State Climate and Energy Technical Forum
Smart Grid's Potential for Clean Energy
March 23, 2010
Webinar Summary

Participants: 63 participants from 30 states and a number of regional, local, and national organizations.

Materials: The participant list, agenda, background document, and all presentation materials from this webinar are available at http://www.epatechforum.org/documents/2009-2010/2009-2010.html. Please refer to these documents for additional detail.

Key Issues Discussed

- Policies at the state level to get clean energy results from Smart Grid (SG).
- Why Smart Grid investment does not automatically produce benefits for clean energy.
- Reasons why access to real-time data on energy use is key to clean energy goals.
- Need for coordination among utility regulators and advocates of Smart Grid, energy efficiency (EE), and renewable energy to promote clean energy goals.

Summary of Presentations

A. Welcome/Introduction – Julia Miller, US Environmental Protection Agency (EPA)

- Smart Grid is getting a lot of attention, but this forum will focus particularly on how the smart grid can enable the adoption of clean energy.

B. Overview of Energy Systems Planning with Smart Grid (SG) Technology – Rob Pratt, Pacific Northwest National Laboratory (PNL)

- The primary targets of SG technologies are reducing costs and increasing reliability, but carbon reduction is also important as an ancillary benefit; hence the DOE study, put out by PNL.

- Mr. Pratt outlined the findings of the DOE study: *The Smart Grid: An Estimation of the Energy and CO_2 Benefits*
  - Direct vs. indirect benefits from reducing energy consumption were evaluated separately.
  - Study results were based on the theoretical assumption of 100% penetration of SG.
  - None of the results from individual actions, e.g.conservation, transmission and distribution system diagnostics, or plug-in hybrid electric vehicles (PHEVs) were very big by themselves (2-3%), but they added up to about 12% reduction in annual electric energy use and utility sector carbon emissions.

- CO_2 reductions are a result of several key factors.
  - There are substantial benefits from reinvesting in efficiency and wind.
  - Another source of reductions comes from lowering excess voltage, but these levels are an unknown factor in parts of the US grid.
  - Reserve generating capacity is reduced as wind is integrated.

- Managing the charging schedule of PHEVs can maximize the use of natural gas generation. It is important to ensure that PHEVs are not charging during peak times when generation comes from oil-fired units.

- Full implementation of SG functionality will provide substantial reductions in U.S. energy consumption and carbon emissions.
  - 9% direct reductions (without electric vehicles).
  - 3% additional direct reductions by supporting additional EVs & PHEVs at very high penetrations (> 60%) by smart charging.
  - 5% indirect reductions from reinvestment of avoided costs for adding extra capacity for regulation and reserves required to support a 25% renewable portfolio standard.

- Advanced Metering Infrastructure (AMI) and demand response (DR) sensors lead to better understanding of consumption patterns.

- There is potential for Solar PV to penetrate to the point that it causes reverse power flows. SG would help address that danger.

C. Policy Planning for Smart Grid Integration – Lisa Schwartz, Regulatory Assistance Project (RAP)

- Key Facts:
  - The power sector produces about 40% of U.S. greenhouse gas (GHG) emissions, but may be called on for 75% of the solution.
  - Carbon pricing is not enough to achieve GHG reductions necessary; state clean energy policies are going to play a big role.

- SG's clean energy benefits are not automatic; SG is only an *enabler*.

- Clean Energy policies should be adopted even in absence of SG investment.
  - Funds for SG investment should not be taken out of clean energy funding.

- It is important to prepare for SG by: engaging with consumers, setting principles/objectives and functionality requirements, making utility transition plan requirements (key due to piecemeal adoption situation), addressing info/security/privacy/ interoperability/cyber-security issues, updating existing rules and requirements.

- To ensure that SG helps achieve environmental goals, it's important to consider the regulatory nexus between energy (power sector) and the environment.

- The most important policy is to acquire all cost-effective EE, as the cheapest resource. It's also important to treat demand-side resources as greater than or equal to supply-side resource, both at the planning and implementation stages.

- States should align utility and consumer interests by addressing the "throughput incentive."
    - Decoupling takes away the disincentive for EE, but by itself provides no incentive; therefore, it's important to consider shareholder incentives for EE

- Consumers need access to data
    - Day-after vs real-time; historical usage; retail vs wholesale
    - Consumer rights and protections should be spelled out

- Policies should integrate SG with dynamic pricing to encourage shifting load to off-peak

- By examining the locational value of customer-side resources and creating incentives for customers, it's possible to defer transmission and distribution infrastructure build-out

Questions

- ***For Rob Pratt: Have you done analyses of the utilization of electric vehicle batteries to satisfy peak demand? In other words, drawing from the batteries for load elsewhere on the grid?***
    - PNL was not drilling down to that detailed level in the study, and did not analyze the origin of certain benefits.

