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DELIVERING LOW-CARBON POWER AT UK GREENHOUSE

CHP energy center with an innovative heat pump system delivers power and heat with 30% less CO_2 than conventionally heated greenhouses

Background

AGR is a leading renewable energy company specializing in low-carbon energy generation. A recent example of the company's environmentally responsible innovation is the new 217,000-square-meter Fenland Glasshouse and energy center in Cambridgeshire, UK. The completion of the energy center that delivers electricity and heat to the greenhouse was facilitated by INNIO's distributor Clarke Energy, a global business specializing in the engineering, installation, procurement, and supply of distributed power plant solutions, including maintenance and local service support.

The greenhouse facility is used to grow cucumbers, with the expectation of eventually supplying about 10% of the cucumbers consumed in the United Kingdom.

A low-carbon energy solution

The energy center for the greenhouse includes a combined heat and power (CHP) plant comprising three high-efficiency Jenbacher engines that deliver electricity, while an exhaust cooling system delivers recovered CO_2 to help the plants grow. Additionally, an innovative 33 MWth heat pump system provides renewable hot water for the facility.

INNIO's energy solutions allow for highly flexible integration into innovative CHP systems. The Jenbacher engines' cooling water circuits offer an ideal match to heat pump systems. And when they are connected to thermal heat storage systems, the overall system efficiency is optimized independently from the operation of the engines during peak electricity periods.

The engines not only provide reliable power, heat, and CO_2 to the greenhouse, but their ability to run in complete island mode with black start capability means that they also deliver resiliency during grid failures or shortages. This energy reliability and resiliency allow AGR to concentrate on its core operations.

Jenbacher systems can be powered by numerous low-carbon or renewable energy sources—including pipeline gas, biogas, biomethane, and up to 100% hydrogen. And INNIO's Jenbacher CHP plants can be adapted easily as changes in gas network supply occur, meaning investments made today are future-proof for tomorrow.

»AGR are proud to have worked in partnership with Clarke Energy and INNIO in the delivery of the 20ha Fenland Glasshouse, the heat supply for which is based on one of the largest water source heat pump arrays in the UK. Sustainable large scale glasshouse developments such as this are vital in an era where energy and food security are under so much pressure.«

Konrad Aspinall,
Director and Co-Owner, AGR Group

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Result

The CHP plant consists of Jenbacher J416, J620, and J624 engines delivering an electrical output of 9 MW, which is used to power the greenhouse, the LED grow lights, and various site auxiliaries. Electrical energy surpluses are fed into the local grid.

The Jenbacher engines generate a thermal output of 11.2 MW, which is used for hot water and stored on site in one 6,000-cubic-meter thermal storage unit, which is used to heat the facility at night and in the winter. Additionally, the engines' CO_2 emissions, which are significantly reduced via a highly efficient SCR exhaust gas cleaning system, are recovered from the exhaust gases and can be transferred to the greenhouse to help accelerate the produces' growth and maximize the harvest.

The energy center does all this while also fulfilling AGR's low-carbon mission by emitting 30% less CO_2 than conventionally heated greenhouses.

Key technical data

Installed engines	1 x J416, 1 x J620, 1 x J624
Electrical output	9 MW
Thermal output	11.2 MW
Total efficiency	101.76%*
Energy source	Pipeline gas
Year of commissioning	2022

* Highest efficiency ratings possible due to exhaust gas utilization below dew point

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Customer benefits

Jenbacher engines offer numerous advantages in a greenhouse environment:

- Reduced operating costs and increased efficiency with a combined heat and power system
- Ready-to-use, dedicated turn-key greenhouse solutions
- Proven high availability and reliable performance operating on fuels from pipeline gas to hydrogen
- Added revenue potential by supplying excess power to the public utility grid
- Site resiliency during grid fluctuations and failures
- Potential to capture engine exhaust CO_2 and use it as high-quality plant fertilizer
- Ability to store heat for a time-independent supply
- Exceptional service team with fast response for spare parts and repairs as needed

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.

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

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