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Efficiency and Economic Viability of Energy Storage: CYTOK Achieves Top Performance

Two of the greatest challenges of the energy transition are the efficient and economically viable storage of surplus energy from wind and photovoltaic systems and its demand-oriented supply. CYTOK, a system provider based in Rostock (Germany), achieves top performance in both categories with its systems.

Batteries quickly reach their capacity limits when storing large amounts of electricity, while the widespread ramp-up of hydrogen production as a storage medium for green electricity will still take several years. This is where the patented Power-to-Gas technology of CYTOK GmbH bridges the gap: it combines the emission-free and sustainable advantages of green hydrogen with the use of proven natural gas technology and infrastructure.

Patented: The Emission-Free CO₂ Cycle

First, hydrogen is produced using surplus electricity. This hydrogen is then converted directly, without intermediate storage, into methane - i.e. synthetic natural gas - together with CO₂ in the so-called Sabatier process.

“The CO₂ required for the production of green methane comes from the company’s own combustion of methane in conventional gas burners or combined heat and power plants. With our technology, it is not released into the atmosphere, but instead returned and reused 100 percent,” explains Klaus Schirmer, one of the company’s two managing directors.

Even the oxygen generated during water electrolysis (water is split into hydrogen and oxygen) is utilized. In the modified OxyFuel process, this oxygen is used instead of ambient air during combustion, resulting in pure CO₂ and eliminating the need for complex flue gas cleaning. In addition, neither nitrogen oxides nor fine particulate matter are produced, as these only occur during combustion with air.

High Overall Efficiency of the Energy Used

CYTOK consistently increases the efficiency and therefore the economic viability of the technology. Through intelligent system control, including weather forecasts, 100 percent of the self-generated green electricity is optimally distributed and utilized on site, meaning that no surplus energy has to be fed into the public grid. Together with the consistent use of waste heat from electrolysis and methanation, the systems already achieve an efficiency rate of more than 85 percent of the energy used in the form of electricity, heat or cooling.

“The use and storage of self-generated green electricity must become more efficient. This also applies in particular to resources that are currently ‘wasted’ through curtailment or free export to neighboring countries. More decentralized systems, including smaller-scale plants, can make a massive contribution across the board,” says Klaus Schirmer.

CYTOK Technology Has Proven Itself

CYTOK’s Power-to-Gas systems are not a vision of the future, but have already demonstrated their efficiency and reliability in customer operation for several years. Since 2020, the reference plant at the Bernsteinsee holiday and leisure resort in the district of Gifhorn has been supplying hotels and adjacent buildings with green, self-generated energy.

The technology can be integrated not only into new construction projects, but also into existing buildings. Klaus Schirmer: “We provide economically viable solutions for emission-free, decentralized energy supply with the same level of supply security as a natural gas grid connection. In the coming years, further properties will be equipped with our innovative technology.”

Images and Captions:



Image 1: Overview of the CYTOK Power-to-Gas technology

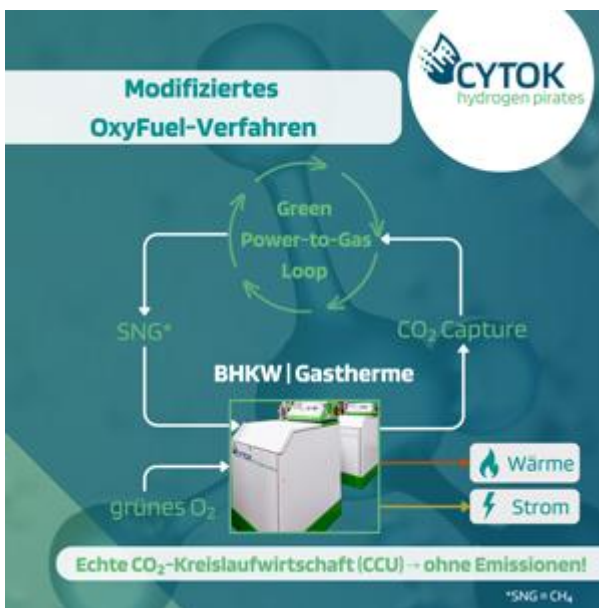


Image 2: CYTOK’s modified OxyFuel process with the CO₂ cycle enables fully emission-free and economically viable SNG production



Image 3: CYTOK's reference plant at the Bernsteinsee holiday and leisure resort (Lower Saxony) with electrolyzer and methanation unit



Image 4: The founders and managing directors of CYTOK: Martin Weiss (left) and Klaus Schirmer (right)

The images are available for download at:

<https://login.yoursecurecloud.de/d/5b741d6baf534387a7ba/>

CYTOK - hydrogen pirates: We capture hydrogen and make it count!

CYTOK GmbH, headquartered in Rostock, is a system provider for emission-free Power-to-Gas plants. Also known as the “hydrogen pirates,” the company offers patented technology solutions for the building and industrial sectors with a focus on emission avoidance, economic viability and independence. Founded in 2023, CYTOK is on a healthy growth and expansion path thanks to the increasing demand for decentralized systems. In July 2025, the company entered the Japanese market through an exclusive licensing agreement with GPSS Engineering Inc. and simultaneously initiated the development of additional markets across Asia. Further information is available at www.cytok.de/en