

Pressemeldung 28.09.2023

Climate Technology "Methan-Elektrolyse": Austria's First Demonstration Plant for Utilizing Natural Gas Without CO₂ Emissions for the Production of Hydrogen and Solid Carbon Goes into Operation in Kremsmünster

- Test operation of the innovative climate technology "Methan-Elektrolyse" for an environmentally friendly, crisis-proof raw material supply without CO₂ emissions in Upper Austria.
- Production of hydrogen and solid carbon for industry and agriculture.
- Storable hydrogen: Summer sun for winter warmth – electricity generation in winter and use as a raw material in industry.
- Highly pure carbon: Starting material for soil improvement in agriculture and valuable raw material for various industries.
- Efficient use of renewable energy to make solar and wind production supply-secure and storable.
- Implementation of the climate technology in Upper Austria.

In the model region for 100% green energy supply, the RAG Energy Valley in Krift near Kremsmünster (Upper Austria), the first Methan-Elektrolyse plant in Austria is being commissioned in an industrial setting. With this forward-looking climate technology, the raw material methane (natural gas) will be broken down into hydrogen and highly pure, solid carbon using solar power, without CO₂ emissions. This environmentally friendly energy and raw material innovation provides not only storable and climate-neutral hydrogen but also the currently scarce raw material "Solid Carbon" for agriculture and various industrial applications.

"Climate protection is one of the central tasks of our generation. Our goals are ambitious: By 2030, 100% renewable electricity in and from Austria and by 2040 climate neutrality in Austria – ten years ahead of the EU. To achieve these climate goals, we need investments, innovation, and collaboration. We must not focus on just a few technologies but must remain open to technology. The RAG, with Austria's first demonstration plant that uses natural gas without CO₂ emissions for the production of hydrogen and solid, elemental carbon, is precisely focusing on this technological openness, which is so urgently needed. Hydrogen makes a significant contribution to year-round supply security – at the same time, the high-quality carbon obtained is a valuable raw material for agriculture, batteries, computer chips, and carbon fibers. A win-win situation for the climate and location!" says Mining Minister Magnus Brunner.

In the RAG Energy Valley in Krift near Kremsmünster, they demonstrate how regions and urban centers can be supplied with green energy all year round. The climate technology "Methan-Elektrolyse" is another central element and a milestone for the energy transition. The natural gas from their domestic production is broken down CO₂-neutrally into solid carbon, important for agriculture and industry, and storable, environmentally friendly hydrogen using solar power produced locally. This is emphasized by Markus Mitteregger, CEO of RAG Austria AG. One significant advantage over alternative production paths for renewable hydrogen is the considerably lower energy expenditure.

This innovative climate technology was developed by Graforce GmbH from Berlin and is being implemented and optimized on an industrial scale for the first time in Austria by RAG

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Austria AG. "Hydrogen is the key to a CO₂-neutral economy. Our modular plants enable the production of CO₂-free hydrogen with high efficiency and lower infrastructure costs. The technology we developed closes essential material cycles, allows central industries to achieve more sustainability and climate protection, and is also economical. We are seeing great international interest in this technology and are pleased about the joint flagship project with RAG Austria," explains Jens Hanke, founder and managing director of Graforce GmbH.

The produced hydrogen can subsequently be stored seasonally in RAG energy storage systems such as the "Underground Sun Storage" in Pilsbach and Gampern or used as industrial hydrogen. In the RAG H₂ combined heat and power plant (CHP) Krift near Kremsmünster, Austria's first 100% hydrogen power plant, this climate-neutral hydrogen is used for the site's electricity and heat supply. In the coming winters, the energy surpluses can also be used to supply up to 800 households with green district heating and green electricity in the Kremsmünster region.

Wonder Material – Solid Carbon Initial results on the agricultural application of carbon are available: Due to intensive agricultural use in recent decades, up to 50% of the carbon in the soils has been lost due to erosion or humus loss. Climate change adds further challenges, e.g., long drought periods. The use of carbon from "Methan-Elektrolyse" offers great potential to improve soil quality and thus secure agricultural production sustainably. Otherwise, massive crop failures and thus a threat to food security are imminent in the coming decades. Their results from several greenhouse and field trials show that carbon improves plant nutrient availability and the drought stress resistance of plants. By adding nutrient-rich residues (e.g., compost or manure), a valuable fertilizer can also be generated. In the next series of experiments, the effect on different soil types and other crops will be expanded, taking into account current and expected climate changes. Due to these promising research results, RAG and RWA (Raiffeisen Ware Austria) now intend to intensify their existing cooperation, especially in product development.

"Given the current and upcoming challenges from global change and global warming, the carbon from "Methan-Elektrolyse" can make a significant contribution to securing soil quality and agricultural production," emphasizes Markus Puschenreiter, University of Natural Resources and Life Sciences, Vienna.

Furthermore, "Solid Carbon" as solid carbon is a valuable raw material for the sustainable production of building structures, batteries, computer chips, carbon fibers, and the production of carbon-based materials. They are used in numerous industries such as medical technology, aerospace, sports and leisure, or high-tech industry.

Currently, about 120 scientists from the Montanuniversität Leoben are researching this core research area. Since 2022, the numerous activities at 25 chairs have been centrally coordinated in the Strategic Core Research Area "Hydrogen and Carbon".

"The solid carbon produced during methane splitting also opens up a wide range of new applications and research fields, especially for sustainable agriculture and forestry," says Peter Moser, designated Rector of Montanuniversität Leoben, enthusiastic about the ongoing development in this area. "The close cooperation with external partners such as RAG and

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BOKU enables a bundling of individual specialist competencies and thus forms the basis for targeted and, above all, application-oriented research."

"Especially for Upper Austria as the number 1 economic and industrial federal state, hydrogen is a crucial key factor to align the location even more future-proof. It is all the more gratifying that RAG is setting another milestone in the direction of a CO₂-neutral economy with the CO₂-free production of hydrogen in our "Energy Valley" in Krift near Kremsmünster. After the Underground Sun Storage in Rubensdorf/Gampern and the hydrogen combined heat and power plant also in Krift near Kremsmünster, RAG is now starting Austria's first demonstration plant, in which hydrogen and solid carbon are produced from natural gas using methane electrolysis, without any CO₂ emissions. This demonstration plant is an essential building block for the transformation of the energy system towards renewable sources. Our federal state is actively driving this change with the Upper Austrian hydrogen offensive 2030 in the fields of transformation of energy-intensive industry, materials technology, and seasonal energy storage. Our own Upper Austrian hydrogen research center in Wels will start in November, into which we, as the state of Upper Austria, will invest in the first step."