



Joint News Release

June 18, 2019

BASF and Lutianhua plan to pilot a new production process that significantly reduces CO₂ emissions

- **Signing of Memorandum of Understanding to build a pilot plant for a new, energy-efficient one-step process in synthesizing dimethyl ether developed by BASF and Linde**
- **Collaboration facilitated by China Petroleum and Chemical Industry Federation's Open Innovation Platform**
- **BASF is strongly committed to advancing climate protection through innovations that help customers reduce greenhouse gas emissions**

BASF and Sichuan Lutianhua Co., Ltd. (Lutianhua) today signed a Memorandum of Understanding (MoU) to co-develop a pilot production plant, that will significantly reduce carbon emissions and increase energy efficiency in producing dimethyl ether (DME) from syngas compared to the traditional process. DME is a methanol equivalent and can be used as an intermediate to produce lower olefins like ethylene and propylene. Currently, DME is produced via methanol as an intermediate from syngas.

According to the MoU, Lutianhua will invest and build the plant with a step-change technology that is developed by BASF and Linde. BASF will supply new, high-performance catalyst systems that enable one-step conversion of syngas to DME while Linde will provide its newly developed process design and engineering for direct DME synthesis. The pilot plant is planned to be built in 2020. The cooperation has been facilitated by the newly established Open Innovation

Platform of China Petroleum and Chemical Industry Federation (CPCIF).

“The Open Innovation Platform is designated to promote cooperation among industry leaders for technological breakthroughs and industrial transformation,” said Mr. Li Shousheng, Chairman, CPCIF at the signing ceremony. “The BASF-Lutianhua partnership shows a great example of how we live up to our purpose.”

As a major chemical producer in China, Lutianhua is one of the first companies to adopt advanced technologies and techniques to produce synthetic ammonia and urea with natural gas as a raw material. “We have well-established production capabilities and are always keen to apply new technologies and processes,” said Tan Guangjun, Chairman of Lutianhua. “We are excited to work with BASF in making the production of key chemicals more environmentally friendly.”

The step-change process is enabled by the new, high-performance catalyst systems developed by BASF researchers. Linde’s novel process design is providing significant energy and CO₂ emission reductions. BASF and Linde jointly developed the new direct DME synthesis technology over the past few years. “The cooperation between BASF, Linde and Lutianhua is a further example of our successful approach to collaboration with engineering companies and technology providers. We contribute our unique know-how as a world leading catalyst manufacturer, and together with our partners, drive the implementation of new processes and innovative future technologies,” said Detlef Ruff, Senior Vice President, Process Catalysts at BASF.

“Climate protection is firmly embedded in BASF’s corporate strategy. This collaboration will help our customers to reduce greenhouse gas emissions,” said Dr. Zheng Daqing, Senior Vice President, Business and Market Development Greater China, BASF. “We will continue working closely with Lutianhua on this revolutionary project for the sustainable development of China’s chemical industry.”

About Sichuan Lutianhua Co., Ltd.

The predecessor of Sichuan Lutianhua Co., Ltd. is Sichuan Luzhou Natural Gas Chemical Plant founded in 1959, which is the first enterprise in China who adopted Western technology to produce ammonia and urea with natural gas as raw material. Solely sponsored by Lutianhua Group

Incorporated with its ammonia and urea production assets as invested capital, Sichuan Lutianhua Co. Ltd. was established in 1999 under approval of Sichuan Provincial Government and was listed in Shenzhen Stock Exchange (Code: 000912) on June 3, 1999.

Sichuan Lutianhua Co., Ltd. holds controlling interest of Jiuhe Company Limited, Ningxia Hening Chemical Co., Ltd. and Sichuan Lutianhua Green Energy Methanol Corporation. It owns a state level technical center, a Post-Doctoral Research Center and a Class B chemical engineering design institute. It has a production capacity of 1,000,000 MTPA of ammonia, 1,580,000 MTPA of urea, 750,000 MTPA of methanol, 110,000 MTPA of DME, 50,000 MTPA of oleochemical products, 100,000 MTPA of concentrated nitric acid, 180,000 MTPA of dilute nitric acid, 230,000 MTPA of ammonium nitrate and nitro-compound fertilizer, and 100,000 MTPA of Diesel exhaust fluid (DEF). For further information, please visit <http://www.sclth.com>

About BASF

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 122,000 employees in the BASF Group work on contributing 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 around €63 billion in 2018. 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 The Linde Group

Linde is a leading industrial gases and engineering company with 2018 pro forma sales of USD 28 billion (EUR 24 billion). The company employs approximately 80,000 people globally and serves customers in more than 100 countries worldwide. Linde delivers innovative and sustainable solutions to its customers and creates long-term value for all stakeholders. The company is making our world more productive by providing products, technologies and services that help customers improve their economic and environmental performance in a connected world.

For more information about the company, please visit www.linde.com

Media Contacts:

BASF

Corporate Communications

Anna Han

+86 21 2039-3110

anna.han@basf.com

BASF

Global Communications Process Catalysts

Kerstin Hoffmann

+49 621 60-29875

Kerstin.Hoffmann@basf.com

Linde

Global Marketing Communications Engineering

Susan Scheidler

+49 89 7445 4727

susan.scheidler@linde.com

Sichuan Lutianhua

Technical Center

Zhu De Lin

+86 138-0828-1927

zhudelin2000@163.com