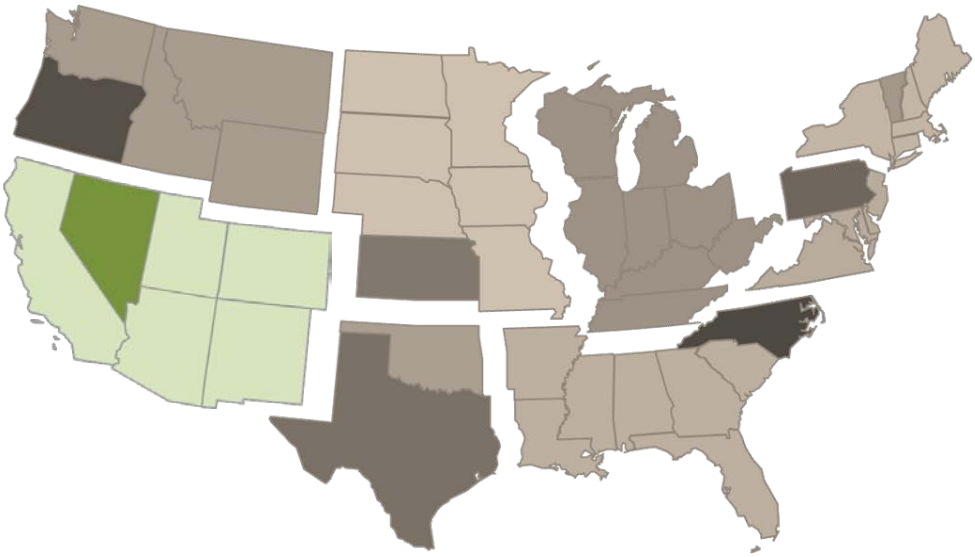
# Southwest Smart Grid Peer-to-Peer Workshop

March 21-22, 2012  Las Vegas, NV



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# Introduction

Smart grid modernization projects across the United States are transforming the nation's electric grid—how it functions, how customers interact with electricity, and how utilities conduct planning. In an effort to leverage the knowledge from deployment projects, the U. S. Department of Energy's Office of Electricity Delivery and Energy Reliability (OE), in partnership with utility hosts, is convening a series of regional smart grid 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 series of workshops aims to establish a platform for smart grid implementers to share their experiences in making the smart grid a reality. In support of this objective, resources shared by workshop participants will be made available to implementing utilities through a dedicated portal on the SmartGrid.gov website.[1]

The Southwest Regional Smart Grid Peer-to-Peer Workshop took place March 21-22, 2012 in Las Vegas, Nevada, and was hosted by NV Energy. More than 60 stakeholders attended, representing utilities from Arizona, California, Colorado, Guam, Hawaii, Nevada, New Mexico, and Utah. Participants included both DOE-funded and non-DOE-funded smart grid projects, representing large investor-owned utilities, rural cooperatives, and municipal electrical authorities.

The workshop featured a series of focused peer-to-peer dialogues regarding successes, challenges, and lessons learned with smart grid deployments and demonstrations, with a focus on customer engagement issues. The first day featured panel discussions titled *Engagement Before, During & After Implementation,* and *Consumer Confidence (Privacy, Security, Accuracy and Health).* Day two featured three panel discussions, titled *Consumer Benefits; Opt-out Plans—When Is it Necessary?;* and *Looking Ahead.* Each panel discussion featured utility project staff, and it was followed by an interactive question-and-answer session and a topical small-group "breakout" session. A full agenda is provided in Appendix A, and a full participant list is provided in Appendix B.

Discussions from the workshop allowed participants to have a constructive dialogue regarding the customer engagement aspect of grid modernization efforts. Several important themes emerged:

- **Customers are diverse and require diverse solutions**. The diversity of customer energy needs and preferences is widely recognized. In response, utilities are implementing a variety of new offerings, from tailored pricing programs to technology platforms through which customers can manage energy. Utilities are also designing outreach programs that are tailored to the unique needs of different groups. Participants shared lessons learned regarding innovative approaches to cultivating customer participation, noting that many successful approaches are fairly "low-tech," such as organizing community events in local parks. In general, programs designed to create and maintain ongoing contact and raise broad community awareness have been important elements to project success.

[1] https://peer.smartgrid.gov/.

- **Define what customer engagement means.** Participants highlighted the importance of approaching engagement as a two-way dialogue, not a monologue from utility to customer. Utilities are increasingly engaging in active discussion, rather than just disseminating information. Many participants described their efforts to reach out to a wide range of stakeholders in developing roll-out plans to solicit feedback at the design stage of their smart grid projects. This sort of sustained, two-way relationship can also help clarify program goals, and it allows utilities to sharpen their focus and set reasonable expectations for program success.

- **Customer confidence directly impacts the success of Advanced Metering Infrastructure (AMI) investments.** For AMI investments to reach their potential—including expanded customer choice, improved outage management, and increased operational efficiency—utilities must work to ensure customers clearly understand the benefits and are they informed about how to use the technology to manage their electricity usage. Customer questions and concerns typically focus on accuracy, privacy, security, and health concerns. Early implementers recommend that the utility develop a customer engagement plan prior to deployment. The plan should articulate how to engage the community, communicate benefits, and respond to customer concerns (both expected and unforeseen). At the workshop, leaders of successful projects remarked that they had prioritized early and consistent consumer engagement. Participants also emphasized the advantages of working with customers, community leaders, and regulators early in the process. Some participants noted that, in a vacuum of information, misleading information about AMI systems can spread quickly. High quality engagement served to familiarize stakeholders with the rationale, benefits and user experience of smart grids, and it generally reduced levels of customer concern.

- **Successful projects identify benefits that are most meaningful to customers, communicate them effectively, and measure results.** Smart grid technologies bring a wide range of system impacts, which translate into both monetary and non-monetary benefits to consumers. Successful projects identify, articulate, and track both of these types of benefits, and they communicate them to consumers and other stakeholders. Effective tracking of system impact data is crucial—for example collecting data on traditional benefits such as increased system reliability or novel metrics such as increased convenience and choice; the avoidance of new power plant construction; increased economic development and modernization; and avoided cost increases. In addition to rigorous data tracking, illustrative case studies can be useful for communicating project benefits.

