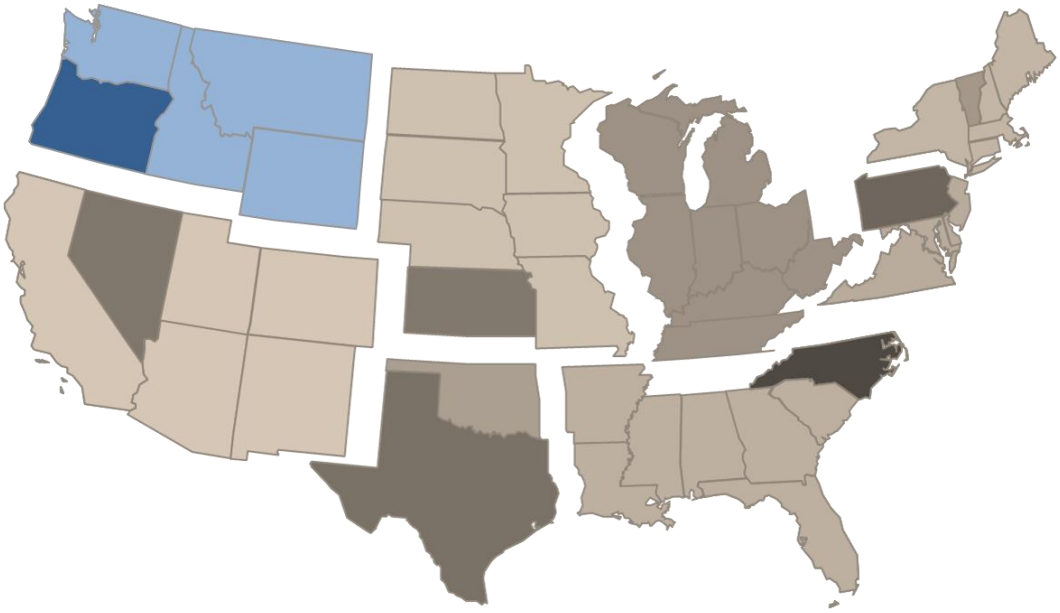
Northwest Smart Grid Peer-to-Peer Workshop

May 9-10, 2012 Portland, Oregon



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Acknowledgements

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Introduction

Smart grid modernization projects across the United States are transforming the country's electric grid—how the modern grid functions, how consumers interact with electricity information, and how utilities plan for the future. In an effort to leverage the knowledge gained from these projects, the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability, in partnership with utility hosts, has convened a series of regional smart grid peer-to-peer workshops. These workshops bring together stakeholders to engage in peer-to-peer dialogue to identify lessons learned and best practices on technical implementation and customer engagement. Together, the workshops in the series aim to establish a platform for smart grid implementers to share their experiences in making the smart grid a reality.

The Northwest Smart Grid Peer-to-Peer Workshop took place May 9–10, 2012 in Portland, Oregon and was co-hosted by Portland General Electric (PGE) and the U.S. Department of Energy (DOE) Office of Electricity Delivery and Energy Reliability. More than 150 stakeholders attended, representing utilities from Oregon, Washington, Idaho, Montana, and Wyoming. See Appendix B for a list of attendees. Participants included both DOE-funded and non-DOE-funded smart grid projects, representing large investor-owned utilities, rural cooperatives, municipal electrical authorities, and the regional power marketing administration.

The workshop featured a series of focused peer-to-peer dialogues regarding successes, challenges, and lessons learned with smart grid deployments and demonstrations. The first day featured three panel discussions titled *The Pacific Northwest Smart Grid Demonstration Project; The Landscape of Northwest Region Smart Grid Projects;* and *Approaches to Consumer Engagement*. The second day featured four panel discussions, titled *The Role of Smart Grid in our Energy Future; System and Consumer Benefits; The Future of Regulation;* and *The Big-Picture: Looking Ahead to What's Next.* Each panel discussion was followed by an interactive question-and-answer session with the audience. In addition to the panel discussions, the event included several opportunities for topical small-group "breakout" discussions. A full agenda is provided in Appendix A, and a full participant list is provided in Appendix B.

This report explores some of the themes that emerged in the course of the workshop:

System Diversity
Power systems in the Northwest are diverse, as are approaches to smart grid deployment. Some utilities initiated smart grid projects 10 or more years ago, while others are only now embarking on early stage deployments. Across the region, novel system configurations are emerging in response to technological innovation, changing generation profiles, and evolving customer preferences.

Technology Integration
Integration of diverse technological elements is a central challenge of grid modernization. The integration challenge is being driven not only by emerging technologies, but also by evolving customer demands. The success of grid modernization depends on the effective integration of these complex systems by utility professionals.

Operational Change
The emerging profile of smart grid systems strongly reflects the underlying operational architecture of utilities. Smarter grids are impacting the human resource and organizational dimensions of utility operating models, and these transitions are of increasing interest to smart grid peers.

System Benefits
Measurable system benefits play a key role at various stages of smart grid deployment, especially project design, regulatory approval, and ongoing operation. The long-term impact and success of grid investments depend critically on improving the measurement and monitoring of these system benefits.

Customer Engagement
The traditional relationship between utilities and customers is in flux and is being driven by changing customer preferences, emerging technologies, and the growing understanding of how demand response can aid in the operation of modern power systems. In parallel, new channels for outreach to customers—especially social media—are fundamentally transforming the scope and pace of these interactions.

