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ENERGY -- Jail gets its own grid

Dublin facility seeks greater efficiency, security

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Packed with security systems and 3,000 inmates, Santa Rita Jail in Dublin can't afford to lose power in a blackout.

The jail uses about as much electricity as a small town, and its annual utility bill hovers around $3 million. The power needs to stay on, every hour of every day.

So the jail, with help from oil giant Chevron Corp., created its own electrical grid.

Santa Rita's new "microgrid" will allow the facility to cut itself off from the state's electrical grid during a blackout. Power will come from solar panels, wind turbines, a big fuel cell and an even bigger battery pack - all located at the jail. And the switch will happen so quickly, so seamlessly that most of the inmates and staff won't know anything happened.

The microgrid system has other benefits as well. It will cut the jail's utility bills by charging the battery pack at night, when electricity from the grid costs less, and using some of that stored energy in the afternoon, when power prices hit their peak.

"It lowers our costs, it gives us a redundancy system in place, and it sends a message to taxpayers that we're doing our best to run the most efficient jail we can," said Alameda County Sheriff Greg Ahern.

Demonstration project

Funded by the state and federal governments, the $11 million system is a demonstration project that could show how big facilities such as hospitals and military bases could power themselves in the future. It also could help the larger grid by giving those facilities more control over the amount of electricity they need to draw from power lines.

"Microgrids could free up the grid from all these demands we place on it," said Chris Marnay, staff scientist at Lawrence Berkeley National Laboratory.

Alameda County has spent the last decade making Santa Rita Jail's power system more self-sufficient, after the California electricity crisis of 2000-01 sent blackouts rippling across the state.

The jail started in 2001 by installing a solar system capable of generating up to 1.2 megawatts of electricity - roughly a third of the facility's peak demand. In 2005, the jail added a fuel cell producing another megawatt. Five small wind turbines, each one generating about 2.3 kilowatts at peak, were added in 2010. In the meantime, the jail also took steps to cut the amount of electricity and water it used.

A megawatt is a snapshot figure roughly equal to the amount of electricity used by 750 homes at any given instant.

Teaming with Chevron

For most of these steps, the jail and the county partnered with Chevron Energy Solutions, a division of the international oil company headquartered in nearby San Ramon. Chevron Energy Solutions works with businesses and government agencies to cut their utility bills through a mix of energy efficiency measures and renewable power.

In 2008, the U.S. Department of Energy announced that it would hand out grants for microgrid demonstration projects, and Chevron suggested that the jail would make an excellent candidate. A microgrid could tie together all the jail's previous energy projects, make them more efficient and protect the facility against power outages.

"Say if we overproduced with the solar, there wasn't any way to store that energy," said Matt Muniz, energy program manager for the Alameda County General Services Agency. "And we really couldn't project how much solar we'd have, and what our actual loads would be. So this project integrated all those things together."

The project was funded by the Energy Department as well as the California Energy Commission and the California Public Utilities Commission.

The jail still has two emergency diesel generators to serve as a backup. In case of an extended blackout - after a major earthquake, for example - the generators would cycle on whenever the battery pack ran low.

The microgrid system balances the jail's power needs with the electricity generated and stored on site.

Plug and play

And if the county chooses to add more solar or wind power to the facility, the system will integrate that new power supply without any impact on the state's power grid. Although renewable power sources are notoriously fickle - their output changing hour to hour - the variability of any power generated at the jail won't touch the larger grid.

"One of the things the jail really proves is the plug-and-play nature of this," said Osama Idrees, Chevron's lead project engineer at the jail. "They have the infrastructure to add more batteries, add more solar. It is scalable."

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http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2012/03/16/BUQ01NLJAB.DTL

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Osama Idrees (left), Chevron's lead project engineer at the jail, visits the power plant with Matt Muniz, energy program manager for the county's General Services Agency.

Photo: Paul Chinn / The Chronicle

An alternative energy system produces power for Dublin's Santa Rita Jail.

Photo: Paul Chinn / The Chronicle

A converted shipping container houses 2,200 battery cells at the Santa Rita Jail in Dublin.

Photo: Paul Chinn / The Chronicle

Matt Muniz, Alameda County's energy program manager, opens one of four converted shipping containers, each of which houses 2,200 battery cells, of the alternative energy system at the Santa Rita Jail facility in Dublin, Calif. on Thursday, March 15, 2012.

Photo: Paul Chinn / The Chronicle