Exh. JLB-10
Dockets UE-190529/UG-190530 and
UE-190274/UG-190275 (*consolidated*)
Witness: Jason L. Ball

BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**DOCKETS UE-190529 and UG-190530 *(consolidated)***
In the Matter of the Petition of **PUGET SOUND ENERGY** **For an Order Authorizing Deferral Accounting and Ratemaking Treatment for Short-life UT/Technology Investment**	**DOCKETS UE-190274 and UG-190275 (*consolidated*)**

EXHIBIT TO TESTIMONY OF

Jason L. Ball

STAFF OF
WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION

Experiences from Consumer Behavior Studies on Engaging Customers, DOE

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U.S. DEPARTMENT OF ENERGY

Electricity Delivery & Energy Reliability

American Recovery and Reinvestment Act of 2009

Experiences from the Consumer Behavior Studies on Engaging Customers

Smart Grid Investment Grant Program

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RECOVERY ACT SMART GRID PROGRAMS

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Executive Summary

One of the most important aspects for the successful implementation of customer-facing programs is to better understand how to engage and communicate with consumers. Customer-facing programs include time-based rates, information and feedback, load management, and energy efficiency.This report presents lessons learned by utilities through consumer behavior studies (CBS) conducted as part of the Department of Energy's (DOE) Smart Grid Investment Grant (SGIG) program.

Under the American Recovery and Reinvestment Act of 2009, the U.S. Department of Energy and the electricity industry have jointly invested over $7.9 billion in 99 cost-shared Smart Grid Investment Grant projects to modernize the electric grid, strengthen cybersecurity, improve interoperability, and collect an unprecedented level of data on smart grid and customer operations.

The SGIG CBS effort presents a unique opportunity to advance the understanding of consumer behaviors in terms of customer acceptance and retention, and electricity consumption and peak demand impacts. The effort includes eleven comprehensive studies with the aim of evaluating the response of residential and small commercial customers to time-based rate programs implemented in conjunction with advanced metering infrastructure and customer systems such as in-home displays, programmable communicating thermostats, and web portals. DOE set guidelines and protocols that sought to help the utilities design studies that would rigorously test and more precisely estimate the impact of time-based rates on customers' energy usage patterns, as well as identify the key drivers that motivate behavioral changes.

The studies consist of several phases: planning, recruiting customers to participate, operating the time-based rate programs, and conducting post-study evaluations to assess results and determine next steps, including possible large-scale roll-outs. To assist the studies, Lawrence Berkeley National Laboratory (LBNL) organized a series of monthly conference calls to provide a forum for the CBS utilities to exchange information, candidly discuss problems and solutions, and share ideas about what does and does not work when engaging consumers in the various phases of study implementation To support others that may be interested in implementing time-based rate and other customer-facing programs, LBNL and the utilities developed a number of lessons learned and recommendations from these monthly discussions. Table ES-1 provides a summary of the lessons learned.

The utilities found that the lessons learned are more than just good things to do - they are practical steps that should be taken by utilities and others to reduce risks and increase

efficiencies, and thereby lower project costs, and increase the chances of successful outcomes in future studies and programs.

Major Findings

In addition to the twenty-two lessons learned presented in Table ES-1, there are four major findings:

- Consumer engagement activities should be ongoing, adequately funded, and integrated explicitly into every phase of the studies to ensure success. Those CBS utilities who undertook a substantial and dedicated level of effort in the early phases to promote consumer engagement, such as general customer education, market research, and stakeholder and community outreach, believe those activities paid significant dividends in the subsequent customer recruitment and operations phases.

  Going forward, electric power industry stakeholders who are interested in providing time-based rate program offerings to customers (e.g., utilities, regulators, vendors, and third party providers) need to employ comprehensive and consistent consumer engagement efforts for meeting the varied needs of all customers and stakeholders involved in the implementation of time-based rate and related programs.

