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RENEWABLE STORAGE POWER PLANT

A contribution to the energy transition in Germany

Background

Biohof Querdel, an organic farm in the Münsterland region of Germany (in the federal state of North Rhine-Westphalia), has been farming vegetables and fruit organically since 2005. The farm, which previously practiced conventional farming, also has been a member of Bioland, an organic farming association, since 2016. As a result, it is subject to strict quality requirements, not only for its food production, but also for its energy supply.

Produce such as tomatoes, cucumbers, and bell peppers that grow in greenhouses require a lot of heat. To earn the Bioland label, the thermal energy used must come from renewable[1] sources. When Biohof Querdel doubled its greenhouse space in 2022, the existing biogas plant and wood chip heating system were no longer sufficient. During the search for the right renewable energy solution, Energethik Ingenieurgesellschaft mbH from Osnabrück, Germany, suggested a renewable storage power plant (RSPP), and the farmers immediately knew that was the ideal solution. Working with Energethik as the responsible engineering firm and plant designer, Biohof Querdel has implemented the project successfully. At the heart of the plant, the cogeneration unit chosen was the tried-and-trusted Jenbacher combined heat and power (CHP) technology from INNIO Group.

Renewable biomethane storage power plant

The renewable Jenbacher storage power plant at Biohof Querdel runs on biomethane from the natural gas grid. The three Jenbacher cogeneration units with a total electrical output of roughly 10 MWel and a total thermal output of roughly 10.5 MWth reach a high overall efficiency of more than 93.5%.

The Jenbacher cogeneration units do not run in baseload operation; as part of a flexible peak load power plant, they only generate electricity when the renewable energy available from the grid is not sufficient – and when the electricity market yields the highest returns.

A 4,000 m^3 heat accumulator ensures that enough heat is always available to supply the greenhouses.

»The renewable storage power plant at Biohof Querdel is an important part of our philosophy. The Jenbacher unit from INNIO Group is a perfect fit. This solution enables us to generate green heat for the entire farm (all of the electricity generated is fed into the grid). We also feed a significant quantity of green electricity into the public grid exactly when this electricity is needed. With good business integration and ecological operation, we are making a valuable contribution to the energy transition.«

Andreas Querdel,
Managing Director, Querdel Biohof GmbH

[1] Biomethane meets these requirements, as does mass-balanced biomethane, which is used in this case.

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Outcome

The outstanding heat output of the Jenbacher CHP plant combined with a high-capacity heat accumulator make operating the greenhouses at Biohof Querdel much easier. While extreme weather conditions were challenging in the past, the plant now provides enough guaranteed heat output to, for example, melt snow and prevent it from breaking the glass, which protects the crops.

One of the greatest challenges of the energy transition is ensuring grid operation as the proportion of fluctuating renewable energy continues to increase. Flexible renewable storage power plants like that at Biohof Querdel step in when there is not enough wind or solar energy – and thus make a key contribution to the energy transition. The decentralized plant at Biohof Querdel is not only a blueprint for intelligent provision of safe and flexible electricity and heat from renewable energy sources, it also shows that this approach can helpmake the energy transition in Germany a success, as it can help to balance increasing volumes of renewable and volatile energy sources in the electricity mix.

Customer benefits

- Reliable electricity and heat generation from renewable energy sources
- Storage of significant heat capacity until needed
- Significantly easier greenhouse operation
- High-efficiency, decentralized CHP system with an overall efficiency of > 93.5%
- Flexible power generation at peak load times
- Higher revenue on the electricity market
- CHP technology that can be powered by renewable gas from day one supplements wind and solar power, playing a key part

Plant facts

Installed units	3 x J620
Electrical output	3 x 3.35 MW
Thermal output	3 x 3.54 MW
Total efficiency	> 93.5%
Energy source	Biomethane
Heat storage system	4,000 m^3
Biomethane storage (pressureless)	10,700 m^3
Year of commissioning	2023

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