

## ABOUT THE NEWSLETTER

The EPRI Smart Grid Demonstration Initiative is a five-year collaborative research effort focused on design, implementation, and assessment of field demonstrations to address prevalent challenges with **integrating distributed energy resources** in grid and market operations to create a "Virtual Power Plant." This newsletter provides periodic updates on the project and relevant industry news and events.

## PROJECT UPDATE

### **SAVE THE DATE: October Smart Grid Meeting – Hosted by Con Edison** *October 25<sup>th</sup> – 27<sup>th</sup>, in New York City, New York*

This will be an important meeting for the Smart Grid Demonstration Initiative where we will be prioritizing research across all host-sites through 2013 to extend collaboration opportunities. In addition, we will get a 1<sup>st</sup> hand update of Con Edison's "Interoperability of Demand Response Resources" smart grid demonstration project. More information is on page 4, but if you only attend one EPRI Smart Grid Demo meeting this year, **THIS IS THE ONE TO ATTEND!** (But of course you should attend all of them ☺).

### **7<sup>th</sup> & 8<sup>th</sup> EPRI Smart Grid Demonstration Host Sites officially selected.**

KCP&L & Exelon's Smart Grid demonstration projects are officially approved; see "EPRI Smart Grid Demonstration Host-Sites Update" for more information.

### **9<sup>th</sup>, 10<sup>th</sup> & 11<sup>th</sup> Smart Grid Demonstration Host Sites are under Review**

The review of the final set of large scale smart grid demonstration host-site projects underway. The following three utilities have projects in the EPRI Technical Review phase of the process with Peer Review Webcasts to be scheduled in late June and July. More to come.....

*Southern California Edison (SCE)*

*Duke Energy*

*Southern Company*

### **EPRI / Galvin Electricity Initiative Smart Grid Survey**

If you are receiving this newsletter via email, there is a good chance you received an invitation from EPRI to participate in a smart grid survey. EPRI & the Galvin Electricity Initiative (GEI) have collaborated to create a survey to analyze the development and deployment of smart grid projects around the world. The goals and objectives of the survey are to gain an understanding for different smart grid implementations around the world, identify the key drivers that stimulated leadership to deploy the smart grid projects, describe the lessons learned, experiences, business drivers, and internal/external factors that had an effect on deployment. Although the survey response due date is May 26<sup>th</sup>, if you are interested in completing the survey and can respond by June 4<sup>th</sup>, or have questions, please contact [Christina Haddad](#).

### **Cost-Benefit Analysis Guidebook for Smart Grid Demonstration Projects**

Building on the recent report that was jointly funded by EPRI and the DOE "Methodological Approach for Estimating the Benefits and Costs of Smart Grid Demonstration Project" Product ID [1020342](#), EPRI is extending the lessons from that report into a stand-alone guidebook that can be utilized to perform a step-by-step Cost Benefit Analysis (CBA) of smart grid projects. The guidebook will provide tools to describe the research plan, identify project impacts, associate impacts with benefits, and perform the analysis while also providing a framework for communicating results. In addition to supporting EPRI smart grid demonstration projects it is also designed to meet DOE ARRA Smart Grid Stimulus project reporting requirements. The guidebook is in its early development, but is expected to be publicly released at the end of the summer. If you are interested in being part of the peer review team, please contact [Christina Haddad](#).

Related to the CBA Guidebook, EPRI has developed a Metrics & Benefits template to support development of the DOE Metrics & Benefits Plan for ARRA Stimulus projects. Members of the EPRI Smart Grid Demonstration Initiative interested in this template can contact [Matt Wakefield](#) for more information.



## International Smart Grid Project Tracking

In an effort to extend collaboration opportunities and knowledge of world-wide smart grid activities, we are providing overviews of smart grid projects around the world. We added three E-Energy Projects in Germany to our smart grid projects [web-page](#) and will be adding several more over the coming months. We are very pleased with the cooperation from [E-Energy](#) as well as support from Japan's [NEDO](#) organization (New Energy and Industrial Technology Development Organization) to provide overviews of their smart grid projects. If interested in providing an overview of your national or international smart grid project for EPRI's web-site, please contact [Matt Wakefield](#).

## EPRI Smart Grid Demonstration Host-Site Updates

This section provides a brief highlight of recent activities for each host-site.

### *KCP&L (New Host-Site effective April, 2010)*

The KCP&L "Green Impact Zone" demonstration project objective is the integration of distributed resources into all levels of grid operations including market trading, generation dispatch, distribution operations, and consumer interaction that creates an end-to-end Smart Grid from SmartGeneration to SmartConsumption built around a major SmartSubstation. KCP&L will work with select partners to demonstrate and test renewable energy and distributed generation (DG) sources in a way that will provide benefits to an underserved population, in a designated "Green Impact Zone," while enabling key stakeholders to better understand and demonstrate the technologies, business models, and prices required to further commercialize the concepts.