- **Opt-out provisions are becoming an important and necessary component of smart meter deployment programs**. Many projects in the region did not include an opt-out provision at the project outset, primarily because opposition was unanticipated. With the rise of small but active opposition to smart meter deployments, opt-out provisions are becoming more common and, in some cases, have been mandated by state regulators. At the workshop, various opt-out programs were discussed. For some programs, the choice to opt-out is limited to a narrow window of time during program deployment, and, in most cases, the opt-out customer pays an initial cost for installing the non-standard equipment and a monthly cost for the manual reading of the meter. In other cases, utilities have created a “postpone” list to accommodate customers who express concerns while keeping the project on schedule and allowing the bulk of AMI deployments to proceed. Some participants noted that long delays by regulators in evaluating opt-out provisions increased customer angst. Additionally, participants observed that opposition can be minimized by increased communication and awareness with customers. When customers understand the technology and benefits, they are more accepting of the program.

- **Success requires a strategy for change management.** Smart grid projects are not simply technology deployments but rather involve broad transformation of business practices and company culture. The technical, social, and economic context of doing business is in flux, and the internal organization of utilities is changing in response. This, coupled with the accelerated pace of change, is leading utilities to focus on change management strategies. Specific issues that were identified at the workshop include breaking through "silos," modernizing staff training and development, transforming customer engagement and communication, and upgrading data management systems. As has been noted in other regions of the country, smart grid project success is enhanced by a coherent, shared vision and organizational leadership at all levels of the organization.

Together, these themes and others point to a dramatic transformation in progress. As with transformations in other industries, the far-reaching effects of a modernized grid are not easy to project. Projected investments in grid modernization over the next 50 years range from $338 billion to $880 billion (or more[2]) making it important to fully leverage the lessons learned from early projects. The following sections examine in detail the main themes that emerged at the workshop, with an emphasis on reporting unique observations, lessons learned, recommended best practices, and insights into the future of grid modernization.

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[2] 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. Strategic Insights into Customer Engagement

***"Communication with the customer now becomes a central function."***
*-Workshop participant*

## Overview

The Southwest Peer-to-Peer Workshop focused on customer and community engagement issues as an essential factor in successful implementation of smart grid projects. Effective engagement not only impacts the system benefits but also bears a strong relationship to other important project success indicators, namely customer satisfaction. Participants noted that utilities are rapidly realizing how smart grid projects are changing the utility-customer relationship. This section details some key insights into consumer engagement strategies discussed at the workshop.

- **Engage internal stakeholders early.** One municipal utility spent two years engaging employees prior to launching their project. Since the electric system planner and the customer service personnel were rarely in same room together previously, the smart grid project necessitated 6 months of meetings between the two offices to cultivate a deeper understanding of each other's plans, requirements and even definition of terms. Another utility panelist described how the head of their smart grid project required all employees in the division to install the new technology in their own homes before deployment to help understand the customer perspective and identify possible concerns or issues. Effective external engagement almost always starts first with effective internal communication and staff engagement.

- **View engagement as an opportunity.** One panelist from an investor-owned utility (IOU) in an urban service territory observed that the utility's smart grid project was viewed as an important chance to connect with every customer in its territory. Anticipating that town hall meetings would not be enough, the utility planned a more robust approach, attending town council meetings and partnering with environmental organizations and community non-profit agencies to promote awareness and to solicit input on their plans. These measures dramatically increased the utility's connection to its customers. On this theme, a different utility representative remarked that its AMI deployment was initially regarded internally simply as an equipment exchange. As the planning process proceeded, the opportunity and the necessity of engaging in a conversation with consumers became clear. Another panelist observed that customer trust in the utility has risen along with increased engagement. Utilities are discovering that customers like when utilities talk with them.

- **Have the hard conversations with partners up front.** The same workshop participant who had worked closely with non-profit agencies in the planning stage also related the experience of using early community meetings to ask hard questions, for example, "Are you concerned about radio frequency emissions from meters?" In addition to providing important insights into customer concerns, the direct approach also improved the transparency of the process and garnered a level of trust in the planning process.[3] Another utility panelist described the process and benefits of inviting consumer advocates to participate in designing the new programs. This greatly helped reduce project opposition and improved the programs since potential program opponents were an integral part of the planning process, aided in program design, and got to see, first-hand, how the technology worked.

[3] No participants in these pre-planning meetings expressed any concern about radio frequency (RF) emissions.

- **Understand and leverage general principles of new technology adoption.** One participant observed that smart meter deployment obeys rules similar to those followed with other forms of technology adoption. Utilities can leverage insights from Everett Rogers' theory of technology diffusion,[4] which identifies five factors that determine rate and level of adoption: relative advantage, compatibility, complexity, observability, and "trialability." These factors all play a critical role in the customer's decision whether to adopt or reject a technology. For each factor, the panelist described the connection to smart grid projects. (For details, see the text box titled "Diffusion of Technology.")

### Diffusion of Technology

One workshop participant likened the acceptance of smart meters to technology adoption criteria described in Everett Rogers' "Five Factors" framework. Below are the observations from one panelist and how the factors were applied in their project.

*Relative advantage—Does it save money and/or help me in some way?* Smarter grids offer the customer the advantage of having constant, real-time access to information, which represents an improvement over the status quo.

*Compatibility—Does it work with other elements of my life?*
On this factor, the panelist remarked that the smart grid is still a work in progress. For example, the programmable thermostats chosen by the utility were discovered to be incompatible with multi-unit AC systems, and in other apartment units, radio range issues frustrated effective functioning.

*Complexity—Is it simple enough to use?*
The panelist noted that customers are less likely to adopt a technology if it is too complex, and so utilities should strive to make it simple. Making participation look like other, more established experiences, is key (e.g., designing web portals that look similar to other on-line experiences such as "Sign up for My Account." The panelist also expressed optimism about (1) the Green Button initiative—a program to make customer data available and more easily readable—as a good example of reducing complexity and (2) the increasing availability of in-home devices that excel at user interface (e.g., the "Nest" thermostat).

*"Observability"—Can I see or perceive how it is being used?*
The panelist remarked on the importance of making the new technology a tangible, observable experience. For example, "Can we take pictures of what it looks like to use a smart meter?" To this end, the panelist's organization shared pictures and information about home area networks (HANs) on a web-based discussion board so that customers could see how other people are using the technology. Another participant noted that cell phones are easier to sell because consumers can interact with them. Giving customers tools for interacting with their devices like smart appliances or smart phone apps helps them to see the value. Conversely, while such features as "self-healing circuits" can add value, customers are less likely to connect with such benefits given that they are difficult to observe.

