

August 18, 2008

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FR: Scott Bernstein and Anthony Star, CNT
FOR: Kenny Esser, Policy Advisor, Office of Governor Corzine
RE: A Smart Grid Vision for New Jersey

This memo outlines some of the standards and goals that should be considered by the state and utilities for implementation of a smart grid within the New Jersey Energy Master Plan.

The Energy Master Plan should focus on what is best for the health, economy, and environment of the state, but it shouldn't propose new policies in a vacuum. A lot of work is being done at a national level, and in other states, on defining smart grid plans. For example, the Illinois Smart Grid Initiative, facilitated by CNT, is working to create a policy framework for Illinois: www.ilsmartgrid.org. There is a lot that can be taken from other efforts and adapted to the needs of New Jersey. Harnessing these other efforts will be an advantage to New Jersey, because as new technologies are developed and deployed, New Jersey will be able use standard products and services to lower the cost to New Jersey businesses and residents.

A Quick Review of Other Visions

There are many visions of a smart grid. Some have been developed by government entities, some by utilities, some by advocacy groups, and some by vendors of the technology products and services. Below is a quick review of a few key models from a range of sectors, and some observations on common themes that should be considered in New Jersey.

The **US Department of Energy Modern Grid Initiative** calls for a smart grid that has the following features:

- Self-healing from power disturbance events
- Enabling active participation by consumers in demand response
- Operating resiliently against physical and cyber attack
- Providing power quality for 21st century needs
- Accommodating all generation and storage options
- Enabling new products, services, and markets
- Optimizing assets and operating efficiently

[From: <http://www.oe.energy.gov/smartgrid.htm>]

Meanwhile the privately sponsored **Galvin Electricity Initiative** calls for a set of priorities for the smart grid:

- Allow free, competitive retail markets for electricity service
- Incent utilities to provide customers with time-of-use rates
- Compensate utilities for efficiency programs and customer service, not just for the amount of electricity they sell
- Pave the way for smart microgrids
- Require higher reliability standards for the electric grid
- Enact new energy efficiency standards to conserve power
- Change tax codes to foster grid innovation

[From: <http://www.galvinpower.org/files/PolicyPriorities4.pdf>]

The Galvin Electricity Initiative was developed by the former CEO of Motorola who was frustrated with how grid modernization was progressing and was interested in injecting into it the perspective of businesses and technology entrepreneurs. As a result, while it shares many industry goals, it adds in an interesting layer of the business consumer perspective.

Another vision comes from the **Center for American Progress** which envisions a smart grid in terms of how it can generate environmental improvement and job creation. They frame it in terms of, "...rebuild[ing] the fabric of our communities on modern principles that allow for conservation and clean energy."

The key attributes of a smart grid for the Center for American Progress are that it can:

- Enable demand response
- Increase energy efficient technology
- Reduce pollution with renewable energy
- Deliver plug-in electric cars
- Optimize utility investments

[From: <http://www.cnt.org/news/media/hendricks-greeningthegrid.pdf>]

The three visions have quite a bit in common. They all presume the deployment of a range of new technologies, including smart meters and grid automation. They promote a technology infrastructure that harnesses the free flow of powerful information to allow utilities and consumers to make smarter choices. This includes the basic standard of services that should be expected from a smart grid vision:

- Variety of innovative pricing and demand response products
- More robust, reliable and safer grid
- Better integration of renewable resources and new types of alternative generation

If you dive deeper into the details of each proposal there are differences in policy and technology recommendations, but there is plenty of overlap.

Where the Smart Grid is Today

The smart grid today still exists more as a vision than a reality. Nevertheless, pieces of it are beginning to come together. Smart meter deployments in Ontario are going strongly, and the California utilities are moving forward on their new metering systems. Pilots of other technology pieces are underway in Texas, and Boulder, Colorado is on the path towards being the country's first smart grid city. Innovative real-time pricing rate structures are offered in Illinois, and rate pilots are underway elsewhere. A wide range of technology vendors are promoting new meters, new in home information networks and devices, and the coordinating systems to tie them all together. But nowhere is a fully realized and developed smart grid up and running. A variety of states also have regulatory proceedings underway for the adoption of elements of the smart grid, most typically smart metering proposals.

The opportunity for New Jersey is to learn from what has been done and adopt best practices and standards. The focus will be to make sure that the smart grid is more than just installing an automatic meter reading infrastructure or adopting some new rates and direct load control technologies. It needs to transform the grid to a 21st century architecture that enables a broader range of benefits to consumers, the environment, and utilities.

