EPRI Smart Grid Demonstration Update

An EPRI Progress Report **August 17, 2009**

ABOUT THE NEWSLETTER

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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."

The newsletter provides periodic updates on the project as well as updates on relevant industry news and events. If you have comments about the newsletter, please contact Matt Wakefield at 865-218-8087, mwakefield@epri.com.

PROJECT UPDATE

5th EPRI Smart Grid Demonstration Host Site Selected

Electricité de France (EDF) Smart Grid project selected as 5th Smart Grid Demonstration Host-Site

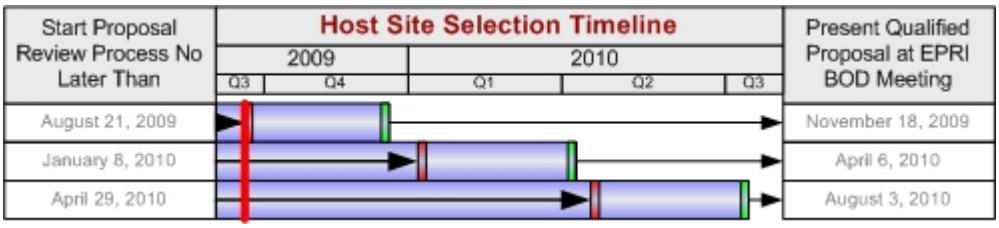
EDF's Smart Grid project will develop a Distributed Energy Resource (DER) controller integrating 9 families of Distributed Energy Resources (DER) including all four DER domains (Demand Response, Storage, Distributed Generation and Renewable Generation). It also is our first demo with 100% Internet Protocol (IP) based WAN communications and security. This project significantly strengthens the value of our overall initiative with alignment on our six key critical elements and adding diversity with some unique attributes as well.

This project joins our four other existing Host-Site Projects at AEP, Con Edison, FirstEnergy and PNM and is our first international Smart Grid Demonstration Host Site project.

The Six Critical Elements that EPRI Evaluates when selecting host-site projects includes:

1. Integration of multiple types of Distributed Energy Resources (DER) (Demand Response, Storage, Distributed Generation & Renewable Generation)
2. Deployment of Critical Integration Technologies and Communication Standards
3. Link wholesale conditions to customers
4. Integration with System Planning and Operations
5. Compatibility with EPRI's Initiative and Approach (Use Cases, Standards, Enables Widespread integration of DER)
6. Leverage Additional Funding Resources (Government, Research Organizations, Universities, Other utilities, Vendors, etc.)

EPRI Smart Grid Host-Site Selection Process



EPRI Smart Grid Demonstration Members interested in submitting a proposal for the November approval date have been identified and will submit a draft proposal by August 21st. We will have all host-site projects identified by April and approved by August of 2010.

EPRI "Resident Researcher – Domestic" Employee Program - Smart Grid Engineer or Analyst

EPRI has two openings for a Smart Grid Engineer or Analyst in our Knoxville TN office.

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 give your employees broad experiences in real-word smart grid industry activities and help strengthen and prepare your workforce for the future. Please contact Matt Wakefield for more information. (mwakefield@epri.com, 865-218-8087).

Task 1: Analytics work in progress

Subtask 1.1 – Development of Regional Profiles

Project Manager: Dr. Angela Chuang

The West, Northeast, Midwest & International workshops are complete with an average of about 40 attendees each. The final Southern Regional workshop will be held August 25th in Kansas City, MO. See Key EPRI Smart Grid Dates for registration information. Analysis of responses to the online Distributed Resource survey is being conducted – responses were requested by August 9th, thank you for your participation.

Background: EPRI is hosting regional workshops as part of the smart grid demonstration initiative to develop regional profiles and lessons learned. The workshops are designed to collect information in a well-structured fashion to be able to relate disparate activities with one another under common frameworks. The workshops will focus on developing a collective perspective on 1) regional drivers and challenges for distributed resource integration, 2) activities to integrate distributed resources in grid and market systems, and 3) existing and planned smart grid demonstrations. Resulting summaries will include identification of relevant demonstration activities and regional demonstration needs.

