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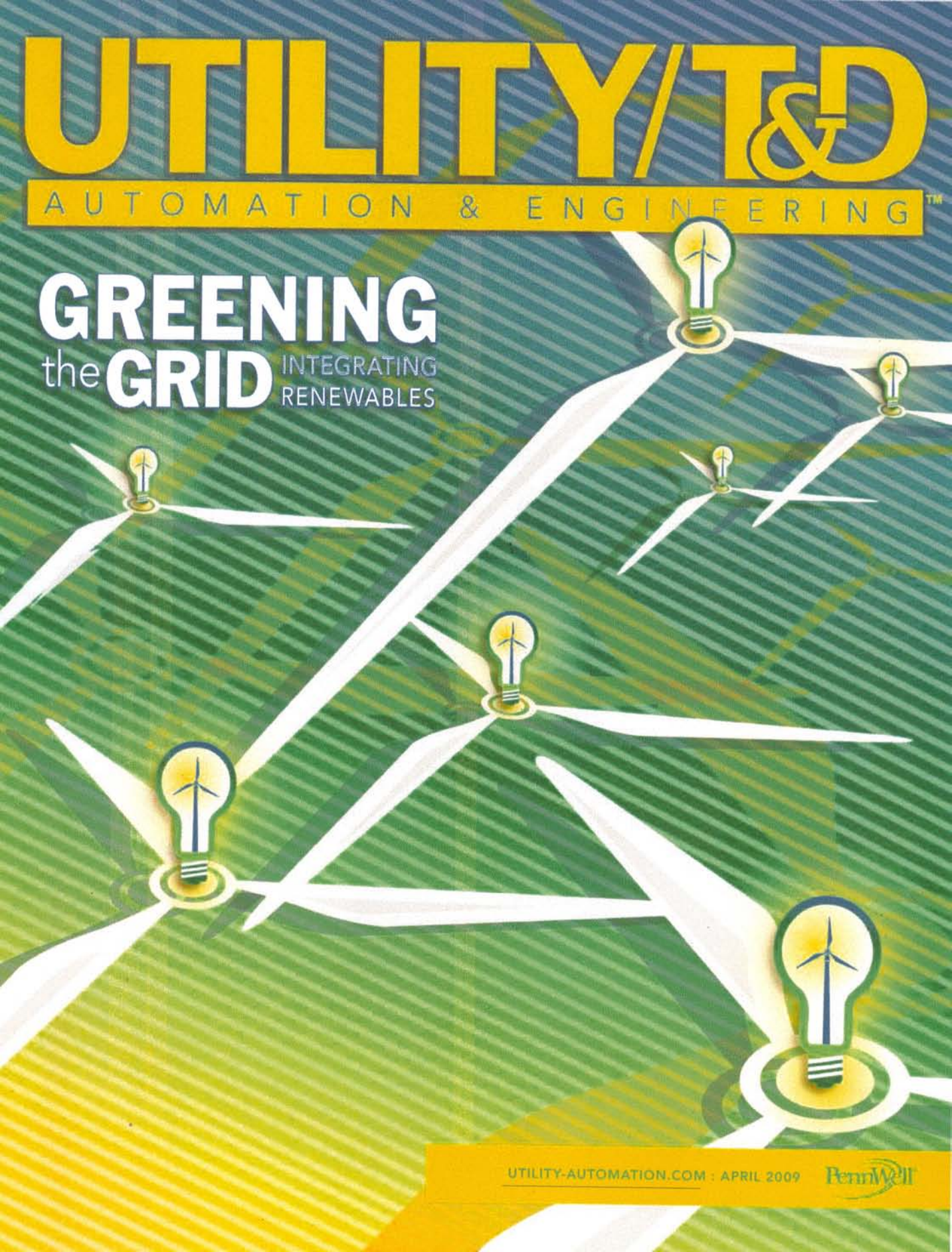

# GREENING the GRID

INTEGRATING RENEWABLES

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# One Alternative to New Power Generation Infrastructure: Demand Response

Building excess power generation infrastructure can ensure a consistent supply of electricity during unexpected system emergencies. Unfortunately, such generation is expensive to construct and often lies idle and unused. The possibility that a utility or independent system operator (ISO) might be unable to meet system demand, however, is unacceptable. Utilities and ISOs must guarantee that they have sufficient reserves at all times to deal with multiple contingencies or they face severe penalties. Although expensive, few alternatives other than generation assets existed in the past.

Recently, however, a reliable and cost-effective way to meet these requirements on a large scale was introduced. It makes use of brownouts and has received the support of power consumers nationwide.

To ensure grid stability during continuously changing electrical demand and potential system contingencies, ancillary grid support services, such as synchronized reserves, are essential. These reserves, traditionally provided by fast-reactive, generation resources, are called synchronized or "spinning" reserves. They must be available to the system operator at a level determined by national reliability rules. In organized ISO markets, these resources are procured from generators through a competitive auction. Until recently, the idea that entities consuming power could be a part of that auction, by offering to provide the same (or better) benefit by reducing load as quickly (or more quickly) than a spinning generator could ramp up to supply it, was not considered, at least not at any significant level.

During the past few years, however, commercial demand response (DR) providers such as CPower have demonstrated that aggregated demand-side resources can provide ancillary services on a large scale. Demand reduction is an extremely effective form of synchronized reserves and can be reliably provided by using SCADA systems for real-time monitoring, metering and control that meet the same requirements as those installed at generation facilities. By paying medium to large energy consumers a meaningful dollar amount—equivalent to or less than the cost of using generation for these reserves—large consumers are often willing to commit to electricity reduction as a standby resource for the grid. In effect, they are agreeing to a voluntary, rolling brownout in return for a portion of the costs of the generation needed to prevent one. The value of synchronized demand reserves is illustrated in the following example:

*On Feb. 26, 2008 (the same day that Florida suffered a blackout), a significant amount of wind and conventionally generated electricity was expected to be on-line in ERCOT but was unavailable. At the same time, the demand for electricity was significantly higher than forecasted. As a result, ERCOT dispatched its rapid-response demand-side resources. CPower provided more than 100 percent of its 225 MW obligation within 10 minutes. Other demand-side aggregators did the same with their obligations, allowing a total of 1,200 MW of load to drop off the grid within 12 minutes. This prevented ERCOT from having to create rolling blackouts for nonparticipating clients by involuntary load shedding.*

Demand-side resources provided a reliable and cost-effective form of fast-reactive reserves in ERCOT, and more recently in the PJM and New York regions. DR is well-equipped to compete with generation resources in this regard and brings a host of other benefits to grid management. This was recognized in 2008 when the Federal Energy Regulatory Commission mandated that ISOs allow demand-side resources to participate in their ancillary services markets unless prevented by local legislation. **uae**

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