As these themes suggest, grid modernization is impacting the power sector far beyond a simple technology upgrade. Looking forward, cumulative investments in grid modernization over the next 50 years have been estimated between $338 billion and $880 billion.[1] Developing utility strategic planning processes and effective public policies to guide these investments is a critical challenge facing regulators, utility leaders, consumer advocates, and the public. Early smart grid projects, and the lessons learned in their deployment, are a crucial resource for all stakeholders. This report examines the main themes that emerged at the workshop, with an emphasis on reporting unique observations, lessons learned, suggestions for best practices, and insights into future pathways of grid modernization.

[1] Estimates of U.S. grid investment from Electric Power Research Institute (EPRI) and Edison Electric Institute (EEI)/Brattle Group, accessed April 12, 2012. EPRI report at: http://my.epri.com/portal/server.pt/gateway/PTARGS_0_234325_317_205_776_43/http%3B/uspalecp604%3B7087/publishedcontent/publish/epri_analysis_estimates_costs_benefits_of_fully_developing_smart_grid_da_777189.html; EEI/Brattle Group report at http://www.eei.org/newsroom/energynews/Pages/20081110.aspx.

1. The Landscape of Northwest Smart Grid Projects

The Northwest region – including Washington, Oregon, Idaho, Montana, and Wyoming – feature a diverse array of grid modernization projects, ranging from remote rural installations of peak-shaving direct load control devices to the $178 million Pacific Northwest Smart Grid Demonstration Project (the largest of the smart grid demonstration projects funded by the American Recovery and Reinvestment Act of 2009 or Recovery Act). From an electricity sector perspective, the region is unique; installed wind capacity has reached nearly 8,000 megawatts (MW) across the five states, representing one of the highest shares of wind capacity in the country and making integration of variable renewable energy a system priority in the region (see Figure 1). Additionally, large portions of the region are endowed with abundant and relatively low-cost hydropower. The Bonneville Power Administration, which administers these resources, plays an important role in the region that encompasses transmission, market operation, and strategic planning.

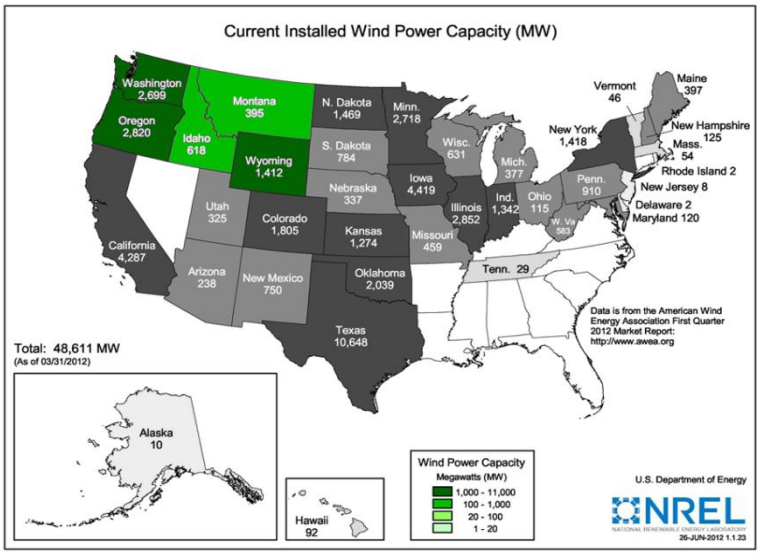

Figure 1: 2012 Installed Wind Power Capacity
Source: NREL, June 2012

Other unique features of the region identified at the workshop include:

- Some utilities implemented smart grid projects 10 years ago or earlier, typically in the form of automated meter reading and direct load control devices for peak-shaving purposes.
- Upon completion of Recovery Act project deployments, 55% of Oregon residents will have smart meters.
- There are 3 million electric water heaters in the region, representing approximately 1.5 gigawatts (GW) of demand-side capacity.
- The last remaining coal plant in Oregon is slated to close in 2020, and PGE is evaluating converting the plant to biomass.

Grid modernization in the region is generally directed toward achieving greater reliability, integrating larger shares of renewable electricity, reducing operating costs, and improving customer satisfaction. Across these motivating forces, several high-level themes emerged in the areas of technology integration, operational change, system and customer benefit, and customer engagement. Specific observations in each of these areas are detailed in Sections 2–5.

2. Technology Integration

Rapid technology evolution is revealing new possibilities and posing new challenges for utilities. At the same time, evolving customer demands are changing not only how utilities generate and distribute energy—for example, providing greater support for distributed solar generation and electric vehicle charging—but also how they communicate electricity information to customers via Web portals and in-home devices. The successful integration of the various technological systems underlying these trends was a major topic of discussion at the workshop.

A Growing Diversity of System Configurations

Throughout the Northwest, novel system configurations are emerging in response to technological innovation, changing generation profiles, and evolving customer preferences. Whether in larger urban centers or in remote rural settings, these configurations are often at the cutting edge of smart grid technology. For example, one utility operates a voluntary program that synchronizes customer-owned standby generators with the grid using paralleling switchgear. This program now represents more than 70 MW of additional reliability resources, with participants including hospitals, water plants, data centers, factories, and hotels. In exchange for participation in the program, the utility upgrades and/or maintains generators for participating entities.

Several rural utilities have innovated novel methods to add intelligence and control across distribution networks in sparsely populated areas. Various utilities have incentivized customers to participate in peak-shaving load control operations, typically by installing load control switches on electric water heaters or air conditioning units. Cost reduction and greater reliability are the main goals of these projects. For some utilities, these programs are more than a decade old, while others have only recently been established, and they are testing the economics of the programs with an eye toward expansion.

