



## 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

### Welcome Sacramento Municipal Utility District (SMUD) to the EPRI Smart Grid Demonstration Initiative – Now 21 International Electric Utility Members in the Collaborative

SMUD is our most recent member of the initiative and was able to participate in the March Smart Grid Demonstration Advisory meeting hosted by Southern Company. We are working with SMUD in the development of their Host-Site project integrating Distributed Energy Resources. The stakeholder web cast on their project is expected in the next month or two. More to come.

### Hydro-Québec Smart Grid Demonstration Host-Site Project - Under Development

Hydro-Québec's Smart Grid Demonstration Host-Site project has completed the first two phases of the process and we are working on the final step of a stakeholder web cast prior to presenting it to the EPRI Board of Directors in April. The stakeholder webcast is tentatively scheduled for April 6<sup>th</sup> at 11am Eastern (invitations coming shortly) and will discuss the details of their Smart Grid Demonstration Project.

### Summary of March Smart Grid Demonstration Advisory Meeting

A big THANK YOU goes out to Southern Company for hosting the March 2011 Smart Grid Demonstration Meeting at the Georgia Power headquarters in Atlanta. A majority of the meeting was focused on providing updates on research efforts related to the four strategic topics: 1) Conservation Voltage Reduction (CVR) and Volt/VAR Optimization (VVO), 2) Consumer engagement, 3) Energy Storage Monetization and 4) DMS Integration and Visualization. In addition to EPRI providing updates on the research progress, ten different utility members provided project updates and results associated with these topics to achieve our goal of cross-collaboration and learning. More detail related to these research topics follows later in this newsletter. Southern Company also provided additional detail on their Smart Grid Projects including the topics of AMI, Fault Location Analysis and Distributed Photovoltaic (PV) systems followed by a tour of their Technology Showcase and Georgia Power Annex Distributed PV Systems evaluating at least six different PV technologies.



Figure 1: Team Photo - EPRI Smart Grid Demonstration Advisors

## EPRI Program COCKPITS



Access ALL program and project information in one, centralized place!

EPRI's new [Program Cockpits](#) provide EPRI Members a centralized location to bring together research results, events and event materials, links to collaboration and user groups, contacts, committees, technology transfer and more. The Smart Grid Demonstration program information is also available in the Cockpits including access to the monthly web casts and the advisory meeting presentations which are available for download.

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### Program D\_SG: Smart Grid Demonstration

The Smart Grid Demonstration Project is conducting several regional demonstrations to integrate distributed generation, renewable generation, storage and demand response technology into a "virtual power plant." The widespread, efficient and cost-effective deployment of these technologies requires new capabilities in the distribution system as well as integration with the overall power system operation. [Read More...](#)

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**Research**

**Research Results** | **Research Support** | **Announcements**

American Electric Power Smart Grid Host Site Progress Report 28-Mar-2011 [Download](#)

Decision Support for Demand Response Triggers: Methodology Development and Proof of Concept Demonstration 03-Mar-2011 [Download](#)

**Links**

Integration

Smart Grid Technologies Report 01-Dec-2010 [Download](#)

There are no Announcements listed at this time.

Click on **Events** to Download Presentations from Advisory Meetings

Click on **Webcasts** to Download Presentations and Recordings of Webcasts

### The Smart Grid Reference Guide to Integrating Distributed Energy Resources

One of the challenges associated with cataloging the vast amount of information we are collecting is consolidating all of it into an easy to use, valuable resource. To accomplish this goal, we are developing a Smart Grid Reference Guide. Since our last meeting in November, we have made significant progress in this effort and as a team we evaluated the format of the content to make sure we are including the right content and making the content easy to find. We received a number of excellent suggestions and we are on track to have the first revision of this guide published later this year. We will have a near final draft ready to review at our next meeting in June.

On a lighter note, the acronym for the "Smart Grid Reference Guide to Integrating Distributed Energy Resources" doesn't exactly roll off the tongue (SGRGTIDER). Fortunately, we have some creative members and Karlton Fredebeil of TVA came up with an alternative name for the "Reference Guide." His suggestion is: Grid Integration of Distributed Energy Resources; Definitions, Operations, Networks and Elements. The resulting Acronym is "GIDER DONE" – This suggestion is under review, the EPRI Marketing team is seeing it for the first time if they are reading this newsletter... Don't hold your breath Karlton.

