SmartGridToday
The independent journal of the digital energy industry
MMI
Monday, January 5, 2015

Toyota uses microgrid for post-nuclear reliability

Car maker shares project with local utilities

The push to alternative energy and smart grid technology that followed the giant earthquake and tsunami that struck Japan three years ago has included a microgrid that Toyota is building near the village of Ohira, Ichiro Suzuki, a project manager for Toyota Motor East Japan, told us in a recent interview in Japan. The car maker expects by the end of this year to connect the microgrid to the local community and be able to supply emergency power to the city hall building in Ohira, five kilometers away, he added.

Two power providers – Tohoku Electric Power Co and City of Sendai Gas Bureau – are among 11 partners paying 948 million JYP (US$7.8 million) to build the microgrid, Toyota told the press. Tohoku has a 1.1% equity stake and Sendai owns one-tenth of 1%.

The microgrid has a natural gas-fired generator and is connected to the main power supply feeding Tohoku's facilities.

Toyota is experiencing some fuel savings with the 7.8-MW microgrid, but it built the facility, starting in 2011, as it "expected the supply-demand balance would be very tight because of the long-term shutdown of nuclear reactors caused by the East Japan Earthquake," Suzuki said. The solution to the problem of keeping the lights on at one of Japan's major manufacturers bypassed a Japanese government still struggling to gain enough support to turn the country's nuclear plants back on.

The microgrid is controlled through Toyota's self-designed community energy management system (CEMS), which steers the operator toward balancing supply with demand while giving them the option to take advantage of discounted rates during off-peak hours, Suzuki said.

Toyota calls its entire system the "F-grid," with the "F" standing for "factory." The project includes 740 KWs of solar power using roof-mounted PV panels.

Future plans call for adapting recycled car batteries from scrapped Toyota Priuses for use as "emergency electrical power supply systems, especially for disaster management headquarters during a power disruption," he added.

Toyota has not learned anything new relative to car design from its foray into the utility business, Suzuki said. But, he added, the firm did discover the most difficult obstacle to overcome in getting the privately controlled

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grid online: “deregulation – to be able to supply electricity to the factories.”

Minnesota’s E21 Initiative promotes TOU, DG

Minnesota’s utilities should facilitate wider use of TOU pricing models, and the state should move toward a more distributed grid, the E21 Initiative said in a report on future energy systems in the state the group publicized recently. Members of the initiative include the Minneapolis-based Center for Energy & Environment and Energy Systems Consulting Services along with the George Washington University Law School in Washington, DC; the Great Plains Institute for Sustainable Development; Minnesota Power, and Xcel Energy, it added.

The state should also revamp its regulatory approach and framework for Minnesota utilities and emphasize smart grid, E21 Initiative member the Great Plains Institute for Sustainable Development told the press recently.

Minnesota’s grid “relies on many technologies that originated more than a century ago,” while the “rapidly emerging modern grid looks much more distributed and decentralized, with many actors on the system sending electricity and data back and forth,” E21 said in the report.

While Minnesota has “on peak” and “off peak” pricing options, the state’s PUC should “review and adjust time-varying rates for energy services,” which would include a broader array of TOU options, E21 added.

The report recommended a shift from the fossil fuel-centric business model to one that emphasizes “energy efficiency, reliability, affordability, emissions reductions [and] predictable rates,” the report said. The group cited “a growing and fundamental misalignment ... between the traditional utility business model,” along with the regulatory framework that supports it, “and the realities of today’s marketplace and Minnesota’s public policy goals.”

The state should also “develop a transparent, forward-looking, integrated process for modernizing the grid,” – a process which would include “identifying how to achieve a more flexible distribution system that can efficiently and reliably integrate cost-effective distributed energy resources,” E21 added in the report, citing as examples DR and DG.

A shift toward a decentralized, distributed grid in Minnesota could also have major repercussions for utilities in the state, with “increases in energy efficiency and distributed energy technologies,” the report said. That could translate “into even lower sales of electricity and less need for capital-intensive, central station power plants,” it added.

The group cited those as “the two principal ways utilities currently earn revenue.”

