

POWER PROFILE

Customer: AS Grüne Fee Eesti Greenhouse

Location:

Tartu, Estonia

Customer Business Issue:

Power generation with heat recovery for vegetable production in a greenhouse

Solution:

4 Cat® G3516A Generator Sets

Cat® Dealer:

Wihuri Estonia and Witraktor Finland



CHP provides sound financial solutions year round for greenhouse operations.

POWER NEED

Gas engine based Combined Heat and Power (CHP) installations represent an attractive solution to investors to provide reliable heat and power to their industry or production while maximizing their return on investment. AS Grüne Fee Eesti is located in the city of Tartu in Estonia. Because of the need for power to run the greenhouses as well as an increase in the prices of electric power, the greenhouse, 200 km southeast of the Estonia capital of Tallinn, needed an onsite power generation system to maximize growth of the vegetables. In addition, AS Grüne Fee Eesti needed a low energy price to keep high production rate.

CHP in a greenhouse is a superb way of making maximum use of natural gas, as CHP produces heat, CO₂ and electricity. A greenhouse needs heat and CO₂ to accelerate the plant growth and electricity to maintain the installation. Consuming CO₂ is, of course, an environment-friendly solution. The 4.12 MW power plant has provided ecological, economic and social benefits for the customer.

SOLUTION

The first two Cat G3516A generator sets rated at 1,070 kW were installed in 1998, and it made AS Grüne Fee Eesti the first greenhouse in Estonia to start estate production of thermal energy and electricity from natural gas. Raivo Kulasepp, the managing director of AS Grüne Fee Eesti, notes, "We're very much satisfied with the G3516As. Therefore for further investment, we decided to enlarge our greenhouse by installing some more Cat G3516A generator sets." For the purpose of the greenhouse expansion, two additional generator sets were installed in 2003 and

2006. All four Cat G3516A generator sets are operated at 100% load.

Due to the technology being used for abundant production in greenhouses, AS Grüne Fee Eesti is a major consumer of electric power in Southern Estonia. The Cat G3516A generator sets produce 75% of the required power to manage the greenhouse. The generator sets run parallel with the grid, and AS Grüne Fee Eesti purchases 25% of their required power from the local utility.

The heat recovery system utilizes heat from jacket water, oil cooler, aftercooler and exhaust gases. The system also uses accumulating tank load balancing. Therefore the efficiency shows the outstanding improvement.

AS Grüne Fee Eesti uses two 1100 cubic meter heat accumulating tanks. In the winter, the Cat G3516A generator sets and peak load boiler cover heat consumption. In the summer, heat is used only during the night. The second aftercooler circuit is used for soil heating. For additional heating, CO₂ is produced by a boiler and used in limited amounts. Internal lighting is used only on cloudy days and during the night.

Wihuri Estonia and Witraktor Finland, the local Cat dealer, supplied a control system for generator protection and synchronization. AS Grüne Fee Eesti developed the control system used for heat recovery control. Heat recovery control is integrated to the greenhouse temperature control SCADA (Supervisory Control And Data Acquisition) system.

Production control has been automated so the conditions needed for plants to grow are close to being perfect. For example, the temperature is adjusted with the accuracy of 1/10 of a degree.

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RESULTS

Due to an increased need for power to run greenhouses, and an increase in the prices of electric power, AS Grüne Fee Eesti became an exemplary enterprise in the Baltic countries by implementing new technology that enables vegetables to be produced regardless of the season.

AS Grüne Fee Eesti produces lettuce and other herbs, as well as 126 kg of cucumbers per square meter per year. AS Grüne Fee Eesti is the largest producer in its field in Estonia, and has been doing excellent work that results in healthy supplementary food products on their consumers' tables all year long.

By the end of February 2009, the four Cat G3516A generator sets had accumulated total

of 130,000 hours. For approximately 10 years the generator sets have provided constant heat and power. Ivar Kitler, the sales manager from Wihuri Estonia and Witraktor Finland, notes, "AS Grüne Fee Eesti firmly believes that the G3516A is a very reliable engine and has never faced major problems."

Through their website, consumers can purchase fresh and safe products which are biologically controlled in the fight against pests and meet the quality requirements of the domestic production mark "Grown in Estonia." The company is able to use energy produced on-site, expand the growing area and diversify the assortment.

For more information, please visit cat.com/powergeneration