### Smart Grid Training

Our first Smart Grid Training session was provided by Bob Uluski, EPRI Technical Executive, on the topic of Advanced Distribution Management System (DMS) Applications and the session was well received. The video and content from the presentation is being formatted into a formal deliverable for member utilities to use to train their own staff on smart grid topics. The deliverable is expected to be available prior to our next meeting in June. We are anticipating approximately three smart grid training sessions per year with possibility of having 12 different training modules at the end of the initiative.

The next Smart Grid Training topic is on Communication Technologies and will be given by Tim Godfrey, Senior Project Manager at our June meeting hosted by Duke Energy June 28<sup>th</sup>-30<sup>th</sup>. Tim is a relatively new member of the EPRI team specializing in Smart Grid Communications. He has worked in the area of wireless networking and communications for 20 years and has 16 granted and 9 pending patents. Mr. Godfrey has participated in IEEE standards development since 1994 and is the chair of the IEEE 802.16n task group, and served as the IEEE 802.11 working group secretary from 2000 to 2007.

The Communications Technology training syllabus is being finalized, and the training will include topics like

- Basics of RF and Propagation
- Modulation and spectral efficiency - Approaching Shannon's Limit
- Coexistence, Interference, Interoperation
- Wireless Standards - History/timelines/evolution; What are they good and not good at? How do they solve utility needs?
- Forward and Backward Compatibility
- How wireless networks differ from point-to-point wireless links
- Reliability and management

Cyber Security was overwhelmingly selected as the preferred training topic for our October Smart Grid Demonstration meeting hosted by KCP&L in Kansas City, MO. We are fortunate to have a talented (and growing) Cyber Security team to support the training as well as our Cyber Security efforts within the Smart Grid Demonstration Initiative.

### **Cyber Security Strategies**

We have four main Strategic Topics identified for cross-collaboration in the initiative, but Cyber Security was identified as a high priority as well. To capture member Cyber Security strategies along with industry practices, we will be conducting phone interviews with the CTOs and CIOs at member utilities. A majority of the interviews will occur during April and a summary of the results will be presented at the June Smart Grid Advisory meeting. A subsequent report will be produced as a deliverable.

### **Smart Grid Maturity Model**

As a group we discussed how we may be able to use the Smart Grid Maturity Model (SGMM) from the Software Engineering Institute at Carnegie Mellon University ([www.sei.cmu.edu](http://www.sei.cmu.edu)) within the Smart Grid Demonstration Initiative. The SGMM is a management tool that provides a common framework for defining key elements of Smart Grid transformation and helps utilities to develop a programmatic approach and track their progress. Many of the members have already gone through the process and found it useful for a Smart Grid Roadmap-like process to be used by individual utilities, but there was uncertainty of the value when performed as a group since the optimal SGMM profile should vary by utility. That said, EPRI will sponsor a couple of SGMM self-assessments to help us explore this further. In addition, we are evaluating the SGMM in the IntelliGrid program as a possible compliment to our Smart Grid Roadmap efforts including efforts to set Smart Grid aspirations as part of a roadmap.

### **EPRI Public Advisory Group (PAG)**

The Smart Grid Demonstration Initiative has been and continues to be a good forum to help inform and educate non-technical policy makers through EPRI's PAG on research and science of Smart Grid technologies and applications. A brief overview of the PAG was presented to explore how we can continue to educate policy makers as well as how policy makers can educate electric utility technical staff. The general discussion acknowledged that in some cases state technical staff is shrinking and educating them is becoming more difficult. This is especially so when managing expectations, since in some cases early expectations have given the perception of poor performance. There was a general appreciation of the efforts of the PAG. In addition, technical staff would like generalized feedback from policy makers on what they are looking for to approve Smart Grid Technologies. The next PAG meeting is in Portland Oregon on April 5-6, 2011. If Smart Grid Demonstration members are interested in attending, please contact [Matt Wakefield](#) or [Ellen Petril](#) for more information. In addition, at our October Smart Grid Demonstration meeting hosted by KCP&L, we are planning on having a ½ day joint session with the PAG and the Smart Grid Demo members.

### **Smart Grid Demonstration 3-Year and 4-Year Public Updates**

The Smart Grid Demo [2-Year Update](#) was well received and it is important we continue to make public contributions to help advance the industry. While we are largely in a deployment and data collection phase for most of the Host-Site projects, we are working to share scientific and technical results to benefit others. To accomplish this goal, the 3-year update will provide a view into the progress of each of the projects and where we have results we will begin publishing case studies. By the time of the 4-year update in 2012, we expect to have many more case studies to publish. Each of the EPRI Project Managers will be coordinating with the associated electric utility members to collect the information required as part of this effort.