Subtask 1.2 – Integration Framework

Project Manager: Dr. Angela Chuang

The DER Integration Framework is being developed considering responses received on over 50 Activity Surveys that have been collected to date at the regional profiles workshops

Subtask 1.3 – Tools for Planning and Operations that consider DER

Project Manager: Matt Wakefield

This deliverable includes investigation and evaluation of analytical tools for system planning and operations that consider distributed energy resources. Includes the identification of approaches for assessing the firmness of distributed resource response and assessing the impact of distributed resources on system operation and planning, including forecasting. The deliverable will be reported on at the October Smart Grid Advisory meeting with the initial report following shortly thereafter.

Subtask 1.5 – Develop Framework for Economic Assessment

Project Manager: Dr. Bernie Neenan.

Preliminary research is being jointly developed between EPRI, DOE & Oak Ridge National Laboratory to establish mutually exclusive and exhaustive categorization of the benefits that might be attributable to virtually any smart grid investment. The initial report is expected to be published prior to the October Smart Grid Advisory meeting with a follow-up peer review with our members on the third day of the next Advisory meeting on October 14th.

Task 2: Critical Integration Technologies

Subtask 2.1 – Develop Architecture Reference Guide for Distributed Resource Integration.

Project Manager: Matt Wakefield.

Nine use cases that identify high level functional and non functional requirements necessary for real time transmission and distribution operations to integrate significant penetration of DER are under review. The resulting use cases will be used as a foundation for the demonstration projects and will be expanded on as demonstrations are deployed. The resulting use cases will be reported on at the Advisory meeting and made publicly available on EPRI's Use Case Repository (http://www.smartgrid.epri.com/usecaserepository.html).

Subtask 2.4 – Develop Aggregation Methods and Tools

Project Manager: Dr. Angela Chuang

The most recent activity includes a matrix of ISO/RTO market and program opportunities for distributed resources to participate in has been drafted and is being extended with results of analyses on historical price outcomes. This information will be included in the final report to our members.

Subtask 2.5 – Develop DER Controller Requirements

Project Manager: Gale Horst

DR Controller design concepts from several vendors are starting to move toward a controller design that manages DR for the utility by centrally aggregating responses thus relieving utility systems from the responsibility of micro-managing end use loads.

Subtask 2.6 – Critical Integration Technologies

Several Technologies and Field Trials are being considered. Below are two projects that we will provide updates on at the smart grid advisory meeting. Several other critical technologies are being considered for evaluation and as plans mature, updates will be provided. Any Smart Grid Collaborator that has a critical integration technology that is being evaluated can leverage EPRI for targeted research. This does not need to be part of a host-site project and enables targeted research that not only benefits the individual utility, but the collaborative as well.

- **TVA/Bristol Water Heater Control**: Leveraging Fiber-To-The-Home (FTTH), ZigBee: Analytical study of daily water heater control for permanent peak shifting.
  Update
  The first phase of installation is complete with the second phase expected to be complete by early September. Performance Monitoring and customer response begins Monday August 17th. A report on hardware and installation lessons learned is under development along with second report on system performance and customer feedback.
- **PV Integration:** Specification for local communication interface to small-scale solar systems for utility applications. This effort is focused on developing a communication specification for interfacing grid-tie inverters with utilities to further interoperability.
  Update
  - Seven functions have been selected for the first version of the spec. These are: connect/disconnect (or on/off), generation adjust up/down, power factor adjust, direction of energy flow (to/from storage or grid), basic event/history logging, basic status reading/reporting, and time-synch.
  - Our study into standards and protocols, in conjunction with NIST roadmap activities, has led to an approach based on Smart Energy Profile messages built from 61850-7-420 device models. This approach ensures that systems that use this specification will be aligned with overall smart grid activities.
  - During the upcoming phase of the project, a draft will be prepared and discussed at the next face-to-face meeting - tentatively set for the Friday morning following the SPI conference in Anaheim, October 30th.

Task 3: Demonstrate Technologies in Actual Applications

EPRI Smart Grid Demonstration Host Site Projects

An update of each project will be provided at the Smart Grid Advisory meeting. The goal of each update at the meeting will be to provide information and learning's that can be leveraged in your utility.

