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GridWeek Looks Beyond the Stimulus

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Overview

GridWeek is an annual event located in Washington, DC that focuses on progress in developing the Smart Grid. The scope of this year's event grew to include greater international participation. At GridWeek, ARC also learned how US utilities plan to sustain their smart grid investing during the austere, post-stimulus utility business climate that looms. In the utility market, policy leads, especially regulatory policy. In many cases, policy is still catching up to new grid technologies.

> This year's GridWeek event in Washington, DC featured a more international focus as well as presentations of measured energy savings and service improvements by several US utilities.

International Focus at GridWeek

The entire first day of the event was devoted to international content, highlighted by the attendance of a large delegation representing the Indian government, Indian utilities, and Indian electrical manufacturers. Several sessions featured this delegation, including a keynote from India's Secretary of Power.

Stakeholders in the North American grid often fret about the fragmented state of the utility market, preferring the problems faced by countries like France with state monopoly utilities. However, after a day of discussion by international visitors it became clear that, just as diverse business structures are possible for a nation's electric power industry; there are also diverse reasons for smart grid investment.

In the case of India, the business drivers are to reach large un-served segments of the country's population with electric service and to reduce the grid's "non-technical losses" (a euphemistic term). Happily, reducing such losses was what truly paved the way for Italian ENEL to deploy more than

30 million meters, at a time when such a deployment was probably 50 times larger than any other worldwide. Utilities should not neglect theft reduction as a source of smart grid ROI. The benefits are relatively easy to measure, the value can be substantial, and the application has social benefits. Unfortunately, this benefit area is often kept under wraps since it is a difficult topic for both utilities and regulators to speak about.

ARC Session Focuses on Field Device Connectivity

ARC moderated a GridWeek panel session on grid networks and device connectivity. The panel included three electric utilities of vastly different sizes and structures. These were Duke Energy, the country's largest investor-owned utility; Avista, a medium-sized utility in Washington State; and Leesburg, Florida, a small municipality. In addition, the panel included cellular technology developer Qualcomm and an attorney representing the Utilities Telecom Council (UTC).

The very concept of a "smart grid network" can be controversial, in that many believe most new grid applications (such as meter reading, demand response, and outage management) would be best served via existing residential and commercial internet services. Another area of controversy concerns the transformation of the "meter network" into a general-purpose piece of utility infrastructure serving multiple applications, including mission-critical applications. Yet all AMI suppliers tout the value and flexibility of their networking. Finally, some utilities and stakeholders (in this context, stakeholder is polite way to say "special interest group") want the US and other national governments to reserve radio spectrum for critical utility communications, much as has already been done for US public safety applications like police, fire, etc.

> Compared with traditional utility purchasing practices, purchases of networking equipment for smart metering and smart grid applications are from relatively immature suppliers

Avista built a network primarily to support its distribution automation applications mainly using 802.11 (Wi-Fi) wireless and a venture-stage supplier. Duke Energy, with five major geographic service areas, is building a network that is more like an "erector set." This can incorporate a variety of network technologies and can include field-based analytics (ARC clients can view a report on Duke's network supplier by clicking this link.). Leesburg conducted a pilot experiment in multi-vendor device communications and vendor service capabilities, with mostly unsatisfactory results.

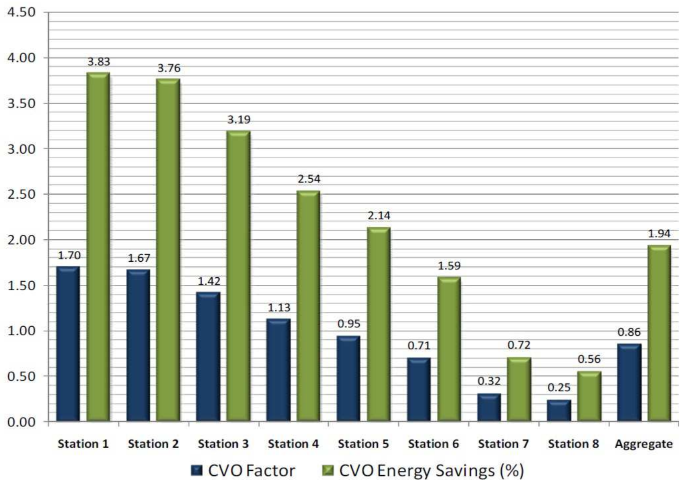
Several points emerged from the panel discussion. First, both medium and large utilities are operating far outside their comfort range when procuring these networks, unless they are buying them through large meter suppliers. Yet most meter suppliers are, by their own admission, not leaders in the networking field. Instead, the need for privately owned field networks has forced major utilities to procure from relatively immature firms (Ambient Corporation, Current Group, Silver Spring Networks, Trilliant, Tropos Networks, etc.). Second, the "private vs. public" debate is really a straw man in that utilities are using both types of networks in their smart grid applications. As IP becomes pervasive within new network technologies (such as meter data collection networks) barriers to utility investment should lower, since an IP network is a well-known commodity, even if its geographic reach is vast. Third, none of the utilities on the panel expressed strong support for reserved radio spectrum, at least for the set of applications they now deploy.

Distribution Automation

Distribution automation (DA) has been an area of growing interest among US utilities and suppliers alike. The attention stems from the fact that distribution circuits have always been a relatively blind spot within utility operations. In addition to existing SCADA sensors, smart meters (which can include sensing and reporting of the local voltage) provide a huge new set of well-located sensors and a torrent of near-real-time information about feeder circuit conditions. The objective of distribution automation is to use this data and/or intelligent field devices to manage the switching equipment, feeder voltage, and power factor more precisely. The overall benefits are higher quality of service and greater energy efficiency for end user customers as well as reduced distribution losses for the utility.

Several US utilities explained their DA projects at GridWeek and showed their improvement measures. One of the most attractive aspects of DA is that it can be deployed incrementally. Utilities operate hundreds, sometimes thousands of distribution "feeder" circuits. DA investment can be targeted initially at the most troublesome circuits, where reliability and/or voltage control are chronic problems. Thus, rather than requiring a large initial infrastructure investment (as is the case with metering and field networks), DA investment can be concentrated on areas (feeders) that expect to yield the highest returns. Furthermore, the required investment is made in smaller chunks as individual feeder circuits are upgraded.

Utilities that discussed their DA programs at GridWeek included American Electric Power, ConEdison, Dominion Resources, and Southern California Edison. Typically, utilities had measured 2-4 percent energy savings for feeders that they had automated for "conservation voltage optimization," or CVO (see figure). The drawback for these programs at this point, presenters noted, is regulatory policy. Optimizing the voltage at the consumer service point saves energy, but under many existing utility rate structures, the consumers realize these energy savings and the result is a ***revenue loss*** to utility suppliers. Clearly, decoupled regulatory policies in which utility revenue is not reduced in proportion to reductions in meter turns (at least when the reductions come from greater system efficiencies) will spur asset investments like DA.



Savings from Voltage Optimization (CVO)
Source: ConEdison, Inc.

Last Word

It's beyond cliché to note that there is no single definition of "smart grid." It's important to recognize this fact, not only when dealing with the global market where regional contrasts and gaps between developed and developing economies weigh, but even within the US, where utilities are a patchwork of organizations that operate in another patchwork of policies and regulations. What would help this market most would be a broad consensus around a few simple, elegant, and consistent policies. An ad hoc approach to policy and regulation inevitably provokes an ad hoc industry response.

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