## **Strategic Smart Grid Research Issues and Topics**

### **Strategic Research Topics for Cross-Collaboration in 2011**

Four strategic issues were identified as top priority research topics to collaborate across host-sites in 2011. Below is an update on the progress of the 2011 topics. Formal updates will occur at the next three EPRI Smart Grid Demonstration Advisory Meetings and selection of new topics will occur for 2012, 2013 & 2014.

### **Conservation Voltage Reduction (CVR) and Volt/VAR Optimization (VVO)**

The Conservation Voltage Reduction (CVR) and Volt/Var Optimization (VVO) strategic topic team was able to bring in Bob Uluski, Technical Executive for EPRI, to present a "VVO/CVR Best Practices" presentation to the group as one of the deliverables for the topic. Bob's presentation covered the latest methods that utilities are implementing to achieve their CVR/VVO goals across the nation. Bob's presentation also covered the benefits that some utilities have achieved using their CVR/VVO systems. Mark Nealon, Manager of Smart Grid Strategy and Implementation at AmerenUE, gave Ameren's Volt-Var Optimization Use Case presentation. We learned some of the history and reasons why Ameren is deploying the project, and then Mark walked the group through Ameren's thought process during the use case workshop and spoke of the plans Ameren has to implement the system. Adile Ajaja, Engineer at Hydro Quebec, presented an overview of their VVO Implementation. Hydro Quebec has a large implementation and has a vast amount of experience. Adile presented some of their benefits of their CVR/VVO project to date and presented the plans for expanding their systems in the future. Joe Nowaczyk, Executive Manager of Electronic Systems at SRP, presented "SRP Voltage Reduction Study Preliminary Finds" which allowed the group to see the work that was completed during SRP's involvement with the Green Circuits project for their CVR/VVO implementation. It was very interesting to see how three different utilities are implementing CVR/VVO systems and it was valuable to hear from three of the newer members of the Smart Grid Demonstration.

From the presentations we were able to see that the purpose of CVR/VVO is to maintain acceptable voltage at all points along the distribution feeder under all loading conditions. It is done by improving system efficiencies by reducing losses through var correction and through voltage optimization. It is also valuable in reducing electrical demand and/or accomplishing energy conservation through voltage reduction. CVR/VVO also has value in the smart grid by maintaining proper voltage after "self-healing" of the system has occurred, and will assist with widespread deployment of distributed generation, energy storage and other distributed energy resources as it calculates and adjusts the system to optimize var and voltage with these new components. Finally, we learned that the "CVR Factor" measures the effectiveness of CVR.  $CVR\ Factor = \frac{\text{Percent change in load}}{\text{percent change in the voltage}}$

### DMS Integration and Visualization

The ability to view, recognize and act on information emanating from multiple streams of data is a key factor in the effectiveness of any system used for distribution management. Distribution Management Systems (DMS) are key to coordinate dispatch of DER with other advanced distribution grid management activities such as conservation voltage reduction, fault location isolation and restoration and system optimization and reconfiguration. Each of these activities, taken on their own, is complicated enough but need to be performed in coordination with other sources of data such as weather, traffic and workforce location and availability. The visualization of all these resources and data types can be overwhelming and some sort of prioritization needs to be taken.

The goals, of the DMS Integration and Visualization strategic project, as set out in the October meeting, were to survey the members of the Smart Grid Demonstration Project for their current and future views of DMS data visualization to separate the “must have” capability from the “nice to have”. A survey was created and the results were presented at the March meeting. Functionality that was high on the list to obtain included the status of IEDs, status of outages, switching order support, what-if scenarios, draft switching orders, DER availability and links to work management or asset management. Functionality that might be classified as “nice to have” included Volt/var control, DER dispatch, DER results verification and energy requests. Other functionality such as crew location and visibility into the transmission system did not figure prominently in the priorities of the survey participants. State management and predictive behavior of the distribution network seemed to be most important. These results seem to indicate that most of the information, critical to the survey participants could be found in DMS applications such as present by Bob Uluski with links to external systems.

The team will be meeting to discuss the next steps in the strategic project. The preliminary results of this effort are shared in Presentation 17 “DMS Integration & Visualization Survey Results – accessible from the EPRI Cockpits.

