

Hydrogen from Natural Gas without CO₂ Emissions

KIT and Wintershall Dea Launch Collaboration on Climate-friendly Industrial-scale Methane Pyrolysis



Methane pyrolysis by means of a bubble column reactor allows for the climate-friendly use of fossil natural gas. (Graphics: Leon Kühner, KIT)

Methane pyrolysis will allow for the future climate-friendly use of fossil natural gas: Methane is separated into gaseous hydrogen and solid carbon that is a valuable material for various industry branches and can also be stored safely. This may be a key component of future climate-neutral energy supply. Researchers of Karlsruhe Institute of Technology (KIT) have developed a highly efficient process for this purpose. Together with the industry partner Wintershall Dea, this process will now be further developed for use on the industrial scale.

In the current energy debate, hydrogen is increasingly considered a key to the success of the energy transition. Experts of the International Energy Agency IEA calculated that admixture of 20% of hydrogen in the European gas grid could reduce CO₂ emissions by 60 million tons per year. This corresponds to about the amount emitted by Denmark in a whole year. "Direct thermal cracking of methane and other hydrocarbons is a way to produce hydrogen from natural gas without direct CO₂ emissions," explains Professor Thomas Wetzel of KIT's Institute of Thermal Process Engineering. For this purpose, his team, in cooperation with the Institute for Advanced Sustainability



KIT Energy Center: Having future in mind

Monika Landgraf
Chief Press Officer,
Head of Corp. Communications

Kaiserstraße 12
76131 Karlsruhe, Germany
Phone: +49 721 608-21105
Email: presse@kit.edu

Press contact:

Dr. Martin Heidelberger
Press Officer
Phone: +49 721 608-21169
Email: martin.heidelberger@kit.edu

Studies e.V. in Potsdam, developed a process for the continuous decomposition of methane in a bubble column reactor filled with liquid metal to produce hydrogen and solid carbon. As a pure solid, carbon can be stored safely and be used in many industrial sectors. Hydrogen is a clean source of energy and can be used for the production of electricity and heat and in the mobility sector or in industrial processes, such as for the production of steel.

Research Collaboration with Wintershall Dea

In a joint project scheduled initially to run for three years, KIT and its industry partner Wintershall Dea plan to lay the foundations for future industrial use of methane pyrolysis within the next three years. “There are huge quantities of natural gas worldwide and it can be used in a climate-neutral way. We now want to study how this can be achieved efficiently and use the results for processing large quantities of gas later on,” Wetzel says. “We are looking forward to this collaboration and are confident that we can make a major contribution to sustainable energy supply in the future.” Hugo Dijkgraaf, Member of the Board and Chief Technology Officer of Wintershall Dea, says: “The perspectives we are creating as part of our cooperation with KIT show that natural gas is fit for the future. Natural gas already is the cleanest conventional source of energy. Yet, it can become even more climate-friendly in the future, if we separate the CO₂ and use the natural gas to produce hydrogen.”

Prize-winning Methane Pyrolysis Research

In 2018, research of KIT and the Institute for Advanced Sustainability Studies e.V. relating to methane pyrolysis was granted the Innovation Award by the German Gas Industry and additionally won the audience award of the ERDGAS 2018 Zukunftswerkstatt, an event staged by the Zukunft ERDGAS industry initiative. “Cutting-edge gas technologies are given a stage at the Zukunftswerkstatt and the Innovation Award competition of the German Gas Industry,” says Dr. Timm Kehler, Chairman of the Zukunft ERDGAS industry initiative. He greatly welcomes the launch of a joint project by KIT and Wintershall Dea to put decarbonized natural gas on the market. “We need green gas and such forward-looking partnerships in order to swiftly overcome the challenges of climate change,” Kehler says. Zukunft ERDGAS also sponsors the Innovation Award along with other industry associations. Both events are supported by Wintershall Dea.

About Wintershall Dea

With the merger of Wintershall Holding GmbH and DEA Deutsche Erdöl AG, two successful companies with a long tradition have formed Europe's leading independent natural gas and oil company: Wintershall Dea. The company with German roots and headquarters in Kassel and Hamburg explores for and produces gas and oil in 13 countries worldwide in an efficient and responsible manner. With activities in Europe, Russia, Latin America, and the MENA region (Middle East & North Africa), Wintershall Dea has a global upstream portfolio and, with its participation in natural gas transport, is also active in the midstream business.

Wintershall Dea stands for more than 120 years of experience as an operator and project partner along the entire E&P value chain. The company employs around 4000 people worldwide from over 60 nations. The company plans to increase its average daily production from about 590,000 barrels of oil equivalent in 2018 to about 750,000 barrels by 2023.

For more information, click <https://wintershalldea.com/en>

More about the KIT Energy Center: <http://www.energy.kit.edu>

Being “The Research University in the Helmholtz Association,” KIT creates and imparts knowledge for the society and the environment. It is the objective to make significant contributions to the global challenges in the fields of energy, mobility and information. For this, about 9,300 employees cooperate in a broad range of disciplines in natural sciences, engineering sciences, economics, and the humanities and social sciences. KIT prepares its 25,100 students for responsible tasks in society, industry, and science by offering research-based study programs. Innovation efforts at KIT build a bridge between important scientific findings and their application for the benefit of society, economic prosperity, and the preservation of our natural basis of life.

This press release is available on the internet at http://www.sek.kit.edu/english/press_office.php.

The photo in the best quality available to us may be downloaded under www.kit.edu or requested by mail to presse@kit.edu or phone +49 721 608-21105. The photo may be used in the context given above exclusively.

This year's **anniversary logo** recalls the milestones reached by KIT and its long tradition in research, teaching, and innovation. On October 1, 2009, KIT was established by the merger of its two predecessor institutions: the Polytechnic School and later University of Karlsruhe was founded in 1825, the Nuclear Reactor Construction and Operation Company and later Karlsruhe Research Center in 1956.