

# Island Diesels Get Cleaned Up

*RJM's urea-based SCR helps small utility meet emissions targets*

by Mark McNeely

In the wintry regions of the United States, Groundhog Day — February 2nd — is an annual tongue-in-cheek exercise whereby if a groundhog emerges from its hole and sees its shadow, it is said that winter will linger for six more weeks. On tiny Block Island, off the coast of Rhode Island, Groundhog Day is also the day in which heads are officially counted for the island's annual census.

For the 883 hardy souls counted in 2000, the mid-winter census not only serves as an opportunity to congregate for merrymaking, but the timing also ensures an accurate count of the island's year round inhabitants. Block Island's primary business is tourism, fed each summer by a large influx of people that populate the island in an effort to relax and escape New England's "mainland" heat.

The summer's temporary increase in population is accompanied by an increase in demand for electricity. On Groundhog Day 2001, for example, the mid-day load



*Two of four Caterpillar diesel generator sets situated in the main power generation building of Block Island Power Company. A small island dominated by its summer tourist trade, Block Island usually sees peak summer demand reach 3350 kW. The utility, therefore, has installed an additional 1300 kW Cat 3516B-powered gen-set to help ensure power availability on the island.*

was 925 kW. A mid-summer peak, however, will see demand rise to about 3350 kW. That is also why the island's utility has installed a new Caterpillar diesel gen-

erator set, according to Cliff McGinnes, an owner of Block Island Power Company.

Block Island Power was organized in 1923 as Island Light and Power and at that time consisted of one single-cylinder Fairbanks-Morse engine. Today, the utility has at its disposal four Caterpillar gen-sets — three 3516Bs and one 3512B — as well as an older 1000 kW 38D8-1/8 series Fairbanks-Morse diesel generator set in a standby mode.

The company is in the process of commissioning its newest Caterpillar 3516B-powered gen-set. The 1200 r/min 3516B, supplied by Southworth-Milton Power Systems of Milford, Massachusetts, U.S.A.,

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*The administrative office of Block Island Power Company.*



*RJM Corporation's ARIS urea-based injection system installed in the exhaust gas stream (foreground) and the Johnson Matthey catalyst (background).*

is rated 1300 kW for continuous operation. Switchgear for the installation has been supplied by Enercon Engineering, engine cooling is provided via Amercool split core horizontal radiators and exhaust silencers are from Silex.

Because of an earlier consent decree regarding permits to run the diesels, Block Island Power is installing a selective catalytic reduction (SCR) system on the new generator set. Likewise, the company has already retrofit the existing Caterpillar gen-sets with new NO<sub>x</sub> reducing SCR technology supplied by RJM Corporation.

"We were looking at a very large expense to install an SCR and for this little island that would have had a terrible impact on our customers," explained McGinnes. "So we kept looking for new technology. It's only because we were willing to utilize new technology that we ended up with RJM's cost-effective system."

RJM Corporation's advanced reagent injection system (ARIS) works to reduce NO<sub>x</sub> emissions in diesel or lean burn natural gas engines by metering precise amounts of a safe reagent into the engine's exhaust stream. According to T.J. Tarabulski, project manager for the Norwalk, Connecticut, U.S.A.-based RJM, the ARIS system can achieve a 75 to 90% NO<sub>x</sub> reduction on stationary, marine or locomotive engines. ARIS is a trademark of Clean Diesel Technologies, Inc., Stamford, Connecticut.

When injected into the exhaust stream of a diesel engine, urea will decompose to ammonia and react with oxides of nitrogen (NO<sub>x</sub>) across a catalyst located down-

stream of the injection point to reduce NO<sub>x</sub>. RJM's ARIS technology utilizes a urea-based reducing reagent, which contains 32.5% urea in an aqueous solution, to deliver ammonia to the catalyst.

Mike Wagner, plant manager for Block Island Power, said initial exhaust emission readings indicate that the ARIS system is achieving its NO<sub>x</sub> reduction target of 90%.

The ARIS injection system comprises a

single-fluid return flow urea reagent injector combined with a low pressure pump, pressure regulator and electronic controls to accurately meter the quantity of reagent injected as a function of engine load, speed, temperature and NO<sub>x</sub> emissions.

For stationary engines, exhaust gas temperature should be between 300° to 600°C and the technology is effective with engine loads varying from 30 to 100%. The catalysts for Block Island's SCR systems were supplied by Johnson Matthey.

Tarabulski noted that a unique advantage of the ARIS injector system is that it provides the droplet size distribution required without the capital expense and operating costs of an additional atomizing medium, such as steam or compressed air.

The ARIS system uses pre-engineered components to help ensure reliability and reduce total system cost. Standardized system designs are applied to diesel or natural gas engines ranging in output from roughly 75 to 2250 kW. Larger engines can also be fitted with the system and

*Urea storage tank, circulation skid and control panel for the utility's emission reduction system.*



would require additional engineering to optimize the number of injectors.

“Another important aspect of this RJM equipment,” McGinnes said, “is not only was the system capital cost effective, but from an operational standpoint it wasn’t nearly as complicated and as expensive as some of the other technologies we looked into.”

The power plant is staffed 24 hours a day and continuously monitored. “We do all of our basic maintenance,” said Wagner. “If there are any serious problems we rely on Southworth-Milton to assist us. They will have a technician with the proper expertise and parts jump on a plane. They are extremely responsive and it’s been a good partnership with them.”

McGinnes added, “Our position is that with continuous operation we can’t afford to have failures. So we follow the manufacturers operations and maintenance guidelines. One summer early in our ownership we had 22 outages, and people were ready to run me off of the island. Last summer we had, I think, only two episodes.”

McGinnes continued, “Electrical consumption has been increasing every year. Homes are still being built at a pretty rapid pace and the homes are getting bigger and with more power requirements. Power quality has also become more and more important over the past five or 10 years, with the advent of everybody owning a computer. Sometimes it’s hard because a disturbance out on the distribution side at one end of the island can affect the whole island.”

Improvements, including the installation of the new generator set and a 4160V substation, continue to be made at Block Island Power by McGinnes and his staff. The utility currently generates and distributes at 2400 V, but the new substation will allow distribution at 4160 V. The distribution system consists of six radial circuits. The utility has approximately 1600 customers.

The utility also replaced older fuel tanks with glass-lined tanks. “We started with 600 000 gallons of underground fuel storage, delivered by barge and pipeline. It was risky, both environmentally and economically,” McGinnes said. Today the company has storage for 100 000 gallons of fuel, with regular deliveries by tanker truck. 🗣️