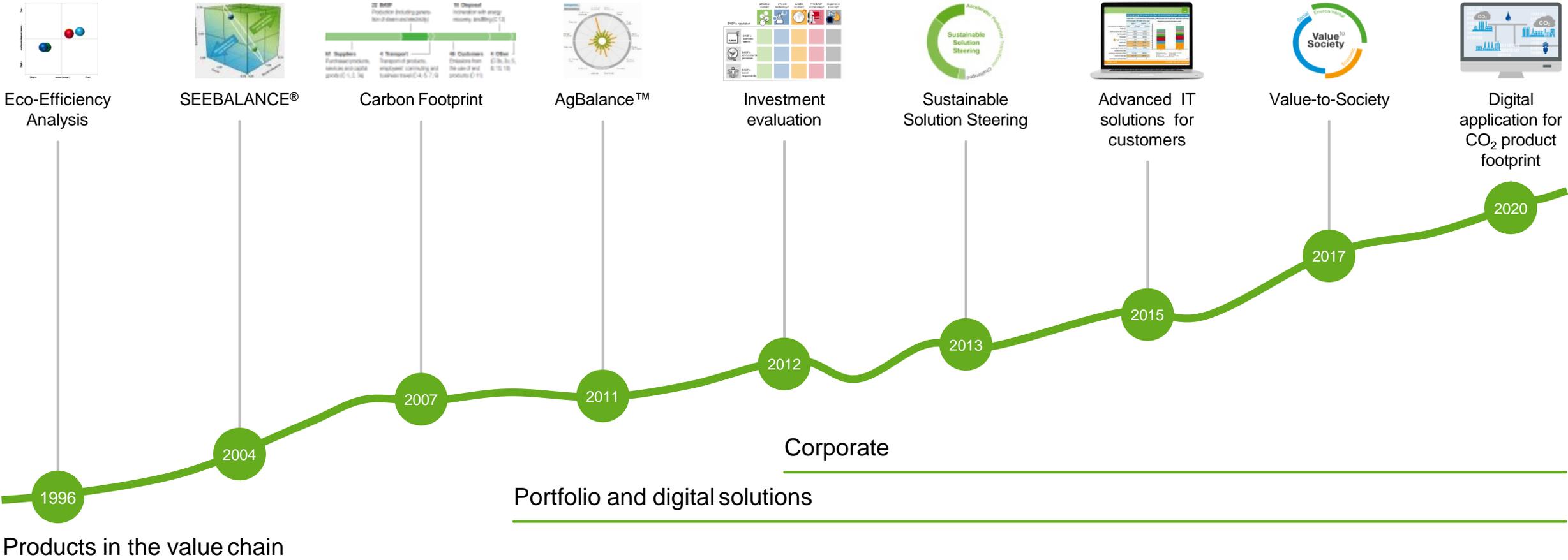




Creating value for society

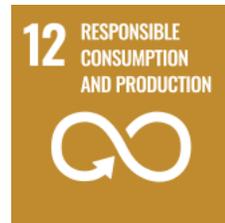
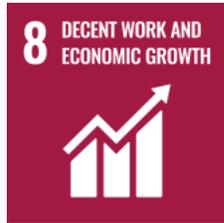
We drive sustainable solutions

Systematic sustainability performance assessments since 1996



We engage in global initiatives

BASF particularly contributes to:



BASF

- contributes to the U.N. SDGs through products and solutions along the value chain
- uses the SDGs as orientation for BASF's own goal setting
- will continue to monitor the SDGs by using established indicator systems (e.g., GRI, WBA)
- is in continuous dialogue with external stakeholders to establish trustful partnerships on the way to reaching the SDGs

Societal engagement at local and corporate level creates impact for society, environment and BASF alike

Global focus areas

Examples of BASFs societal engagement activities:



Future Health

Helping Hands 

Provision of disinfectant, personal protection equipment; support of food banks, medical centers; contribution to medical research; operation of vaccination center

New nets project 

Distribution of more than 25 million of Interceptor® G2 mosquito nets in African countries as of December 2021.



Future Skills

Global Kids' Labs  

STEM education program since 25 years
On-site and virtual experimentation workshops
Around 1.2 million kids reached in 45 countries

Young Voices for a Sustainable Future  

Innovation challenge for a just transition
Implementation in 8 countries
YTD >1,000 participants, >90 volunteers, >60 posts
Young Voices Report due in February 2023



Future Resources

Waste-to-Chemicals 

Initial Starting Venture project in Nigeria; sorting to generate jobs and clean environment; production of pyrolysis oil as Feedstock for BASF Verbund under mass-balance

Clean-up initiatives 

Local team activities to clean up the environment, e.g., in China, Greece, Chile

Sustainability networks

Sustainability requires dialogue and partnership with stakeholders

We engage in sustainability networks

- to better **understand trends** in society as the drivers of our business
- to help **shape** measurement and performance **standards**
- to **partner for** joint **contributions** to sustainable development