*"Trialability"—Can I try it out?*
Customers are more likely to adopt a technology if they can try it before they buy it. Mechanisms to increase this factor include allowing customers to try a system at a retailer such as Costco or providing nine months of sample energy use data, along with what the customer would pay under five different rate structures.

[4] Rogers, E. M. (1995). Diffusion of Innovations. Simon and Schuster. Fifth Edition. 1995.

- **Be strategic about the sequence of programs and technologies.** Adding responsive loads to the grid is a vital objective of many AMI investments, but participants noted that not all responsive loads are the same and not all customer types require the same level of engagement. One participant remarked that engaging commercial and industrial customers around demand response could be less complex than it is with residential customers. Another participant remarked that the first outreach to residential customers should not be around demand response but rather about giving customers something useful and non-invasive, for example, tools to help manage their energy. Once the customers are on board and see the benefits, then talk about possible load shifting or demand response (DR). Similarly, some participants recommended that utilities pursue non-base load shifting first, then the larger loads that require significant behavioral change. “Start with the “small bets,” “small wins,” and “small [DR] events” to get traction and build momentum… then expand.”

- **Prepare for “field” and “back-office” challenges.** Including back-office and field operations personnel in planning and educational efforts is a key element for project success. In many rural areas, field representatives are trusted advisors in their communities, and as such, they should fully understand the goals and objectives of smart grid programs. Additionally, many customer benefits depend heavily on effective back-office functions, such as data management and information technology (IT) integration. One specific example of new back-office functions is the implementation of a ”high/low bill check” after smart meters have been deployed. Several utilities have struggled to manage the perception that bills have increased immediately after AMI installation, and compounding this perception, one utility mistakenly sent a bill for $12,000 to a customer soon after the meter was installed, leading to a difficult public relations process. Effective management and alignment of back-office functions will be essential to promoting project success.

  Executing data-intensive back-office functions is not trivial. One panelist noted that (1) the volume of data and the degree of computational complexity are transformational for the utility industry and (2) cloud-based solutions will help small and medium-sized utilities the most. Communications systems were identified as a challenge for rural areas, and the codependence on third-party carriers often adds complexity to this challenge. On a related theme, participants were unanimous in their agreement that ensuring cybersecurity requires effective and ongoing back-office coordination. One participant described the ongoing development of a cyber security achievement plan for that includes tools and training, and is updated yearly to address new issues.

- **Hope for the best; plan for the worst.** Several utility panelists described their efforts to plan for and recover from customer engagement difficulties. One panelist described this work as a “disaster recovery plan,” involving instructions for customer service representatives, executives, and media relations staff. Many utilities described very high levels of customer satisfaction (greater than 98%) but best to plan for possible opposition to be ready.

- **Plan for flawless execution.** Several stories emerged about the importance of flawless execution—implementing all facets of smart grid projects without major problems, customer misunderstandings, or complications. This theme has implications at each step of implementation. For example, one IOU described the logistics of receiving shipments of smart meters for its entire territory within several days. At one point, 300,000 meters were arriving per day, a logistical challenge that deserved ample planning attention. News media were be scrutinizing all aspects of the project. Later in the deployment, because of an error in billing software unrelated to the meter deployment, a bill totaling thousands of dollars was sent to a customer, who then reported the bill to the local TV station. In each case, the

panelist remarked that having the most accurate smart meters or the best equipment is not enough—the back-office operations need to be extremely well planned and executed, too.

A participant from a municipal authority noted that any AMI deployment will certainly entail challenges and that if mistakes are made, it is important to be able to admit them early and take measures to fully address them. In support of this strategy, executive leadership might need to consider giving project managers adequate authority to handle and resolve customer engagement issues quickly. (For detail see the text box titled "Engagement Case Study: Resolving Technical Issues Quickly in the Field").

**Engagement Case Study: Resolving Technical Issues Quickly in the Field**

A technical surprise arose when the first few smart meter installations in a home-owner association (HOA) community with many retirees inadvertently shut off the cable TV in those homes. The HOA leader told the utility project manager to "stand down." Fortunately, the utility project manager had been delegated the authority to resolve problems without the need to first gain approvals up the corporate hierarchy. That enabled quick responsiveness to resolve the issue in a few hours:

- The project manager called the cable company to determine the cause of the problem. Cable company technicians resolved the issue and communicated the solution to cable customer service representatives so they could walk customers through the process when they called.
- The project manager tasked a utility technician—who shared a military background with the HOA chairman—to meet directly with him to arrive at an understanding that allowed work to proceed the same day

**Lessons Learned:** Responsive communications and a nimble organizational structure with capable personnel holding the authority to resolve problems in real-time can keep a project on track.

## 2. Engaging Customers: Methods and Approaches

**Overview**

While the workshop focused on the strategies listed above, participants also identified specific methods and successful approaches. These range from changes in communication channels to employing innovative events in support of project roll-out. The general theme was that open and collaborative approaches hold more promise for deployment. This section highlights the successful methods and approaches discussed at the workshop.

- **Deploy different methods to engage different audiences.** In any utility service territory, awareness of and receptiveness towards smart grid projects vary widely. Understanding the various customer "segments" in a market can help streamline customer engagement. Differentiating approaches to various audiences via tailored channels and methods is important in successfully implementing programs. Utilities are recognizing the need for market segmentation in their messages to consumers. Understanding what motivates different customer segments and designing approaches to reach these segments is helpful.

  Customer segments include groups based on geographic location (region, urban, suburban, or rural), age, income, education, socio-politico-cultural factors, motivations, preferences, and other aspects. Needs, wants, and desires for different segments based on these factors

will vary and impact the customer's motivation, participation, and perception of a program. As one participant from an island community noted, motivations may vary widely between residential customers with an $18 bill at a seasonal beach house or a $350 bill inland.

In addition to customer segment as traditionally conceived, other relevant audiences exist for smart meter/grid modernization programs. (See the text box titled "Diversity of Stakeholders") The message for reaching each of segment or audience may need to be tailored to address its perspectives and priorities.

- **Be direct and avoid jargon.** Use simple, direct language rather than industry jargon. As one participant put it, "How would you explain it to your grandmother?"