One rural utility has faced persistent “voltage sag” at the end of a 155-mile long distribution circuit, which represents a power quality issue that is limiting the growth on the circuit to include new customers. The utility is testing a solution to deploy voltage control (specifically static VAR[2] compensation to adjust the power factor) at the end of the line during peak periods. If successful, the project would allow further growth of the circuit, although the project manager noted that hardware performance has been a challenge for the project to date.

One participant echoed the sentiments of the majority of participants, noting that utility assets are aging and that “smart grid” projects are another classification of the normal process of modernizing assets. The same utility just decommissioned a 120 year old substation – part of the normal process of upgrading aging systems.

Information Technology, Operational Technology, Networks, and Data

The deployment of information technology (IT) and operational technology (OT) systems—including but not limited to fiber and wireless communication networks, distribution automation hardware, and back-office data management architectures—is a vital component to the larger challenge of technology integration. Grid projects in the Northwest have addressed this challenge in unique ways. One major urban university has made significant upgrades to its grid IT architecture. As late as 2009, the university’s electricity system management software ran on a completely open campus Ethernet network.[3] Every student could look at the university’s building automated control system. The university has since set up a private, secured network for

[2] Volt-ampere reactive, or VAR, is the unit of measurement of reactive power in an alternating current electric power system

[3] The panelist observed that the network was “shared with 60,000 of our closest friends.”

managing energy assets, and its representative remarked that without DOE funding the project would not have been completed.

Rural utilities observe unique IT/OT modernization challenges. These range from the complexity of integrating multiple software packages across legacy and new systems to managing the "data deluge" from smart meters. As one rural utility representative described the data analytics hurdle, "just because you have the information does not mean you can use it." The same representative noted that IT projects are typically most likely to go over budget.

One participant remarked that the smart grid as a concept is not revolutionary but rather evolutionary. Specifically, the participant noted that "in the '70s and '80s, we did not have the technology to collect the data." The affordability and reliability of data systems today has vastly broadened the accessibility of "smart" capabilities.

Navigating the Smart Grid Vendor Ecosystem

Across all smart grid projects, the effective management of hardware and software vendors is a key component of successful technology integration. Workshop participants shared many observations in this arena. Selected comments include:

- Vendors of meters and in-home devices need to work together more effectively to ensure robust interoperability. In some cases, meter vendors are not noticing issues with their meters (e.g. interoperability) that the utilities are catching.
- Financial difficulties are impacting the delivery schedules of some vendors.
- Some vendors make promises that they cannot deliver. If there are critical features that you really want, make sure they are available.
- Slow delivery of electric meters has been a problem.
- Vendors of in-home devices are not all equal. The performance of some vendors has been lackluster.
- One project manager working with a battery vendor inquired about fire suppression solutions and was surprised to learn that the firm did not have one. Together, the project leader, the vendor, and an engineering graduate student identified and deployed an appropriate technical solution.

Numerous participants noted the value of convening with utility peers to learn from each other and candidly discussing vendor management issues.

Preparing for the Future

Across these technology integration domains, "future proofing" is an important idea that can help guide planning processes. Participants noted that anticipating the impact of future developments --- with an eye toward seizing new opportunities and minimizing negative impacts on grid systems --- merits consideration across the technology integration spectrum. For example, the concept arises as a key component of capital expenditure planning. One public utility is deploying more capital today to install fiber in their substations, with the understanding that this critical network asset will allow them to implement different programs and technologies in the future. One investor-owned utility (IOU) at the workshop is building a network of direct current (DC) electric vehicle charging stations in partnership with a charging station provider as a way to reduce "range anxiety" and promote greater uptake of electric vehicles. This system can be viewed as a potential network asset in the future. On a related note, various participants questioned whether electronic components will last as long as mechanical systems. Currently, utilities do not have perfect vision into the lifespan of the new technologies being installed.

In the standard setting process, future proofing also serves as a useful strategic concept. For example, various participants remarked that utilities could and should engage more actively in the

interoperability standard setting process led by the National Institute of Standards and Technology, as a way of ensuring alignment between smart grid standards and the perspectives of utility practitioners.

3. Operational Change

In addition to posing technology integration challenges, smarter grids are impacting the human and organizational dynamics of utilities. This topic received attention during the workshop, and some major themes are detailed in this section.

One clear example of this transformation is seen in the modernization of equipment available to utility field technicians. One IOU participant described the parallel process of upgrading operational mobile technology (e.g., laptops and tablets) for field workers while developing new training and protocols for them. The utility representative observed that a networked, technology-enabled mobile workforce accelerates service and outage management. Another participant agreed that field crews have embraced the new technologies, with the caveat that the technologies must prove themselves useful.

Several participants remarked that linemen have been very receptive to new distribution system technologies (e.g., automated switches), and that training issues have not been as serious an issue as anticipated. In many cases, the automated “smart” distribution switches are in the same locations as the manual switches, which eases the logistical and training burden.

In other settings, the evolution of smarter grids is changing the human resource footprint of utilities. While various utilities noted that the dynamic of utility workforce change began long before smart grid projects, driven by automated meter reading in the 1980s and 1990s, many utilities reported that these changes are still underway. A representative of one rural cooperative observed that they have fewer employees today than they had three years ago but twice as many customers. On the staffing front, the utility employs fewer linemen but more IT and OT staff. A representative of another rural utility noted a similar dynamic but added that they have been able to move “displaced” meter readers to other positions. Another participant described that in their experience “service staff can now get back to their core job of servicing customers rather than doing connects, reconnects, and additional meter reads.”