- Utilities should re-think organization and management approaches when implementing time-based rates, either as studies, or perhaps more importantly, for larger-scale roll-outs. The CBS utilities generally found, as have others who have been active in time-based rate programs, that implementation activities cross-cut a variety of utility departments and functions and that skill sets are often lacking in key areas such as marketing and market research. For example, several CBS utilities reported difficulties in finding expertise in building and operating data bases and management information systems to handle increasing amounts of customer data.

  When implementing time-based rate programs and related products and services, electric power industry stakeholders should apply techniques for greater internal coordination through the use of cross-functional teams and other approaches to strengthen organizational effectiveness. Many of the CBS utilities found these approaches to be highly beneficial.

- More effective strategies are needed for working with vendors and developers in the relatively immature customer-systems industry. All of the CBS utilities experienced disconnects between what was said in brochures about device capabilities (such as in-home displays) and their actual performances in the field. As a whole, the electric power

industry can view these experiences as emblematic of a broader array of challenges when developing and deploying new and emerging software systems and applications, many of which are new ventures, and where some come from small companies and start-ups.

Without short changing creativity and innovation, utilities need to find more effective ways to work with vendors and ensure that fully verified and validated products and services are the ones offered to customers.

- Utilities can improve their chances of success in implementing time-based rate programs by communicating with each other in candid discussions during the course of implementing their studies and programs. It is true that the SGIG CBS effort represented a somewhat unique opportunity for DOE to play a role in fostering open and candid information exchanges among utilities that would not normally interact on a regular and consistent basis. All of the CBS utilities said they valued the LBNL-facilitated forums very much and in several instances said they were able to implement ideas and lessons learned from other utilities in their own efforts.

  Going forward, regions, states, and industry groups should consider taking on this function to improve implementation efficiency, replicate best practices, and maximize the use of resources by avoiding the repeat of common mistakes.

Next Steps

Over the next 18-24 months, DOE and LBNL are planning to publish additional reports on the results of analysis of the SGIG CBS data and evaluation reports. Upcoming reports include: interim and final analysis reports on SGIG CBS project results including energy and peak demand reductions, bill impacts, and customer acceptance/retention; how energy and peak demand reductions vary over time (e.g., from event days to non-event days, from year one to year two of the studies); how vulnerable populations such as low-income and elderly customers fared compared with other groups; and how alternative experimental designs (e.g., randomized controlled trials vs. within-subjects) affect the precision and credibility of load impacts from studies of time-based rate programs. All of these publications will be posted on **www.smartgrid.gov**. Appendix A contains web links to CBS materials and related reports.

Table ES-1. Summary of Lessons Learned		
Study Phases	**Topics**	**Lessons Learned**
Planning	Education and Outreach	*1. Conduct General Customer Education*
		2. Conduct Market Research
		3. Test Messages before Using Them
	Organization and Management	*4. Implement Cross-functional Teams*
		5. Have Friends and Family Participation
		6. Evaluate Systems Integration Requirements
		7. Verify Equipment Capabilities
Recruitment	Recruitment Infrastructure	*8. Be Prepared for Much More Customer Data*
		9. Have Plans for Using Vendors and Call Centers
	Recruitment Strategies	*10. Conduct Soft Launches and Avoid Holiday Seasons*
		11. Use Multiple Delivery Channels
		12. Set Realistic Expectations
		13. Avoid Confusing Messages
Operation	Notifications and Communications	*14. Conduct Training for Communication Skills*
		15. Expect Notification Errors
		16. Use Web Portals as Active and not Passive Tools
	Multi-Day, Critical-Peak Events	*17. Refine Notification Frequency to Avoid Confusion*
		18. Have Plans for Addressing Customer Complaints
Evaluation	Ending the Study	*19. Have Plans for Dealing with Customer Devices*
		20. Take Steps for Reaching Closure
	Roll-Out Decision Making	*21. Conduct Comprehensive Evaluations*
		22. Educate Decision Makers about Evaluation Results

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1. Introduction

Under the American Recovery and Reinvestment Act of 2009 (Recovery Act), DOE and the electricity industry have jointly invested over $7.9 billion in 99 cost-shared SGIG projects to modernize the electric grid, strengthen cybersecurity, improve interoperability, and collect an unprecedented level of data on smart grid technologies, tools, and techniques.

