

## Gefu Produktions AG

When faced with a surplus of milk sugar, one enterprising milk processing plant – Gefu Produktions AG – saw an opportunity to generate onsite electricity and heat. Using 12 Capstone CR65 MicroTurbines® installed in a combined heat and power (CHP) application, Gefu today converts waste produced during processing to generate onsite electricity and heat.

Centrally located in Switzerland between the Swiss Plateau and the Alps, Gefu caters to the numerous farmers that dot the country’s scenic landscape. Gefu collects whey concentrate, a milk byproduct, from the Swiss dairies and uses an ultrafiltration process to separate out the whey protein. But as the usable protein is extracted, waste milk sugar remains.

“We didn’t know exactly what to do with the milk sugar years ago,” said Toni Habermacher, Production Manager of Gefu Produktions AG. “So, five years ago we decided to build a biogas plant to use the milk sugar as energy, and use the biogas in microgas turbines to produce electric energy.”

All of the whey protein created at Gefu is redistributed back to the farms to use as cattle feed.

“The main point behind this idea was to produce cattle feed without using or producing CO<sub>2</sub>,” Habermacher added. “We wouldn’t have been able to do it if we hadn’t built the biogas plant, and if we hadn’t chosen the Capstone microturbines, a new steamer, and hot air for spray drying plant.”

Not only is it one of the largest biogas plants in Switzerland, it is also one of the most efficient, with overall efficiency levels exceeding 90 percent. “That (combination) gives us the efficiency, and that makes us the leader in producing cattle feed without CO<sub>2</sub>,” Habermacher said.



### At a glance

#### Location

Rickenbach, Lucerne, Switzerland

#### Commissioned

December 2010

#### Fuel

Biogas from milk sugar fermentation.

#### Technologies

- 12 Capstone CR65 microturbines.

#### Customer

- Gefu Produktions AG, a milk processing plant catering to farmers in central Switzerland.

#### Results

- Twelve Capstone CR65 microturbines installed in a CHP application are fueled by waste milk sugar.
- Installation allows clean-and-green production of cattle feed without using or producing CO<sub>2</sub>.
- Produces about 6.5 Gigawatt Hours (GWh) of electricity each year, enough to power 1,500 households.
- Overall operating efficiency exceeds 90%.
- Surplus power produced by the microturbine system is fed back into the local grid.
- Site is responsible for a 1.7% reduction of CO<sub>2</sub> emissions in Switzerland that is required under the Kyoto Protocol.

*“The Capstone microturbines provide a reliable and economical solution to what would otherwise be an environmental problem.”*

— Beat Näf, President and CEO  
Acrona Systems Ltd.

Annually, the 12 microturbines produce about 6.5GWh of electricity, enough electricity to power 1,500 households.

“The reason we have installed 12 CR65s is because of exhaust gas temperature,” said Beat Näf, President and CEO of Capstone distributor, Acrona Systems Ltd. “The CR65 comes with an exhaust gas temperature of 305°C (581°F). This hot exhaust air is used for the direct production of steam. After the steam boiler, the exhaust gas still has a temperature of about 170°C (338°F). This warm air is used as an energy source for the drying process. We even use the warm air for cooling the electronics. By doing that we have an overall efficiency of more than 90 percent. This is an excellent value for this kind of plant.”

Capstone’s “CR” (for “Capstone Renewable”) microturbines make system design easier than using traditional generating technologies because they can operate on a wide range of energy contents, automatically adjust to changing energy densities over time, and can accept high levels of contaminants such as hydrogen sulfide (H<sub>2</sub>S). The CR65 is able to operate with up to 5,000-parts-per-million. This may avoid the need for H<sub>2</sub>S cleanup altogether, with associated benefits in capital and maintenance costs.

“We produce green energy because we don’t use oil for producing steam or hot air,” Habermacher said.

In addition, the plant can feed surplus power back into the local grid. “We get a better price for the electrical power we bring into the electrical system in Switzerland,” he said.

“The Capstone microturbines provide a reliable and economical solution to what would otherwise be an environmental problem,” Näf said. “This site is responsible for 1.7 percent of CO<sub>2</sub> reduction in Switzerland that is required under the Kyoto Protocol.” The Kyoto Protocol is an international treaty facilitated by the United Nations



Twelve CR65 Capstone microturbines installed in a CHP application at the Gefu Produktions AG manufacturing facility in Lucerne, Switzerland, use milk sugar from the manufacturing process to generate onsite electricity and heat.

that sets binding regulations on industrialized countries to reduce emissions of greenhouse gases.

Gefu Produktions is regarded as a trailblazer in Switzerland. “The CO<sub>2</sub> reduction is important to Gefu Produktions,” Näf said. “It should be important to everybody, not just here. The difference is they take it seriously, and are doing something about it, not just talking about it.” ■