Initial efforts of this effort are related to development of a research plan that helps to meet the goals of the DOE "Metrics and Benefits" plan. Evaluation and development of use cases using the IntelliGrid Methodology will be near-term activities later this year.

### *Exelon (New Host-Site effective April, 2010)*

The Exelon project is a collaborative effort bringing together ComEd and PECO technologies and applications to further the industry in regards to integration of Distributed Energy Resources (DER). The ComEd Customer Application Pilot (CAP) is a comprehensive customer behavior study that will provide research to understand consumer responses to varying types of pricing programs in various combinations with enabling technology and education in an opt-out format. The project will enhance the assessment of ComEd's AMI options and support other utilities experience-based data on engaging customers via technology, education, and time-based pricing. The PECO demonstration is a project with Drexel University that will develop and deploy an advanced distributed energy management system to demonstrate economic and environmental value of integrating and optimizing DER through a "Smart Campus" micro-grid capable of aggregating dispatchable demand reduction resources to the regional grid.

The ComEd CAP project has started its first billing cycle as part of this project and the analytic evaluation plan is being finalized to evaluate post-summer performance and end-of project performance in 2011. The research activities for the PECO "Smart Campus" are also under development.

### *American Electric Power (AEP)*

EPRI Project Manager, Gale Horst

Simulation tools are used to study at the impact of adding specific technologies to the distribution system. The AEP SG Demo team selected a specific circuit where AMI metering is available in 15-minute intervals. Typical of any data load, in addition to being newly deployed AMI technology, this data must be examined to gain confidence in data accuracy prior to executing simulations.

Cross-check validations provide support for determining the validity of the data set. In the case under study, we had feeder data for the same circuits. Using this data gave us a check and balance for the AMI data. Due to a significant difference, further examination of the circuit revealed that AMI data was missing. This was narrowed down and the team found that one or more 3-phase circuits were not yet being metered with AMI equipment. This reveals yet another opportunity for an algorithmic solution to fill in some data to ensure we are using data that is representative of the circuit under study.

Note that if the data from other sources is available, this type of double check could be initiated at several points in the data validation process to see how close the match is between AMI and feeder or transformer data. We have to note however, that we cannot assume that a close match necessarily infers accuracy of the data. A data scan for duplicate or zero entries is another checkpoint. Duplicate data is easy to identify algorithmically. However, since zero entries can represent both an unoccupied or disconnected premise as well as errant or missing data, these need further validation. This data validation can be a time-consuming process. The AEP / EPRI team is walking through this process and plans to share additional "learnings" as the project work proceeds.

### *Con Edison*

EPRI Project Manager, Gale Horst

Current focus is on creating the demand response command center (DRCC) concept at Con Edison. This will interface into the distribution control center moving the capabilities toward the virtual power plant concept able to enfold customer owned generation and demand response resources. This SG host site is also being realigned to leverage and coordinate with additional stimulus funded projects awarded to Con Edison to maximize the benefits of the projects. The work also intersects with a related EPRI cost/benefit study regarding utilization of a virtual power plant implementation as an alternative to installing an additional transformer for providing contingencies in a Con Edison substation.

### *ESB Networks*

EPRI Project Manager, John Simmins, PhD

The 6,000 person customer behavior trials are now in full force. On average 9 months baseline data has been collected for the 6000 customers. Since Jan 1<sup>st</sup>, 4500 customers have been switched to time-of-day pricing tariffs with varying levels of peak charges. The customers are receiving a range of more informative in bills to assist them in managing their load. In addition 1000 of these customers have In Home Displays (IHDs) giving them real time information on their use and their electricity price.

As analysis of the behavior trials before the full year trial has been completed could be misleading by a novelty effect or lethargic effect of slower responders, the sponsors of this project are keen to ensure that no results of the CBT will be issued until 2011. However the

customer profiles collected to date are going to be studied to compile updated standard customer load profiles for use as part of the Green Circuits and EV streams of the Distribution project.