1.1 Overview of the Consumer Behavior Studies

The SGIG program includes ten utilities that are conducting eleven consumer behavior studies (CBS). All of the studies produce interim and final evaluation reports and these are posted on DOE's **smartgrid.gov website**. These reports contain additional details on the specific consumer engagement activities conducted by the various utilities. Figure 1 provides a summary of the SGIG CBS utilities and the technologies and rate offerings they have deployed. These two-year studies will be completed by the end of 2015. Appendix A contains web links to CBS and related reports.

The SGIG CBS effort presents an opportunity to advance the electric power industry's understanding of customer acceptance and retention, and energy and peak demand impacts, from participation in time-based rate programs by building on the existing and long-standing industry experience with studies, experiments and pilots. This is valuable for determining how to use time-based rates for achieving demand reductions and deferring needs for future capacity additions.

To increase the usefulness of the studies to others, DOE set guidelines and protocols for the ten utilities to: (1) focus their studies on the application and implementation of time-based rates (e.g., time of use, critical peak pricing); (2) apply experimental methods (e.g, randomized control trials, randomized encouragement designs); and (3) recruit sufficient numbers of participants into the study.[1]

The DOE guidelines and protocols sought to help the utilities design studies that would rigorously test and more precisely estimate the impact of time-based rates on customers' energy usage patterns, as well as identify the key drivers that motivate the changes. This would enable the studies, if implemented consistent with the design, to provide more definitive answers for policymakers and stakeholders to key questions in the areas of acceptance of and

[1] Further information on methods for conducting studies of time-based rates and other types of customer programs can be found in a report by Lawrence Berkeley National Laboratory (with funding from DOE) and the Electric Power Research Institute, "**Quantifying the Impacts of Time-Based Rates, Enabling Technologies, and other Treatments in Consumer Behavior Studies: Guidelines and Protocols**", July 2013.

response to time-based rate programs. Each utility was assigned a Technical Advisory Group to provide technical assistance which would help the utilities better adhere to the DOE guidelines and protocols.

Two of the studies are complete, the rest are at different phases of study implementation. Overall, the aim of the studies is to examine the response of residential and small commercial customers to time-based rate programs which are implemented in conjunction with the deployment of AMI and customer systems such as in-home displays (IHDs), programmable communicating thermostats (PCTs), and web portals.

The purpose of this report is to present lessons learned by the CBS utilities about one of the most important aspects of implementing customer-facing programs: how to effectively engage and communicate with customers. The lessons learned consist of recommendations and suggestions for planning and operating time-based rate programs in conjunction with AMI and customer systems, recruiting customers to participate, and conducting post-program evaluations to support decision making for follow-on, larger-scale, roll-outs.

The lessons learned are based on a series of discussions and in-depth interviews with the utilities facilitated by Lawrence Berkeley National Laboratory (LBNL). Beginning in 2010, LBNL has organized a series of monthly conference calls to provide a forum for the CBS utilities to exchange information, candidly discuss problems and issues, and share ideas about what does and does not work within the various phases of program implementation. During the monthly CBS forums consumer engagement activities have consistently been one of the top priority topics for discussion.

