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The Coming Smart Grid Boom -- and Bust

04.08.10 Jack Ellis, ,

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Smart Grid is the power industry's version of the legendary dot.com boom. It could bring some long overdue innovation and excitement to the industry, or it could leave enormous disappointment in its wake. There are certainly some interesting parallels -- legions of starry-eyed entrepreneurs with big ideas chasing venture capital; a whole cottage industry of newsletters, seminars and conferences; and lots and lots of hype. In 2000, every company was a dot.com company. Today it seems announcements for every new device and every new service in the power industry claim they're either Smart Grid ready, or an essential building block of the Smart Grid.

It's no secret that our nation's power grid (and the power grids of most countries) is a bit antiquated. System operators rely on estimates of power flows, phase angles and voltages at critical points on the grid rather than real data. Transmission line ratings are overly conservative, in part because accurate state measurements and granular temperature and wind speed data are not available in grid control rooms, so operating margins are padded accordingly. Lack of remote diagnostics and communications at substations means the nature and location of equipment outages at both the transmission and distribution levels are difficult to isolate and identify without sending someone to investigate, which in turn leads to unnecessarily long service interruptions. These are some of the critical issues that a Smart Grid strategy should be addressing.

The problem is, installing phasor measurement units (PMUs), putting wind and temperature sensors on transmission towers, and spending money for remote substation monitoring are not the kinds of things that resonate with politicians, regulators or the public. These are parts of the power grid infrastructure that few people see and even fewer people care about, at least until something goes wrong. But they're damned important. Just ask the men and women who monitor and operate the grid every day. Better yet, just ask FirstEnergy.

Likely in an attempt to build broad public support, Smart Grid has evolved into a strategy that focuses on the customer side of the meter. "Smart Meters", which are little more than interval meters that can communicate wirelessly or via some wired medium (telco or utility power lines) and may have two-way communications, are one part of the strategy. Another is in-home displays that allow consumers to monitor energy usage. And then there's the enormous interest in electric vehicles, which presents a sizable new sales opportunity for utilities and power producers, offers a potential source of flexibility to accommodate the variability and difficult-to-predict output of renewable energy projects, and urgently requires innovative solutions to the problem of charging batteries so millions of vehicles plugged in at the same time don't overload the grid. Sometimes explicitly and often times not, there seems to be an underlying assumption among smart grid proponents that customers will allow their local utility or the regional grid operator to control end use devices over this Smart Grid infrastructure.

In this author's view, any Smart Grid strategy must focus on and be limited to those elements of the grid that lie upstream of the customer side of the meter. PMUs and better weather data are particularly worthwhile targets for investment because they could increase the capacity of the transmission system at relatively modest cost and without the headaches of permitting and building new lines. Moreover, all of this upstream infrastructure is owned by the utility and it is the utility's responsibility to maintain and operate it. Modernizing it will require a large investment of time, money and effort that should not be diluted or slowed down by well intentioned but misguided attempts to reach into customer premises.

The customer side of the meter is and should be the customer's responsibility, with perhaps a select few exceptions. It makes sense to require programmable thermostats in new home construction, because they save money and they're cheap. It makes sense to impose appliance level energy efficiency standards if regulators insist on keeping electricity prices artificially low while trying to encourage energy efficiency and demand management. However, home displays and devices that could potentially be used to extend the reach of a utility into homes and businesses are largely a waste of money. If consumers perceive there's value in installing these devices, they should be able to buy them at a local



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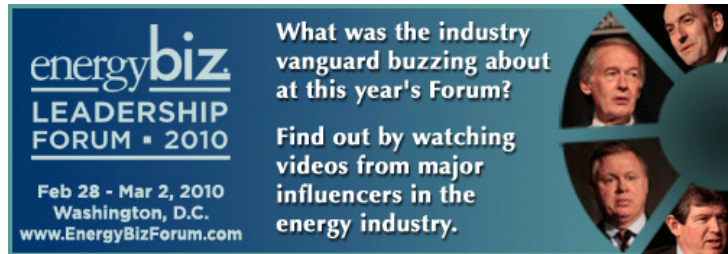
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hardware store or electronics retailer, bring them home and plug them in. Standards development efforts currently underway to facilitate interoperability should ensure that this happens. If customers don't perceive any value in displays and intelligent appliances, then allowing utilities to install expensive, sophisticated hardware in homes and businesses, and then recover the cost in rates is foolish and wasteful. Moreover, even if most customers were willing to allow their local utility to control appliances and electric vehicle charging, it's simply not practical at the scale and level of granularity that is going to be required as renewable energy makes up a larger and larger fraction of our power supply. Current Demand Response programs are not up to the task of providing the kind of flexibility grid operators will need in a few short years and even if they were, there simply isn't enough computing power on the face of the earth to control thousands, let alone millions, of electrical devices in an efficient way that also avoids inconveniencing customers.

It is for these reasons that the more mundane elements of Smart Grid will move forward and likely be highly successful, albeit with little public notice. The sexier elements will likely follow in the footsteps of so many dot.com companies, though perhaps with a twist. This time, companies large, small and mostly tied to the traditional utility industry supply chain will pour substantial amounts of money into R&D, pilots and small-scale demonstrations, only to find out they've misjudged consumers and don't really understand where and how to tap that flexibility. The true fortunes will be reaped in a second incarnation of Smart Grid by clever consumer products companies that can develop simple, easy-to-use devices and a compelling value proposition that gives rise to Grid Smart consumers.

References:

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1. Electricity rates are typically linked to historical costs, which is why customers typically have a hard time justifying energy efficiency improvements. This is one of the reasons residential-scale thermal storage that costs \$1,000/kW can't compete with a new peaking plant that costs \$1,000/kW.

2. The "prices to devices" concept is a much cheaper, simpler and more practical way to harness demand-side flexibility, but the power industry has not yet embraced the different way of thinking about electricity pricing and power system coordination and control that's required for this concept to work.



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Date	Comment
Ferdinand E. Banks 4.8.10	You are treading on dangerous ground, Jack. That expression 'SMART GRID' is enough to rein in the....curious. (I almost said 'suckers.') It has a near-magic lilt. I've seen a few things on the smart grid, but unfortunately I tune out before getting to the nitty-gritty. I do the same thing where CCS is concerned, although I agreed to go to a seminar next week where that topic will probably be mentioned. I just hope that I don't lose control until I get out of the building.
Len Gould 4.8.10	Well, a fairly decent investor newsletter for the traders with a two-day horizon.

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