### Energy Storage Monetization

The Energy Storage Monetization Strategic Topic is focused on addressing the issue of monetizing the benefits of energy storage and using energy storage for multiple applications to achieve numerous benefit streams. One of the first goals of this effort was to document benefit and costs of energy storage and share member approaches. This was accomplished in coordination with EPRI’s Energy Storage Program led by Dan Rastler. During the smart grid advisory meeting, Dan provided background information on the Advantages of Energy Storage: bidirectional (load or source), high efficiency at partial load, flexible location sizing and siting, silent, and no emissions. The challenges with energy storage are limited energy duration, cost, and durability. The key factors that affect cost and value of energy storage include capacity available (kW), energy storage (kWh) / duration, roundtrip efficiency (AC/AC), operation and maintenance costs, and location.

Value Chain	Benefit	PV \$/kW-h		PV \$/kW	
		Target	High	Target	High
End User	1 Power Quality	19	96	571	2,854
	2 Power Reliability	47	234	537	2,686
	3 Retail TOU Energy Charges	377	1,887	543	2,714
	4 Retail Demand Charges	142	708	459	2,297
Distribution	5 Voltage Support	9	45	24	119
	6 Defer Distribution Investment	157	783	298	1,491
	7 Distribution Losses	3	15	5	23
Transmission	8 VAR Support	4	22	17	83
	9 Transmission Congestion	38	191	368	1,838
	10 Transmission Access Charges	134	670	229	1,145
	11 Defer Transmission Investment	414	2,068	1,074	5,372
System	12 Local Capacity	350	1,750	670	3,350
	13 System Capacity	44	220	121	605
	14 Renewable Energy Integration	104	520	311	1,555
ISO Markets	15 Fast Regulation (1 hr)	1,152	1,705	1,152	1,705
	16 Regulation (1 hr)	514	761	514	761
	17 Regulation (15 min)	4,084	6,845	1,021	1,711
	18 Spinning Reserves	80	400	110	550
	19 Non-Spinning Reserves	6	30	16	80
	20 Black Start	28	140	54	270
	21 Price Arbitrage	67	335	100	500

Figure 2: Estimated Range of Benefits \$/kW-h and \$/kW\*

\*See Reference: EPRI Report 1020676: [Electricity Energy Storage Technology Options: A White Paper Primer on Applications, Costs and Benefits](#). Each benefit is modeled in isolation using a consistent battery configuration of 1 MW of discharge capacity and 2 MWh of energy storage capacity, with a 15-year life and a 10% discount rate. “\$/kW-h” used in this table is the present value of the benefits divided by the useable kWh of the energy storage device.

To collaborate and share approaches for deploying and benefiting from energy storage applications, three presentations were presented by Jon Hawkins, PNM, Brian Schell, American Electric Power, and Mike Rowand, Duke Energy. All three presentations outlined their

project goals, but all also indicated that they were early in the deployment phase so research results to validate assumptions are not available at this time. The next steps of this strategic topic includes coordinating with EPRI's Energy Storage Team on the development of a tool to help estimate the monetization of energy storage technology when applied to multiple applications. We are shooting for a prototype of this tool by the June Advisory Meeting.

### **Consumer Behavior and Engagement**

During the EPRI Smart Grid Demonstration advisory meeting several presentations and discussions took place on the topic of consumer behavior. The consumer engagement in the ComEd CAP pilot was reviewed. This involves a total package combining various consumer engagement elements such as the rate, presentation of electricity usage information, customer informational materials and resources, and measurement of the enabling actions that indicate the extent to which consumer engagement is taking place. EPRI released a report covering the design of this study (Report No. 1022266). The follow-up report covering the first three months is being finalized and should be available the first of April (Report No. 1022703).

FirstEnergy presented materials and a live demonstration of the door-to-door customer recruiting process for their IDER (Integrated Distributed Energy Resources) project. The program utilized a combination of printed materials, web, and outsourced enrollment personnel. Of the consumers personally contacted for enrollment 40% agreed to participate in the program. Plans are being made to extend the customer engagement by offering training to local HVAC contractors to ensure understanding of the equipment they may encounter. With thousands of customers enrolled (currently 15MW of AC with the target of more than doubling this amount of controlled load) the benefit of this awareness will help retain customers via the understanding of the installation and service technicians.

