OREGON APEM Association of Professional Energy Managers

Mission Statement: To advance the understanding and practice of sound energy and resource management principles, and to provide a network among business, government, and utilities for information, education, and leadership.

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OPPORTUNITY TO BE PUBLISHED: SHARE YOUR EXPERTISE

Do you have an energy management success story, a case study, or special knowledge of a new technology that you would like to share with your fellow Oregon APEM members? Submit your case studies, articles, and write-ups to be considered for publication in our quarterly newsletter. Email your ideas or your article as an attachment to board@oregonapem.org with NEWSLETTER in the subject line. Include contact information. We even offer assistance with getting an article publication-ready.

Oregon Association of Professional Energy Managers
P.O. Box 6764
Portland, OR 97228-6764

APEM WINTER FORUM 2013!

Pacific Northwest Smart Grid Implementation and Applications

When: December 6th, 2013 - 8:30 am to 3:30 pm

Where: Chemeketa Community College Center of Business and Industry
626 High St NE, Salem, OR 97301

Why: The Pacific Northwest has a long history of leadership and experimenting with Smart Grid applications and implementation models. For our Winter Forum we will explore the largest of the 16 smart grid demonstration projects funded by the U.S. Department of Energy under the American Recovery & Reinvestment Act (ARRA). The Pacific Northwest Smart Grid Demonstration Project involves about 60,000 metered customers, and contains many key functions of the future smart grid.

As a local participant in this project Portland General Electric (PGE) will discuss the Salem Smart Power Project, which is testing how to store solar and wind energy in the electrical grid along with understanding how to make the best use of renewable energy sources that change with the weather. PGE will also discuss its larger smart grid initiatives.

We will also explore smart grid specific applications such as demand management/response, batteries and energy storage systems for smart grid applications as well as smart grid enabled appliances and equipment.

Schedule:

8:30 – 9:00	Registration and Continental Breakfast
9:00 – 9:15	Welcome by Elin Shepard, APEM President
9:15 – 10:00	Smart Grid Hardware Applications and Technology Updates - Tim Wolf, Itron
10:00 – 10:25	Networking Break
10:30 – 11:15	Battery Storage Systems - Allen L. Burns, PK Energy Solutions
11:15 – 11:45	2013 Energy Manager of the Year Award + Project Presentation
11:45 – 12:45	Lunch, Networking, Annual Business Meeting
12:45 – 1:45	Pacific Northwest Smart Grid Demonstration Project - Ronald B. Melton, PNNL
1:50 – 2:45	Salem Smart Power Project and PGE Smart Grid Initiatives - Wayne Lei, PGE
1:45 and 2:45	*Limited Capacity Available* for Tour of Salem Smart Grid Center led by PGE

Presenters:

- **Wayne Lei, PhD,** PGE Corporate R&D, Smart Grid Programming - Portland General Electric
- **Ronald B. Melton, PhD,** Project Director - Pacific Northwest Smart Grid Demonstration Project
- **Tim Wolf,** Director of Marketing, Smart Grid Solutions –Itron
- **Allen L. Burns,** VP Business Development, PK Energy Solutions
- **Tour Host,** Portland General Electric - Salem Smart Grid Center

Register: www.oregonapem.org

CEU: Continuing Education Units available for this forum

board@oregonapem.com
www.oregonapem.org

PRESIDENT'S CORNER – WINTER 2013

Fall continues to be my favorite time of year. The air is crisp, the leaves are beautiful and it doesn't rain all that much. The fall harvest brings pumpkin patches, berry pies, and pinots. For many of us, we don't leave the house without something in orange and black or green and yellow. For an Energy Manager, fall can actually be a nice time for some savings while the chillers sit idle and we take advantage of free cooling.

As a lifelong Salem resident and energy manager, I've enjoyed living in the state capital. It's central in the valley, with easy access to the mountains, coast, and gorge, and we have very mild temperature extremes. However, recently we have another source of pride – one of the first Smart Grid projects in the United States. The demonstration project is an interesting collaborative opportunity with utilities, labs, government, and private companies. Our upcoming forum in December features this Smart Grid project, with a tour of the site, and a deep dive into other sources of battery storage. It's a topic we haven't explored in depth before at Oregon APEM and we look forward to these educational discussions.