> **Diversity of Stakeholders**
> Customers are vital to smart grid implementation, but they are not the only utility stakeholders. The list generated at the workshop of audiences to consider when developing smart grid plans is:
>
> - **Customers – both residential and commercial, large and small**
> - **Home owners associations**
> - **Regulatory commissions**
> - **Legislators and other elected officials**
> - **Interveners** (e.g., environmental organizations, consumer advocates, community-based organizations)
> - **Employee unions**
> - **Local and National News Media**
> - **Military service members**, which represent a unique and important market
> - **Workforce education and training organizations at all levels:** Universities, trade schools, community colleges, K-12
> - **Science trade associations**
> - **Third-party vendors** Grid technologies, EV charging stations, application developers
> - **Chambers of Commerce** and other economic development organizations

- **Give a range of choices.** One large IOU described providing a broad menu of options and encouraging customers to select what appeals most to them, because customers like to know that they get to choose. The language used for giving choices is also important. One panelist noted that in her citywide project, customers were required to make a "mandatory choice" with regard to a range of pricing plans, with one option being staying on their current plan. The phrasing "mandatory choice" was not well received—customers also wanted the option not to choose.

- **Invest in staff training.** The transition to smarter grids entails important changes in staff training needs. For example, customer service personnel will be dealing with more than just billing inquiries; they may have to answer questions on a wide range of smart grid topics. Project success can be supported by ensuring that customer service representatives are well informed about the full range of smart grid topics and are trained to be supportive and flexible in responding to customer concerns. Field personnel will also benefit from additional training on smart grid systems, as they often serve as important "touchpoints" for community engagement.

- **Develop multi-stage engagement plans.** A common recipe for smart grid project rollout is a "90/60/30/0" day schedule of activities, starting 90 days before the planned launch and extending through "launch day." Numerous participants noted that their utilities have developed these plans, which include specific activities for each stage. One example of activities discussed during the workshop was identifying third-party advocates and other community stakeholders 90 days prior to launch to assist in building awareness and acceptance. Some 60- and 30-day activities included multi-channel customer outreach including letters, phone calls, and door hangers. Other examples of launch-day activities included face-to-face contact with the customer during the meter installation.

- **Test technologies with "friendly customers" (e.g., utility employees who are also customers).** The "friendly employee base" provides an important source of experiential data and qualitative feedback on technology performance and ease of use, and it helps develop effective training for employees and education for customers. Participants recommended leveraging this friendly group as a source for lessons learned on what to do and not to do.

- **Employ focus groups to help understand the customer**. Various participants mentioned focus groups as a good way to identify concerns, levels of awareness, and particular benefits that resonate with various customer segments. One participant remarked that focus groups helped him realize that customer expectations were not as negative as he first thought.

- **Address internal issues that may arise due to smart grid projects.** Several participants from municipal utilities ("munis") remarked that they realized that changes from the smart grid project could create concerns with union members because job duties would change dramatically with the transformation to a smarter grid and with the installation of smart meters. The muni was careful to determine how individuals in those jobs could be retrained for other jobs and was deliberate and open with the union leadership to explain the changes to ensure that personnel were on board before publically announcing the project.

- **Measure results.** Various participants noted the importance of measuring customer satisfaction through various avenues. A traditional avenue—the customer survey—provides valuable data, while also serving as a form of engagement, and it can be leveraged in subsequent outreach efforts and program development. Some participants reported using a respected third party (e.g. J.D. Power) to carry out customer satisfaction surveys. (A range of measurement techniques is described in the text box titled "Metrics for Measuring Customer Engagement and Results.")

- **Develop a media plan.** Various utility panelists noted that media personnel need to be well informed about smart grid project benefits, and timelines, so that when the media department liaises with local media they are able to respond to questions without being caught off guard. In some utilities, communications personnel are integral project partners. One panelist described a robust media plan that aimed to anticipate all risks from a news media perspective. Additionally, all project materials were vetted by the communications department, which then helped when issues arose in the local press. Another participant described talking with her company media representative daily to keep them abreast of issues. The participant also vetted all community stakeholder documents through the media representative before sharing it with stakeholders. This preparation allowed the media department to respond more quickly and effectively to challenges.

### Metrics for Measuring Customer Engagement and Results

From a change-management perspective, the ability to measure actions, results, correlations, and progress provides a valuable tool in program implementation, validation and course correction. Various participants remarked that traditional methods of evaluating customer service programs need updating. Useful metrics and methods shared at the workshop include:

- Rate of complaints as a percentage of installations and follow-on calls
- Response time for inquiries, claims, and complaints. This can apply to how long it takes a utility to either send a technician to respond to a claim or make available a customer service technician to answer a call and remain on the line with the customer. In the past, customer service representatives may have been rewarded for handling calls quickly. Today, this metric is changing so that customer service reps typically dedicate whatever time it takes (within reason) to address customer concerns.
- Number of customers on "postpone" list and ultimate refusals of smart meters in the service areas
- Tracking and providing granular satisfaction data directly to crews to maintain and improve performance (done by at least one utility)
- Complaints or concerns by category (e.g., accuracy, RF, privacy, security, health/safety, equipment interference)
- Internet monitoring of positive and negative comments—At least one utility described a program for using these results in preparation to respond to customer calls.
- Customers signing up for web accounts, using electronic billing payment, and other portal capabilities.
- Twitter responses and mentions, "Likes" on Facebook
- Customer satisfaction surveys by third-party firms, such as J.D. Power and Associates
- Transaction sampling—One utility maintains a program in which representative call customers directly about a sample of transactions, including meter experiences. A representative asks, for example, whether the technician followed the process outlined, stepped on flowers, knocked on the door, scratched a wall, and acted professionally and with courtesy.
- Goal metrics including energy and in-home device usage, online payments, portal usage, peak-time usage, and in the medium-term, EV connections.

- **Build a high-quality online presence.** Many utilities are building their online capabilities to support grid efforts. This can come in many forms, including dedicated websites with information, video, independent research studies, and other resources. Many utilities have started using social media such as Twitter and Facebook, and video sharing sites such as YouTube. One participant described online capabilities that allow customers to monitor and share their usage through Facebook. One cooperative utility panelist cautioned that Twitter and Facebook pose the possibility of negative messages, while other utilities shared methods of dealing with this possibility. (For more on social media efforts, see the text box titled "Social Media.")

- **Take unique and creative outreach approaches.** Utilities reported having to leave the "beaten path". For example, traditional public hearings at central locations tend to bring out only a handful of stakeholders—usually the passionate few who are strongly for or against a project. The silent majority often remains unmoved on the sidelines while the program is discussed and advances. Practitioners are devising successful ways of varying their

outreach to increase participation from all customers, including:

- **"Engaging up."** While engagement typically centers on customers, various utilities invested effort to reach out to a wide range of stakeholders in leadership roles, such as town councils, public utility commissions, and state legislatures.