A number of documents were reviewed by the EPRI team as a baseline topical scan on related topics. In addition to information reviewed in the March advisory meeting, below are some highlights and references to related material included in the scan. Demo participants are encouraged to also review these, and any similar documents found, and submit comments:

- **2011 State of the Consumer Report** (<http://smartgridcc.org/tag/report>)
  - The Smart Grid Consumer Collaborative (SGCC) aims to gather all stakeholders to listen, educate, and collaborate toward modernized electric systems in the U.S. The SGCC welcomes consumer and environmental advocates, technology vendors, research scientists, and electric utilities to work toward a common goal of accelerating adoption of a consumer-friendly, consumer-safe smart grid. The SGCC report titled 2011 *State of the Consumer Report* is a recommend read covering a look at the knowledge gap, adoption, segmentation attitudes, social norms and other related topics.
- **Public perceptions of energy consumption and savings (Shahzeen Z. Attari, Michael L. DeKay, Cliff I. Davidson, and Wändi Bruine de Bruin. Published Proceedings of the National Academy of Sciences: [PNAS.org](http://PNAS.org))**
  - An article published in the Proceeding of the National Academy of Science discussed a national on-line survey of 505 participants. When asked for the most effective strategy the survey participants could implement to conserve energy, most participants mentioned curtailment rather than efficiency related actions. The report indicated that that people may still not be aware of what the significant opportunities are to save energy and that "Customers don't seem to understand the difference between curtailment (load shifting) and efficiency." Lighting was the number one answer (19.6%) when asked for suggestions to save energy.
- **How to Drive the Smart Grid Forward: Connect with Consumers (Bob Gilligan. Published September 08, 2010. GreenBiz.com. <http://www.greenbiz.com/blog/2010/09/08/how-drive-smart-grid-forward-connect-consumers#ixzz1HLU2xzS7>)**
  - "So, in reality, consumer education and policy strategies arguably go hand in hand" according to Bob Gilligan of GE Energy Services as quoted in GreenBiz.com. Despite a lack of familiarity with the term and meaning of the smart grid, 63 percent of the consumers indicated a willingness to work with their utility to change their consumption habits. He expressed a need to "communicate the purpose and value of smart grid in a way that resonates with consumers." There were indications that consumers may be more concerned that they can keep cool in the summer than with saving a few dollars on their electric bill.
- **"The Smart-Meter Opportunity – The U.S. Consumer's Perspective" (Boston Consulting Group, May 2010)**
  - In December 2009 Boston Consulting Group conducted a U.S. Smart-Meter survey of 1,678 U.S. consumers. A few of the conclusions of the survey include a low overall customer awareness of smart meters and their benefits, yet consumers ultimately believe that smart meters have the potential to help them reduce energy consumption. However, results also show their needs to be further education about reliability, privacy and pricing. When asked "How open would you be to have this company provide an in-home solution for monitoring the data from your smart meter?" 37% indicated they were very open and 41% indicated they were somewhat open to having their power company provide those solutions. The same survey also asked, "Assuming your power company has installed or will install a smart meter at your residence, how interested are you in the following product or service options," where 76.3 % of respondents indicated they were interested in detailed monthly comparison with their neighbors.
- **PowerCentsDC™ Final Report, (September 2010, <http://www.oe.energy.gov/DocumentsandMedia/DC OPC Attachment.pdf>)**
  - The PowerCentsDC™ Final Report revealed that consumers reduced their peak summer electricity demands consistently when given a price signal. Critical Peak Pricing had the largest reduction in the summer at 34% compared to Critical peak rebate and hourly pricing at 13% and 4% respectively. "Consistent with other pilots, PowerCentsDC™ showed that consumers reduced summer peak usage in response to dynamic prices, energy information, and automated control." The pilot also found that automated response through smart thermostats increase the reduction in energy use as well.

Further EPRI focus on consumer engagement is being planned. EPRI intends to delve into related subjects in more detail with the 2012 launch of a new program entitled "Understanding the Electric Utility Customer" (Program 182). Recognizing the growing need for electric utilities to better understand their customers, this program will center on the subject of customer behavior, which is cross-cutting and applies to many of EPRI's technology programs. Topics will include customer response to pricing structures and information feedback, behavioral program evaluation, targeting approaches, perceptions and adoption of new technologies and programs, etc. A bridging

supplemental opportunity will be launched in April 2011 that will involve scoping workshops and white papers on the themes of 'Rates and Customer Impacts' and 'Behavioral Insights'. For more information contact Jennifer Robinson (jrobinson@epri.com, 865-218-8068). Interaction with the SG collaborators will be beneficial as the team moves into this next phase of discovery. Feedback on the consumer engagement strategy development is welcome and should be directed to [Gale Horst](#) and [Christina Haddad](#).

## **EPRI Smart Grid Demonstration “Mini-Demos”**

We are also working on a couple “Mini-Demonstrations” where EPRI provides research support for non-host-sites to provide direct value back to those members while also making significant contributions to the overall initiative.

