

## Our Carbon Management

The transition towards a climate-friendly society remains a huge challenge. This is because a growing population and increasing prosperity mean there is a greater need for food, housing and mobility – and, of course, energy. In all these areas, chemical products play an essential role. They are key for enabling low-emission mobility, energy-efficient housing and low-CO<sub>2</sub> power production. To provide these in the future with less emissions, new ideas are needed. These ideas, however, must be embedded in the societal and political framework to make further development and implementation possible.

For BASF, climate protection and limiting global warming to less than 2 degrees Celsius are key priorities. Our climate action focuses on our strength: finding innovative solutions to address new challenges. We bundle our measures to help reduce the greenhouse gas (GHG) emissions of our own energy-intensive production in our Carbon Management.

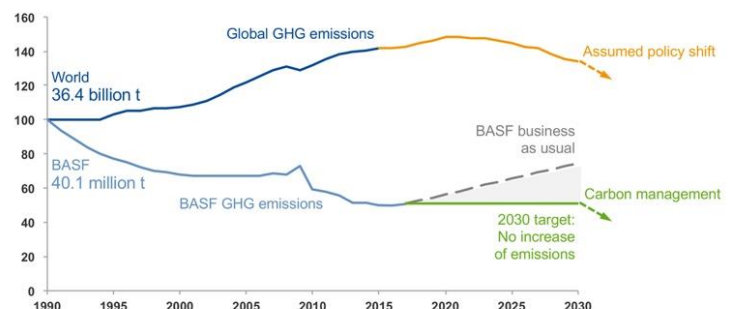
### We have achieved a lot

Since 1990, we have cut our GHG emissions by half – while more than doubling our production. We achieved this through efficiency measures as well as the use of catalysts to reduce nitrous oxide emissions. Further reduction of greenhouse gas emissions will be increasingly difficult due to the high degree of efficiency we have already reached with our processes. Nevertheless, we will exploit the remaining potential, wherever possible. We will continue to transparently report on this in our corporate carbon footprint. BASF has published a comprehensive corporate carbon footprint since 2008, the first industrial enterprise worldwide to do so.

### Our target 2030: CO<sub>2</sub>-neutral growth

We are convinced that economic success and climate protection must go hand in hand to enable the development of the innovations needed for global climate protection. We want to serve the increasing demand for chemical products – but not at the cost of the climate. We have therefore set ourselves the target of CO<sub>2</sub>-neutral growth until 2030\*, which means growth without an overall increase in GHG emissions. In order to realize further GHG savings in the chemical industry in the long term, completely new technologies will be needed, which we are already exploring.

**Absolute GHG emissions**  
Indexed (1990 = 100)



### Our Carbon Management

In 2018, we bundled all the measures that will help us reach our new climate target 2030 and enable further reductions in the long term into a global Carbon Management with the following three core elements:



Reducing the CO<sub>2</sub> emissions from our production by improving energy and process efficiency and reducing nitrous oxide emissions



Increasing the share of renewable energies in our global power supply



Developing breakthrough technologies for low-emission production in a Research & Development program

\*Our goal includes other greenhouse gases converted to CO<sub>2</sub> equivalents

## We intensely work on fundamentally new climate-friendly technologies

Within the Carbon Management Research and Development (R&D) Program, we develop technologies and processes that are capable of substantially reducing CO<sub>2</sub> emissions – and can be realized in practice. We therefore focus on the base chemicals: These are responsible for 70% of GHG emissions in the chemical industry but are an indispensable starting point for the value chain and all our innovations. Electrification and new processes could make it possible to produce base chemicals with almost zero emissions.