	Cleveland Electric Illuminating Co.	Detroit Edison	Green Mountain Power	Lakeland Electric	Marblehead Municipal	Minnesota Power	NV Energy – Nevada Power	NV Energy – Sierra Pacific Power	Oklahoma Gas & Electric	Sacramento Municipal	Vermont Electric Cooperative
Rate Treatments											
TOU		■		■		■	■	■	■	■	
CPP		■	■		■	■	■	■	■	■	
CPR	■		■								
VPP									■		■
Non-Rate Treatments											
Education							■	■			
IHD	■	■	■						■	■	
PCT	■	■					■	■	■		
Web						■					
Enrollment											
Opt In	■	■	■	■	■	■	■	■	■	■	■
Opt Out				■		■				■	

TOU Time of Use
CPP Critical Peak Pricing
CPR Critical Peak Rebates
VPP Variable Peak Pricing
IHD In-Home Display
PCT Programmable Communicating Thermostats

Figure 1. SGIG Consumer Behavior Studies

1.2 Study Implementation Phases

For the purposes of these studies, discussions were organized according to four phases that generally define the sequence of implementing studies of time-based rate programs: (1) planning (2) recruitment, (3) operation, and (4) evaluation (Figure 2). There are consumer engagement activities in each of the phases and this report presents information on CBS utility ***Expectations and Experiences*** (e.g., initial conditions and observations) and ***Lessons Learned*** (i.e., suggestions and recommendations about what to do and not do).

Figure 2. Phases of Study Implementation

The first phase involves ***planning*** of consumer engagement activities undertaken prior to recruitment to understand what motivates customers to join programs and take service under time-based rates. This phase can include: market research (e.g., surveys and focus groups) to gain a better understanding of levels of consumer awareness, interests, and needs about smart meters, time-based rates and customer systems; general consumer education activities about these topics; and outreach to specific stakeholders and community groups to better educate target audiences and identify/address their concerns.

The second phase involves ***recruitment*** of customers to join the study of time-based rate or information programs. This phase can include: development and delivery of study invitation packages; processes and tools for addressing customer questions about the study; and management and organizational activities for building needed administrative processes and systems.

The third phase involves ***operation*** of consumer engagement activities undertaken after recruitment is complete and during the period when the study is being implemented and delivered. This phase can include development and use of: systems for notifying customers of pricing levels and/or demand response (e.g., critical peak) events; information about how to manage consumption and bills; processes and procedures for addressing customer questions, concerns, and attrition; and activities for operating the management and administrative processes related to customer engagements.

The last phase involves ***evaluation*** of the study to understand what was learned so as to inform decisions about future plans for potentially larger-scale roll-outs. This phase can include: implementation and analysis of customer acceptance surveys and energy and demand impacts analysis; evaluations of program designs, implementation, and cost effectiveness; decision making about future plans and possible roll-outs; and management of used customer equipment and devices.

2. Planning Phase

The study planning phase covers consumer engagement activities undertaken prior to recruitment in order to understand what motivates customers to join programs and take service under time-based rates. CBS utility Expectations and Experiences and Lessons Learned are presented in two main areas: (1) needs for effective customer outreach and education, and (2) needs for effective organizational teams and management approaches.

2.1 Outreach and Education

An important aspect of planning for studies of time-based rate programs is raising the knowledge and awareness of customers about new offerings. One challenge is that customers today are busy people who are constantly being bombarded with messages and sales pitches from many different vendors who are using all types of media, including newspapers, radio, television, phone lines, and the internet. The competition for the attention of people is intense and the SGIG CBS utilities found that in order to be heard they needed to sharpen their strategies and tactics for customer education and outreach. Following are several suggestions:

Conduct General Customer Education

- *Expectations and Experiences:* Smart grid, smart metering, and time-based rates are complicated concepts that will be initially unfamiliar to most customers. Raising their awareness and understanding is important but finding effective ways for doing so can be difficult. While the concepts of meters and time-based rates are related, some of the CBS utilities were concerned that they wouldn't be effective trying to educate customers about these concepts all at once, or using the same materials. Customer smart meter concerns about privacy and health effects require delivery of factual information to off-set inaccuracies promulgated from a variety of non-utility sources. Setting appropriate expectations about what these technologies can accomplish for utilities and what they can do for customers was viewed by the SGIG CBS utilities as being critical in order to help boost understanding and set the stage for broader receptiveness to utility's study offering.