4. System Benefits

The impact and long-range success of grid investments depend critically on measurable system benefits. These issues received attention at the workshop, and some key insights are detailed in this section. While some observations were general in nature,[4] these benefits can mostly be grouped into the categories of *energy efficiency, reliability, customer experience,* and *operations.*

Energy Efficiency
One large IOU noted that energy efficiency is one of the most tangible system benefits because it can be calculated and it has a real impact on system performance. The panelist noted that a 2% energy savings has been achieved (about 32 MW) just by upgrading feeders and transformers. Another IOU panelist translated the customer impact of energy efficiency savings by saying, "You [the customer] can save some money and we might be able to build fewer power plants."

Reliability
Reliability represents additional clear and measurable system benefits. In many cases, the business case for such upgrades is financial; one panelist remarked that in her territory small outages can have a big impact on businesses.

In remote service territories, outage management is an important system benefit. Various rural utilities have created "active" outage management systems in which the network control center automatically "pings" meters in strategic locations to determine if there is power. The system then maps areas that are out of power on a computer screen, and with this information technicians can be dispatched directly to the impacted area. The new system dramatically reduces outage time as, previously, trucks used to roam the streets looking for the problem.

Reliability is also the driver of one of the largest projects in the region. Led by the Western Electricity Coordinating Council, the Western Interconnection Synchrophasor Program is dedicated to achieving greater visibility into the bulk power system in order to predict and avoid widespread outages. The project is deploying a region-wide network of phasor measurement units (PMUs) or "synchrophasors" that give real-time and detailed indicators of power system health. This network of PMUs was essential in accelerating power restoration after the regional Southwest outage of 2011. Other benefits of this project include increased utilization of transmission, which in turn can support increased use of intermittent (renewable) energy sources.

Customer Experience
Customer experience is in many ways the most difficult benefit to quantify. One participant noted that it is difficult to apply specific metrics to customer satisfaction, and yet customer dissatisfaction shows up directly in the form of phone calls and increasingly negative comments on social networking websites such as Facebook and Twitter. Smart grid systems can have a directly positive impact on customer experience; one large IOU has implemented "preferred due dates" for customers allowing them to pay on their preferred dates. This system is made possible by smart meters that regularly send usage data to the utility instead of requiring a monthly manual read. Determining how to measure and quantify customer engagement benefits will be important moving forward.

Various rural utilities have installed smart meters with remote switching capabilities, allowing for immediate connection and disconnection as needed, providing another benefit to consumers. One rural cooperative has had such a program in place for eight years, which facilitates reconnection in the case of new tenants or homeowners. Various utilities at the workshop also now allow

[4] For example, the representative of one rural utility noted that its project has had the unforeseen benefit of heightening a sense of community responsibility for energy sustainability.

customers to prepay for electricity and check their usage and balance in real time. As noted in reports for previous regional smart grid workshops, such programs have the benefit of eliminating "bill surprises" at the end of the month and they dramatically reduce delinquency. In this particular utility's service territory, upwards of 20% of customers had a history of delinquencies. As reported by participants, prepay and remote service configurations improve customer experience by allowing greater transparency and immediate power restoration upon payment or when initiating service.

Operations
Another benefit of remote service systems is the thousands of avoided "truck rolls". Previously, the utility had to send service personnel to customer's homes anytime there was a disconnect, reconnect, or reported outage. With remote service, this is no longer the case.

This reduction of truck rolls through the deployment of modern communication systems can result in significant savings on gasoline as well as wear and tear on utility service vehicles.[5] These and other operational savings can represent significant cost savings. One large IOU that installed over 800,000 smart meters recorded roughly $18 million in operational savings – an immediate benefit that can support the financing of such technologies.

5. Customer Engagement

In the Northwest and around the United States, the installation of smart grid technologies is reshaping the customer engagement landscape. A wide range of lessons learned and experiences regarding customer engagement were shared at the workshop. This section organizes these lessons learned into the categories of *engagement strategies, channels, and methods; engagement challenges;* and *messages resonating with customers.*

Engagement Strategies, Channels, and Methods
During the meeting, utility representatives shared some key ideas and strategies that guide their outreach. One IOU values greater message control and visibility on topics that they want to be understood. To achieve this, they established a dedicated team to manage a blog that articulates the official company position on a wide range of topics that matter to customers. The team is highly informed about all aspects of project planning and is charged with producing material that is timely, concise, and accurate.

A utility in California has decided not to use the term "smart grid" in branding its programs, because as a result of anti-smart meter campaigns, the term can sometimes have a negative connotation. In a related vein, numerous utilities emphasized the importance of providing employee training on how to listen and respond to customers who are resisting smart meters. One utility strengthened and expanded its internal training beyond traditional customer service representatives: technicians switching out the meters now receive customer service training, as they are the direct point of contact for most customers. Many utilities at all of the Peer-to-Peer meetings have emphasized the importance of education for all levels of employees about the smart grid project.

Participants also reported experimenting with a variety of new avenues to improve customer engagement. Many utilities reported establishing Web-based payment and usage platforms, and others have deployed mobile platforms for payment and usage data. One utility representative

[5] One rural utility noted that remote service has been well received by their technicians, who do not miss running through backyards, avoiding pit bulls, in order to service customer meters.

remarked that mobile phone systems are the next frontier: “We know for sure that mobile self-service is key, not just having it on the Web.”