- ***Coordinating outreach with other community organizations.*** Several practitioners noted the value of leveraging other community organizations for smart grid outreach. The smart grid outreach coordinator for one large IOU also serves as its local outreach manager on various issues, including environmental and stakeholder development. The outreach manager and others noted the value of working with other community organizations that share some goals, such as conservation groups, environmental groups, chambers of commerce, rotary clubs, consumer advocates, public assistance agencies, and others with an ongoing presence in the community. For the launch of the smart meter program, the outreach manager partnered with 15 non-profit organizations. Response from customers to the outreach was not limited to the smart meter, but customers wanted to know about other company activities, such as "why are you building this substation" or "why are you routing that transmission line through the valley?" This outreach helps broaden the conversation, establishes a sense of trust, and builds relationships with customers.

- ***Holding "coffees in the park."*** One municipality held "coffees in the park" on weekends, with good results. Where public hearings might draw a handful of people, the park gatherings would draw 60-80 people in one morning. While residents brought in questions about bills and other concerns, the events provided a basis for good communications and community relations.

### Social Media

Smart grid deployments are happening in an age of social media, and utilities are deploying various platforms including Twitter, Facebook, and YouTube. Multiple participants emphasized the importance of developing a social media plan as part of deployment. Some observations and lessons learned include:

- Social media can be used in very different ways. It is important to align their use with overarching goals related to the web presence. For example, one utility used Twitter only for outage notification, not for smart meter rollout. Another utility used both Twitter and Facebook for engagement during their smart meter rollout. Another utility works with a third-party vendor whose products allow customers to monitor their electricity use through Facebook and compare their consumption to the community to foster friendly competition.
- Cross-functional communication is important. Staff in charge of media and deployment should be in close communication.
- Popular local websites represent an important source of information about customer approval and disapproval. Use them to improve service or program design.
- Adequately train customer service staff on how to use the tools. This is especially important in connecting with 20- and "30-something" customers, many of whom are now becoming homeowners and more interested in managing their energy use.
- Be prepared for customer Tweets or Facebook posts about bad experiences. In response to these, one utility emailed customers directly and asked them to call. Interestingly, most users did not call.
- Participants noted that leaders in leveraging social media include BC Hydro and British Gas.

- ***Partnering with businesses, universities, and community colleges.*** A large metropolitan utility in the Southwest partnered with universities, colleges, and businesses to communicate the benefits of the smart grid to the community and customer base. Educational institutions sponsored programs on and off campus, while both educational and business leaders sent letters on their respective letterhead to show their support and to help get the message out in a positive way.

# 3. Identifying and Communicating Smart Grid Benefits

**Overview**

Traditionally, utilities have been focused on delivering reliable energy services to customers safely, at low cost, and with little emphasis on customer engagement. Increasingly, engaging customers in their energy management is an integral part of realizing smart grid potential. Identifying and communicating smart grid benefits are important aspects of this emerging dimension of the utility business. Some key themes in this domain are discussed in this section.

**Identifying Benefits**

Workshop participants identified several benefits that have been found to resonate with customers:

- **"No more surprises."** One utility remarked that consumers identify strongly with the idea that they can control their usage and avoid "bill shock" at the end of the month. Real-time information allows customers to respond early to identify problems—for example an energy-hungry or broken appliance—or simply to reduce energy use.

  Similarly, smart meters and real-time pricing allow electricity to be purchased more as other goods are purchased, and they promote improved transparency. One workshop participant remarked on how different electricity is currently sold: imagine going into a gas station and filling up the tank, with no idea of how much fuel was added or how much it costs, and then getting a bill at the end of the month. Utility investments in metering and pricing technologies give customers more information about what they are using.

- **Improved outage management.** In cases where AMI is coupled with outage management systems, utilities reported achieving much faster outage notification and restoration time, as well as fewer spot outages. Additionally, some utilities reported the ability to provide customers with web-based maps of outages.

- **Real-time price and usage information.** Grid modernization underway provides customers for the first time with the information they need to make informed choices. Additionally, where dynamic pricing signals are in effect, the connection between energy usage and prices is becoming more tangible. Several participants remarked that their utilities observed a quick and significant customer response to price signals. Another utility panelist remarked that universal time-of-use pricing would represent the fairest way to allocate system costs.

- **"Pre-pay" programs help to manage energy expenses.** Several utilities have established pre-pay programs that allow customers to pay in advance and regularly monitor their electricity expenses. In these programs, customers add money to their balances, much like adding minutes to a pre-paid cell phone. Paying in advance for electricity gives consumers more control over their expenditures. With smart grid technologies, consumers can view their usage and bill online, and they can receive alerts at preset limits. This puts control back in the customer's hands. One panelist noted that 14% of his customers use the pre-pay program, saving an average of 12% per month relative to usage prior to enrollment.

Additionally, under many of these programs, the need for a large out-of-pocket security deposit is reduced or waived. One utility participant reported reducing the typical security deposit of $275 to $99 for pre-pay customers, representing substantial help to income-strapped consumers. At the workshop, utilities unanimously reported very positive customer reactions to pre-pay programs.

- **Billing convenience.** Parallel implementation of smart meters, web portals, and enhanced back-office systems has opened up new options for consumers. For example, some utilities now offer customizable billing dates. Others offer a choice of rate options, in which the customer can evaluate a new rate by back-testing it to see whether it would have been a better choice based on his or her own historical usage.

- **Quicker customer service.** Many smart meters offer remote connect and disconnect functionality, allowing a new resident to get electrical service much more quickly, without waiting for a service technician to schedule a trip to the house. Others are prioritizing one-call bill resolution, in which call center staff now have much more data at their fingertips and can resolve customer billing calls more quickly.

- **Innovation and economic competitiveness.** Establishing the smart grid as a platform for innovation is an idea that has been found to resonate with policy makers and other leaders. Compared to traditional electricity grids, smart grids allow entrepreneurs to develop new applications that can produce system benefits as more customers adopt them. Innovators will be able to create new applications and add value---opportunities that were extremely rare over the last 100 years. One participant noted that as electric vehicles become more affordable and common, the smart grid and associated customer applications and business models will enable their use at lower costs, unlocking innovation in other sectors.