### ***Ameren Mini-Demonstration Project***

EPRI is supporting Ameren in their Volt/VAR Optimization efforts in developing a use case, modeling the use case in OpenDSS and performing a benefits assessment of their implementation. The use case (Methodology for Volt/VAR Optimization on a Substation Basis) is complete and will be uploaded to the EPRI use case repository in the coming weeks. The resulting methodology from the use case is now in the process of being modeled in OpenDSS prior to being implemented. Once the control methodology is deployed, EPRI will support Ameren in the benefit assessment to evaluate performance.

### ***Salt River Project (SRP) Mini-Demonstration***

We're excited to be working with SRP on a “mini-demo” plan for a Field Area Network (FAN) pilot. A system wide deployment of a FAN would unify SRP's first generation of Smart Grid field area communications infrastructure and provide the necessary connectivity for future innovation. Preparatory work will include evaluation of use cases, analysis of business case options, and a framework for evaluating the costs and risks associated with public wireless carrier-based and private, utility owned-and operated networks. If justified by the analysis, the joint EPRI-SRP team will deploy a pilot (2-3 base station) 4G wireless Field Area Network and use it to test a range of applications. The applications being looked at for the trial include distribution feeder automation, capacitor bank control, distributed renewable generation integration, voice, mobile data, and advanced metering infrastructure.

Several of the applications being looked at for the trial are already being performed by SRP's first generation of Smart Grid technologies. Distribution feeder automation and capacitor control are examples of this. Due to the technical limits of existing communications infrastructure, these applications have numerous constraints. The implementation of a 4G FAN would allow for the expansion of existing applications, advanced use of existing applications, simplified installation, and provide the capacity for new applications such as voice or mobile data.

SRP envisions the pilot serving as the basis for a living Smart Grid laboratory for testing existing and future applications over the Field Area Network. A key part of the project that EPRI will conduct involves modeling the capital and operating costs of providing the entire SRP service territory with an advanced performance, secure, and highly reliable Field Area Network. Schedule for the pilot study is April-September 2011, with pilot implementation and evaluation running through 2013.

## **Key Deliverables and Information since Last Newsletter**

### ***ComEd Customer Application Program (CAP) Phase One Analysis***

[Product ID: 1022703](#)

Commonwealth Edison Company Customer Applications Program was designed as a comprehensive and scientific pilot to test alternative price structures and enabling technologies via an 8,500-customer field trial of dynamic rates, enabling technology, customer education, and customer experience, using an opt-out customer enrollment methodology. EPRI has completed the analysis of the first three months (Jun-Aug 2011) of detailed data from the 27 different customer groups. This report is targeted for public availability in April 2011. This preliminary analysis of the first three months of data indicates that response is identifiable within the group of participants assigned to dynamic pricing. The analysis, although preliminary, will be an early look at identifying similarities and dissimilarities of an opt-out program compared with the traditional opt-in method of consumer enrollment.

### ***AEP Smart Grid Demonstration Progress Report***

[Product ID: 1021501](#)

This progress report provides an update on AEP's Smart Grid Demonstration the details of which will be discussed during the April 21<sup>st</sup> Deep Dive web cast.

### ***Smart Grid Technologies Report***

[Product ID: 1020415](#)

The electric utility industry is pushing forward into advanced automation and communication systems that are becoming the base of the Smart Grid. Each new deployment adds more intelligence to the grid and expands the information gathering capability available to energy suppliers and system operators. It also brings new challenges in the form of standards, data mining, and automated control. New technologies for electric energy storage and demand response open opportunities to integrate distributed generation more effectively, reduce peak demands, and allow end users to become active participants in managing energy use. This report focuses on recent advances in products, methods, and software available today or currently in field testing that would potentially be incorporated in a modern power system. It is organized based on the fundamental technologies that drive the Smart Grid: integrated communications, energy storage, advanced control, sensing and measurement technologies, distributed generation, home and building systems, electric transportation, and situational awareness and decision support. The topic is so vast that a detailed examination of all advances is impractical in a single document. This report provides an overview with a collection of examples for each of the topic areas.