Many utilities in the region are using social networking platforms such as Facebook and Twitter to some degree. Social media has given the utilities the opportunity to be much more pro-active in disseminating information to customers rather than simply reacting to customer or media questions. Twitter was mentioned by one IOU as a great avenue for reaching customers, especially regarding outage status. Another utility echoed this and remarked that by using social media as a method of communication, the media is able to track disruptions and other information online which has reduced the number of incoming media calls to the utility.

For universities, student engagement on matters of energy efficiency and smart grid is a growing trend. One major university in the region observed that students have encouraged the administration to participate in smart grid projects. Partially in response, the university is conducting a behavioral response study with students in their dormitory rooms. As the project leader put it, “The students are excited and ready to go.”

For many utilities at the workshop, customer education was well received and opposition was virtually non-existent. For example, one project involving hundreds of thousands of smart meters registered only four customers who opted not to receive a meter. Across utility types, many have developed carefully phased smart meter education programs. A smaller public utility described its multi-stage process:

> “First comes a general education campaign to build awareness of what is happening, why it is happening, and when. Next, we help customers understand what the program means for them. Finally, the program explains the actionable items for customers: What are they supposed to do with the new usage information? Most consumers need to be empowered to do something with the information and understand what actions they can take to save money or improve their interaction with the utility.”

In terms of engaging customers in more advanced opt-in programs such as demand response, various utilities directly incentivized customer participation through rebates. The economics work because the operational (e.g., peak-shaving) impacts of the program represent direct cost savings to the utility. One utility recommended the “keep it simple” approach; they recruited customers to participate in an electric water heater load control program by offering $50 gift cards to a popular local retailer and they found the strategy to be very successful. A rural utility offered a $50 credit on participating customers’ bills and found that seniors on fixed income were some of the first to respond.

Engagement Challenges

Various participants noted challenges to be overcome, especially around cultural issues of privacy and control. These challenges are not universal, however. One rural utility noted very little resistance from customers regarding “big brother” or privacy issues. In the words of the panelist, “Few people have shot at the smart meters.” In fact, in some instances smart meters are helping resolve disputes. One utility reported an enhanced ability to defuse bill complaints by showing daily energy usage data.

Various utilities cautioned against engaging in debates with hardened opponents, as the positive returns of using this strategy are very limited. Similarly, one utility found that neighborhood meetings, typically a standard means for outreach, were turning into opportunities to air inaccurate, inflammatory, and strongly anti-utility messages. One participant remarked that it is increasingly important to listen to customers but it is also important to recognize that not everyone can be convinced.

Other engagement challenges are more mundane. One utility noted the challenge of helping its community understand demand response. “Energy efficiency is easy—DR [demand response] is harder to understand.” Another utility noticed that customers were used to having someone knock on their doors to let them know they were going to be disconnected, and that this door knock was the “real” signal that they would finally have to pay their bill. Finally, one utility panelist remarked that “energy patterns in most homes are not very interesting. There needs to be an actionable item if you want information to do something for them.”

Another utility found that the message that installing advanced metering infrastructure would reduce operating costs did not resonate with its customers. Rather, the message needed to answer the questions, “what’s in it for me.” Customers want the freedom to choose, so utilities should work to determine what is valuable for its customers. In this vein, and as noted in the previous section, prepay programs have received positive feedback from many customers.

Messages Resonating With Customers

While there have been challenges, much has been learned about which types of programs and messages resonate with customers. These lessons learned are not simply products of recent Recovery Act-funded activity. One utility has been encouraging peak-shaving demand response participation for 26 years through a discount on electric bills of about $3 per month. According to the utility manager, customers are very happy to sign up because they want to contribute to system reliability as well as save money. It helps that “controlling water heaters is totally painless for the customer.” Indeed, the panelist indicated that some participants have tried to sign up more than once, having forgotten that they already participate.

Various utilities shared specific themes that are resonating with residential customers:

- Saving money
- Keeping the lights on while “shaving the peak”
- Safe, clean, reliable power
- Protecting the environment
- Saving energy
- Early warning about outages and rapid restoration.

Of course, residential customers are not the only users of electricity. One utility noted that private firms generally feel that smarter grids are a good investment—especially companies looking to relocate to new service territories. Specifically, investments in reliable power grids can serve as a an incentive to relocate to a specific location, and in many cases smart grid projects send a signal of commitment to modern power systems.

6. Looking Ahead

Smart grids present new opportunities and challenges to utilities, customers, and policy makers. The proceedings of the Northwest Smart Grid Peer-to-Peer workshop highlighted these opportunities in the unique context of this region. Some of the key questions that participants expressed interest in pursuing in the near future included:

- How do we best utilize the vast amounts of data being generated by new technologies?
- How can we collaborate to handle new security challenges?
- How can we collaborate to understand the technology lifecycle and interoperability issues of new grid systems?

- What is the future of customer engagement in the operation of the electric grid?
- To what extent can new smart grid systems facilitate the entry of greater shares of variable renewable energy?

These and other questions reinforce the importance of breaking down the natural barriers between utilities when it comes to sharing information about technologies, business models, and organizational strategies. Furthermore, each of these questions involves complex networks of stakeholders, suggesting the need for new modes of engagement between regulators, consumers, technology providers, and utilities. In this light, regular opportunities for utility peers—and broader stakeholder communities—to learn from one another and share evolving approaches will continue to be a foundational component of the ongoing smart grid transformation.