- **Integrating renewable energy.** Many smart grid projects in the region aim to enable greater deployment of renewable energy. One utility panelist from Hawaii, where electricity rates are the highest in the United States, noted that photovoltaic (PV) technology is an economically attractive option for many customers, but most traditional grids are not built to accommodate high penetrations of PV in a given neighborhood. Another utility panelist noted that some neighborhoods in her territory now have 30% penetration of rooftop PV. New smart grid technologies that provide voltage regulation can help mitigate problems that arise from rapid changes in power production.

## Communicating Benefits

The challenge of communicating the extensive range of benefits described by workshop participants received significant attention. The collected experience of the utility project managers at the workshop led to numerous lessons learned about communicating benefits, including:

- **Synchronize communications plans with system roll-out.** Before, during, and after deployment of AMI and other grid systems, utilities are working to align communications plans—and corresponding customer expectations—with the state of technology readiness. Multiple utilities reported that advertising certain benefits before they were ready for “prime-time” created confusion or unrealistic expectations from customers. For example, some participants recommended that utilities ensure that web portals and other baseline capabilities were in place and operational before installing smart meters.

- **Do not overpromise.** Panelists cautioned against overpromising on project timing and benefits, and others cautioned about over-emphasizing potential cost savings. Alternatives include (1) emphasizing personal control based on information and (2) highlighting broader

system benefits such as increased reliability, avoided operating costs, avoided outages, faster outage recovery, greater integration of renewable energy, and economic development.

- **Describe smart grid systems and benefits through analogies.** Analogies to other products and services can help contextualize smart grid systems for customers. Some potential framings suggested by participants include:
    - Energy usage reports are similar in many ways to water quality reports, a valuable public service that many customers already identify with and that may help build confidence with smart meter services.
    - The electrical grid is similar to the Interstate Highway System. Just as the Highway System has been the backbone of the domestic economy and U.S. competitiveness, the grid is critical for economic competitiveness, and smart grid technologies are very important to competitiveness both domestically and internationally. One municipal utility panelist described his smart grid plans as a key component of a larger high-tech community development strategy.
    - Online portals provide the functionality, privacy, and security seen in other internet contexts, such as online banking sites.
    - Smart meter RF emission levels are lower than those of other home devices. Various participants reported quantitative studies showing how common electronics in the home emit significantly more RF signal.

- **Create a project roll-out plan that prioritizes early "wins" for customers.** Roll-out plans that prioritize clear customer benefits and easy-to-use products can lay the groundwork for more complex systems solutions. Various participants noted that some systems bring clear and quick benefits for customers (e.g., data portals that make energy use more transparent) while others take more time and education (e.g., demand response, which can seem invasive).

# 4. Navigating Customer Concerns

**Overview**

Customer concerns regarding smart meters have been an issue for many utilities in the region. Whether due to privacy, security, accuracy, or health, it is important for utilities to understand and be prepared to address them. One panelist from a major IOU that had faced significant customer opposition reflected on their smart grid experience and wished they had done more to help alleviate customer concerns and provide information on project elements sooner. This section details the insights shared at the workshop on navigating customer concerns.

- **Take proactive steps to build customer confidence.** While customer acceptance of smart grid projects is generally broad, it is not automatic. Participants highlighted the importance of engaging customers and explaining technologies. Such engagement requires resources to execute engagement plans, and various participants reported budgeting in approximately $1.50 to $5.00 per smart meter to support engagement activities. (For more detail, see text box titled "Engagement Case Study: Customer Confidence Program Elements").

- **Prepare for potential negative media coverage and anti-smart meter campaigns.** A vocal minority, whose presence has expanded significantly in the last two years via internet sites and local campaigns, has received significant attention from local and national news media outlets. These campaigns typically raise concerns about safety

**Engagement Case Study: Customer Confidence Program Elements**

A utility in the process of completing a system-wide AMI implementation program with 1.4 million meters developed a 6-point education and communications program. This was done partly in advance of meter deployment and partly in response to lessons learned during deployment.

1. **Security and Safety**—A cyber-security program was developed that meets federal requirements and standards, and is validated by independent third-party assessment and staffed 24/ 7 to monitor the system and respond to concerns. An independent safety analysis demonstrates RF exposure at 15,000 times below FCC limits.
2. **Privacy**—The program includes assurances that meters do not track individual appliance usage, that they do not transmit personally identifiable information, and that the law prohibits sharing customer information outside the purpose for which it is gathered.
3. **Accuracy**—Meters meet American National Standards Institute (ANSI) standards, are independently tested, factory tested, and sample tested upon arrival. Meters show 99.85% accuracy rate in the field with only 0.25% returned to manufacturer after testing.
4. **Deployment**—The program includes a lead-up program for customer outreach on a 90-60-30-5-0 day schedule. In addition to beginning engagement 90 days in advance, the program includes post-installation follow-up to survey satisfaction and provides additional support. Less than 0.2% of customers requested a postponement.
5. **Verification**—Each smart meter is verified at least once. Only 0.59% of bills required an adjustment; 100% of installed meters checked met ANSI accuracy standards. A "back office" process for checking high and low readings and billings before a bill is sent now precludes billing errors.
6. **Ownership** – The program enables "customer ownership of energy use." This empowers customers with energy usage information at 15-minute intervals, web portal access, the ability to compare their use with average use in the area, and a two-way HAN system for managing energy use at home.

related to RF exposure, equipment interferences, privacy, and the security of smart meters. Participants noted that it is important for utilities to address these concerns and respond with timely information. Without sufficient information to make their own decision, customers are more apt to believe opposition claims. Various participants shared their strategies for dealing with these campaigns and the associated media coverage. Some of the recommendations provided include:

- Develop a media kit of prepared materials, including frequently asked questions sheets with information on issues and responses; articles to disseminate to local media outlets; and other press materials, such as targeted media briefings that can be used in advance or in response to criticism. Internally, this may involve vetting all customer communication materials with a media representative and anticipating all possible risks.
- Start the smart meter and smart grid discussion with media far in advance of project deployment, educating media with articles and facts.
- Provide training and assistance to project implementers to prepare them with information on messages about project details such as logistics, issues, costs, and benefits.
- Identify and work with media members who are educated and objective, about smart grid modernization projects.
- Designate a single point of coordination within the utility to ensure consistency.
- Communicate smart meter and smart grid projects in the context of larger utility issues, such as renewable energy integration, energy efficiency, and conservation

- Designate an independent technical advisory panel, consisting of respected third-party evaluators who can help craft project plans and work to ensure accurate messaging.

