Microbial power storage shows it can do the job: Microorganisms turn surplus power into natural gas within seconds

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New results have proven that certain microorganisms are capable of producing natural gas under industrial conditions. The method, based on microorganisms known as Archaea, converts climate-damaging CO2 and hydrogen into storable methane (natural gas). A recently completed pilot study has impressively demonstrated how quickly microorganisms can respond to sudden peaks in power generation and produce high quality natural gas to be fed into the grid.

Large-scale power storage is a major challenge. Considering rising power generation from renewable sources, there is an increasingly urgent need for a practical, commercial solution. While oil and gas can be converted into electricity in line with demand, wind, water and sun cannot be adapted as readily to fluctuations in power consumption. Efficient power storage solutions must satisfy two essential criteria: Their own consumption of resources must be as low as possible, and surplus power must be stored within seconds. The results of a pilot study at the Vienna University of Technology have now demonstrated that a microorganism-based process developed by Krajete GmbH is unequalled in the way it satisfies both of these criteria.

Primevally efficient

The process benefits from life characteristics of microorganisms known as Archaea, which have inhabited Earth's extreme environments since

the origin of life. These single-celled organisms are capable of converting CO2 and hydrogen into methane, i.e. natural gas. Commercial use of this ability has long been thwarted by the harsh living conditions under which the microorganisms feel truly at home.

Some time ago, Krajete GmbH managed to establish the process in a bioreactor under user-friendly conditions, as Dr. Alexander Krajete, CEO of Krajete GmbH, explains: "Our know-how makes it possible to run the process at moderate temperatures of around 40-60 degrees Celsius and at atmospheric pressure. Extreme heat or elevated pressure that prevails in the natural habitat of the Archaea is no longer necessary. This saves resources and satisfies an essential criterion for efficient power storage." Moreover, Archaea only need CO2 and hydrogen to produce natural gas. Production takes place with a surprisingly short response time once these nutrients have been supplied, thereby satisfying the second criterion for efficient power storage.

Micro(bial) response time

A pilot study, which Krajete GmbH conducted at the Vienna University of Technology, has now shown how short this response time actually is. The study has impressively demonstrated that Krajete's process can be ramped up to full load and even shut down again within one minute. The system can deliver this performance repeatedly and stable over a period of months. As a result, sudden peaks in power generation can be immediately captured and stored in the form of natural gas. The hydrogen required can be quickly and efficiently produced simply by electrolyzing water. As Dr. Krajete points out: "Our patented process is tailor-made for storing intermittent surplus power. In the waiting time between power peaks, it does not consume any power and, on arrival of surplus power, gas production begins within seconds, and natural gas ready to be fed into the grid is available after one minute. The system comes very close to the ideal situation of immediate power storage in the

form of natural gas."

However, Krajete's process is not "only" suitable for intermittent power storage in a "power to gas" system - it can also directly enrich biogas and waste gas into natural gas. In fact, the process can convert gasoline and diesel combustion gases, syngas-type gases from the steel making industry or transform incineration and crude biogas into natural gas with a purity of > 95 volume percent methane. Intermittent power storage with ultra-short response times and direct utilization of genuine industrial CO2 gases impressively demonstrate the efficiency and versatility of natural processes which, thanks to the work by Krajete GmbH, are ideally suited for a sustainable energy concept.

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