- *Lessons Learned:* Customer education is an important step in successfully deploying studies of time-based rate programs. Methods for delivering this education curriculum are many and varied but one approach used effectively, particularly by smaller utilities, is public meetings at the city, town and even community level. Many smaller utilities already have on-going community outreach activities that can be changed to include smart grid-related topics. Encouraging utility representatives to meet with community groups and talk directly with customers through local business venues, like the Chamber of Commerce, or more

informal gatherings, like neighborhood associations, can be more effective than newspaper articles or radio spots since they allow for greater interactions, including question and answer sessions. However, even when utilities do not have the interest or resources to engage in direct community outreach, more general education methods such as radio and newspaper advertisements should be considered for addressing mass markets as they can also be effective. Educational information can also be presented on web sites and through social media. Traditional bill stuffers are helpful but most of the CBS utilities found them to not be sufficient.

Conduct Market Research

- *Expectations and Experiences:* The needs and wants of customers with respect to electricity can be challenging to determine. Market research is one of the tools for doing this. However, not all SGIG CBS utilities utilized focus groups, surveys, and other market research tools for test marketing terms and concepts that will attract customer interest and engage them to participate in the new rates being offered. For budget planning purposes, market research is an important part of program implementation and most of the utilities saw the need to budget for these activities at appropriate levels.

- *Lessons Learned:* Wording and the use of terminology matters and market research can help determine how customers will perceive different forms of utility messages. The use of focus groups and surveys led to changes in marketing materials in almost all cases for those CBS utilities who utilized them. For example, the initial marketing materials explaining time-based rate programs for many of the utilities included words like “critical” and “emergency” to convey the importance of customer actions and what those actions need to accomplish for the electric system. However, for several utilities who test marketed these messages, these terms were perceived by many customers as having somewhat off-putting connotations and for being overly centered on the needs of the utility. Several of the utilities moved from terms like “critical” and “emergency” to more customer-centered terms that conveyed a greater sense of personal control over energy consumption and bills (such as terms like “choice” and “savings”). It was also found that terms which gave the customer a stronger sense of control were preferred over terms which conveyed a sense of strong utility control and thus minimized the role of customers and their taking action to change their own behavior. [2]

[2] However, for at least one utility installing PCTs, once customers enrolled and were participating, a majority allowed the utility to control their thermostat during peak periods, even though they may have preferred messaging to the contrary. This utility speculated that the reason for the change was the value to the customers of convenience.

Clear and concise presentations of study details are paramount to successfully engaging customers. Customers indicated through market research that they wanted detailed information about the study and what it would mean for them to participate in terms of hassles and savings. The utilities who undertook such efforts found that it often required considerable time and effort to refine messages and strike the proper balance between too many and too few details. All of the utilities also found that initial messaging tends to set expectations that carry through the entire study, and so if set incorrectly can have implications for customer retention later. As such, market research budgeted for and carried out during the planning phase can help prevent problems with customer recruitment and acceptance down the road.

Test Messages before Using Them

- *Expectations and Experiences:* A few of the SGIG CBS utilities initially thought that focus groups alone would be sufficient for creating effective marketing messages. In several of the focus groups the majority of customers said they were highly motivated by environmental and societal concerns and that their participation in studies of new time-based rate programs would be driven by that over economic or financial concerns.

- *Lessons Learned:* In focus groups, even with highly experienced focus group facilitators, customers seem to be more inclined to express opinions that they believe their peers would like to hear than their own actual preferences. It is frequently the case that validation is needed to test market focus group-based messages on a variety of customer segments and circumstances during the planning phase before they are offered to customers as part of the recruitment phase. Test marketing, along with observed recruitment results, showed that for various messages (e.g., saving money, helping the environment, taking control, and having fun) the primary motivator for the majority of customers is financial, saving money. Environmental and societal concerns are important to customers, but the utilities learned that participation, acceptance, and behavioral changes seemed to be driven more by opportunities for bill savings and lower costs than environmental or societal concerns. Test marketing messages outside of focus groups was one of the keys in making this determination.

