

CAP Group Water Service

Government/Municipal



The Challenge

Providing integrated water services efficiently and reliably to two million people has inherent challenges. Such is the task for the CAP Group, the main water service management company in Milan, Italy as well as for neighboring municipalities. For its sewage treatment plant in Sesto San Giovanni (MI), near Milan, CAP Group embarked on a project to equip its purification plant with a cogeneration plant that exploits the biogas produced in the purification process to produce electricity and heat in the form of hot water.

Anaerobic digestion of sludges separated from the water is one phase of the overall water purification process. During this phase, bacteria takes care of the 'digestion' of the organic component of the sludge, producing high methane content biogas. The biogas is normally used inside the purifier to produce the heat necessary to keep the digester at the proper temperature (about 37°C or 98.6°F). To accomplish this, it is burned in boilers for the production of hot water. When the production of biogas exceeds the demands of the boilers, it is burned in a torch.

The Solution

A more efficient way to exploit biogas is to use it in a cogeneration plant to produce both electricity for the plant and hot water for heating the digester. In May 2018, two biogas-fueled Capstone C65 units were installed by IBT Europe GmbH to introduce efficiencies in the purification process. The microturbines operate in conjunction with the local utility in grid connect mode.

"The biogas production is variable from winter and summer season," says Dario Alberto Babuin, Supply Chain Manager, IBT Europe. Capstone's solution is perfect because our system is able to follow exactly the biogas production and convert it into electricity. During summer season when the biogas production is less, it is possible to use only one C65 at full power.

Power Profile

Customer

CAP Group, a water service management company

Location

Sesto San Giovanni (MI), near Milan, Italy

Commissioned

May 2018

Fuel

Biogas

Technologies

- Two Grid Connect C65 High Pressure Digester Gas systems

Capstone Turbine Distributor

IBT Europe GmbH

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IBT Europe



Reliable power when and where you need it. Clean and simple.



Two Capstone C65 microturbines ensure high reliability while also benefiting the environment.

In addition, in this area of Italy – and in Milan itself – there is a very restrictive emissions limit. Only with Capstone microturbines is it possible to produce electricity without the need to install a catalyser on the exhaust.

The clean exhaust from the microturbines are sent to a heat recovery module for the production of hot water and then released into the atmosphere. For the treatment of biogas before it is sent to the turbines, IBT installed a desulfurizer to reduce the concentration of H₂S in the biogas before the compression and dehumidification phases.

The Results

The use of biogas from anaerobic digestion exploits what is naturally produced by the bacteria used for the sludge purification. While the gas would normally be burned in traditional boilers, the use of this very low-cost biogas for the production of electricity enables the CAP Group to save on the purchase of electricity from the network local utility. Those savings can then be directed to improve the costs of managing the water purification process. The installed system produces 130 kW per hour if there is at least 72 Smc/h of biogas available (CH₄ 65%). The system provides a best case of 8,000 annual operating hours.

The robustness and flexibility of Capstone microturbines are the best allies for applications of this type where the use of low-quality fuel does not affect the life cycle and the performance of the machines. Through the systems installation, the CAP Group has been able to derive an increase in efficiency and a reduction in emissions and energy costs, with a 50 percent reduction in utility costs in the first year. ■

Capstone C65 ICHP Microturbine



A C65 provides up to 65kW of electrical power while the UL-Certified C65 ICHP provides up to an additional 150kW of thermal power for CHP and CCHP applications.