As this is my last President's Corner before my second term expires, I hoped to reflect on the past year at Oregon APEM. Here are some updates on the goals we established in January at our retreat:

- GOAL: Expand newsletter into an electronic format and expand the website with a members-only section. UPDATE: Done and not done! The fall edition was the pilot and it worked great. We will plan our next steps to ensure that we meet the needs for members who want hard copies and those who want electronic, without duplication. Creating a members-only section on the website is still a work in progress. Stay tuned for more information.
- GOAL: Grow Oregon APEM to 125 professional, group and student members. UPDATE: Done! Our members are the reason we are here and we will strive to continue to provide the value and benefits to maintain a relationship with us. While this number may not seem as high as some organizations, Oregon APEM has always prided itself on creating a small, but mighty network of energy professionals.
- GOAL: Establish a forum calendar for the year at the retreat. UPDATE: Done! To see the full list of forum topics, dates, and locations, click www.oregonapem.org. We plan to continue this practice into future years to help members plan their calendars and hold the dates early.
- GOAL: Collaborate with one or two organizations for an event. UPDATE: Not done. We will continue this goal into 2014 and beyond.
- GOAL: Expand the re-branding further by creating more Oregon APEM marketing materials. UPDATE: Done! We gave out our new Hydro Flask thermoses at the Fall Forum for speaker gifts and received rave reviews. It was also fun to give the new bags as door prizes. We'll continue giving these as door prizes at future forums and also work on getting some additional goodies to give out.

In addition to meeting 4 of the 5 goals, we also delivered a successful year in forums. We took two deep dives into case studies of projects featuring a new construction building in Eugene and a major renovation in Portland. We also continued our trend of bringing high quality technical information with our recent forum on monitoring systems and the upcoming forum on battery storage. This is the direction we plan to continue for our forums into 2014, with a spring forum around chiller systems. We'll plan to keep this momentum strong with useful discussions at the Executive Board retreat in January. At this retreat, we elect our officers, determine goals for the year, and develop our forum topics. If you have any ideas for goals or forum topics for 2014, please feel free to share them with me. We value your input greatly.

It's been a pleasure to serve you as Oregon APEM President in 2012 and 2013, and I look forward to continuing to visit with you at Oregon APEM events in the future. Thank you for your continued support of Oregon APEM. We feel fortunate to have each of you as a member.

Happy Holidays!

