

At a glance

Location

Würselen, Germany

Commissioned

March 2010

Fuel

Natural Gas

Technologies

- Capstone C200 microturbine
- Air-to-water two-stage heat exchanger

Customer

- Aquana Sauna and Recreation Pool located in Würselen, Germany, featuring a family-friendly wellness, sauna and leisure spa and a water park.

Results

- Overall operating efficiency of the combined heat and power (CHP) system reaches 88–89%.
- The C200 system achieves a thermal output of 320kW.
- Maintains comfortable water temperatures for nearly 1,800-square-meters (2,153-square-yards) of water area for the play and wave facility, and electricity for the spa.
- Patented oil free air-bearing technology of the C200 has lowered overall maintenance costs.
- The C200's ultra-low emissions and limited operating noise helped the local utility company, enwor energy & water spot GmbH, achieve its environmental initiatives.
- Since meeting requirements set in European Union directives, the CHP application is now recognized as a high-efficiency system.
- First C200 installed in a CHP application in Germany.

Aquana Sauna & Recreation Pool

A blend of extreme adventure and vast tranquility, the popular Aquana Sauna and Recreation Pool in Würselen, Germany offers a one-of-a-kind experience. From a heart-pounding black hole water ride to the peaceful wellness, sauna and leisure spa, the family-focused spa and “play and wave” waterpark is the first in Germany to perform in a CHP application with a Capstone C200 MicroTurbine®.

The complex array of equipment that operates the center’s abundant rides and amenities, and the high electrical load necessary to maintain comfortable water temperatures, requires considerable round-the-clock energy consumption.

Aquana offers a myriad of activities including a 25-meter (82-foot) indoor pool and dive area, outdoor children’s pool, lazy float river, interactive pirate ship adventure, and a series of water slides and tube rides. Pair the water park with the wellness and leisure elements of the center, such as power-zapping tanning beds and hot tubs, and energy production and costs are top of mind at Aquana.

The aqua-park component of the facility has a total water area of nearly 1,800-square-meters (2,153-square-yards). “There is a lot of water surface where you lose a lot of energy,” said Bernhard Peters, Technical CEO for Capstone distributor E-quad Power Systems GmbH. “Aquana needs nearly continuous heat consumption of around 280- to 290-kilowatts.”

The local utility – enwor energy & water spot GmbH – operates with a mission to provide environmentally friendly, self-generated electricity. When Aquana’s reciprocating engines could not successfully meet the facility’s technical and economic needs, Aquana and enwor executives were faced with the option to abandon the cogeneration aspect of the onsite energy supply, or upgrade the





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*— Stephan Hunze, CEO
enwor energy & water spot GmbH
grid operation and electricity department*



for the engine to run in full load, the turbine will run as master so that the turbine is optimizing the total heat supply for the CHP system.”

“In this installation we have a two-stage heat exchanger that increases total efficiency of the turbine from 82 percent to 88 to 89 percent,” Peters said. “Because in the second stage we use low water temperature, we have an exhaust temperature of around 50°C (122°F) with no condensing. This is a big advantage of the high energy production system.” During peak load, the system achieves a thermal output of 320kW.

Additionally, the C200’s ultra-low exhaust emissions and limited operating noise helped enwor achieve its environmental initiatives. The microturbine features Capstone’s patented oil free air bearing technology, and produces 200kW of clean, green, and reliable power. The C200’s reliability and patented oil free air-bearing technology has lowered maintenance costs at Aquana.

According to enwor the high efficiency of the turbine technology itself is enhanced by a six-year grant under the German Cogeneration Act. The grant provides support for sites with 60 percent of heat or cold generated by CHP or waste heat. Meeting the requirements set in European Union directives, Aquana’s CHP application is now recognized as a high-efficiency system. More than a mere drop in the bucket, enwor executives anticipate the microturbines to have a significant environmental impact – reducing around 2,500 tonnes of CO₂ annually.

While once popular in Germany, Hunze explained the use of nuclear energy was reassessed following the nuclear disaster at Fukushima, Japan. “It is quite obvious green technologies with low emissions and high efficiencies take center stage, and microturbines fulfill all the requirements – especially in CHP plant applications,” Hunze said. ■

system to an environmentally friendly model that provides heat and generates electricity.

Aquana opened in December 1998 powered by a combined heat and power plant with reciprocating natural gas-fired engines. “The complex system was not well designed,” explained Peters. “One engine broke after nearly eight years.”

“We replaced it with a Capstone C200 microturbine,” said Stephan Hunze, CEO of enwor’s grid operation and electricity department. “It was the first C200 in Germany in a combined heat and power plant application.”

“The energy regulation system is operating a reciprocating engine and turbine,” Peters said. He noted that the reciprocating engine runs continuously, and when the demand for heat exceeds the engine’s capacity, the microturbine is activated. “If the consumption is too low