BASF Research Press Conference on December 9, 2021

Sustainability Starts in Research

Dr. Melanie Maas-Brunner
Member of the Board of Executive Directors and Chief Technology Officer of BASF SE
We live in a time of tremendous challenges...

“...We are leaving the comfort zone of our climate system ... and moving into completely uncharted territory.”

Dirk Notz, lead author of IPCC Report 2021
...and we live in a time of groundbreaking innovations

Battery materials  Renewable energies  Quantum computing
Innovation is the key enabler for the sustainability transformation
We operate the industry-leading innovation platform

Global expenditures of \( \sim €2 \) billion for research and development, world leader in chemical industry

Approximately 10,000 employees worldwide involved in research and development

Around 950 new patents filed in 2020

8 Academic Research Alliances and 245 university cooperations

1 BASF's Academic Research Alliances, academia, industry partners, start-ups
New setup to benefit our customers and support the transformation towards sustainability

Strengthen customer proximity
Moving closer to our customers by embedding research units into operating divisions

New innovation setup

Leverage BASF’s Know-how Verbund
Bundling research capabilities into one research division with presence in all regions

Act faster on rapidly evolving market trends
Cater to differentiated customer requirements
Bundle capabilities to drive innovation
Our purpose leads the way: We create chemistry for a sustainable future

Climate protection

2050 net zero CO$_2$ emissions$^1$

Circular economy

Sustainable solutions

$^1$ Scope 1 and Scope 2; 2030 target compared with 1990: 60% CO$_2$ reduction
Methane pyrolysis – process innovation to reduce CO₂ emissions

- **Test plant** at the Ludwigshafen site in trial operation
- **Funding granted** by German Federal Ministry of Education and Research
- Key challenges are **process technology and control**
- **Methane pyrolysis** requires around **80% less electricity** than water electrolysis
Gas fermentation for carbon-neutral and circular products

Source
- Methane pyrolysis
- Water electrolysis
- Industrial off-gases
- Process emissions
- Residuals

Feedstock
- $H_2$
- $CO_2$
- CO

Fermentation platform
- Gas reception
- Compression
- Fermentation
- Recovery
- Product tank

Intermediate building blocks
- n-Octanol

Downstream value chains
- BASF products
New biodegradable chemistry – significant acceleration of development through digitalization and automation

Understanding the relationship between structure and biodegradability

Development of new tailor-made biodegradable materials

- Cosmetics
- Detergents
- Packaging
Chemical industry as enabler for the reduction of CO₂ emissions in other sectors

Greenhouse gas emissions 2019 in Germany by sector¹ million metric tons

- Main greenhouse gas emitters are the **energy** (32%) and **industry** (23%) sectors
- Sectors such as transportation and **agriculture** are also significant emitters and important customer industries for BASF
- Products from the chemical industry can make a significant contribution to help **decarbonize customer value chains**

¹ Source: German Environment Agency (Umweltbundesamt – UBA), August 2021
The transformation of the automotive industry towards electric mobility is in full swing – with significant opportunities for BASF

30% of new cars BEVs\(^1\) and PHEVs by 2030

Light-duty vehicle production volume, million units

Chemical content per car 2.5x higher (by value)\(^2\)


2 Including metals
BASF innovations enable electric mobility in various applications
Agriculture depends on innovations that protect the environment and address societal expectations.

+2 billion increase of world population by 2050

Limitations on arable land¹

50% higher productivity in farming required in 2030²

¹ World Bank: hectares per person 1994–2016: -23%
² FAO
From individual products to holistic system solutions – creating the best offer for our customers in agriculture

-30% CO$_2$ per ton of crop produced by 2030$^1$

1 In wheat, soy, rice, canola and corn
BASF’s R&D team is committed to helping our customers become more sustainable.
We create chemistry