Appendix A. Workshop Agenda

Wednesday, May 9

8:00 – 8:30 a.m. **Registration and Continental Breakfast**
Two World Trade Center Auditorium Lobby

8:30 – 9:00 a.m. **Welcome to the NW Smart Grid Summit**
Emcee: Kurt Miller, PGE Director, Business Model and Program Development

PGE Welcome: Bill Nicholson, Senior Vice President, Customer Service, Transmission and Distribution

Welcome from DOE: Eric Lightner, Director, Smart Grid Task Force,

9:00 – 10:00 a.m. **PANEL 1: The Pacific Northwest Smart Grid Demonstration Project**
Moderator: Ron Melton, PNW Project Manager

Panelists:
Norm Menter, University of Washington
Mark Osborn, PGE
Mike Charlo, Milton-Freewater City Light & Power
Warren Jones, Lower Valley Energy

Panelists will share their utility's role in the Pacific Northwest Smart Grid Demonstration Project, and participate in audience Q&A.

10:00 – 10:15 a.m. **Break**
Coffee service in auditorium lobby

10:15 – 11:15 a.m. **PANEL 2: Landscape of Northwest Region Smart Grid Projects**
Moderator: Bob Bass, Portland State University

Panelists:
Roman Gillen, Consumers Power, Inc.
David D'Avanzo, Lane Electric Cooperative
Jan Bryant, Idaho Power
Jason Zyskowski, Snohomish County Public Utility District (PUD)

Panelists will share their utility's role in smart grid projects in the region, and participate in audience Q&A.

11:15 – 12:00 p.m. **Breakout Discussions on Related Topics**
Mezzanine 2, 3 and 4

Conference attendees will gather in Mezzanine rooms in groups of 10-12 to discuss related topics. Attendees will designate a note taker and a spokesperson to report back to the group at-large in the auditorium. Assigned rooms and tables can be found on attendee name badges.

12:00 – 1:00 p.m. **Networking Lunch**
Networking lunch on Skybridge Terrace. Open seating.

1:00 – 1:45 p.m. **Discussion Summaries**

Each group's spokesperson will summarize what they discussed in breakouts. Each group will be given 4 minutes to present.

1:45 – 2:45 p.m. **PANEL 3: Approaches to Consumer Engagement**
Moderator: Sheelagh Bandettini, PGE

Panelists:
Curt Kirkeby, Avista
Shawn Dolan, Kootenai Electric Cooperative
Carol Dillin, PGE
Blaine Andreasen, PacifiCorp

Panelists will share what their organizations are doing around smart grid and engaging customers, and participate in audience Q&A.

2:45 – 3:00 p.m. **Break**
Auditorium Lobby

3:00 - 4:00 p.m. **Breakout Discussions on Related Topics**
Mezzanine 2, 3 and 4
Afternoon snacks and beverage service provided

Conference attendees will gather in Mezzanine rooms in groups of 10-12 to discuss related topics. Attendees will designate a note taker and a spokesperson to report back to the group at-large in auditorium. Assigned rooms and tables can be found on attendee name badges.

4:00 – 4:45 p.m. **Discussion Summaries**

Each group's spokesperson will summarize what they discussed in breakouts. Each group will be given 4 minutes to present.

4:45 – 5:00 p.m. **Concluding Remarks and Adjourn**

5:30 – 7:30 p.m. **Reception hosted by Portland General Electric**
The Nines Portland Hotel, Ballroom Foyer
525 SW Morrison St. Portland (a 3-minute walk from World Trade Center)

THURSDAY, MAY 10

8:00 – 8:30 a.m. **Registration and Continental Breakfast**
Two World Trade Center Auditorium Lobby

8:30 – 9:15 a.m. **Welcome to the NW Smart Grid Summit**
Emcee: Dave Robertson, Vice President, Public Policy, PGE

PGE Welcome: Jim Piro, President and CEO

Keynote Address: Hank Kenchington, Deputy Assistant Secretary, Research & Development, Department of Energy Office of Electricity Delivery and Energy Reliability

9:15 – 10:30 a.m. **PANEL 4: The Role of Smart Grid in our Energy Future**
Moderator: James Mater, Smart Grid Oregon

Panelists:
John Hewa, National Rural Electric Cooperative Association
Bryan Nealy, Data Center Demand Response, State of Oregon
Joe Barra, PGE
Duane Van Patten, Idaho Power
Vickie VanZandt, Western Electricity Coordinating Council

Panelists will share their role and their organization's role around smart grid and our energy future, and participate in audience Q&A.

10:30-10:45am **Break**
Coffee service in auditorium lobby

10:45 – 12:00 a.m. **PANEL 5: System and Consumer Benefits**
Moderator: Katie Pruder-Scruggs, Bonneville Power Administration

Panelists:
Shawn Dolan, Kootenai Electric Cooperative
Lee Hall, Bonneville Power Administration
Conrad Eustis, PGE
Curt Kirkeby, Avista

Panelists will talk about their role and their organization's role in smart grid system and consumer benefits, and participate in audience Q&A.

12:00 – 1:15 p.m. **Networking Lunch and Keynote Presentation from Oregon Governor John Kitzhaber**
Skybridge Terrace

Networking lunch and keynote presentation from Governor Kitzhaber on Skybridge Terrace. Open seating.

1:15 – 2:30 p.m. **PANEL 6: The Future of Regulation**
Moderator: Bill Bradbury, Northwest Power and Conservation Council

Panelists:
John Savage, Oregon Commissioner
Howard Schwartz, Washington Department of Commerce
Paul Kjellander, Idaho Commissioner

Panelists will share their thoughts on the future of smart grid regulation and participate in audience Q&A.

