JENBACHER
INNIO

FLAGSHIP HYDROGEN PROJECT

using Jenbacher technology

»The hydrogen-fueled combined heat and power plant that we co-developed in Hamburg with INNIO is not only an important step towards a decentralized energy supply in our region but also a flagship project for the future success of the energy transition.«

Thomas Baade, technical director at HanseWerk Natur

Background

The federal states of Hamburg and Schleswig-Holstein hope to make northern Germany a national hydrogen (H_2) technology hub. Given its plentiful supply of wind energy, for which H_2 is a promising storage option, the location is perfect. With this in mind, the city of Hamburg is intent on supplying all interested parties in the electricity, heat, and transportation sectors almost exclusively with green hydrogen by 2035. One of the key players in meeting this goal is the HanseWerk Group, whose grids provide over 3 million customers in northern Germany with electricity, gas, and heat. Its subsidiary, HanseWerk Natur, manages more than 850 energy conversion plants with a total capacity of around 800 MW, generating over 1,100 GW hours of heat per year using pipeline gas or biogas. With the aim of climate neutrality by 2030, the heating grid operator is increasing the proportion of biogas and biomethane in its operations as well as continuously expanding its use of waste heat. Because HanseWerk Natur rates green hydrogen as a key technology for the energy transition, it has been working on various H_2 projects for some years now.

Solution

The joint flagship project by HanseWerk Natur and INNIO is the first combined heat and power (CHP) plant in the 1 MW range converted in the field and capable of operating either with 100% natural gas or with variable hydrogen-natural gas mixtures up to 100% H_2. In this flagship project, INNIO and HanseWerk Natur are pooling their valuable expertise in operating CHP systems as efficiently as possible using H_2 or natural gas-hydrogen mixtures. After the first series of tests, a second series during commissioning confirmed a significant improvement in the plant's performance and efficiency when running on H_2.

The Jenbacher pilot plant in the center of Hamburg provides 30 residential buildings, a sports center, a daycare center, and the Othmarschen Park leisure complex with a reliable supply of local heating that equates to 13,000 MW hours every year. The electricity generated is fed to electric vehicle charging points in Othmarschen's multi-level parking garage as well as to the local grid.

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Results

Green hydrogen is a key to boosting the proportion of renewables in the power and heat sector. By linking wind or solar farms to large electrolyzers, the excess energy generated during peak production periods can either be stored or fed into the natural gas network in the form of H_2.

The innovative Jenbacher CHP facility in Hamburg's Othmarschen district proves INNIO and HanseWerk Natur right: Pure hydrogen operation on an industrial scale is no longer just blue-sky thinking, but sets the course for greener and more reliable, flexible, and forward-looking power systems.

As of 2022, all Jenbacher units in the 50 Hz range are available with a "Ready for H_2" option. This means that they can run on admixtures of up to 20% (vol.) hydrogen in pipeline gas and can easily be converted to 100% H_2 operation. INNIO anticipates that from 2025 onward, its entire Jenbacher product portfolio will be capable of operating with 100% H_2.

Customer benefits

Benefits of INNIO's Jenbacher H_2 CHP system:

- Climate neutral
- High efficiency at around 93%
- Highly flexible operation
- Reliable decentralized energy supply at the point of use
- Complementary to seasonal wind and solar power
- Low emissions

Key technical data

	Pipeline gas (2019 design)	20% (vol.) H_2 admixing (after conversion)	100% H_2 operation (after conversion)
Electrical output	999 kW	999 kW	>600 kW
Electrical efficiency	42%	~42%	~40%
Total efficiency	93.5%	~93.5%	~93%
CO_2 emissions	216 g/kWh$_{el}$	201 g/kWh$_{el}$ (-7%)	0 g/kWh$_{el}$ (-100%)

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INNIO is a leading energy solution and service provider that empowers industries and communities to make sustainable energy work today. With our product brands Jenbacher and Waukesha and our digital platform myPlant, INNIO offers innovative solutions for the power generation and compression segments that help industries and communities generate and manage energy sustainably while navigating the fast-changing landscape of traditional and green energy sources. We are individual in scope, but global in scale. With our flexible, scalable, and resilient energy solutions and services, we are enabling our customers to manage the energy transition along the energy value chain wherever they are in their transition journey.

INNIO is headquartered in Jenbach (Austria), with other primary operations in Waukesha (Wisconsin, U.S.) and Welland (Ontario, Canada). A team of more than 3,500 experts provides life-cycle support to the more than 54,000 delivered engines globally through a service network in more than 80 countries.

INNIO's ESG Risk Rating places it number one of more than 500 worldwide companies in the machinery industry assessed by Sustainalytics.

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