### ***Decision Support for Demand Response Triggers: Methodology Development and Proof of Concept Demonstration*** A Report on Connecting Retail to Wholesale Electricity Markets

[Product ID: 1022318](#)

This report describes a project conceptualized and executed to help bridge a financial disconnect between retail and wholesale electricity markets. Although wholesale electricity costs vary hourly with wholesale market and grid conditions, retail customers are predominantly disconnected from wholesale conditions by fixed retail tariffs, and generally lack incentive to respond to wholesale market changes in a timely manner. Demand response (DR) programs have been developed at the retail level by both load serving entities (LSEs) and

Demand Response Providers (DRPs), also known as Curtailment Service Providers (CSPs), in an attempt to bridge the gap by incentivizing customers to adjust their usage in the short term. However, wholesale market participants who represent LSEs lack timely (day-of and day-ahead) demand-side valuation information to help them understand the financial value or impact of triggering demand response to capture wholesale benefits. Under the DR Triggers project, the project team developed a methodology and prototype for a decision support tool to help wholesale electricity market participants understand and quantify the value of triggering demand response at the retail level to mitigate wholesale supply-side procurement costs. A live demonstration illustrated how the devised trigger methodology could assist wholesale market participants in making operational decisions in day-ahead and day-of timeframes, using DR as a market resource. The methodology helps market participants determine the wholesale financial impact of triggering a megawatt of demand response by time interval and by location. By focusing on value-add for market participants on the demand-side of electricity markets, the approach has the potential of revealing the impact of DR and its market value at any time during the year based on latest market conditions.

## Related deliverables, not from Smart Grid Demo, but publicly available

### Radio Frequency smart meter safety:

#### *An investigation of Radiofrequency fields Associated with the Itron Smart Meter*

[Product ID: 1021126](#)

Smart meters represent one component of the advanced metering infrastructure (AMI). Although data to and from smart meters may be transmitted through wired connections, many smart meters make use of miniature, low power radio transceivers to wirelessly communicate with the electric utility and with the Home Area Network (HAN) that provides home owners with the ability to interact with electrical appliances and systems within the home. Deployment of smart meters has raised concerns by members of the public about possible adverse health effects that could be related to exposure to the radiofrequency (RF) emissions of the meters. As part of on-going efforts to address public concerns on this issue, this report documents the collection of information on RF exposure related to the operation of two particular models of Smart Meters produced by Itron Inc. This report is focused on the RF aspects of smart meters and in particular, the strength of the transmitted RF fields that may be produced by the meters from a human exposure perspective. The greatest difficulty in arriving in determining realistic time-averaged exposure from smart meters is associated with determining transmitter duty cycles since the meters only emit RF radiation for very brief periods at intervals that are not necessarily periodic.

#### *Radio-Frequency Exposure Levels from Smart meters: A Case Study Model*

[Product ID: 1022270](#)

This paper presents results from measurements of radio-frequency (RF) emissions from one specific type of smart meter. These tests were conducted as an initial step in responding to questions from the public concerning RF exposure levels from wireless smart meters. Smart grid technology promises to deliver enhanced reliability and economy of electrical power use. Consumers will be empowered with knowledge about—and with greater control over—their patterns of electricity use. Coincident with such benefits must also be an assurance that these new systems are operating in a manner compatible with human health and safety.

## Southern Co. Animation

EPRI and Southern Company have teamed up to create an animation describing the Southern Company Smart Grid Demonstration project. It's called [Smart Grid Application – Southern Company's Approach](#) and can be found on the EPRI YouTube channel.

### Smart Grid Application -- Southern Company's Approach

EPRIvideos 33 videos



## Use Cases

The following use cases have recently been posted to the [Use Case Repository](#):

Ameren – Volt Var on a Substation Basis

KCP&L – First Responder Applications

KCP&L – Distributed Hierarchical Monitoring and Control – Between DMS and DCADA

KCP&L – Distributed Energy Resource Management System – DMS to DERMS Integration

KCP&L – Customer Demand Response

Infotility – 3G-System of the Future Legacy Use Cases – Dispatch of Customer Load Controllers for Compact Network Load Alleviation

Infotility – 3G-System of the Future Legacy Use Cases – Software Demonstration of Intentional Islanding

- CAISO – Demand Response Providers Adjust Consumers' Energy Consumption in Response to ISO Dispatch Instructions
- CAISO – ISO Publishes Indicators of Grid Conditions with Expectations Consumers Will Adjust Usage
- CAISO – Non-Dispatchable Distributed Energy Resources (DER) Changes ISO Forecast and Unit Commitment Decisions
- CAISO – ISO Uses Synchrophasor Data for Grid Operations, Control, Analysis and Modeling
- CAISO – ISO Uses Energy Storage for Grid Operations and Control

Use cases can be uploaded directly to the Use Case Repository. We would enjoy sharing your use cases with the rest of the world.

**Use Case Repository**

The EPRI Use Case Repository is a collection of use cases and requirements developed within the industry as well as through EPRI's smart grid demonstration initiative.