2:30 – 2:45 p.m. **BREAK**
Beverage service and snacks in auditorium lobby

2:45-4:00 p.m. **PANEL 7: Big-Picture: Looking Ahead to What's Next**
Moderator: Lynn Frank, Former director of Oregon Department of Energy

Panelists:
Susan Ackerman, Oregon Commissioner
Maria Pope, PGE
Barbara Hins-Turner, Centralia Community College
Bob Jenks, Citizens Utility Board
Roy Hemmingway, Smart Grid Oregon

Panelists will look ahead to the future of smart grid and participate in audience Q&A.

4:00 – 4:15 p.m. **Closing Remarks and Adjournment**

Appendix B. Participant List

Workshop participants are listed here alphabetically by organization.

Mike Brown Advanced Energy Systems	**Ken Den Ouden** Advanced Energy Systems	**Curtis Kirkeby** Avista Utilities
Daniel Johnson Avista Utilities	**Kevin Christie** Avista Utilities	**Laurine Jue** Avista Utilities
Linda Barney Barney and Associates	**Don Hammerstrom** Battelle	**Evan Jones** Battelle
Ron Melton Battelle	**Nikolas Foster** Battelle	**Paula Ball** Benton PUD
Chad Bartram Benton PUD	**Patt Bilow** The Bilow Group	**Katie Pruder-Scruggs** Bonneville Power Administration
Lee Hall Bonneville Power Administration	**Hoi (Betty) Fung** Bonneville Power Administration	**Jeff Maslow** Bonneville Power Administration
Terry Oliver Bonneville Power Administration	**Donald Watkins** Bonneville Power Administration	**Steve Jennings** BPL Global
Bruce Lovelin Central Lincoln People's Utility District	**Bob Jenks** Citizens' Utility Board Of Oregon	**Gordon Feighner** Citizens' Utility Board Of Oregon
G. Catriona McCracken Citizens' Utility Board Of Oregon	**Ted Barkley** City of Ellensburg	**Bob Titus** City of Ellensburg, WA
Patrick Mazza Climate Solutions	**Dan Spatz** Columbia Gorge Community College	**Jim Pytel** Columbia Gorge Community College
Jess Kincaid Community Action Partnership of Oregon	**Trevor Sleeman** Congressman Kurt Schrader's Office	**Ryan Mann** Congresswoman Suzanne Bonamici's Office
Sharon Ginn Consultant	**Vishnu N. Jetmalani** Consultant	**Roman Gillen** Consumers Power Inc
James Ramseyer Consumers Power Inc	**Henry Kenchington** US Department of Energy	**Eric Lightner** US Department of Energy
Jihad Aljayoushi US Department of Energy	**Michelle Dallafior** US Department of Energy	**Donald Macdonald** US Department of Energy
Merrill Smith US Department of Energy	**Dave Sabala** Douglas Electric Cooperative	**Sean Penrith** Earth Advantage Institute
Robert Marritz Electricity Policy	**Rob Currier** Emerald PUD	**Kyle Roadman** Emerald PUD
Tanya Burns Energetics	**Steve Lacey** Energy Trust of Oregon	**John M. Volkman** Energy Trust of Oregon

John Femal Eugene Water & Electric Board	**Joe Harwood** Eugene Water & Electric Board	**Angie R. Marzano** Eugene Water & Electric Board
Jeannine Parisi Eugene Water & Electric Board	**Lance Robertson** Eugene Water & Electric Board	**Hans van der Meer** EV4 OREGON, LLC
Martha Henderson, PhD Evergreen State College, The	**Bryan Case** Fall River Rural Electric Cooperative	**Boyd Bowles** Falls River Rural Electric Cooperative
Lynn Frank Five Star International	**Teri Rayome-Kelly** Flathead Electric Cooperative Inc.	**Dylan McNamee** Galois, Inc.
Nancy Estergard Grays Harbor College	**Joe Esmonde** IBEW	**Cheryl Linder** IBM Energy and Utilities Industry
Jackie Flowers Idaho Falls Power	**Susan Davis** Idaho National Laboratory	**Michael Hagood** Idaho National Laboratory
Jan Bryant Idaho Power Company	**Duane Van Patten** Idaho Power Company	**Paul Kjellander** Idaho Public Utility Commission
Michael Elliott Integral Group	**Deana Pearlmutter** Integral Group	**Jeanette Hubbard** JobGroup.org
Edward Hedges Kansas City Power & Light	**Shawn Dolan** Kootenai Electric Cooperative	**Robin A. Rego** Lakeview Light & Power
Dave D'Avanzo Lane Electric Cooperative	**Robin Freeman** League of Oregon Cities	**Warren Jones** Lower Valley Energy, Inc.
Tracy Colard Mason County PUD #3	**Gregory Kester** Mason County PUD #3	**Katherine McDowell** McDowell Rackner & Gibson PC
Mike Charlo Milton-Freewater City Light and Power	**Mario Sciulli** National Energy Technology Laboratory	**Sonja Berdahl** National Renewable Energy Laboratory
Steve Hauser National Renewable Energy Laboratory	**Mackay Miller** National Renewable Energy Laboratory	**John Hewa** National Rural Electric Cooperative Association
Randy Bachtell New Market Skills Center	**Daniel Sloop** nLIGHT	**Dwight Langer** Northern Wasco County PUD
Wendy Gerlitz Northwest Energy Coalition	**Fred Heutte** Northwest Energy Coalition	**Bill Bradbury** Northwest Power and Conservation Council
Leann Bleakney Northwest Power and Conservation Council	**Massaud Jourabchi** Northwest Power and Conservation Council	**David Kirkland** Opower
John Kitzhaber Oregon Govenor's Office	**David Kenney** Oregon BEST	**Mark Brady** Oregon Business Development Department
Bryan Nealy Oregon Department of Administrative Services	**Julie Bozzi** Oregon Department of Administrative Services	**Sean Henry** Oregon Department of Energy