Elin Shepard

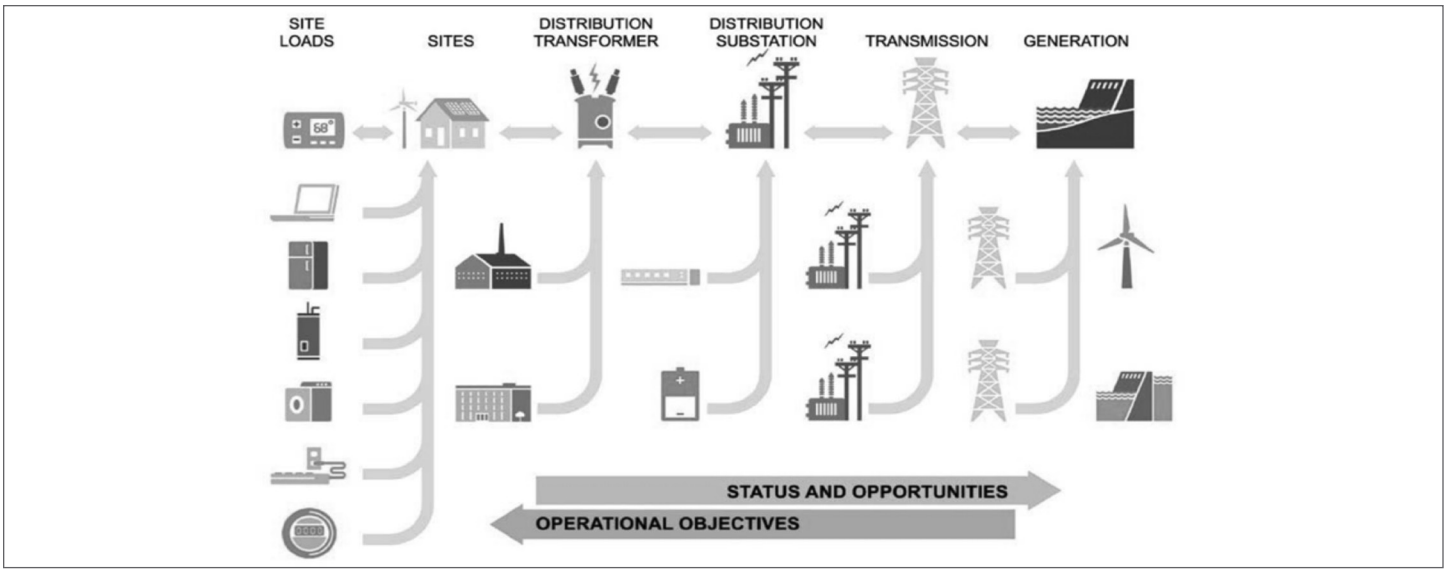
Elin Shepard
President, Oregon APEM

SMART GRID AND TRANSACTIVE CONTROL

As a precursor to our Winter Forum this December in Salem, OR we thought we would highlight a critical component of the Pacific Northwest Smart Grid Demonstration Project technology, Transactive control. It is a smart grid technique using an incentive and feedback signal that helps coordinate smart grid resources, and it is the glue that binds the Pacific Northwest Smart Grid Demonstration Project. This technological innovation can help optimize use of the grid and power resources, providing benefit to the region as a whole, utilities and end users alike.

From the Gridwise Architecture Council:

"The term "transactive energy" is used to refer to techniques for managing the generation, consumption or flow of electric power within an electric power system through the use of economic or market based constructs while considering grid reliability constraints. The term "transactive" comes from considering that decisions are made based on a value. These decisions may be analogous to or literally economic transactions."



Transactive control signal at the heart of the project

In technical terms: The Pacific Northwest Smart Grid Demonstration Project is developing a new approach to managing resources throughout the electric power system. This technique, called transactive control, uses distributed communications to send a transactive incentive signal and receive a transactive feedback signal within the power system's hierarchical node structure.

In human terms: The transactive control signals contain information about what power is available (and at what price) and what power is needed by end users. Two-way communication of this information – all the way from the source of electricity, such as dams or wind projects, to your home – allows intelligent devices and consumers to make smart energy use decisions thus bringing benefit to the region, to utilities and to consumers. These benefits include helping improve efficiency of the regions' power system, cost effectiveness, enhanced reliability and a smaller carbon footprint.

Transactive control is the centerpiece of the demonstration project. Its success, combined with the testing of utility-level smart grid assets, will help make a business case for smart grid. That will allow utilities in the region to make wise smart grid investments and create a more robust power system for years to come. If successful, it also can serve as a model for national implementation.

How does it work?

So what is the transactive control signal, exactly? The transactive control signal represents the monetary value of power in terms of dollars-per-megawatt-hour, at a given point in time and specific location, in an electronic form. The signal moves through the system (see graphic above), incentivizing the use and movement of power. It's a forward-looking signal, meaning that it forecasts days ahead and is updated every five minutes.

Data for the signal originates with the power generators. From there it propagates downstream through the network, following the flow of power, and corresponding to physical locations in the electrical system called nodes. These nodes can be anything (from appliances to a customer meter or a substation) that can receive information and transmit it, either up or downstream, so that other assets on the system can respond appropriately.

At each node, a decision is made to increase the incentive signal value if less electric load is needed below that point, or decrease the incentive signal value if more load is needed.