2.2 Organization and Management

An important aspect of implementing studies of time-based rate programs is internal staffing, organization, and management. Many utilities do not have extensive experience with successful deployment of time-based rate programs at the residential level and there are learning curves

to climb. Learning about how other utilities have tackled organizational challenges is helpful. Following are several suggestions:

Implement Cross-functional Teams

- *Expectations and Experiences:* Studies of new customer program offerings, like time-based rates, require the active participation of staff and expertise from multiple utility departments that include, for example, rates, load research, metering, distribution, customer services, IT, and planning. Yet personnel from these other parts of the organization have their own job responsibilities and may not always share in the vision for the study and the study team's requirements for success. In some cases special expertise is needed that may be unavailable or non-existent at the utility. Without firm staffing commitments and appropriate expertise, risks of failure or at least complications with the study become more likely.

- *Lessons Learned:* The unexpected is common, particularly for utilities lacking experience with studies offering new time-based rate or information programs. One solution found by several SGIG CBS utilities is to form cross-functional teams at the outset of the project and hold regular meetings, weekly if necessary. These team meetings are primarily aimed at addressing staffing and resource allocations and for anticipating and troubleshooting problems. In several cases, these teams have been paramount for keeping efforts on schedule and contributing to the study's success. Many of the CBS utilities also mentioned executive support for the study as a key element that helped study teams gain access to and commitment from the necessary internal staff resources.

Have Friends and Family Participation

- *Expectations and Experiences:* For many utilities, particularly those with limited experience implementing studies of new time-based rate programs, there are many details that are only visible when you are experiencing them as a participating customer. For example, even well-tested messages do not always come across to customers as intended. And, recruitment and sign-up logistics often come with glitches that customers can find annoying and can affect their interest in participating. Some customers find it easier to drop out than to report problems and wait for them to be addressed.

- *Lessons Learned:* Several of the CBS utilities found that when problems arose customer didn't often report them which meant that certain issues took longer to be identified than they should have, and thus went unresolved for longer than necessary. Having Friends and Family of the utility participate in the study (e.g., company staff directly or indirectly

associated with the study who enroll and receive all of the same materials, rates, treatments, and incentives) was helpful in keeping implementation glitches to a minimum by identifying and alleviating problems before they happen and/or resolving them faster when they did occur. When problems arise during subsequent phases of the study, having a dedicated set of Friends and Family of the study proved to be an effective way to provide early warnings about potential problems and issues.

Evaluate Systems Integration Requirements

- *Expectations and Experiences:* Effective information systems are one of the keys to successful customer-facing programs that rely on ever-increasing volumes of customer data from advanced metering infrastructure. In particular, interval load data from smart meters is processed and incorporated by meter data management systems, customer information systems, billing systems, and outage management systems. Not all of these systems work seamlessly together. So, it is possible for the information generated by one of the systems to not be fully integrated into the operations of other systems. For example, several CBS utilities said they assumed in their process that once a critical peak event was called the event would then be implemented successfully and the participating customer bills would accurately reflect their load response during the event. However, many utilities reported at least one substantial problem communicating upcoming critical peak events or changes in rates to customers, which then resulted in a need to revise monthly bills after the fact, as the utilities' systems did not envision a need for making such adjustments and providing credits. Several utilities also reported encountering problems with integrating data from meter data management systems with web portals and with customer information systems.

- *Lessons Learned:* End-to-end internal testing of the major process steps, logistics, and procedures (e.g., for notifying customer of critical peak events and then making sure their bills reflect their participation in those events) is necessary to identify and fix major systems integration issues. For the SGIG CBS utilities, those who experienced fewer systems integration problems had developed detailed process flow diagrams which outlined information flows and affected systems and used them in cross-functional team meetings to identify problem areas and implement remedies before major issues occurred or address them more quickly after they had already happened. End-to-end testing of these systems in the planning phase was another one of the keys to success.