- **Choose your battles.** One participant cautioned utilities to take the concerns of a vocal minority seriously and with a proper degree of respect, while not disproportionately focusing time, attention, or resources on individuals that may not be possible to win over. In spending significant resources on these issues, utilities run the risk of detracting from the greater good of the program. Generally, participants agreed that utilities should expect these concerns to surface and should be prepared to address them directly and competently. Similarly, the utility may need to accept that some small fraction of the customer base will continue to vigorously object to smart grid projects. Including an opt-out provision for that fraction may be an inevitable project component.

- **Consider opt-out provisions or "postpone" programs.** With increasing customer concerns and anti-smart meter campaigns, several participants noted that opt-out provisions may become a common element of smart meter programs. Early precedents in the region require opt-out customers to pay an up-front cost and a monthly recurring fee. To achieve optimal operational and consumer benefits, participants emphasized the need for all (or nearly all) customers in the project or service area to participate in the program. If an opt-out plan has not yet been approved, consider establishing a delay or "postpone" list for customers who continue to voice concerns. This allows service technicians to continue installing meters at other homes, while the utility to addresses that customer's concerns. Various participants remarked that if opt-out programs are positioned amidst comprehensive outreach programs, options for postponement, and requirements to pay costs, only a small fraction of customers will ultimately opt out.

  Some participant recommendations regarding opt-out provision design included:

  - **Estimate financial and system costs for opt-out provisions.** Opt-out costs will be different for each utility. However, participants who provide opt-out plans reported that the cost categories that need to be considered include the cost to integrate manual reads into the billing process, additional IT support to merge advanced and standard meters, and gaps in the network created from those residents who did not participate in the program. The differential costs to service a standard or a non-activated smart meter are not easily determined, but they can be considerable and need to be taken into account.

  - **Provide alternative metering options.** Some participants reported establishing "non-standard metering" programs. Options discussed included:
    - A digital meter with the radio module removed—a one-time upfront fee and a recurring monthly service fee for manual meter reading.
    - Keep the non-network meter—a one-time fee of and a recurring fee for manual meter reading service.
    - A smart meter installed on the property away from the house—this option requires a significant one-time fee.

- **Work with regulators or other public authorities to address customer concerns quickly.** Utilities with low opt-out rates reported engaging commissioners early to educate them on the benefits of the program and the costs associated with residents who opt-out. Participants who experienced opposition noted the importance of talking with commissioners to help shorten the time to make a ruling. One participant observed that a lengthy PUC consideration process can magnify customer frustration and aggravation. Shorter resolution times are better for both customers and utilities. The range of delays associated with

regulatory decisions varied widely. In one case, the delay was five months, while another utility reported that implementation was delayed approximately 12 to 18 months.

- **Prepare for a hassle-free customer experience.** Several participants noted the very real challenges of aggregating many new sources of data into a clean package for customers. This is not typically an easy task, especially with hundreds of thousands of customers. As one participant observed, “As usage data is collected at 15 minute intervals and billing is typically on a daily basis, getting the systems to synch on daily basis is a challenge.” On top of the IT and back-office integration challenges, one panelist also noted that ensuring device interoperability and compliance with security standards slow the availability of benefits and the ability of customers to apply the technology. These implementation need to be considered in order to maximize customer satisfaction.

## 5. Challenges and Opportunities Ahead

The Southwest Workshop confirmed that, from the utility perspective, smart grid projects entail much more than just new meters. They involve substantial transformations of how utilities do business, perhaps most significantly in the required level of attention to stakeholder outreach and customer engagement, which in turn entails significant training and staffing needs as well as attention to back-office and IT integration activities. As one participant stated, “It’s never going to be the same in the utility industry again. We know customers do not want to be surprised or upset. Ask yourself if what you are investing in will make your customers (or anyone) smile.”

At a strategic level, workshop discussions point to a need to change the culture and structure of utilities in order to be more customer-focused. This transformation was summarized by one panelist: “We need to reach out to other industries that have dealt with the issues with customer service that utilities are currently facing. We should continually monitor the private sector to look for best practices.”

In addition to revealing the transformational re-orientation taking place in the industry, workshop participants shared their lessons learned and strategies for navigating the concerns of a small but active opposition to smart meters. One participant noted that this is inevitable and that utilities must at least give a last resort option to customers, but that they should first try to keep them in the program and work hard to build confidence. Another participant encouraged her colleagues to be flexible and nimble, and to address customer issues directly. “Transparency and collaboration are key principles for stakeholder groups. Get their buy-in early,” she said.

Far from being a purely technical activity, smart grid projects depend heavily for their success on effective customer and regulatory engagement. As one participant put it, “Regulatory issues are much more challenging than technical issues.” Resolving these intertwined issues and leveraging future investments to sustain grid modernization will be a critical focus of the next decade. These issues will certainly motivate further discussions and peer-to-peer meetings in which a growing community of practitioners can work together to share lessons learned and to advance U.S. smart grid efforts.

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# Appendix A. Workshop Agenda

**March 21, 2012**

**8-8:45a.m.** **Registration, light refreshments and networking**

**8:45 a.m.** **Introductions from NV Energy and DOE**
**Punam Mathur**, NV Energy, Vice President, Employee & Community Engagement
**Eric Lightner**, Director, Federal Smart Grid Task Force
**Gary Smith**, NV Energy, Director, Customer Energy Solutions

**9:30 a.m.** **Panel 1: Engagement Before, During & After Implementation**
**Moderator:** Peter Honebein, Customer Performance Group
**Panelists:** Risa Baron, San Diego Gas & Electric; Vicky Zavattero, Sacramento Municipal Utility District; Craig Kuennen, Glendale Water & Power; Susie Derbes, Arizona Public Service

*Framing questions:* What is your approach to informing customers about grid modernization/smart grid efforts? How are social media affecting the communication with customers? How has the customer engagement process changed with the deployment of smart grid technologies? Has staff education changed?

**10:30 a.m.** **Breakout discussions on related topics**

**11:15 a.m.** **Discussion Summaries**

**12 p.m.** **Networking Lunch**

**1 p.m.** **Panel 2: Consumer Confidence (Privacy, Security, Accuracy and Health)**
**Moderator:** Peter Honebein, Customer Performance Group
**Panelists:** Gary Smith, NV Energy; Dan James, Xcel Energy; David Bissell, Kauai Island Utility Cooperative; Ryan Blanc, Southern California Edison

*Framing questions:* Are these four issues the 'tickets to stay in the game'…in other words, will a project falter if consumer confidence is lacking in any one of these four areas? How are you addressing consumer privacy concerns? What are the mechanisms and messages for doing this? What are the key issues that you are facing regarding privacy and security? How important are health concerns in your consumer area? What are you doing to address health concerns?