- **AEP** – 4 Substations, 8 Circuits being evaluated and loaded into OpenDSS & GridLAB-D. Use case categories being identified, evaluated and prioritized to develop the Virtual Power Plant Simulator (VPPS).
- **Con Edison** – Evaluating Architecture requirements with numerous integration points and internal and external stakeholders/systems. Documenting existing use cases in IntelliGrid format and identifying new use cases for development to integrate customer owned Distributed Generation and commercial buildings as a Demand Response resource.
- **FirstEnergy** – First Phase of Integrated Distributed Energy Resource (IDER) platform is underway and partially deployed with two-way monitoring control of residential and commercial air conditioners and interface with PJM. Use case documentation in IntelliGrid format is underway for both Operations and Market-based scenarios.
- **PNM Resources** – Finalizing use case reviews, next steps are architecture design and technology selection focused on systems and technology to deploy high penetration PV, Storage and Demand Response at both the system and customer level.
- **Electricité de France (EDF)** – EDF is our most recently selected host-site project and the first phase of this effort will be to developed a detailed project plan for the duration of the effort that will support integration and interoperability efforts to enable wide-scale deployment of DER.

Task 4: Technology Transfer

Subtask 4.2 – Industry Coordination

Project Manager: Stephanie Hamilton:
EPRI has submitted an abstract to coordinate two panel sessions at Grid-Interop (Nov 17-19, Denver, CO, http://www.grid-interop.com/2009/) that will provide an overview of both EPRI and DOE Renewable and Distributed System Integration (RDSI) smart grid projects. Each panel session will discuss 3 to 5 smart grid projects that are challenged with working towards enabling Integration of DER and the panel sessions will discuss project status and lessons learned to date surrounding the numerous facets of each project.

New Presentations added to web-site: http://www.smartgrid.epri.com/smartgrid_demo.html

- June 8th, CIRED – Active Distribution Management Conference, Prague, Czech Republic
- June 23rd & 24th Smart Grid Advisory Meeting, Red Bank, NJ

Subtask 4.3 – Standards Development

EPRI IntelliGrid Team:
This effort is currently leveraging, participating in and monitoring the NIST Roadmap Effort and translating the results into suggested action plans for our utility members. The U.S. Commerce Department's National Institute of Standards and Technology released for public review a report that identifies issues and proposes priorities for developing technical standards and an architecture for a U.S. Smart Grid. The nearly 300-page report, developed and delivered to NIST by EPRI, is available on the NIST Smart Grid web site.

Member Deliverables Available for Download (www.epri.com)

- Product ID 1018945: Smart Grid Distributed Energy Resources (DER) Project Assessment
- Product ID 1018926: EPRI Pre-Workshop Proceedings: Active Distribution System Management for Integration of Distributed Resources RD&D, Nice France December 9, 2008
- All Public Deliverables are available on www.smartgrid.epri.com

Visit the EPRI Smart Grid Resource Center & Use Case Repository for Public Updates

www.smartgrid.epri.com

The EPRI Smart Grid Resource Center is a public smart grid collaborative resource. The scope of this resource will be expanded over the next year and we plan to coordinate with the DOE Smart Grid Clearinghouse effort to avoid duplication of efforts.

KEY EPRI SMART GRID DATES

Regional Workshops

See Subtask 1.1 on page 2 for more information

When/Where: August 25, 2009, 8:00 AM – 3:30 PM, Kansas City, MO

Link: Click here to register or email your name, title, company and contact information to Ashley Eldredge (aeldredge@epri.com). The West, Northeast, Midwest and International workshops are complete with an average of about 50 attendees at each. Our final workshop is the Southern Regional Workshop in Kansas City, MO.