- ***For Lisa Schwartz: Where are leaders in the U.S. in terms of integrating these policies?***
    - IL, CA, TX are all moving ahead on broad-scale smart grid investments. There are additional presentations on the RAP website (www.raponline.org) about state SG activities.

D. Texas' Experience with Smart Grid technology and Clean Energy Goals –Christine Wright, Texas Public Utilities Commission

- Texas has been making SG technology investments in the context of the clean energy landscape, including renewables integration, transmission upgrades, and updated demand response options.

- Texas has seen a big decline in CO_2 largely because of wind integration.

- The challenges of integrating wind are beginning to be addressed by SG technology; they are also trying to address transmission challenges using the Competitive Renewable Energy Zone (CREZ) process which calls for expanding transmission between renewable energy zones and load centers.

- A new nodal design is underway to better integrate response options, as well as a description of the types of smart meters being introduced.

- TX has exceeded its RPS; now the state is looking at non-wind resources, EE, and PHEVs.
    - PHEV usage directly ties to smart meters.
        - This is an important goal for the PUC, and they need to manage this along with Reliant, Oncor, and TXU.

- Texas is also doing the following:
    - Smart Meter (SM) deployment and goal-setting.
        - Using SM functionality to link up wind and other distributed generation (DG).
        - Meter data is available online in 15-min increments.
    - Monitoring the impact on central station generation.
    - Helping assimilate DG resources.
    - Facilitating centralized intermittent resources.

Questions (for Christine Wright)

- ***How do utilities justify investment in Smart Meters, since the benefits are theoretical? How did utilities quantify the benefits?***
    - 1) Legislation in 2005 assumed that SG would include demand response and reliability in the market, and 2) it also required utilities to file a cost-benefit model for evaluating deployment of the SG. The utility needs to come in for reconciliation periodically during deployment, to compare the benefits. However, some types of benefits were not included in the analysis, because the 'wires-only' companies did not look at system-wide benefits.

- ***How much of the dramatic emissions reductions in TX were from downturn in economy?***
    - The study was done by another group, not the TX PUC, but she would be happy to send the question on to them. Ms. Wright believes it was largely a function of increased wind.

- ***How does the PUC work with the TX Commission for Environmental Quality (CEQ)?***
    - The quantification of benefits happens at CEQ; the PUC is not responsible for results or reporting.

- ***Do you anticipate that peak pricing to customers will be based on real-time demand soon?***
    - Yes, already there are some real-time prices being offered to small business class customers; this is expected for other customers soon.

E. Questions and Discussion

What are the prospects for public-private cooperation of SG deployment?
Christine: They have worked with the private sector, especially vendors, on Smart Meters and distributed generation. They rely on vendor information, and use an open stakeholder process.
Rob: There has been a lot of participation in standards setting for *communication* protocols. Google has put SM readings on their website for free, for now.
Lisa: Demonstration projects are a good example of public-private cooperation. For example, Smart Grid in the City of Boulder, CO has been implemented by Xcel in partnership with a number of other private sector entities.

Any advice to states on how to get started, what questions to pose to stakeholders?
Christine: Texas started looking at SM deployment in November 2007, then expanded into other market areas. They filed summaries of impacts on other market areas. Also, they had an independent facilitator run those meetings, which was uncommon, but well worth it.

Lisa: Look at the Illinois Statewide Smart Grid Collaborative for stakeholders. IL also has an independent facilitator.
Rob: Building on Lisa's comments, he seconds the notion that SG and EE share a need for decoupling. They face the same obstacles and disincentives. Also, he seconds the notion that SG does not automatically provide benefits to the environment. To utilize DR and DG resources, one needs short-run influence and control over those resources

What about TX's portal for data access? How did you deal with cyber-security issues?
Christine: The setup for the portal was supposed to take 3-4 months. Instead, it took a lot longer. Agreeing on the functionality made more work for the utility, and home-area-network (HAN) requirements also complicated the process. Cyber-security required an independent security audit before it went public. Audits are now going to be done on an ongoing basis.

Given it is very important to coordinate EE/RE and customer aspects of SG, how do states ensure this happens? Who should be engaged at the state level?
Lisa: Where you have most leverage, utilities will listen, i.e. at the pre-approval stage. For example, Puget Sound Energy is working to provide clear data to customers.
Rob: In recruiting folks for the SG demo, we found that the attention span for electricity/energy issues is pretty short, about five minutes on the phone. Therefore, states and utilities need to reach out to customers with a combined message, even though they may have different agendas.
Christine: Agreed. From 2005-2008, marketing efforts were in silos, and this was not as effective. At the commission level, it's important to start coordination sooner. Also, industry needs to get more sophisticated in packaging EE/CE investments. "Set it and forget it" is the more common attitude.