**Electricité de France (EDF)**

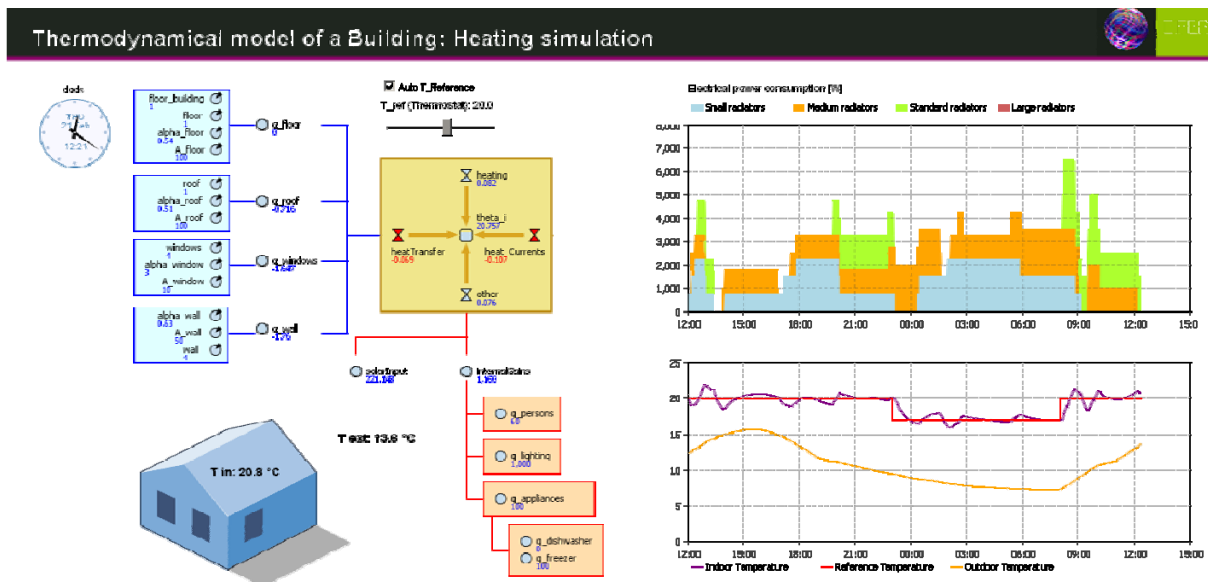
EPRI Project Manager, John Simmins, PhD

**Agent based modelling of the PREMIO Platform** - A bottom-up method to model impacts of PREMIO is being applied. Most of traditional static methods follow a top down approach where electrical demand modelling at a higher level is generated and later broken down. The Agent-Based Model developed within the framework of PREMIO presents a three level bottom-up approach and uses data provided by statistical sources that has been geographically located.

This model includes:

- Agents representing customers at the lowest level that generate the demand based on stochastic models,
- This demand is aggregated in the second stage at the distribution transformers which are modelled as agents as well
- At the global level, the global aggregation point represents the substation

Results of the model, though still not completely calibrated and validated show advantages in comparison with classical modelling approaches. The bottom up approach allows for a realistic way to reproduce heterogeneous user behaviour because demand is not predefined at a high level but generated at individual agents and then aggregated. Creation of future scenarios by changing agents' behaviour are possible and permits the analysis of DMS strategies, large penetration of DG, integration of Distributed Resources or the individual usage of electricity of a selected number of customers. The model allows also for a real time simulation enabling to observe single customer's consumption. Different PREMIO Distributed Resources are being integrated. At the moment, this includes a thermodynamic model of the buildings to estimate the electrical heat demand as well as social behaviour models at household level.



**FirstEnergy / JCP&L**

EPRI Project Manager, Gale Horst

The addition of an additional 10 MW of direct load control is bringing the total sum to 15MW in the FirstEnergy project in its Jersey Central Power & Light region for the 2010 peak season. Plans are underway to add distribution line sensors that also utilize the same communications mesh network. Several types of sensors are being deployed in an initial test pilot to evaluate the utilization effectiveness of each. These include both single and three-phase sensors. Several IceBear units are also a part of the demonstration providing evaluation of permanent peak load shifting technology. An integrated control platform utilizes the two-way communication system to control and display the controlled load, available load, and the load currently being shed.

**PNM Resources**

EPRI Project Manager, John Simmins, PhD

Work is progressing on the modeling work for the distribution feeder. The University of New Mexico is currently working on getting the translation from PNM's Graphical Information System (GIS) into GridLAB-D. The feeder layout is nearly complete, and work continues to complete the distribution equipment attributes used in the model. The translation from the GIS system to GridLAB-D has proven to not be a trivial process. Additionally, initial models have been made to model the Distributed Resources (DR) in OpenDSS. These initial models are currently being refined to better represent the actual system variables. Lastly, models have been created in TRNSYS to model building energy performance. Future work will combine those models to create a prediction of feeder performance with the distributed generation resources and storage, including building energy storage and how these systems can interact with Solar PV.

Building on last year's Use Case completion, work continues on using the IntelliGrid methodology to complete the architecture requirements and trade-off analysis. With that work, technology candidates will be identified and a gap analysis for missing technologies will be completed. Current emphasis is focused on the DMS with a report being created on candidate technologies, emerging standards, selection criteria decision factors, and tradeoffs based on the analysis. Sandia National Laboratories is leading the efforts on the remaining analysis using the IntelliGrid methodology.

## Technology Transfer Activities – Deliverables Update

New Deliverables since last Newsletter available for download at [www.epri.com](http://www.epri.com).