Flowing in the other direction, starting with end-use points such as homes, information is accumulated and forwarded about expected energy use over the next day. In this way the transactive control system is a closed loop.

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OREGON APEM FALL FORUM 2013 RECAP

Held at the Pacific One Building at NW Natural in downtown Portland, the Fall APEM Forum examined new and exciting ideas in utilizing real time energy data monitoring. Several case studies were used to highlight successful building projects as well as lessons learned from the field. The use of real time energy data, user friendly dashboards and integrated systems were central theme throughout the forum.

Erica Dunn from Green Hammer, discussed her work in analyzing net zero buildings. Six public buildings in the U.S. were assessed, including a community college building in Western Oregon. Her goal was to identify the best practices for designing and maintaining net zero buildings. She also discussed the successful qualities of green screens – a monitor that displays real time and/or historically energy use about the building to the public occupants or building staff.

The impact of occupant habits was the main focus of her presentation. Occupant controlled thermostats, plug loads and lighting controls comprised the majority of occupant driven over consumption. She also expressed the need for an energy manager to actively operate and maintain a building in order to effectively manage energy consumption, minimize mechanical drift and reinforce occupant habits that are energy efficient.

Properly displaying real time energy use information to building occupants and operators is integral to success for a net zero building, as well as for any building or facility that is striving for better energy efficiency. Green screens can be an effective means of broadcasting information to large groups. When done well, green screens or dashboards can be powerful tools for effective building operations management.

Green screens and mobile apps are still being explored for effective use in multi-family residential buildings. Some residential dashboards use real time energy use to give tips, suggestions and notifications based on occupant behaviors. For example, a notification to a resident their television was left on past 11 p.m. or that it will be 80 °F the next day and to wear light clothing.

The following are keys for a successful green screen:

- Where: Locate in common spaces where occupants may have a few idle minutes – near elevators, waiting areas, communal spaces.
- What: Information presented should be comparative; goal oriented with data in short byte sized pieces and offers actionable items.
- How: The information should be passive and simple enough to be understood at a glance.
- Why: Green screens and dashboards created occupant engagement, community involvement and pride. It can create a healthy platform for peer pressure to be more energy efficient.

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Earl Gray from Honeywell discussed how integrated building systems could dramatically impact the bottom line. He emphasized the importance of having a Master Systems Integrator (MSI). This system includes a central networked buildings system, a company methodology for building energy use and a central person to orchestrate and facilitate the process, both in the short and long-term life of the building(s).

A successful MSI, according to Gray, starts with network level integrated services for building automation. There needs to be a plan that ensures new equipment and products are compatible. Defining a standard for protocols, equipment and systems can help to ensure smoother sailing in the future when expansion or renovation projects are under way. He stressed the importance of graphical representations of building systems and real time energy use data to improve the facility operator's comprehension of the current and historical energy use of the building.

Gray also highlighted the need to "change the way we buy things." Be more cognizant of purchasing decisions and not relying on how things were done in the past. Lastly, Gray highly recommended having a single staff member responsible for the MSI system is critical to the success of energy management.

Bruce Hemmelman of Lutron Electronics shared an interesting perspective on lighting applications and real time energy use data. In a commercial setting, using real time and granular data, Lutron identified that occupant controlled lighting and collaborative employee work lead to a reduction in energy use and artificial light related health issues for employees. Another case study highlighted an LED retrofit in an office space. They reduced the typical over lit workspaces, but it was the addition of individual workspace lighting controls that had an unexpected outcome. Real time energy monitoring showed that when one employee lowered the workstation lighting levels, other employees around them did the same.

Hemmelman's recommendation is to have a pre, during and post construction or retrofit plan for energy management. There has to be a focus towards a holistic approach to incorporating energy efficiency strategies whether it's a lighting upgrade or integrating real time energy management into a building. To be successful, an organization needs to develop energy goals, have a sequence of operations, commit to tracking and reviewing information and be willing to adapt. Training staff and tenants to use the space efficiently is often a missed opportunity in energy savings. Real time energy data allowed Lutron to draw meaningful insights to how lighting energy was being used and altered throughout their studies.