While the report did not mention decoupling, it did note that “utilities are faced with [an] inexorable erosion of their traditional sources of revenue” and are “obligated to continue to invest in the electric system, much of which is in need of replacement and upgrades.”

Xcel Energy and Minnesota Power in 2010 decided not ask the state’s

PUC to decouple revenue from sales, with Minnesota Power telling us it had unusual concerns as "a high-load-factor utility."

For Xcel, "pretty aggressive demand-side management incentives" are already "doing a good job of encouraging" the utility – the state's largest electric utility – to "take appropriate conservation measures," (SGT, 2010-Sept-24).

Xcel last year made a rate-increase request meant to partially separate the utility's revenue from power sales (SGT, May-9).

Renewable energy integration is also a concern for the state and regulators should ensure that solar panel owners who sell energy back to the grid are compensated fairly and transparently, E21 added.

E-Gear, Eguana ready for possible boom in Hawaii

Eguana Technologies signed a three-year pact to supply "Bi-Direx" power control and conversion systems to E-Gear, a renewable energy product development firm based in Hawaii, the Canadian firm told the press recently. Bi-Direx is a "high efficiency power control and conversion system for distributed storage," Eguana said, noting it shipped over 2,500 of the systems in the past 19 months, mostly to Germany.

Eguana makes power control systems for grid-connected energy storage in 1.8 KW-15 KW power ratings.

"Unlike conventional power inverter solutions, Bi-Direx enables advanced battery technologies to be deployed on a cost-effective basis in the lower power ratings needed for residential systems," Eguana said.

E-Gear is taking part in Hawaiian Electric's DG interconnection plan, and if the piloted technology is approved, E-Gear estimated demand for the Eguana systems in the first year of the contract could be about 6 MWs, the latter firm said.

3 stories in 90 seconds

SunPower teams with Sunverge in Australia: Solar PV maker SunPower and energy storage firm Sunverge are teaming to offer solar energy storage systems to utilities and residential consumers in Australia and the US this year, the firms told the press recently. The duo plans to offer SunPower's PV panels in combination with Sunverge's "solar integration system," – storage that "offers tremendous benefits on both sides of the meter, from more reliable and cost-effective energy for the consumer to enhanced grid-management and ancillary services capabilities for utilities," Sunverge CEO Ken Munson said in prepared remarks.

Battery maker Electrovaya raises $1.4 million: Electrovaya raised CA$2 million (US$1.4 million) in two recent stock sale rounds, the Canadian firm told the press last week,

noting that a third round is expected to be completed by Jan 9. Euro Pacific Canada and Jacob Securities were the brokers and the funds will be used for general corporate purposes, the firm said. Electrovaya designs and makes proprietary lithium-ion batteries, battery systems and battery-related products for utility-scale energy storage and smart grid power, it added. The firm saw funding from the Canadian province of Ontario's Smart Grid Fund to install 11 "intelligent energy storage systems" in Toronto and London, Ontario, to solve issues caused by system congestion and sudden connection and disconnection of EVs (SGT, Dec-3).

Turner phone app helps monitor meters: Manassas, Va-based HVAC firm Turner's Service is releasing a new smart-home app for the Northern Virginia that allows automation and remote access to thermostats and energy meters, it told the press last week. The app is accessible using smartphones or tablets and users can adjust settings and access energy management data remotely. They can use data from the app to spot energy use trends and adjust thermostats accordingly.

Smart Grid Today is published 245 times/year on business days by Modern Markets Intelligence Inc. (MMI Inc.) at 4908 Hornbeam Drive, Rockville, MD 20853-1475 USA, 1-888-980-4446 or +1-301-769-6903 by phone, +1-301-769-6917 by fax. Standard rate for a one-year subscription is $1,097 in US funds (plus 6% sales tax in Maryland). Significant discounts for bulk and corporate subscriptions are available, including some that allow putting copyright-protected issues on a password-protected intranet site for an entire company to see. We welcome all news tips and rumors. Please submit your story ideas to **Brett Brune**, editor, brett@mminews.com, 213-341-1516. **Sam Spencer**, publisher & CEO. **Season Crawford**, VP of marketing, associate publisher. **Liz Yap**, production director.

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