Smart production process for natural gas from CO2 and hydrogen ready for market

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An innovative process for storing electricity generated from renewable energy sources is now market ready, a fourth patent application having been filed. The process, which was developed by Austrian company Krajete GmbH and is based on microorganisms, enables a highly efficient and environmentally friendly conversion of climate-damaging CO2 and hydrogen into - storable - methane. The innovative method makes use of a natural metabolic process in microorganisms known as "archaea" to generate pure methane the main constituent of natural gas. In addition to power storage, the clean solution developed by this leading Austrian innovator also provides resource-conserving options for the production of biofuels and the low-cost purification of biogas and waste gas.

It has been in the pipeline for four billion and four years and it is now finally available: an industrially viable process for the direct conversion of CO2 and water into methane of high purity. The first four billion years were taken up with the development of the natural process by archaea - microorganisms belonging to the oldest living species on earth. Over the past four years, the Austrian company Krajete GmbH worked on making this environmentally sound process usable for large-scale industrial purposes. The company succeeded. Following a fourth patent application, the entire process has been optimized and is now ready for licensing.

The demand for this highly efficient process for the manufacture of ultra-pure methane is considerable for numerous applications, as Dr.

Alexander Krajete, CEO of Krajete GmbH, explains: "In addition to its use for the storage of excess renewable energy from solar, wind and hydropower plants within the the so called "power to gas" frame, our process is also suitable for two other industrial applications: the purification of raw biogas to produce pure natural gas and the production of 5th generation biofuels." Compared to current methods of making biofuels from (food) crops, this technology has the major advantage of not competing for arable land.

The conversion of CO2 (and hydrogen) into natural gas takes place in a bioreactor - a highly controlled system in which special strains of microorganisms known as "archaea" live.

Dr. Krajete explains: "This tantalizingly attractive process for the energy sector proved very difficult to "tame" i.e. is to adapt for concrete use. That is precisely what we managed to do. Thanks to our exclusive expertise in process control, we can find an economically optimized turnover for every application." The company succeeded in perfecting the methane production under controlled conditions in the bioreactor - its characteristics being a high level of resource efficiency and high turnover rates as well as robustness and the capacity to cope with rapidly changing conditions.

Its remarkable capacity for adaptation is what renders the process ideal for the storage of excess electricity from renewable energy sources, meaning the electricity produced under favorable conditions such as high sun intensity or wind speed. If this electricity cannot be fed into the network, it is lost. The fact that excess electricity arises unexpectedly and irregularly poses a great difficulty for all systems designed for its storage, and requires the rapid switchover from an idle state to full-scale production mode. The process developed by Krajete GmbH fulfills this requirement perfectly. In addition, the storage itself requires hardly any energy. Once converted, the methane can be stored passively until it is

needed - an important criterion that distinguishes Krajete s solution from other storage processes.

In summary, Krajete GmbH is the first company in the world to have succeeded in developing this promising process for industrial use. Having filed a total of four patents, the company is now in a position to license the entire process to customers from the energy sector, the chemical industry and the mechanical engineering sector.

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