Eric Shimmin from ESC Automation provided an in depth look into the developing world of real time energy use dashboards. He discussed the differences in format and objectives for the two main styles of dashboards – public and technical.

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OREGON APEM SPRING FORUM 2014:

Keepin' It Cool, How to Get The Most Out of Your Chilled Water Plant

Save the Date: March 7, 2014

Location:

United Association of Plumbers and Steamfitters
Local 290 Union Hall and Training Center

20210 SW Teton Avenue
Tualatin, Oregon 97062

Topic:

Optimize the operation of your chiller, water side economizers, and high efficiency air cooled chillers. Kick off the 2014 cooling season with a session that will cover chiller basics, controls and best practices, new technology and equipment. Learn which chiller compressor motors can be retrofitted with variable frequency drives (VFDs). Are the savings claimed by the manufacturers really true? How cold can you run the condenser water system before running into problems? How is the condenser water system temperature controlled? How do you retrofit a fixed primary system to variable flow and how is it controlled? Do the economics work? Learn the answers to these questions and more. The Forum will include a tour of the UA Local 290 training center.

Public dashboards are intended for public information and education. Typically they are large screens in common areas, like lobbies, main entryways or waiting areas. They display the building's historical energy data, real time energy use and can be interactive. Building managers are finding new and innovative ways to make green screens more engaging. An example given by Shimmin included a primary school installing interactive kiosks for students. The kiosks have age appropriate games and quizzes for students to learn about building energy and conservation practices. Another school installed a glowing light that displayed different colors based on real time energy use data. The colors represented whether the occupants were meeting their energy use target or not.

Other public style dashboards also include those used in multi-family housing complexes. One example given was a housing complex where residents were allotted a set amount of energy per week before a fee was added to their utility bill. Energy use was displayed on a communal dashboard in such a way that residents could gage if they were within their weekly energy quota as well as how their energy use ranked compared to their neighbors. Most dashboards provide local weather and other helpful information for reducing energy consumption.

The purpose of a technical dashboard is different from public dashboards. Here the purpose is to quickly convey real time data to facilities and operations managers. Operators use this information to make changes to systems in order to decrease demand and/or consumption. For the technical dashboard, it is important to format the information so it is relevant to the specific user and allows them to make meaningful conclusions.

Shimmin also stressed the need to present real time data in multiple aspects to assist staff in fully understanding a problem. For example, viewing a schematic of air-handling units (AHU) in terms of air and coil temperatures as well as real time energy use of the total system. A case study shared about a gym had the AHU control system showing comfortable space temperatures in the building with no apparent issues. Real time energy data would have exposed that both the AHU heating and cooling coils were running simultaneously. Real time energy data could have identified this problem within hours, potentially saving hundreds of dollars in utility bills.

Shimmin also discussed the emerging world of virtual metering. Here real time energy use data combined with the building mechanical data – like air temperature in ducts, pump pressure, etc. – could be used to mathematically submeter a building.

Mike Bailey from ECOVA provided forum attendees with two valuable real time energy data case studies about two Oregon based Co-Op food processors. Both Co-Ops had contracted ECVOA to provide an energy audit and analysis to make facility level and operational changes to decrease energy consumption. One company (Plant A) made huge improvements in decreasing their energy consumption while the other company (Plant B) was hampered by barriers and unable to make any head way in decreasing their energy consumption.

Plant B was hindered by the inability to change and accept input from an outside source. According to Bailey the following created much resistance to making energy use improvements for Plant B:

- Lack of upper management support.
- Bad set points and settings on equipment.
  - An unwillingness to change these settings based on the "That's how we've always done it" mentality.
- Poor purchasing choices and decision making from management.
- No real time data. Difficult to allocate utility cost and usage to individual equipment or processes.

