



Joint News Release

March 24, 2021

BASF, SABIC and Linde join forces to realize the world's first electrically heated steam cracker furnace

- **CO₂ emissions could be reduced by up to 90% in future large-scale applications**
- **Parties aim to jointly demonstrate innovative concepts to use renewable electricity**
- **Application for funding underway to enable implementation in demonstration plant at BASF's Ludwigshafen site**

March 24, 2021 – BASF, SABIC and Linde have signed a joint agreement to develop and demonstrate solutions for electrically heated steam cracker furnaces. The partners have already jointly worked on concepts to use renewable electricity instead of the fossil fuel gas typically used for the heating process. With this innovative approach focusing on one of the petrochemical industries' core processes, the parties strive to offer a promising solution to significantly contribute to the reduction of CO₂ emissions within the chemical industry.

Steam crackers play a central role in the production of basic chemicals and require a significant amount of energy to break down hydrocarbons into olefins and aromatics. Typically, the reaction is conducted at temperatures of about 850 degrees Celsius in their furnaces. Today these temperatures are reached by burning fossil fuels. The project aims to reduce the CO₂ emissions by powering the process with electricity. By using electricity from renewable sources, the fundamentally new technology has the potential to reduce CO₂ emissions by as much as 90%.

BASF and SABIC have combined their extensive know-how and intellectual property in developing chemical processes together with their longstanding experiences and knowledge in operating steam crackers, while Linde contributed with its intellectual property, expertise in developing and building steam cracking furnace technologies and driving future industry commercialization.

“This technology leap will be a milestone on the path to a low-emission chemical industry. We have not only developed the world’s first electrical heating concepts for steam crackers, but also want to demonstrate the reliability of key components for use in this type of high-temperature reactors. To be able to drive a timely scale-up and industrial implementation of this technology, investment support and competitive renewable energy prices will be important prerequisites,” said Dr. Martin Bruder Müller, Chairman of the Board of Executive Directors of BASF SE. The project is part of BASF’s Carbon Management R&D program with which BASF aims to significantly further reduce its CO₂ emissions beyond 2030.

Yousef Al-Benyan, Vice-Chairman and CEO of SABIC said: “Our industry thrives on innovation and collaboration which enable us to come up with and deliver important contributions to urgent global challenges like resource efficiency and CO₂ reduction. This agreement brings together the deep technical knowledge and implementation focus that can help transition energy-intensive processes within our industry to be low carbon emitting processes. This flagship sustainability initiative forms part of SABIC’s long-term vision and climate change strategy to transform our business on the path towards carbon neutrality”.

“With this project we are singling out a particular industrial CO₂ producer. Cracking furnaces are one of the largest CO₂ emission sources in the whole petrochemical value chain. This is a time-tested, optimized technology that we are now putting on a completely new footing, not in the laboratory, but on a large industrial scale. The effect this project will have is significant. We are proud to be part of it,” said Juergen Nowicki, Executive Vice President Linde plc and CEO of Linde Engineering.

The partners applied for financial grants at the EU Innovation Fund and the funding program Decarbonization in Industry (new program of the German Federal Ministry for the Environment). The parties are evaluating construction of a multi-megawatt demonstration plant at BASF’s Ludwigshafen site, targeted for start-up as early as 2023, subject to a positive funding decision.

About BASF

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. More than 110,000 employees in the BASF Group contribute to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions. BASF generated sales of €59 billion in 2020. BASF shares are traded on the stock exchange in Frankfurt (BAS) and as American Depositary Receipts (BASFY) in the U.S. Further information at www.basf.com.

About SABIC

SABIC is a global diversified chemicals company, headquartered in Riyadh, Saudi Arabia. It manufactures on a global scale in the Americas, Europe, Middle East and Asia Pacific, making distinctly different kinds of products: chemicals, commodity and high-performance plastics, agri-nutrients and metals. SABIC supports its customers by identifying and developing opportunities in key end-use applications such as construction, medical devices, packaging, agri-nutrients, electrical and electronics, transportation and clean energy. Production in 2020 was 60.8 million metric tons. The company has more than 32,000 employees worldwide and operates in around 50 countries. Fostering innovation and a spirit of ingenuity, SABIC has 9,946 global patent filings, and has significant research resources with innovation hubs in five key geographies – USA, Europe, Middle East, South Asia and North Asia. Visit www.sabic.com for more information.

About Linde

Linde is a leading global industrial gases and engineering company with 2020 sales of \$27 billion (€24 billion). We live our mission of making our world more productive every day by providing high-quality solutions, technologies and services which are making our customers more successful and helping to sustain and protect our planet. The company serves a variety of end markets including chemicals & refining, food & beverage, electronics, healthcare, manufacturing and primary metals. Linde's industrial gases are used in countless applications, from life-saving oxygen for hospitals to high-purity & specialty gases for electronics manufacturing, hydrogen for clean fuels and much more. Linde also delivers state-of-the-art gas processing solutions to support customer expansion, efficiency improvements and emissions reductions. For more information about the company and its products and services, please visit www.linde.com.

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