

## Our Carbon Management

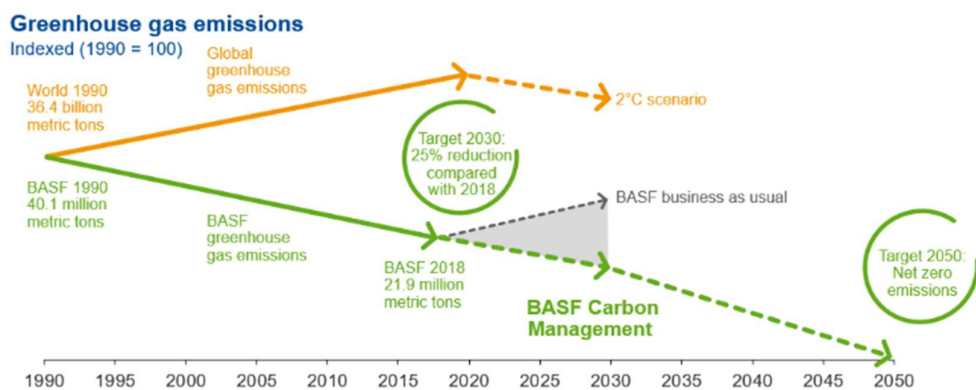
The transition towards a climate-friendly society remains a huge challenge. This is because a growing population and increasing prosperity mean there is a greater need for food, housing and mobility – and, of course, energy. In all these areas, chemical products play an essential role. They are key for 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. Therefore, in addition to improvements to existing plants, new processes and technologies are needed. We are tackling this challenge in order to achieve ambitious emission reductions. 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: Net zero CO<sub>2</sub> emissions\* by 2050

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. On our journey toward climate neutrality, we have set ourselves ambitious goals and are striving worldwide to achieve net zero CO<sub>2</sub>



emissions\* by 2050. In addition, we want to reduce our greenhouse gas emissions worldwide by 25 percent by 2030 compared with 2018 – and to achieve this despite targeted growth and the construction of a large Verbund site in South China. Excluding the effects of the planned growth, this means cutting CO<sub>2</sub> emissions in half in the current business by the end of this decade. In order to realize further GHG savings in the chemical industry in the long term, completely new technologies will be needed, which we are advancing.

\* The goal includes Scope 1 and Scope 2 emissions. Other greenhouse gases are converted into CO<sub>2</sub> equivalents according to the Greenhouse Gas Protocol.

## Our Carbon Management

The levers to reduce BASF's CO<sub>2</sub> emissions:



Continuous improvement processes for existing plants



Increasing the share of renewable energies in our global power supply



Power-to-steam



New technologies



Bio-based feedstock

## 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.

- A core element will be the production of emission-free hydrogen based on methane (from natural gas or biogas). BASF is working together with cooperation partners in a project funded by the Federal Ministry of Education and Research (BMBF) to develop methane pyrolysis technology. Methane or natural gas, which mainly consists of methane, is split directly into its components of hydrogen and solid carbon. The process uses comparatively little energy and, if it is run using electricity from renewable resources, is even CO<sub>2</sub>-free. Compared to other processes for emission-free hydrogen production, methane pyrolysis requires only around one-fifth as much electrical energy. A pilot reactor has been constructed in Ludwigshafen and is being started up.
- BASF, SABIC and Linde have signed a joint agreement to develop and demonstrate solutions for electrically heated steam cracker furnaces. 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%.

## Key to success is the availability of electricity from renewable sources at competitive prices

To be able to implement the new processes we are aiming for, we will need significantly more electricity from renewable sources. Besides technical feasibility, this poses the biggest challenge. Therefore, such processes 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.

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 will require the use of, in some cases, 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 electricity 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:  
[www.basf.com/climateprotection](http://www.basf.com/climateprotection)

### Contact

Felix Seebach  
Energy & Climate Policy  
BASF Group  
E-Mail: [felix.seebach@basf.com](mailto:felix.seebach@basf.com)