Langfristige Energieversorgungskonzepte als Schlüsselelement beim Klimaschutz in der chemischen Industrie

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Our purpose:

We create chemistry for a sustainable future
The Why
Does the carbon footprint of chemicals matter?

With 6% of total contribution, the chemical industry is a large GHG emitter. In addition, chemical products impact nearly all value chains.

Over 95% of all manufactured goods rely on some form of industrial chemical process. Most industry sectors make use of chemical products, from energy generation and transportation, to information and communication technology (ICT) and construction.

Responsibility is ambition

Primary energy demand of BASF in 2021, specific GHG emissions

<table>
<thead>
<tr>
<th>Additional key indicators for energy and climate protection in BASF operations</th>
<th>2021</th>
<th>2020</th>
<th>2018 (baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific greenhouse gas emissions(^a) (metric tons of CO(_2) equivalents per metric ton of sales product(^b))</td>
<td>0.564</td>
<td>0.639</td>
<td>0.577</td>
</tr>
<tr>
<td>Primary energy demand(^c) (million MWh)</td>
<td>57.627</td>
<td>60.256</td>
<td>60.586</td>
</tr>
<tr>
<td>Energy efficiency (kilograms of sales product(^b) per MWh)</td>
<td>621</td>
<td>540</td>
<td>626</td>
</tr>
</tbody>
</table>

\(^a\) Scope 1 and Scope 2 (market-based) according to the GHG Protocol, excluding emissions from the generation of steam and electricity for sale to third parties, including offsetting.

\(^b\) Sales product volumes include sales between BASF Group companies; merchandise is not taken into account.

\(^c\) Primary energy used in BASF’s plants as well as in the plants of our energy suppliers to cover energy demand for production processes. Purchased renewable energy has a primary energy conversion efficiency rate of 100%.
Example: Product Carbon Footprints – Polypropylene from Plastics Europe

Monomer production is by far the most important contribution

PCF: 1.6 kg CO2/kg

Monomer production includes mainly oil and gas as fossil resources
Why
There is an urgent need for an efficient way to gain transparency in carbon footprints and for a level playing field

The entire industry has a responsibility in contributing to curbing climate change

Customers along the value chain ask for carbon footprint disclosures and reduction commitments

Authorities are announcing more restrictive regulations, and investors look for better sustainability disclosures

But...

How to steer the product portfolio without the required transparency on carbon footprint at product level (Product Carbon Footprint, PCF)?

How to effectively engage with partners in the value chain without a common and consistent standard in determining PCFs?

How to determine PCFs of complex portfolios at scale, without recurring to a costly ad-hoc Life-cycle Assessment consulting approach, if no commercial software solution is on the market?
The What
Responsibility is ambition

Our way to net zero 2050

- We are a **key enabler** in the net zero transformation of base chemicals and downstream value chains
- Globally, we want to reduce our absolute CO₂ emissions by 25% by 2030 compared with 2018
- This means that, **compared with 1990**, we aim to reduce our global CO₂ emissions by 60% by 2030
- We aim to achieve **net zero CO₂ emissions at BASF by 2050**
- We are a **front-runner** in offering customers a portfolio of **products with lower carbon footprints** to enable their decarbonization
High potential from changing to power-to-steam allows decoupling from electricity supply

**Current situation**

- Gas-fired power plants with $\text{CO}_2$
- Gas-fired steam boilers with $\text{CO}_2$

- Fossil-based steam generation

**Future situation**

- E-boilers
- Heat pumps
- E-drives

- Electrification of steam generation and reduction of steam consumption
To meet our high demand for renewable energy, we will focus on two pillars ensuring additionality.

BASF’s green power demand for Europe (terawatt hour per year)

- Invest in own assets
  - Building up portfolio of own assets
  - Goal: Secure long-term supply at producer economics
- 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 to one diversified portfolio, taking into account costs, flexibility and availability.
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- This means that, compared with 1990, we aim to reduce our global CO$_2$ emissions by 60% by 2030.
- We aim to achieve net zero CO$_2$ emissions at BASF by 2050.
- We are a front-runner in offering customers a portfolio of products with lower carbon footprints to enable their decarbonization.

Responsibility is ambition

The How
Our path to reduce BASF emissions from 1990 to 2050

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

CO₂ reduction in business as is 2018

CO₂ increase from growth

1990 2018

>45% 22% Grey-to-green
Power-to-steam New technologies Bio-based feedstocks Opex Temporary measures

~75% Temporal measures

2030 Business as is 2018

Growth (organic, inorganic)
Verbund site South China

2030 2050

~60% 100%
Preparations for the world's first electrically heated steam cracker furnace on track

- Goal is to scale up electrically heated steam cracker furnace concepts in cooperation with Linde and SABIC
- Startup of the pilot plant planned for 2023 subject to positive public funding decision
Strategic CO₂ Transparency Tool (SCOTT): Assessing and steering complex product portfolios from carbon emission perspective

- **20,000** Raw materials Scope 3
- **10 TWh/a** Energy Scope 2
- **700** Production plants Scope 1
- **~45,000** Product Carbon Footprints of Sales Products

We will replace secondary data with consistent primary data provided by the respective suppliers based on TfS guideline

In less than 1h calculation time
We are ready for the next level in our transformation – sustainable growth with products with reduced carbon footprints

- The market for products with reduced carbon footprints is expected to grow strongly
- BASF prepares to offer net-zero products at scale calculated with a certified digital solution and expects that the market will be short by 2030
- At BASF’s integrated sites, absolute CO₂ emissions can be reduced significantly with a limited number of measures
- The scale of our Verbund sites allows lower specific capex for CO₂ reduction
- This will translate into affordable net-zero and low-PCF products to meet increasing customer demand

BASF’s transformation provides the basis for future profitable growth
Questions? Discussion!
BASF
We create chemistry