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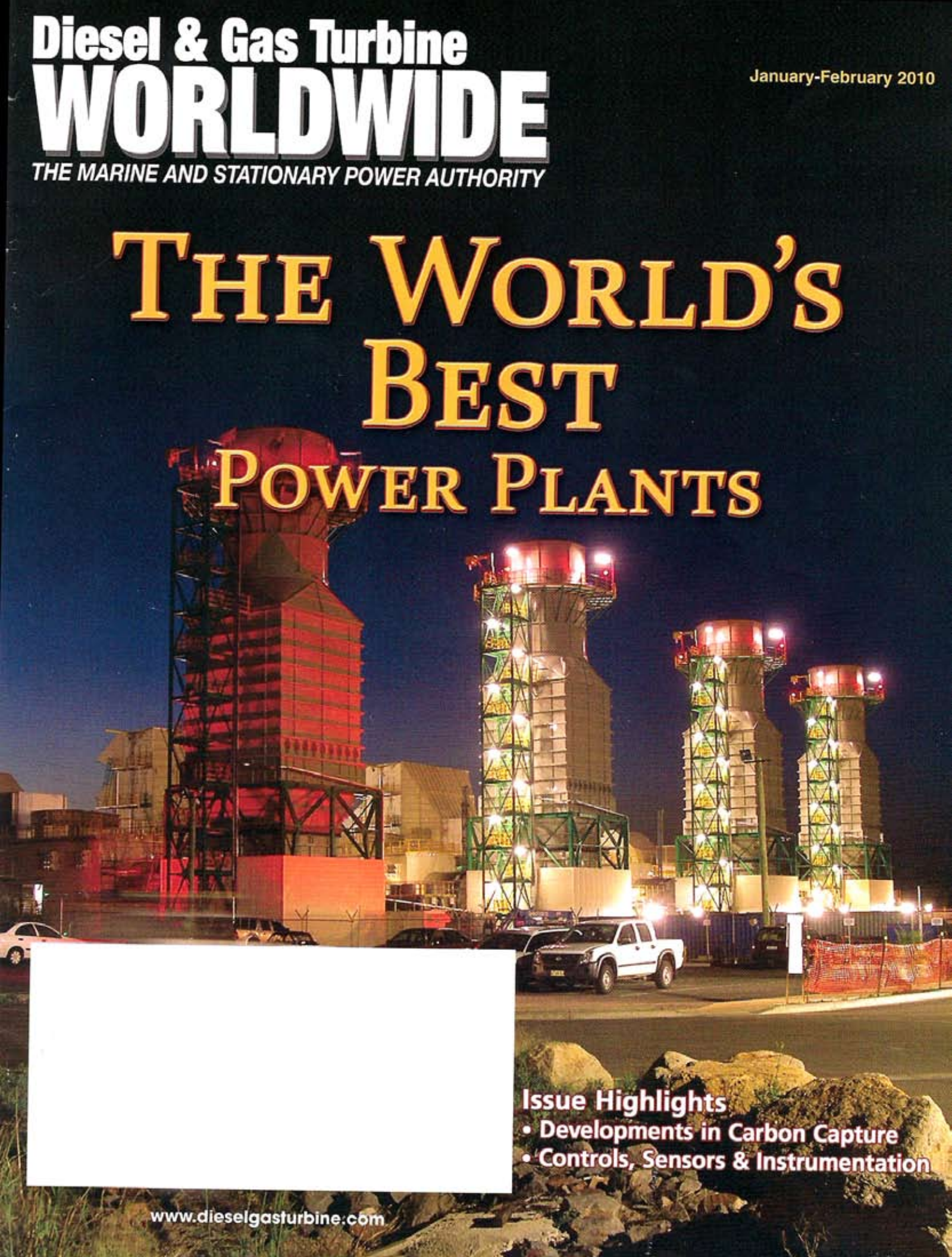

Issue Highlights
- Developments in Carbon Capture
- Controls, Sensors & Instrumentation

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Capstone Microturbine

Salem Community College, U.S.A.

Soon after Hurricane Katrina devastated the Gulf Coast in 2004, the Salem County Red Cross in Carney's Point, New Jersey, U.S.A., asked the nearby community college to continue its 15-year tradition of serving as the local Red Cross disaster relief shelter.

However, the updated agreement stipulated Salem Community College must have a back-up power system that provides electricity, cooling and heating to Davidow Hall – the 6039 m^2 campus building that serves as the county's shelter during emergencies.

