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A New Class of Intelligent Tools for Leveraging Dynamic Energy Pricing

Making building-management systems 'energy-aware'

Editor's note: This is Part 1 of a two-part series.

By Dirk E. Mahling, PhD
WebGen Systems
Cambridge, Mass.

A truly deregulated energy market that functions on the principles of supply and demand requires a price feed that changes in real time to guide customer action and set valid price levels. Most energy users, however, are accustomed to fixed rates, which require no daily change in behavior. For them, flexible pricing and demand response pose a problem, as they simply lack the tools to receive energy pricing in a timely manner and understand their current consumption and related energy situation. Even if that were not the case, they would be unable to chart an optimal course of action.

The primary tool for managing energy in a dynamic-pricing environment is, in most cases, the building-management system (BMS). The main concern of a BMS, however, is device integrity and space conditions. A BMS employs control loops, feedback mechanisms, and clocks to do its work; it does not know about energy prices, tariffs, weather forecasts, etc. To truly function as an energy-management system, a BMS needs a module--preferably, an enterprise one--to make it energy-aware.

A new class of intelligent systems does just that. Figure 1 shows how one of these systems works with a local BMS.

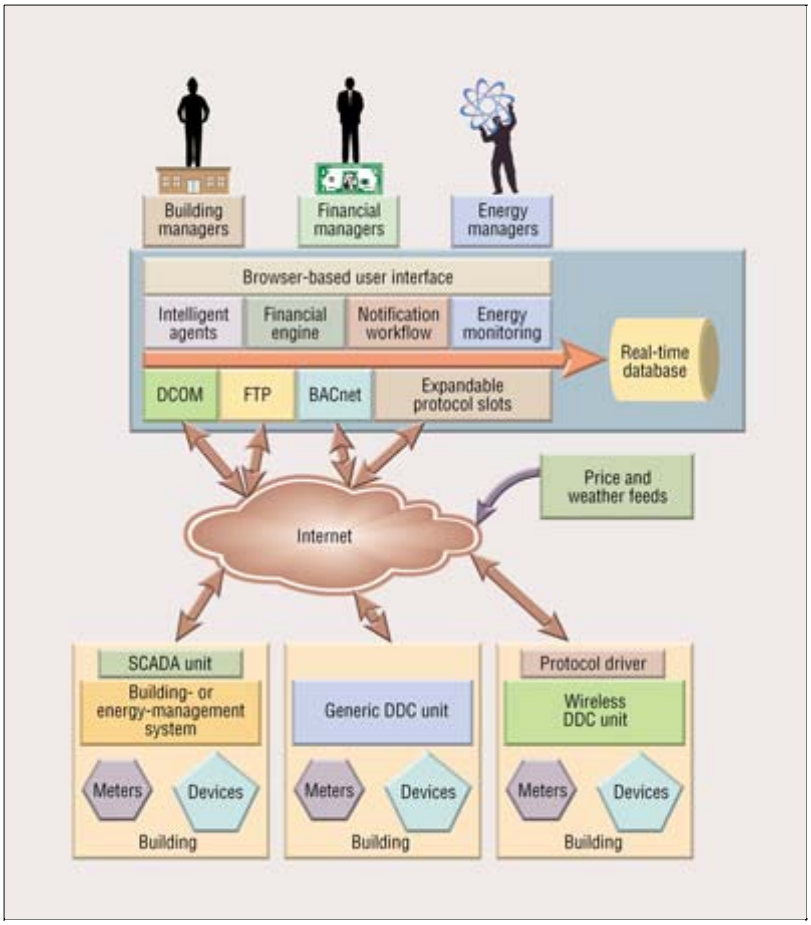

FIGURE 1. How one intelligent system works with a local building-management system.

Meters and devices are mapped from the BMS to the SCADA (supervisory control and data acquisition) unit and then into the intelligent system via the Internet. A protocol driver in the SCADA unit provides communication to the Internet. The SCADA unit:

- Works as a router to connect points in the BMS to the Internet.
- Works as a store-and-forward device to provide a local buffer.
- Works as a protocol translator from the BMS to the intelligent system.

On the other side of the Internet, the intelligent system's communication module picks up sensory data from the SCADA unit, thinks, and then sends a control signal back along the same communications path. The signals are put on the Internet, where local SCADA units pick them up. Communications and addressing are handled via Internet Protocol addresses.

At the heart of an intelligent enterprise energy-management system that works with a BMS are proven energy-management strategies, such as:

- Supply-air-temperature reset.

- Price-responsive supply-air-temperature reset.
- Speed reset.
- Static-pressure reset.
- Pre-cooling.
- Optimal mixed-air-temperature ratio for heating and ventilation.
- Load rotation.

These strategies operate within limits set by end users. Operating information is received from neural networks, which predict energy use based on sensed data from buildings, weather forecasts, and occupancy. One, many, or all strategies can be deployed at a customer site, depending on the equipment and the BMS.

Next month, this series will conclude with a discussion of a strategy for automatically leveraging real-time pricing, as well as tools for participating in demand-response programs.

Dirk E. Mahling, PhD, is chief technology officer and chief information officer of WebGen Systems. For more than 15 years, he has been contributing to the fields of artificial intelligence, knowledge management, Internet architecture, and graph- ical user interfaces through numerous articles in the trade press and academic journals and frequent speaking engagements.