Examples



BASF Stakeholder & Human Rights Advisory Council

Exclusive feedback to advance BASF's sustainability approach

Challenge and high-level outside-in perspective and advice on sustainability topics

Positioning as responsible and open thought and action leader in sustainability

Investment into trustful stakeholder relations

Stakeholder Advisory Council



Fiona Reynolds



Stephan Singer



Youba Sokona



Ralf Fücks



Christine Loh



Tim Mohin

Discussion topics

- impacts
- corporate strategy
- corporate responsibility
- renewable materials
- supply chain due diligence
- corporate targets
- human rights
- climate change

Human Rights Advisory Council



Dr. Birgit Spießhofer



Michael Windfuhr



Andrea Shemberg



Gerald Pachoud

The Human Rights Advisory Council

Advice from independent international human rights experts

Who?

Independent international human rights experts, including civil society's and academia's perspectives as external members

As internal members, BASF Chief Compliance Officer (chair), Corporate Sustainability (facilitator), others as required

What?

Advancing developments of BASF's human rights-related strengths as well as giving advice on potential for improvement through constructive exchange

Why?

Stimulating insights to better understand different perspectives and address conflicting goals in respecting and protecting human rights



Gerald
Pachoud



Andrea
Shemberg



Birgit
Spießhofer



Michael
Windfuhr

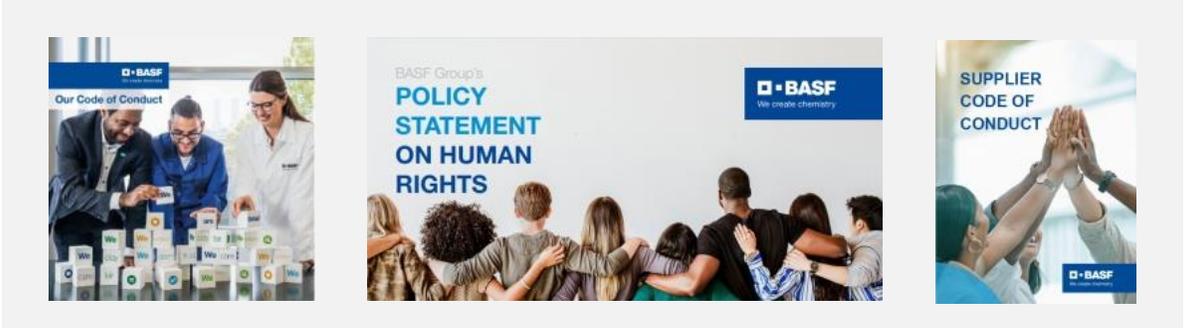
Respect for human rights at BASF

Longstanding self-commitment led to strong and proven processes and building blocks

Overall setup



Important building blocks



Backbone



Grievance mechanism



European Chemicals Strategy for Sustainability (CSS) (1)

CSS proposes major paradigm shifts in EU's chemicals regulation

Published 2020 as part of Europe's zero-emission target

Why relevant for all industries and supply chains:

- More substances will be regulated as hazardous, ignoring their benefit and the means of using them safely
- Multiple transitions at the same time i.e., climate neutrality, circularity, digitalization and toxic-free environment
- “Ripple effects” across value chains relying on chemicals

BASF supports the CSS targets. To achieve the goals, reasonable timelines and a solid implementation of the Transition Pathway for the chemical industry

The CSS Transition Pathway provides more clarity on how to achieve the EU Green Deal objectives whilst remaining competitive; it now needs to be translated into National Transition Pathways



European Chemicals Strategy for Sustainability (CSS) (2)

How we will increase the number of safe and sustainable chemicals in our portfolio by 2050

- Future chemical products must be resource efficient, circular, neutral in GHG emissions and safe for people and the environment
- With Safe and Sustainable by Design, the European Commission works on a new framework to guide innovators and developers
- BASF has a longstanding experience in safe and sustainable innovations while maintaining high performance



Identifying and assessing sustainability topics: Materiality analysis 2022

- Twelve topics are identified considering impact materiality as well as financial materiality
- Results are integrated into our sustainability tools, processes, strategies and in our corporate reporting

- Biodiversity 
- Business ethics 
- Circularity & resource efficiency 
- Climate change adaptation 
- Climate change mitigation 
- Diversity, inclusion & equal work 

- Human rights & labor rights 
- Occupational health & safety 
- Plastic waste 
- Product stewardship 
- Waste 
- Water & wastewater 

Double materiality



**Impact materiality
(impact by BASF)**

Impacts* of our activities along the value chain



**Financial materiality
(impact on BASF)**

Financial impacts* of ESG topics on our performance

* actual and potential as well as positive and negative impacts are considered



We create chemistry