Standards for a New Jersey Smart Grid

Based on our observations of the smart grid developments elsewhere and the visions outlined above there is clearly a common set of standards for what a New Jersey Smart Grid should look like. However these standards are about the end game; where the grid should be by 2020. In the meantime, there are a number of important issues to work out including:

- The need for pilots and other tests of technologies and rates
- Regulatory and/or legislative issues about how utilities should get cost recovery for their investments
- The quantification and monetization of societal benefits
- Impact on low income and other vulnerable customers
- Integration into transportation policy, especially in terms of the potential for plug-in electric hybrids for both individual passenger use and for mass transit

We would recommend a workshop process or other set of open proceedings to work out these near term issues with the goal of reaching a longer term fully realized smart grid vision.

There are also a few key points that are not necessarily fully articulated in these visions and are worth additional consideration.

First, transparency of data is really important and getting the right standards for this up-front is critical. Utilities have traditionally viewed meter and ancillary data as their information and are not good at sharing it with others. A key component of a smart grid strategy should be to change that and to insist on true transparency of data. This means use of open standards for data and

communications that will allow customers access to the data in a timely and inexpensive manner, and state and units of local government to access the data to analyze and understand energy use with a geographical screen. This will be essential for benchmarking the performance of the Energy Master Plan, both by individual businesses and at the aggregate level.

Second, several of the visions hint at the value of small scale generation and the use of renewables. With the advent of plug-in electric hybrids, the need for fleshing out these visions is extremely important. Net metering and interconnection standards need to be revisited in the context of a smart grid. Traditionally a rate filing for smart meters would be separate from those standards, but because they all begin to converge with smart grid technology, it is essential to have an integrated approach.

Third, none of these visions directly addresses lowering costs. In an era of rising fuel costs and rising costs of new generation, it is probably unrealistic to imagine a future where true costs of energy are lower. But there are opportunities through energy efficiency and other customer side measures to reduce the rate of increase of the total cost of power. This should clearly be a goal for New Jersey's Energy Master Plan.

Fourth and finally, a higher level view of the smart grid vision is that for smart meters/smart grids to work, we need smart utilities. Today's utilities gather fairly little data from their customers and only do only a minimum job of processing and analyzing that data. A smart grid completely changes that. Hundreds, if not thousands, of points of data will be collected from each customer (and other intermediate locations) each month, and that data will need to be reacted to in near real time. This will require great amounts of new automation both at customers and along the grid, but also back in the utility central offices. The, perhaps apocryphal, stories of utilities tracking power outages on yellow sticky notepads on a call center dispatcher's desk need to be relegated to the dumpster. The best practices of other industry sectors that know how to be information-based organizations need to be translated to the utility sector. This will require a culture change at utilities, and it is one that isn't likely to come naturally to them or to their shareholders. It is a clear example of how leadership from outside the industry must apply pressure for the creation of a vision of change.

The Smart Grid in a National Political Context

Advancing the smart grid will not be up to states alone, it will require ongoing action at the federal level. With an upcoming change in administration, federal policy is likely to evolve over the next year. To our knowledge John McCain has not provided a detailed smart grid vision, but his energy policy does include this language:

John McCain will work to reduce red tape to allow a serious investment to upgrade our national grid to meet the demands of the 21st century - which will include a capacity to charge the electric cars that will one day fill the roads and highways of America. And to save both money and electrical power for our people and businesses, we will also need to deploy SmartMeter technologies. These new meters give customers a more precise

picture of their overall energy consumption, and over time will encourage a more cost-efficient use of power.

[From: www.johnmccain.com/Informing/Issues/17671aa4-2fe8-4008-859f-0ef1468e96f4.htm]

Barack Obama recently released the following policy statement:

Achieving these aggressive energy efficiency goals will require significant innovation in the way we transmit electricity and monitor its use. Obama will pursue a major investment in our national utility grid using smart metering, distributed storage and other advanced technologies to accommodate 21st century energy requirements: greatly improved electric grid reliability and security, a tremendous increase in renewable generation and greater customer choice and energy affordability. Obama will establish a Grid Modernization Commission to facilitate adoption of Smart Grid practices across the nation's electricity grid to the point of general adoption and ongoing market support in the U.S. electric sector. He will instruct the Secretary of Energy to: (1) establish a Smart Grid Investment Matching Grant Program to provide reimbursement of one - fourth of qualifying Smart Grid investments; (2) conduct programs to deploy advanced techniques for managing peak load reductions and energy efficiency savings on customer premises from smart metering, demand response, distributed generation and electricity storage systems; and (3) establish demonstration projects specifically focused on advanced technologies for power grid sensing, communications, analysis, and the integration of demand side resources into grid management.

[From: www.barackobama.com/pdf/factsheet_energy_speech_080308.pdf]

A lot remains to be seen regarding how these broad proposals would be turned into action, and what sort of fiscal support from the federal government will actually be available for state efforts, but it is clear that the Energy Master Plan should consider how changing federal goals could impact New Jersey.