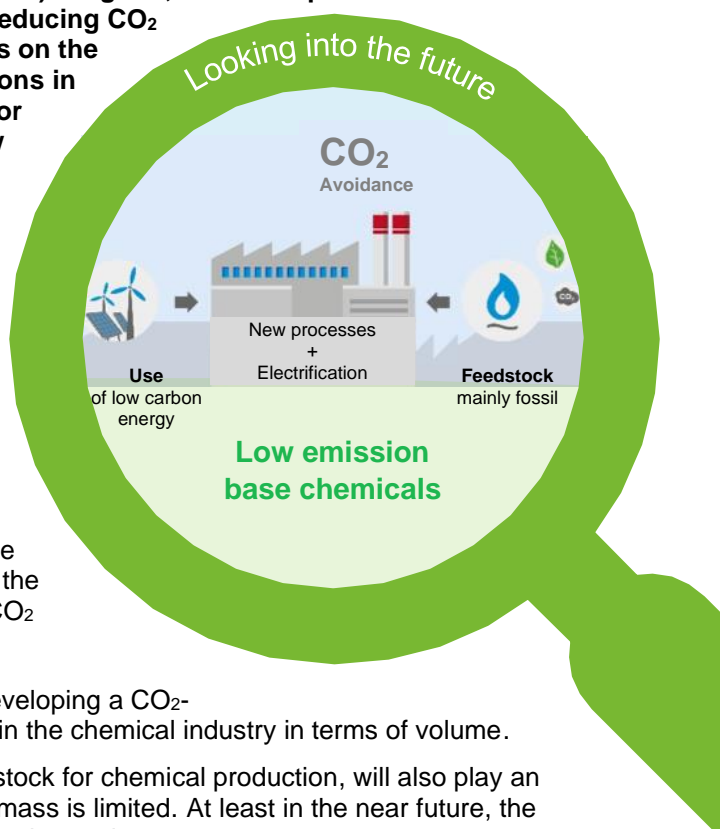
The first pilot plants will be built in the coming years. We are confident that deployment could start around 2030.

- A core element will be the production of emission-free hydrogen based on methane (from natural gas or biogas)
- The world's first electric heating concept for steam crackers is also being developed. BASF's steam crackers require a temperature of 850°C to split crude petroleum (naphtha) for further processing. If this temperature could be reached with electricity from renewable sources, instead of the natural gas currently used, it would be possible to reduce CO<sub>2</sub> emissions by up to 90%.
- On the basis of innovative catalyst systems, we are also developing a CO<sub>2</sub>-free synthesis pathway for olefins, the largest intermediate in the chemical industry in terms of volume.

Other options, such as the use of biomass, CO<sub>2</sub> or waste as a feedstock for chemical production, will also play an increasing role. However, the potential for sustainably available biomass is limited. At least in the near future, the utilization of CO<sub>2</sub> as a feedstock will be limited due to its high energy demand.

**Even the new processes envisaged in our R&D program are expected to lead to a significant increase in the demand for electricity from renewable sources – estimated to be around three times today's requirements. Besides technical feasibility, this poses the biggest challenge. Therefore, such technologies will only be competitive if renewable energy is available in sufficient volumes at fair prices and if the policy framework supports the transformation to GHG-neutral production.**

Industries such as the chemical industry, which compete in an international market and cannot pass on the additional costs associated with low-carbon technologies to their customers, require these additional costs to be compensated. This is a prerequisite for making investments in low-emission production processes sustainable in the long term. Globally comparable carbon pricing would be the best solution to achieve this. As long as there is no such pricing mechanism, policy instruments are needed to prevent the relocation of industry (carbon leakage) and to realize the transformation. In turn, a low-emission, robust chemical industry can provide the innovations that advance a climate-friendly economy and society.



### Summary

- Large potential for GHG emission reduction in the chemical industry has already been tapped. A further substantial reduction requires the development and scaling of completely new technologies.
- With our Carbon Management R&D Program, we aim to provide almost GHG emission-free basic chemicals. These are responsible for around 70% of the GHG emissions of the chemical industry.
- The high amount of energy needed for these technologies must come from renewable sources and needs to be available at competitive prices.
- Globally harmonised CO<sub>2</sub> pricing is a prerequisite for the transformation towards a climate-friendly and internationally competitive chemical industry. As long as such a mechanism does not exist, policy instruments must be designed to make low-CO<sub>2</sub> production competitive.

### Further information

on our corporate carbon footprint, our climate protection solutions and Carbon Management activities are available at:

<https://www.basf.com/global/en/who-we-are/sustainability/we-produce-safely-and-efficiently/energy-and-climate-protection.html>

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