

New Energy Concept Reduces Primary Energy by 30 Percent

A cogeneration power plant with a high-performance MWM genset supplies Andechser Molkerei with power, heat, cold, and steam, saving some 30 per cent of primary energy and more than 1.6 million kilograms of CO₂ a year.



What does organic yoghurt have to do with a gas genset? Well, a lot, as can be seen from Andechser Molkerei Scheitz. Since November 2020, the organic dairy on the shores of the scenic lake Ammersee south of Munich produces power, heat, and steam in its own cogeneration power plant, which is equipped with an absorption chiller in combination with a compressed air power plant. "Our cogeneration power plant is highly efficient; in just three hours, it is able to produce the amount of power that a three-person household consumes in a whole year. In numbers, this means 736 kW of heat energy, 999 kW of electrical energy, and 431 kW of cold", explains Josef Scheuermeyer, Head of Energy, Environment, and Sustainability Management of the

dairy. According to Scheuermeyer, the "core of the plant" – the MWM TCG 2020 V12 gas generator set of Caterpillar Energy Solutions – is one of the main reasons for the superb performance: "The engine is very robust and reliable. It is highly efficient and designed for an output of 1 MW_{el}. We target full-load operation of about 7,500 hours a year." The engine is equipped with an automatic lubricant supply. In order to ensure a steady lubricant level in the engine, the engine oil is automatically replenished. The oil supply system comprises a 1,500-l oil tank and a 900-l waste oil tank. Thanks to the longer oil change intervals and reduced lubricant consumption, the use of MWM premium engine oils boosts the plant's profitability.

"We use all internal heat sources"

About one-third of the exhaust heat from the power generation is used to run a steam generator with an economizer. Before the hot exhaust gas is introduced to the boiler, it is treated in an oxidation catalyst and later in an SCR catalyst. The plant generates 590 kg of saturated steam an hour with a vapour pressure of 10.5 bar (g), which is used for the dairy's production processes. Some 600 kW of the engine exhaust heat are thus available for hot water generation. The water is again post-heated by means of an exhaust heat exchanger. The water that is heated to 190 °C is then cooled to 110 °C, resulting in additional heat output of 136 kW. Using the heating output of 736 kW, the state-of-the-art absorption chiller produces about 307 to 431 kW of cold. "Prior to the setup of the cogeneration power plant, we used to get 100 per cent of our eco-power from the public grid. With the new energy concept, the dairy intends to cut the third-party power share by 75 per cent, in order to reduce both the costs and the carbon emissions. What is more, the intensive use of the exhaust heat for hot

water and steam will save some 30 per cent of the primary energy", explains Josef Scheuermeyer. On a yearly basis, the plant is expected to generate 1.6 million kg less CO₂ compared to external procurement.



Josef Scheuermeyer, Head of Energy, Environment, and Sustainability Management, Andechser Molkerei Scheitz GmbH

Absorption Chiller with New Procedure

The cogeneration power plant with exhaust heat boiler and absorption chiller was planned and implemented by AGO GmbH Energie + Anlagen. For this, the company made use of an innovative procedure with an ammonia/water absorption chiller. For the recooling of the NH₃ refrigerant, two glycol chillers with an output of 400 kW each were installed on the roof of the energy centre as adiabatic chillers. The NH₃ liquefier and the mixture cooler are also located here. The Institute for Energy Technology at Ostbayerische Technische Hochschule Amberg-Weiden (IfE) is coaching the project for three years, in order to furnish evidence of the feasibility of the new technology.



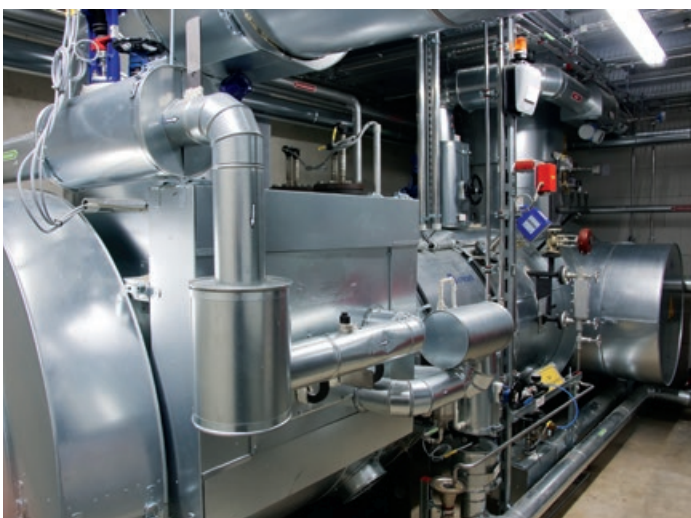
Andechser Molkerei Scheitz GmbH

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Technical data CHP

Go-live:	2020
Engine type:	MWM TCG 2020 V12
Generator:	Marelli
Control:	TEM
Gas type:	Natural gas
Plant builder:	AGO GmbH Energie + Anlagen
Electrical efficiency:	41.8 %
Thermal efficiency:	47.2 %
Electrical output (total):	999 kW
Thermal output (total):	736 kW
Total efficiency:	89 %



New Compressed Air Cogeneration Power Plant

Besides the installation of the new cogeneration power plant, Andechser Molkerei has invested in a compressed air power plant of altAIRnative. The genset delivers about 630 m³/h of compressed air at 8.5 bar. The heat output of 155 kW consists of the engine and exhaust heat, as well as 37 kW of ambient heat. In combination with the compressed air power plant, the efficiency of the cogeneration power plant goes up to 91 per cent, as the previously unused exhaust heat of the mixture cooler is raised from a temperature level of 60 °C to 90 °C with the help of the compressed air power plant. Thus, this energy too can be fully used in the production.

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