EPRI Power Delivery & Utilization Area Advisory Council Meeting

When/Where: August 31- September 2, 2009, Chicago, IL

Link: http://guest.cvent.com/EVENTS/info/summary.aspx?e=75c3f45c-7ad0-4bdc-8eb4-69536544b401

Next EPRI Smart Grid Demonstration Advisory Meeting

Invitations will be sent shortly, please be sure to RSVP to your Invitation

When/Where: October 12th – 14th, 2009, Albuquerque, NM

This 2 ½ day meeting will be hosted by PNM is for EPRI Smart Grid Demonstration funders and key Peer Review team members and stakeholders including participants of the DOE RDSI projects. This meeting will focus on integration, interoperability and lessons learned. It will include an update on the 5 host-site projects, project research updates, a tour of Mesa del Sol and Sandia National Labs and a Cost Benefit Analysis Workshop. These meetings are held 3 times a year and are our members' opportunity to get project updates as well as to provide feedback on your highest priority research to support smart grid demonstration activities focused on integration of distributed energy resources.

Task 2.6 PV Integration Workshop

See Subtask 2.6 on page 3 for more information

When/Where: October 30th, 2009, Anaheim, CA

This workshop will review the draft communication specification for interfacing grid-tie inverters with utilities. The meeting is tentatively set for the Friday morning following the SPI conference in Anaheim, October 30th.

Grid-Interop – Smart Grid Demonstration Panel Sessions

When/Where: November 17-19, 2009, Denver, CO

The Grid-Interop Forum enlists industry involvement in defining actionable steps needed to facilitate the interoperation of the growing number of automation systems that manage the nation's electric system. EPRI has submitted an abstract to coordinate two panel sessions that will provide an overview of both EPRI and DOE Renewable and Distributed System Integration (RDSI) smart grid projects.

KEY INDUSTRY DATES

Industry Smart Grid Related Events are Listed on EPRI's Smart Grid Resource Center

www.smartgrid.epri.com/calendar.html

Want to add an Event? Send event name, date, location and web site link to Matt Wakefield (mwakefield@epri.com)

Smart Grid Industry News

Please share your smart grid story and we will post it in this newsletter

Technology Smorgasbord Needed to Meet Climate Goals
By Peter Behr of Greenwire, August 4, 2009
http://www.nytimes.com/gwire/2009/08/04/04greenwire-technology-smorgasbord-needed-to-meet-climate-35698.html

FERC Policy adopts policy to accelerate development of Smart Grid
FERC News Release, July 16, 2009
http://www.ferc.gov/news/news-releases/2009/2009-3/07-16-09-E-3.asp

The Smart Grid in 2010: Market Segments, Applications and Industry Players
By GTM Research, July 13, 2009
http://www.gtmresearch.com/report/smart-grid-in-2010

US DOE Smart Grid System Report
US DOE, July 2009
http://www.oe.energy.gov/DocumentsandMedia/SGSRMain_090707_lowres.pdf

Chairman Waxman and Markey Introduce "The American Clean Energy and Security Act"
Committee on Energy and Commerce, May 16, 2009
http://energycommerce.house.gov/Press_111/20090515/hr2454_summary.pdf

Visit Duke's Smart Energy Newsroom
http://smartenergynewsroom.com/

Visit PECO's Smart Meters…Smart Future web site
http://www.peco.com/aboutpeco/smartmeterssmartfuture/default.htm

Visit TVA's Campbell Creek Energy Efficient Homes Project
http://www.tva.gov/campbellcreekresearchhomes/

Standards News

NIST Releases Report on Smart Grid Development
EPRI-Developed Report Discusses Priorities, Standards, Architecture
http://www.nist.gov/public_affairs/releases/epri_smartgrid_061809.html

Technology Trends

Sony, Microsoft Face Whole New Game in Gaming
Bloomberg.com, Rich Jaroslovsky, August 14, 2009
http://www.bloomberg.com/apps/news?pid=20601093&sid=aAjInFQ_Vji4
Interesting trend noted in this article – "….OnLive's combination of compression algorithms, distributed data centers and deals with Internet carriers to minimize transmission delays typically pushes the latency figure as low as 25 to 35 milliseconds and no more than 80 in the worst case…" Industries such as the Gaming are driving communication capabilities to a point where we are approaching unlimited bandwidth with virtually no latency. Future smart grid use cases should consider development of forward looking functions in a world with no communication restrictions when integrating distributed energy resources and linking supply with demand. – Matt Wakefield

Google Android for Smart Meters?
Greentelecomlive, July 8, 2009
http://www.greentelecomlive.com/2009/07/08/google-android-for-smart-meters/

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