- Product ID [1020340](#): Architecture Reference Design for Distributed Energy Resource Integration
- Product ID [1021265](#): Architecture Considerations for Integration of Distributed Energy Resources (DER), *EPRI Smart Grid Demonstration Meeting – Architecture Panel Session Proceedings, March 4<sup>th</sup>, 2010*
- Product ID [1020832](#): Development of Data Information Exchange Model for Distributed Energy Resources (Publicly Available)
- Product ID [1020598](#): ESB Networks Smart Grid Demonstration Host-Site Overview (2-Pager), (Publicly Available)
- Product ID [1020892](#): KCP&L Smart Grid Demonstration Project Description
- Product ID [1020893](#): Exelon Smart Grid Demonstration Project Description

### Related Publicly Available Deliverables from other EPRI Programs

- Product ID [1020855](#): Guidelines for Designing Effective Energy Information Feedback Pilots: Research Protocols
- Product ID [1020908](#): Accuracy of Digital Electricity Meters

## Smart Grid Industry News on web-site and with RSS Feed

We are posting industry related smart grid news on the home page of [EPRI's Smart Grid Resource Center](#). We typically update the list of the previous week's key smart grid news items on Monday mornings. Please keep this resource in mind as you are tracking industry news. EPRI specific news and [Twitter feed](#) can be found on [EPRI's home page](#).

## EPRI “Resident Researcher” Employee Program - Smart Grid Engineer or Analyst

*EPRI has an opening for a Smart Grid Engineer or Analyst in our Knoxville TN office.*

The “Resident Researcher” program is open to EPRI utility members supporting the Power Delivery and Utilization (PDU) Sector. The five-year Smart Grid Demonstration Project has created a unique opportunity to expose your new or seasoned engineers or analysts to hands-on smart grid projects focused on integration of Distributed Energy Resources. Location of the position is in Knoxville, TN and duration can be from 1 to 3 years. This opportunity will provide broad experiences in real-world smart grid industry activities and help strengthen and prepare your workforce for the future. Please email or call [Matt Wakefield](#) (865-218-8087) for more information.

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### KEY EPRI SMART GRID DATES

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## EPRI Smart Grid Demonstration Meeting - June 2010

**When/Where:** June 9 - 11, 2010, Hosted by Electricité de France, Clamart, France (South of Paris).

This is a unique opportunity to gain first hand knowledge of the international perspective on smart grid projects including joint participation with ADDRESS: [Active Distribution networks with full integration of Demand and distributed energy RESources](#) ([ADDRESS](#)) meeting. If interested in a last-minute registration, please contact [Robin Pitts](#), 865-218-8057.

## EPRI Power Quality and Smart Distribution 2010 Conference and Exhibition

**When/Where:** June 14 - 17, 2010, Quebec, City, Canada. [Register here](#).

EPRI and Hydro-Québec invite you to the 2010 EPRI Power Quality (PQ) and Smart Distribution 2010 Conference and Exhibition. This conference will provide an unparalleled forum for electric power end users, distribution engineers, reliability and power quality professionals, and related technology manufacturers to gather, share experiences, and learn from one another in a highly efficient and focused environment. The week of events will also include pre-conference tutorials/workshops in power quality, smart distribution, and electric transportation as well as post-conference EPRI working meetings for the EPRI Power Quality (Program 1) and Smart Distribution (Programs 30, 124 and 128) research areas.

## EPRI Smart Grid Demonstration Meeting - October 2010

**When/Where:** Hosted by Con Edison, New York City, October 25 – 27, 2010.

**SAVE THE DATE**, Invitations coming in late June or early July.

Con Edison is hosting the Fall EPRI Smart Grid Demonstration Meeting in New York City where we will get an update on their smart grid demonstration project. In addition, this will be an important meeting for all the member utilities of the Smart Grid Demonstration Initiative where we will be prioritizing research and technology transfer activities through 2013 based on your most important smart grid issues. In the second phase of this 5-year initiative, we are transitioning to “Issues Based” smart grid research across all the host-sites where we will compare and align the inventory of all the smart grid technologies and applications and rank them against the collaboratives’ interest. In addition, we will be developing a three year strategy on Technology Transfer for meetings, webcasts, reports and smart grid training. If you only attend one EPRI Smart Grid Demonstration meeting this year, THIS IS THE ONE TO ATTEND!

## 4<sup>th</sup> International Conference on Integration of Renewable and Distributed Energy Resources

**When/Where:** December 6<sup>th</sup> – 10<sup>th</sup>, Albuquerque, NM (<http://www.4thintegrationconference.com/>)

A portion of the meeting will provide an update on EPRI Smart Grid Demonstration projects. Registrations are now open.

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EPRI | 942 CORRIDOR PARK BLVD. | KNOXVILLE, TN 37932 | WWW.EPRI.COM

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