

9. SMART GRID: Real-time metering could create reliability concerns -- report (08/16/2011)

Hannah Northey, E&E reporter

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A large-scale use of "smart meters" by electricity consumers could trigger power pricing and demand swings that could destabilize the U.S. grid, according to a new report by researchers at the Massachusetts Institute of Technology.

At issue are devices that let electricity customers monitor real-time power usage and respond within minutes through appliances that turn on or off depending on the price of electricity.

Under extreme scenarios, MIT researchers say, automated systems could put electricity prices and power demand on a roller coaster ride.

The report's co-author, Mardavij Roozbehani of MIT's Laboratory for Information and Decision Systems, said allowing consumers to respond to real-time wholesale market prices would close the "open loop" of electricity markets in which price and demand are disconnected. Munther Dahleh and Sanjoy Mitter also co-authored the study.

Instead of electricity bills showing three- to six-month averages for electricity costs, the new system would provide minute-by-minute accounts of changes in the wholesale market.

"Due to increased volatility, the generators will have to constantly ramp up and down, all of [which] increases physical stress on all components of the grid," Roozbehani said. "Slow generators which cannot ramp up and down as fast will have a hard time generating profit and may go out of business ... investment in generation may be discouraged due to high volatility."

The report calls for more sophisticated models of demand for electricity, a deeper understanding of consumer behavior in response to real-time prices, and a thorough understanding of the implications of different market mechanisms and system architectures are needed before real-time pricing can be implemented in large scale.

Eugene Litvinov, senior director of business architecture and technology at ISO New England, said in a statement that he agrees that exposing large numbers of consumers to real-time pricing could theoretically lead to more volatility on the system.

"The authors of this study make a good point in saying that we have to be able to understand, measure and control the complexity of our systems in order to keep the power grid reliable," Litvinov said. ISO New England operates the grid in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

Litvinov said his organization has joined universities and the Pacific Northwest National Laboratory in running computer simulations of how consumers might respond to real-time pricing with an eye toward assuring grid reliability.

Thomas Rumsey, a spokesman for the New York Independent System Operator, said the issue deserves analysis but American power markets are still years away from being concerned about grid reliability problems due to consumers' exposure to real-time pricing and "smart grid" meters.

NYISO currently has 40 megawatts -- 20 MW of battery power and 20 MW of flywheel -- to counter any differences between demand and supply on the grid every 15 minutes, Rumsey said. Such technology will be used to deal with any concerns that surface.

"You rarely have something in terms of technology that can sneak up on you like this," Rumsey said. "It's an obvious evolution of the grid, and these studies are helpful in identifying all the aspects we have to pay attention to, but it's definitely seen as an asset and not a negative."

Roozbehani agreed such technologies could be used for mitigating volatility if they are controlled by grid operators and not subject to market prices. MIT researchers are interested in understanding the trade-offs between cost and reliability imposed by different mitigation mechanisms, he said.

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