Philly condos test AI-enabled energy management system from GRIDPLEX
Project promotes customer-focused 'green' micro-grids

GRIDPLEX is bringing automated conservation and sustainable resource management to intelligent building construction, starting with a "green" development in Philadelphia called Rag Flats, GRIDPLEX Chairman Larry Silverman told us this week. To do so, the largely self-financed, Upper Darby, PA-based firm is partnering with the developer of Rag Flats, the design/build firm Onion Flats, headquartered in Philadelphia.

The $200,000 project is supported by Ben Franklin Technology Partners of Southeastern Pennsylvania. "It will allow people living in the 11 apartments at Rag Flats to set their own strategies for conserving energy and water, using proprietary artificial intelligence and learning applications GRIDPLEX has developed," Silverman said.

"While each flat has an existing solar system, they are neither instrumented nor metered in real time. The GRIDPLEX gear will create a small-scale "intelligent micro grid," by combining local, renewable generation and storage with real-time metering and automation of energy-consuming devices. Installation will begin in mid 2010 and be completed by the end of 2010," he added.

The GRIDPLEX system will seamlessly interface with PECO Energy, the utility serving the Rag Flats project, said Silverman. "We are looking to create an efficient and intelligent interaction between the consumer side of the meter and the utility on the other side, in a relationship that delivers the benefits of sustainability and smart grid technology to both."

GRIDPLEX is creating micro grids similar to those the Galvin Institute has been working on with universities and other large energy-users. "We scaled them down, with the aim that they should include their own self-contained generation, storage and automation, and also interact with the regional grid itself," he said.

The heart of GRIDPLEX's smart grid solution is a patented multi-protocol, embedded automation computer called the C2K. The million lines of code contained in C2K provide users with "local intelligence". The company uses the C2K and its intelligent web-based software to analyze thermostat settings, temperature reads and meter reads. The GRIDPLEX system empowers consumers who want to reduce energy use and cut carbon emissions while not changing their behavior and preserving acceptable comfort levels.

The C2K "will talk to different devices over their native medium and over their native protocol -- wired or wireless, power line, LonWorks, ZigBee and Z-Wave included," said Silverman, who in the 1970s and 1980s pioneered automated lighting control systems for Broadway entertainment and Architecture. "After 35 years in the automation business, it was clear to me that every five years or so, there's a new protocol that's going to 'conquer the world', but it never seems to work that way. So we have designed the C2k to unify new and even future protocols with the wide variety of legacy systems already used by devices in the real world today."

If it Talks like IP …

The C2K uses a patented process to create an object model of each device and its protocol in software. It then proxies an IP address and comes out the other side with IP via a phone modem or over Ethernet. "It looks like you have IP all the way down to the device, no matter what language it speaks," he explained. "This enables us to combine a wide variety of existing disparate devices into a single interoperable network, so that it can be automated effectively."

DTE Energy in Detroit has successfully used the C2K as an energy-monitoring device for several years, and the underlying GRIDPLEX consumer-centric automation algorithms have been proven effective in utility pilots in Texas, Georgia, Michigan and Pennsylvania.

GRIDPLEX's total solution includes programmable, communicating thermostats, and near-real-time sub-meters it is developing with AMRC. The firm intends to work with the Sadoway group at MIT on battery storage, and also plans to collaborate with Lockheed Martin "to make sure we have cyber-secure connections over the 'cloud'," said Silverman. "Data goes back to our servers, which analyze it extensively in order to compute the most efficient operating procedures. Then we send that information back to the C2K to execute with devices."

Keeping in mind that electricity is a speed-of-light medium, "you can't necessarily control everything from the head-end of the network," he said. "The trend in technology is to push intelligence further down the network toward the end points in a truly distributed manner. Ideally, you want an intelligent head-end, an intelligent network and intelligent devices."

Payback in Three Years or Less

The target market for GRIDPLEX is buildings under 100,000 square feet, and residential multi-home complexes throughout the US. "Larger buildings generally have a full-time energy manager and may already have an energy-management system in place from firms like Johnson Controls and Honeywell, Silverman said. Payback on GRIDPLEX system is estimated at three years or less, for energy consumers whose electric bills are $150/month and higher," he added.

Scaling will happen through strategic deployment partnerships, Silverman said, noting that he maintains a small staff in his "technology innovation shop" in Pennsylvania along with a software development team in India.

GRIDPLEX's overarching mission is to create a world of "green communities" that embody sustainability and employ renewable energy.

"I picture the utility business like a seesaw: You've got supply on one side and demand on the other, and the challenge is to keep the two balanced," Silverman said.

In DOE's definition of the smart grid, "point No. 1 is to <u>actively involve consumers,</u>" Silverman said. "Our focus is to empower those energy consumers, both residential and commercial, to proactively influence the demand side of the seesaw, conserving energy and reducing their individual carbon footprint. We are doing so in a manner compatible with the smart grid initiatives being deployed by utilities and RTOs throughout the country, he said. This approach has great appeal to municipal and co-op utilities, where 'the customers are the owners', but we are also finding that it can help many large IOUs meet local their environmental goals."

Recognizing that consumers only have so much time in a day, GRIDPLEX proffers a unique "set it and forget it" approach. "The consumer can be actively involved without having to watch a meter all of the time," he said. "We built a system that has artificial intelligence in it that manages a system using automation for the benefit of the energy consumer as well as for the utility."

If GRIDPLEX can help each household automatically reduce its demand by 1.5kw or more during the 100 peak hours/year that cost utilities and ratepayers dearly, and if GRIDPLEX's system can aggregate "a lot of consumers doing the same, we will deliver valuable demand response for the utilities," he said.

"At the same time, since the majority of our country's electricity is still produced by burning coal, every kWh that is conserved by an energy consumer during non-peak hours has the additional benefit of reducing carbon emissions by a factor of 3-times. This is a huge benefit to society and our overall national sustainability efforts.

Over the long term, that may be far more important than just the economics."