Vijay Satyal Oregon Department of Energy	**Matt Hale** Oregon Department of Energy	**Margi Hoffman** Oregon Governor's Office
Roger W. Rees Oregon HEAT	**Ben Kester** Oregon Institute of Technology	**Hyun "Brian" Choi** Oregon Institute of Technology Portland
John Savage Oregon Public Utilities Commission	**Susan Ackerman** Oregon Public Utilities Commission	**Juliet Johnson** Oregon Public Utilities Commission
Robert Procter Oregon Public Utilities Commission	**Stephen Bloom** Oregon Public Utilities Commission	**Lisa Hardie** Oregon Public Utilities Commission
Patrick Power Oregon Public Utilities Commission	**Phil Boyle** Oregon Public Utilities Commission	**Tarek Chaibederraine** Oregon Tech
Mat Krieske Oregon Tech	**Rian Sackett** Oregon Tech	St**even Werner** Oregon Tech
Monica Brummer Pacific Northwest Center of Excellence	**Jamie Krause** Pacific Northwest Center of Excellence	**Barbara Hins-Turner** Pacific Northwest Center of Excellence for Clean Energy
Carol Haertlein Pacific Northwest Generating Cooperative	**John Prescott** Pacific Northwest Generating Cooperative	Ang**ela Becker-Dippermann** Pacific Northwest National Laboratory
Robb Pratt Pacific Northwest National Laboratory	**Dennis Stiles** Pacific Northwest National Laboratory	**Carl Imhoff** Pacific Northwest National Laboratory/Battelle
Mike Hoffman Pacific Norwest National Laboratory	**Brian Anderson** PacifiCorp	**Michael Curtiss** PacifiCorp
Alisa Dunlap PacifiCorp	**Scott Bolton** PacifiCorp	**Joelle Steward** PacifiCorp
Nicole Walls PacifiCorp	**Greg Lyons** PacifiCorp	**Tashiana Wangler** PacifiCorp
Diane Antonelli PECO	**Mike Simpson** Peninsula Light Company	**Scott Anderson** Peninsula Light Company
Ray Grinberg Peninsula Light Company	**Arlene Abbott** Polar Star Consulting (On behalf of IBEW Local 77)	**Sheelagh Bandettini** Portland General Electric
Conrad Eustis Portland General Electric	**Mark Osborn** Portland General Electric	**Joe Barra** Portland General Electric
Bill Nicholson Portland General Electric	**Carol Dillin** Portland General Electric	**Kurt Miller** Portland General Electric
Dave Alcorn Portland General Electric	**Maria Pope** Portland General Electric	**Dave Robertson** Portland General Electric
Bruce Carpenter Portland General Electric	**James Piro** Portland General Electric	**Kregg Arntson** Portland General Electric

Steve Cox Portland General Electric	**Charlie Allcock** Portland General Electric	**Isaiah Cox** Portland General Electric
Rick Durst Portland General Electric	**Shawn Chandler** Portland General Electric	**Martin Doem** Portland General Electric
Launa Harmon Portland General Electric	**Anna Darian** Portland General Electric	**Richard George** Portland General Electric
Brendan McCarthy Portland General Electric	**Robert Ferraro** Portland General Electric	**Chrystal Lindquist** Portland General Electric
Elizabeth Paul Portland General Electric	**Jay Landstrom** Portland General Electric	**Carol Mills** Portland General Electric
Theresa Taaffe Portland General Electric	**Elaina Medina** Portland General Electric	**Kristin Stathis** Portland General Electric
David Weitzel Portland General Electric	**Sania Radcliffe** Portland General Electric	**Mari Vandewettering** Portland General Electric
Spenser Williams Portland General Electric	**Doug Tingey** Portland General Electric	**Kevin Whitener** Portland General Electric
Bob Bass Portland State University	**Kayce Spear** Public Power Council	**Jimmy Lindsay** Renewable Northwest Project
Roger Kuhlman Salem Electric Coop	**Tony Schacher** Salem Electric Coop	**Carl Mansfield** Sharp Labs of America, Inc.
Doug Peeples Smart Grid News	**Roy Hemmingway** Smart Grid Oregon	**Kelly Cowan** Smart Grid Oregon
James Mater Smart Grid Oregon	**Barry T. Woods** Smart Grid Oregon/Ecotality Counsel	**Jason Zyskowski** Snohomish County PUD #1
Anthony Curtis Snohomish County PUD #1	**Gabrielle Schiffer** State of Oregon	**Bill Dickens** Tacoma Power
John Lawrence Tacoma Power	**Henry Tilghman** Tilghman Associates	**Steve Eldrige** Umatilla Electric Cooperative
Cindy Finlayson Umatilla Electric Cooperative	**Norm Menter** University of Washington	**Brian Dale** Vet Corps
Howard Schwartz Washington Department of Commerce	**Dennis Skarr** Washington Department of Veteran Affairs	**Caitlyn A. Felling** Washington State Labor Council, AFL-CIO
Bill Messinger Washington State Labor Council, AFL-CIO	**Mike Fenimore** Western Electricity Coordinating Council (WECC)	**Vickie VanZandt** Western Electricity Coordinating Council (WECC)
Eric Whitley Western Electricity Coordinating Council (WECC)	**Allen Hardcastle, PhD** WSU Extension Energy Program	**Sally Zeiger Hanson** WSU Extension Energy Program