Verify Equipment Capabilities

- *Expectations and Experiences:* The market for customer-side devices is new and relatively immature. As such, many IHDs, home area networks, and other equipment are in their

early stages of development. Some of these devices were deployed for the first time ever in study participant's homes. Numerous instances were reported by most of the CBS utilities of equipment capabilities falling short of vendor statements and marketing material claims. For example, several utilities reported problems in getting timely servicing from vendors who had promised one level of support but delivered something less. In at least one of the studies, the vendor announced they were no longer supporting the device midway through the study and well after the devices had been installed.

- *Lessons Learned:* When it comes to procuring and deploying equipment on the customer-side of the meter, it is often necessary to dedicate time and resources to ensure the equipment used in studies such as these does what it is supposed to do for the customer, and that servicing the device when there are problems happens quickly and easily. In working with vendors, many CBS utilities found that properly worded contract provisions can be valuable for ensuring equipment performance and servicing, or at least providing utilities with mechanisms for addressing equipment/vendor problems. In at least one of the studies the utility decided to tackle equipment servicing themselves, in-house. This utility said doing so gave them the opportunity to protect their customer relationships more closely.

3. Recruitment Phase

The customer recruitment phase covers activities undertaken while recruiting customers to join a study of time-based rate or information programs. CBS utility Expectations and Experiences and Lessons Learned are presented in two main areas: (1) needs for customer recruitment infrastructure, and (2) needs for strengthening recruitment strategies.

3.1 Recruitment Infrastructure

In carrying out customer recruitment activities there are numerous systems and capabilities that utilities need to have in place for smooth and effective implementation. Many of these are new and some have not been commercially available for very long. Several of the utilities said they were surprised at the extent of the infrastructure that is needed to support studies of large-scale time-based rate programs. Following are several suggestions:

Be Prepared for Much More Customer Data

- *Expectations and Experiences:* Most utilities maintain large customer information systems (CIS) that among other things contain customer contact information such as addresses and land-line phone numbers. In today's world, customers are using mobile phones and email as much or more than their land-lines and this information is not often contained in CIS. Customers are also using social media such as Facebook and Twitter to exchange information with each other and with vendors and services providers. The infrastructure that is needed for contacting and managing customers participating in a study of time-based rate programs can be extensive and is not usually fully developed at most utilities, as was the case for most of the SGIG CBS utilities.

- *Lessons Learned:* Collecting more extensive customer contact information is helpful for utilities implementing studies of time-based rate programs. This information can be collected during various points-of-contact with customers such as during recruitment and enrollment. It is important to plan for a significant data collection effort and make sure the systems and staff are in place for storing and accessing the information when needed for purposes such as notifications of critical peak events, or special messaging about steps to take for achieving demand reductions and bill savings. Several of the utilities found that searchable data bases, dashboards, and other information management tools help with maintaining effective communications and relationships with customers.

Have Plans for Using Vendors and Call Centers

- *Expectations and Experiences:* Many important customer recruitment functions can be outsourced. For example, there are experienced vendors in almost every city and state who provide mailing and call center staffing and services. There are also marketing and advertising firms who can be hired to assist in developing recruitment strategies, messaging, and marketing materials. And, for certain types of energy efficiency and load management programs, utilities can hire companies that provide turn-key services for the design and implementation of program offerings. However, for certain recruitment activities involving time-based rate programs there are new concepts and technologies that have not been used very much. The utilities reported mixed experiences with using vendors for some of the study recruitment activities and in some instances the utilities reported that they could not count upon vendors to carry out assignments without significant hands-on oversight and involvement.

- *Lessons Learned:* Call centers are critical recruitment tools. Outbound calls are often made to follow-up on invitation packages, and outbound calling is a popular function to outsource. Inbound call centers are common utility functions, essential for addressing customer problems and queries, and this function can also be outsourced. When outsourcing outbound and inbound call centers, the utilities said to expect that multiple training sessions will be required to acquaint operators with study details. Much planning can be undermined if call centers accidently misinform customers about the requirements or benefits of study participation. Many of the utilities had success with outsourcing outbound calling and found it a cost-effective alternative to using in-house resources. This was particularly true when the vendor had substantial previous positive experience with the utility and had an understanding of the utility's corporate culture and day-to-day workflow and logistics.

