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MUNICIPAL HEAT GENERATION THAT LEADS BY EXAMPLE

thanks to a partnership between industry and municipal utilities

Background

Dettenhausen, a town in the Tübingen district of Baden-Württemberg, originally obtained its heat from an Organic Rankine Cycle (ORC) generator. After the cooperative set up to operate the plant was forced to file for insolvency in 2019, the local municipal utility company—Stadtwerke Tübingen—assumed responsibility for supplying heat to the approximately 5,600 people in the town, first provisionally and then permanently.

A mobile oil-fired heating system initially was used as a stopgap. During this transitional phase, it became clear that the community needed a new heating solution that was both technically and environmentally sustainable in the long term. After all, modern heat generation has many demands: Besides being available at any time of day or night, it also must be sustainable. Thus Stadtwerke Tübingen joined forces with Alfred Ritter GmbH & Co. KG—a chocolate manufacturer with strong roots in the region—as well as the company Ritter Energie- und Umwelttechnik to implement a forward-looking heating concept for Dettenhausen.

»Dettenhausen is a shining example of what's possible when companies work together constructively to ensure security of supply for a community.«

Ortwin Wiebecke, Managing Director of Stadtwerke Tübingen


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Solution

At the heart of the new energy center built by Stadtwerke Tübingen is a Jenbacher cogeneration unit from INNIO Group that has an electrical output of 999 kW and a thermal output of 1,232 kW.

Alongside a Jenbacher J416, the center also boasts two flue gas heat exchangers which harness the thermal power from the exhaust gas produced by the Jenbacher unit. A third flue gas heat exchanger feeds an extra 92 kW of thermal output into a low-temperature circuit, providing heat for a heat pump. The heat pump also can draw on a further 83 kW of thermal output from the cogeneration unit's waste heat, which is obtained using coolers inside the unit's chamber.

In total, an extra 175 kW of usable thermal output can be heated using the heat pump. The system is enhanced by a 3,000-kW peak load boiler and two large heat accumulators.

The new Energy Center covers 80% of Dettenhausen's heat demand, with the remaining 20% coming from the solar thermal system that the chocolate manufacturer Ritter has built on the roof of its warehouse next door to the Energy Center. With 468 collectors spread across 2,312 square meters, it is one of the largest roof-mounted solar thermal systems in Germany.

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Outcome

The partnership between the chocolate manufacturer Ritter and Stadtwerke Tübingen has given Dettenhausen a heating solution that will serve as an example to others. The companies involved share an understanding of a sustainable future for which they are taking responsibility with this flagship project.

Making highly efficient use of the heat from the cogeneration unit along with the heat pump covers as much as 75% of the heat demand.[1] Dettenhausen's new heating concept also saves 1,100 metric tons of CO_2 annually compared to individual gas-fired heating systems.[2] By combining environmental sustainability and innovative engineering, this joint project sets a pioneering example for local sustainable heat generation.

This innovative approach also impressed the journal Energie und Management (E&M), which crowned the project its "BHKW des Monats" ("Cogeneration unit of the month") in June 2023.

[1] Figures from the operator
[2] bhkw-infozentrum.de/beispiele/bhkw-des-monats-06-2023.pdf (bhkw-infozentrum.de)

Customer benefits

- Combined sustainable heat generation and decentralized energy systems as a pioneering heating concept
- Significantly more usable waste heat through smart integration of various technologies, such as heat pumps combined with CHP technology and a heat accumulator
- Increased amount of latent heat used due to low-temperature flue gas heat exchangers, which make the overall system more efficient
- Annual savings of 1,100 metric tons of CO_2 compared to individual gas-fired heating systems[2]

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Plant facts

Installed engine	J416
Electrical output	999 kW
Thermal output	1,232 kW
Total efficiency	94.9% (CHP plant) 102.3% (including heat pump)
Energy source	Pipeline gas
Commissioning	2021

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