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INNOVATIVE PLANT OPERATION

Thinking beyond iCHP

Background

SWS Energie, a subsidiary of Stadtwerke Stralsund, supplies the Hanseatic city and the surrounding area in Mecklenburg-Vorpommern with electricity, gas, heat, and cooling. In addition to providing a reliable and high-quality supply for its customers, the regional energy provider places particular value on resource-efficient energy generation.

Through January 2022, the company already was generating more than 60% of its heat with combined heat and power (CHP) plants. Three CHP plants with a total electrical output of 6.5 MW were in operation at the energy center at the Prohner Straße site in Stralsund. When the CHP feed-in tariff expired, SWS opted to replace the plants with two new, higher-output Jenbacher CHP plants. They were put into operation at the start of 2023.

Solution

Upgrading the plants in Stralsund has boosted total thermal output from 6.5 MW to 11.6 MW and total electrical output from 6 MW to 9 MW. Thanks to this increased capacity, the plant's full utilization period now is reduced to between 3,500 and 5,300 hours per year instead of the previous 7,700. Additionally, total heat production is up by 27% to 61 GWh with annual power generation of 48 GWh. The plant now operates cost-effectively and flexibly, even without the CHP subsidy.

The special feature of this system is the unconventional integration of the two Jenbacher CHP plants with two ammonia heat pumps, each with an output of 1,055 kW. It also incorporates three condensing exhaust-gas heat exchangers, four heat storage units, and a 6.5 MW power-to-heat system. Due to the sophisticated engineering of the overall concept behind this more efficient and economical solution, the unavoidable waste heat—which usually is lost in comparable CHP systems due to the low temperatures—can be extracted and used at several points. The large heat pumps make it possible to use both the calorific value and the generator heat, which are now available as sustainable heat for the district heating network.

»With our new energy center in Stralsund, we and the INNIO Group are providing a boost to the energy transition. Our blue-sky thinking goes beyond the existing legal requirements for iCHPs, and we see our innovative CHP system as food for thought for legislators going forward.«

Ralf Bernhardt, Managing Director SWS Energie

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Results

Despite the technically efficient combination of CHP and heat pumps, the new energy center in Stralsund does not qualify as an innovative CHP (iCHP) system, as promoted and subsidized by the Combined Heat and Power Act since 2018. However, as the first plant with several technical innovations, it provides ideas about how the existing legislation could be improved.

In the currently subsidized iCHP systems, heat pumps supply the required renewable heat share of at least 30% (river water, ambient air, etc.) separately from the CHP plant. To achieve this, the atmosphere first is heated unnecessarily with the available waste heat before a less efficient heat pump provides the regenerative share of thermal energy. The new energy center in Stralsund, on the other hand, uses the unavoidable waste heat from the CHP system directly via a water/water heat pump. This novel, efficient, and sustainable approach is not subsidized under the Combined Heat and Power Act.

In addition, the CHP plant switches off as soon as excess renewable energy is available and the power-to-heat system takes over the provision of sustainable heat for the district heating network. Therefore, Stadtwerke Stralsund's new energy center is making another important contribution to the energy transition.

This innovative approach so strongly impressed a jury comprising members of the Bundesverband Kraft-Wärme-Kopplung e.V. (B.KWK, German Combined Heat and Power Association) in collaboration with Energie & Management (E&M) magazine that the project was named CHP plant of the year in 2023.

Key technical data for the Stralsund CHP plant

Installed engines	2 x J624
Electrical output	9 MW
Thermal output	9.5 MW (CHP plant) 2.1 MW (heat pump)
Total efficiency[1]	103.7%
Energy source	Pipeline gas
Year of commissioning	2023

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[1] Corresponds to net total efficiency (Hi). The heat pumps' own electrical consumption has been deducted. The heat pumps use the condensation energy of the engine exhaust.

Customer benefits

- Significantly more directly usable waste heat thanks to the innovative and intelligent integration of various technologies such as large heat pumps in combination with CHP technology
- Reduced total usage time due to increased capacity for higher energy production in flexible operation
- Higher overall plant efficiency
- New thought-provoking concept for the improvement of current funding conditions for iCHP plants
- Recognized as CHP plant of the year 2023 by the B.KWK and Energie & Management (E&M) magazine

About INNIO Group

INNIO Group is a leading energy solution and service provider that empowers industries and communities to make sustainable energy work today. With its product brands Jenbacher and Waukesha and its 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. INNIO is individual in scope, but global in scale. With its flexible, scalable, and resilient energy solutions and services, INNIO enables its 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 4,000 experts provides life-cycle support to INNIO's more than 55,000 delivered engines globally through a service network in more than 100 countries.

In March 2023, INNIO's ESG rating ranked first out of more than 500 companies worldwide in the machinery industry assessed by Sustainalytics.

For more information, visit the INNIO website at **www.innio.com.**

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