**2 p.m.** **Presentation:** Green Button Initiative, Chris Irwin, U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability

**2:15 p.m.** **Breakout discussions on related topics**

**3:00 p.m.** **Discussion Summaries**

**4:00 p.m.** **Concluding Remarks**

**4:30 p.m.** **Shuttle departs for Reception**

**5-7:00 p.m.** **Reception at Bali Hai Golf Course**

## March 22, 2012

**8 a.m.** **Light refreshments and networking**

**8:30 a.m.** **Panel 3: Consumer Benefits**
**Moderator:** Craig Boice, Boice Dunham Group
**Panelists:** Scott Trout, Salt River Project; Mark Podorsky, Southern California Edison; Paul Fetherland, Hawaiian Electric Company; Luis Reyes, Kit Carson Electric Cooperative

*Framing questions:* What benefits are you emphasizing? How are these benefits being communicated to consumers? What benefits are most important to communicate to consumers and community leaders? Has your organization implemented pre-pay? What has been customer reaction? What role do vendors play in helping to realize customer benefits?

**9:30 a.m.** **NV Energy CEO Remarks**
Michael Yackira, NV Energy, President and Chief Executive Officer

**9:45 a.m.** **Breakout discussions on related topics**

**10:30 a.m.** **Discussion Summaries**

**11:15 a.m.** **Presentation:** Electric Sector Cybersecurity Risk Management Maturity Program, Samara Moore, Department of Energy Senior Cyber Security Policy Advisor

**11:30 a.m.** **Networking Lunch**

**12:30 p.m.** **Panel 4: Opt-out Plans—When is it Necessary?**
**Moderator:** Jeff Evans, Black & Veatch
**Panelists:** Bruce Hamer, Burbank Water and Power; Gary Smith, NV Energy; Cliff Gleicher, Pacific Gas & Electric; Elaina Medina, Portland General Electric

*Framing questions:* When do you know it's time to develop an opt-out plan? When is the right time to implement it, and who should be involved? What are the key elements in an opt-out plan? What has been the customer reaction to opt-out plans?

**1:15 p.m.** **Breakout discussions on related topics**

**2:00 p.m.** **Discussion Summaries**

**2:45 p.m.** **NV Energy Facility Tour**

**4:00 p.m.** **Panel 5: Looking Ahead**
**Moderator:** Don Denton, Duke Energy
Robert Stewart, NV Energy; Tom Bialek, San Diego Gas & Electric; Steve Lins, Glendale Water and Power; John Hewa, National Rural Electric Cooperative Association

*Framing questions:* Where will we be in 5 years? 10 years? What are the major technical and consumer trends that will affect smart grid projects in the Southwest?

**4:45 pm** **Concluding Remarks and Adjournment**

# Appendix B. Participant List

Workshop participants are listed alphabetically by organization.

| | | |
|---|---|---|
| Sherri Hong<br>Alameda Municipal Power | Susie Derbes<br>Arizona Public Service | Jeff Evans<br>Black & Veatch / NV Energy, Inc. |
| Chris Britton<br>Black & Veatch / Guam Power Authority | Dan Ruiz<br>Black & Veatch / Guam Power Authority | Craig Boice<br>Boice Dunham Group |
| Bruce Hamer<br>Burbank Water and Power | Patty Bigner<br>City of Fort Collins Utilities | Candy Cooper<br>City of Fountain Utilities |
| Debbie Miller<br>City of Fountain Utilities | Rose-Marie Clouse<br>City of Fountain Utilities | Atineh N. Haroutunian<br>City of Glendale Water & Power |
| Steve Lins<br>City of Glendale Water & Power | Craig Kuennen<br>City of Glendale Water & Power | Peter Honebein<br>Consumer Confidence Model |
| Don MacDonald<br>Department of Energy | Merrill Smith<br>Department of Energy | Debbie Haught<br>Department of Energy |
| Eric Lightner<br>Department of Energy | Michelle Dallafior<br>Department of Energy | Jihad Aljayoushi<br>Department of Energy |
| Akhlesh "AK" Kaushiva<br>Department of Energy | Mario Sciulli<br>Department of Energy | Chris Irwin<br>Department of Energy |
| Tanya Burns<br>Energetics, Inc. | Roel A Cahinhinan<br>Guam Power Authority | John J Cruz<br>Guam Power Authority |
| Melvyn Kwek<br>Guam Power Authority | Art Perez<br>Guam Power Authority | Ronald Okada<br>Guam Power Authority |
| Paul Fetherland<br>Hawai'i Electric Company | Tony Furness<br>Heber Light and Power | David Bissell<br>Kauai Island Utility Cooperative |
| Michael Yamane<br>Kauai Island Utility Cooperative | Emil Abdelshehid<br>Los Angeles Department of Water and Power | Steve Hauser<br>National Renewable Energy Laboratory |
| Sonja Berdahl<br>National Renewable Energy Laboratory | Paul Carroll<br>NRECA | John Hewa<br>NRECA |
| Punam Mathur<br>NV Energy, Inc. | Gary Smith<br>NV Energy, Inc. | Robert Stewart<br>NV Energy, Inc. |
| Ruth Urbantke<br>NV Energy, Inc. | Pam Hilts<br>NV Energy, Inc., Inc. | Cliff Gleicher<br>Pacific Gas & Electric |
| David Bratzler<br>Pasadena Water & Power | Elaina Medina<br>Portland General Electric | Erik Krause<br>Sacramento Municipal Utility District |
| Victoria Zavattero<br>Sacramento Municipal Utility District | Scott Trout<br>Salt River Project | Corey McClelland<br>San Diego Gas and Electric Company |
| Tom Bialek<br>San Diego Gas and Electric Company | Risa Baron<br>San Diego Gas and Electric Company | Gordon Stecklein<br>Southern California Edison Company |
| Mark Podorsky<br>Southern California Edison Company | Ryan Blanc<br>Southern California Edison Company | Eileen Brien<br>Sulphur Springs Valley Electric Coop |
| Anselmo Torres<br>Sulphur Springs Valley Electric Coop | Deana Perlmutter<br>The Integral Group | Michael Elliott<br>The Integral Group |

| | | |
|---|---|---|
| Antelia Salazar-Ball<br>United Power | Troy Whitmore<br>United Power | Mehdi Etezadi-Amoli<br>University of Nevada |
| Dan James<br>Xcel Energy | | |