Officials at the 1500-student college, eager to continue serving the community, agreed to upgrade the power system in Davidow Hall to comply with the agreement. They also knew a more efficient energy system to serve the building's day-to-day power, cooling and heating needs could save the college money.

The massive building – one of the largest in this rural New Jersey county – houses a gymnasium that can hold 1000 people during emergencies, a 400-seat performing-arts theater, classrooms, kitchens, office space, showers and bathrooms. In a nutshell, Davidow Hall is an ideal facility for an emergency shelter. During non-emergency times, it is a bustling campus facility full of students, instructors and regular community activities.

Raymond Constantine, executive director of special projects for Salem Community College, led the college's efforts to secure updated and clean power and HVAC systems. Through New Jersey's Public Utility SmartStart Incentive Program, the college received a US $130 000 grant that helped fund the purchase of three Capstone natural gas C65 ICHP MicroTurbines, a 91 tonnes Thermax absorption chiller and a Capstone advanced power server controller.

"We wanted a system that could provide electricity, heating and cooling each day, along with grid-disconnect backup power in an emergency," Constantine said. "Capstone provided a combined heat and power solution that emits very clean emissions."

When planning for the new energy system began several years ago, the 1.36 ha main campus was heated and cooled by a long-standing geothermal system. College officials planned for the new clean-and-green energy system in Davidow Hall to supplement the campus's geothermal ground source system, installed in 1991. In addition, two inefficient systems, a DX cooling system that featured freon-based compressors and natural gas boilers that produced building heat and hot water, also served Davidow Hall.

Constantine was told the payback on the system will be 10 years, but because of its efficiency and energy savings, he expects the payback will be much sooner. He anticipates a 30% overall energy savings because of the microturbines.

Commissioned in late 2009, the Capstone microturbines produce more than 80% of Davidow Hall's electricity and 100% of the building's heating and cooling. The microturbines are dual-mode, which allows for them to island when utility power goes down.

"Dual-mode capabilities are important because we see a lot of brownouts and blackouts on the grid that serves Pennsylvania, New Jersey and Maryland, U.S.A.," Constantine said. "Our grid is vulnerable and by having our own on-site power plant, we're helping to relieve grid pressures."

The system's efficiency is linked to the microturbines' combined heat and power application, and also to the Capstone advanced power server (APS). The APS is a stand-alone controller that monitors the building's load changes and automatically shuts down the microturbine with the most run hours when it's not needed, for example, on weekends or in the late evening when students are gone.

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Syracuse University, U.S.A.

Last year, Syracuse University, located in Syracuse, New York, U.S.A. – regularly ranked among the top 100 schools in the nation – realized it needed a new data center. Escalating demand from researchers, students and professors for greater computing capabilities and data storage was straining the campus's outdated data center, which had been housed in an old brick building for decades.

Constructed in just six months and showcased to the public in December 2009, Syracuse University today boasts one of the world's most energy-efficient and green data centers. The 1125 m^2 facility – named the Green Data Center – is expected to use 50% less energy than a traditional data center.

Key components of the US $12.4 million Green Data Center are 12 patented Capstone Hybrid UPS MicroTurbines from Capstone Turbine that provide power to the entire facility. According to the company, Capstone's Hybrid UPS is the first power system to integrate low-emission C65 (65 kW) microturbines directly with a dual-conversion UPS to provide power for mission-critical loads.

The Syracuse University project and Capstone Hybrid UPS microturbines address critical concerns for modern data centers around the world such as spiraling energy consumption and costs driven by growing demand for Internet, communication, entertainment, global commerce and services.

BHP Energy, a Capstone Turbine distributor, was selected by Syracuse University and project partner IBM to integrate an innovative tri-generation concept into the data center. For the tri-generation system, the 12 Capstone Hybrid UPS microturbines produce electricity, heat and cooling power, all from a single burn of clean natural gas using an integral power plant.

In addition to the cleaner natural gas and lower emissions, Capstone's UPS system operates without the hazardous chemicals common in traditional battery-based UPS systems.

The Green Data Center's tri-generation system is clean and efficient. Exhaust heat from the Capstone microturbine is piped to double-effect absorption chillers. Absorption chillers then use the heat energy to make cold water to cool the Green Data Center's computers and even serve the heating and cooling needs of an adjacent office building.

For the Syracuse Green Data Center, IBM provided more than US $5 million in equipment, design services and support. The New York State Energy Research and Development Authority (NYSERDA) contributed US $2 million to the project.

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