[Upload Use Case](#) [IntelliGrid Use Case Template](#)

Enter Keywords

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Name	Size	Published
<a href="#">Adaptive Transmission Line Protection</a>	254 KB	Feb 15, 2010
<a href="#">Advanced Distribution Automation with DER Function</a>	3 MB	Feb 15, 2010
<a href="#">AGC Frequency Control</a>	40 KB	Feb 15, 2010
<a href="#">Alarm management</a>	24 KB	Feb 15, 2010
<a href="#">AMI Network</a>	504 KB	Aug 19, 2010
<a href="#">Application Adjusts Load To Meet System Capacity Based On Settings From System Operator</a>	10 KB	Feb 15, 2010

For any questions please contact:

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## KEY EPRI SMART GRID DATES

### EPRI Smart Grid Demonstration Advisory Meeting – June 28-30, 2011

**When/Where:** Hosted by Duke Energy, Cincinnati, OH, June 28-30

Invitations were sent on March 28th, contact [Robin Pitts](#) (865-218-8057) if you are a member of the Smart Grid Demonstration Initiative, but did not receive an invitation.

The Summer EPRI Smart Grid Demonstration Meeting will include an update on Duke Energy's smart grid demonstration project and a tour of their Envision Center – *a model and testing facility for smart and energy efficient technologies*. This meeting will have an optional ½ day smart grid training session on Day One focused on Communications Technology with an emphasis on Wireless Technologies.

The focus for this meeting will include an update on the four strategic topics of 2011 with presentations from members on these topics:

- Consumer Behavior
- DMS integration / visualization
- Conservation Voltage Reduction & Volt VAR Optimization
- Energy Storage Monetization.

The meeting will also provide an update on our Cyber Security Strategy Survey and provide an update on the 3 Year Update and the Final deliverable - "Smart Grid Reference Guide to Integrate Distributed Energy Resources".

## Future EPRI Smart Grid Demonstration Advisory Meetings

All Smart Grid Demonstration Members (not just Host-Sites) are invited to host future meetings. Members interested in hosting one of the upcoming meetings, Contact Matt Wakefield.

<b>2011</b>	October 18-20	Meeting Hosted by <b>KCPL</b> , Kansas City, MO
<b>2012</b>	Feb/March –	Meeting Host TBD
	June/July –	Meeting Hosted by <b>Southern California Edison</b> , Westminster, CA
	Oct/Nov –	Meeting Host TBD
<b>2013</b>	Feb/March –	Meeting Host TBD
	June/July –	Meeting Host TBD
	Oct/Nov –	Meeting Host TBD
<b>2014</b>	Feb/March –	Meeting Host TBD
	June/July –	Meeting Host TBD
	Oct/Nov –	Meeting Host TBD

## Smart Grid Demonstration Host-Site “Deep Dive” Web Casts for Members

Throughout 2011, each host site will provide an update on their project to facilitate deeper learning and reporting on the individual projects. Members of the Smart Grid Initiative should have received an invitation to these web casts. Contact [Matt Wakefield](#) for more information.

**2011 Smart Grid Demonstration Host-Site Webcast Schedule** (3<sup>rd</sup> Thursday of the Month at 11am (Eastern) for 1 ½ to 3 hours)

- January 20th, ESB Networks (**COMPLETE**)
- February 17th, FirstEnergy (**COMPLETE**)
- March 17th, Electricité de France (**COMPLETE**)
- April 21st, American Electric Power
- May 19th, PNM Resources
- June 16th, Southern California Edison
- July 21st, Southern Company
- August 18th, Duke Energy
- September 15th, Exelon (ComEd/PECO)
- October 20th, Con Edison
- November 17th, KCP&L
- December 15th, TBD

## EPRI Power Quality and Smart Distribution Conference and Exhibition 2011 – Harmonizing with the Grid of the Future – CALL FOR CONTRIBUTIONS

**When/Where:** August 15-17, 2011, Hilton Nashville, Downtown Nashville, TN

Come join us this summer in Music City, USA as we seek to bring harmony to the emerging Smart Grid. EPRI and TVA, along with the Tennessee Valley Public Power Association (TVPPA) and local conference host, the Nashville Electric Service (NES), invite you to the 2011 EPRI Power Quality (PQ) and Smart Distribution Conference and Exhibition. With the accelerating pace of the Smart Grid, there is a need to ensure that the future grid is robust, manageable, and effective from transmission and distribution down to the end use loads. We encourage you to join us in Nashville to learn all the possibilities for your own applications. For more information or to register, [click here](#).

## Other Smart Grid Related Meetings and Conferences

For a full list of national and international smart grid meetings and conferences, visit [EPRI's Smart Grid Calendar of Events](#).



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