Plant A on the other hand, took the newly acquired audits and real time data and ran with it. One key factor in making large-scale changes to their energy use was viewing a chart of the time frames in which different crops where processed. Looking at the historical and real time data from different angles identified that certain crops could wait a few hours and not be processed in overdrive, during peak hours. These revelations lead to better communication with their growers as to when to harvest and deliver crops.

Plant A used real time energy data to develop equipment schedules and operation plans to maximize operational efficiency while maintaining a quality product. Viewing the real time energy data allowed operational and facilities staff to correlate how changes in the plant affected the utility bill. These changes led to new operational standards and recognized financial savings.

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Oregon APEM Fall Forum 2013 Recap - continued from previous page

Mike Bailey's keys to utilizing real time energy use:

- "Seek First to Understand" what drives energy use.
- Data is not helpful if it is not converted into useful information.
- Data without systems knowledge is useless.
- Change and improvement begins and ends with people.
- A willingness to act on new data and make changes.
- Upper management support is critical.

Wayne Duggan of Apollo Solutions wrapped up the forum with some valuable take-a-ways about incorporating real time energy into a building. He expressed the importance of real time energy systems and equipment that are compatible and able to integrate with each other. He explained the importance of understanding protocol, using systems that are fully programmable and to make things simple. He stressed the importance of making the system and dashboard information applicable to the building managers and operators who would be utilizing the real time energy data to make changes.

The forum was concluded with a group discussion about themes throughout the presentations and break time conversations. There were several recurring messages throughout the day relating to real time energy data use:

- Simple, clear and actionable energy goals derived from real time data.
- Importance of meaningful data to drive actions.
- Having a dedicated building(s) energy manager.
- Organizational teamwork around energy management actions, protocols and plans.
- Have a plan to incorporate real time energy use into the building system.
- Data represented visually that can be quickly interpreted.
- Ability to think outside the box, view data in different ways to see an issue in a new light.
- Ability to adapt and change.

Smart Grid and Transactive Control - continued from page 3

Generators see what the expected load will be and plan accordingly. End users of electricity see what the expected price and availability will be and likewise plan their use. Over time, the incentive signal and the load signal converge, with planned supply of electricity matching planned use. In the figure above, the incentive signal is shown as "operational objectives" and the load signal as "status and opportunities."

What are the benefits?

This two-way communication maximizes opportunities for the region to optimize the use of resources, such as renewable energy, and helps the system meet operational objectives, such as reliability. For example, if the wind is blowing and producing a lot of power in a particular locality or region, the transactive control system would make using that power locally a priority through pricing incentives.

Conversely, if a particular area were experiencing congestion on their transmission system, a feedback signal from the nodes would help move power to other parts of the system to help prevent a blackout.

Utilities can use the signal to optimize their own resources, including reducing peak load, reducing phase imbalance on a transformer or preventing overloads on a transmission line. Eventually the incentive signal will let consumers make educated choices about how and when to use electricity, and even at what price.

Forty-one of the test cases in the demonstration project involve the transactive control signals.

Although the demonstration project will use simulated price incentives instead of actual changes in wholesale power prices, the structure of the project is intended to provide for a realistic scenario at a scale that can be applied regionally, and even to other parts of the nation. The transactive control system is slated to be up and running by September 2012.

The demonstration project also can shape national interoperability standards. This aspect is, in fact, one of the four main goals of the project.[1]

[1] As adapted from Pacific Northwest Smart Grid Demonstration Project Winter 2011 Quarterly Update

http://www.pnwsmartgrid.org/docs/newsletter_Winter2011.pdf

OREGON APEM BOARD ELECTIONS

Oregon APEM Board elections are coming up. If you like what Oregon APEM is doing and would like to be part of the creative process that makes it happen, consider serving on the Oregon APEM Board of Directors. Express your interest, or nominate one of the many talented energy management professionals that you know, by emailing us at board@oregonapem.org or by contacting any of the Board members so that we can get your name on the ballot. Oregon APEM is a totally volunteer run organization. We are only as good as our membership and the volunteers on our board. Step up and help Oregon APEM continue to be the premier energy management association in Oregon.

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