  Outsourcing inbound call center is considered problematic as most utilities have their own inbound call centers that address customer concerns and questions, mostly about billing. Hiring vendors and setting up parallel call-in operations did confuse some customers and required added layers of coordination for SGIG CBS utility project managers and staff. Using in-house call centers for responding to problems and questions from study participants was successful when the customer service representatives were well-trained about study details and were equipped with call logs and data bases that enabled them to capture incoming information and document customer interactions. In all of the successful cases, the customer service representatives had a clear idea of what they could and could not answer, and had mechanisms for forwarding calls to study staff when customers raised questions they could not answer.

3.2 Recruitment Strategies

In conducting studies of time-based rate programs, gaining target numbers of participants is always a top priority. Successful recruitment efforts are typically a function of a variety of factors including the quality and persuasiveness of invitation materials, clarity of messages, thoroughness in following up and following through on customer questions and problems, and having the ability to anticipate and prevent common glitches from cascading into major problems. Following are several suggestions:

Conduct Soft Launches[3] and Avoid Holiday Seasons

- *Expectations and Experiences:* Even when efforts are devoted to refine marketing materials and test recruitment processes, systems, and procedures there almost always will be instances where glitches occur. The SGIG CBS utilities warn that when recruiting customers you can count on Murphy's Law: if something can go wrong, it will go wrong. Sometimes it is the content of the materials and invitation packages that are found to need refinements. And, it is often the case when electronic systems are involved that problems will be found with on-line enrollment systems.

- *Lessons Learned:* Soft launches are valuable when utilities are implementing studies such as these as they can provide time and resources to identify and address problems before they are experienced by the broader customer community. Several of the CBS utilities found that it was important to allocate more time than was initially planned for between soft and hard launches to implement fixes and make adjustments to messages. The utilities said that they needed at least two to three weeks for this to be effective; one utility didn't have enough time to incorporate necessary feedback with two weeks to do it.

  In addition, the CBS utilities also found that it is highly recommended to avoid soft and hard launches during the holiday season that stretches for mid-November through the first of the New Year. This mistake was made by at least one utility and recruitment rates were unacceptably low during that period.

Use Multiple Delivery Channels

- *Expectations and Experiences:* There are many ways for delivering messages about study details to customers and no single one works best in all instances. Traditional methods

[3] Soft launches refer to the release of a product, service, or program to a limited audience to gather information about usage and acceptance in the marketplace before making it generally available to a wider audience through a hard launch.

include printed materials, such as letters and brochures, and telephone calls to homes and offices. Newer techniques include electronic materials delivered by emails, text messages to mobile phones, web sites, and social media. An initial step involves delivering materials to educate customers about offerings and why they should enroll. A second step involves providing the means for customers to enroll in programs being offered. These two aspects are both important but often require different strategies. The CBS utilities collectively used a variety of these different material delivery methods and enrollment strategies.

- *Lessons Learned:* When it comes to delivering materials to customers and educating them about study details, the traditional methods still work. Invitation packages with cover letters that explain the value proposition for enrolling coupled with brochures that contain more details proved to be effective for several of the CBS utilities in providing good overviews and raising customer awareness levels of the study. The most effective utility recruitment efforts also included web sites for customers to get more information about program offerings. A common technique was to dedicate a web page to posting frequently-asked-questions. Outbound follow-up phone calls also were helpful in boosting enrollment levels for the utilities that used them. When it comes to enrollment methods, some of the CBS utilities were surprised by how well the traditional technique of including business reply cards with invitation packages worked[4]. This method is one of the lowest cost options and is highly recommended by the utilities that used them, and regretted by the utilities that did not. Many customers preferred enrolling on-line so it is also recommended that web sites be set up to accommodate this technique.

Set Realistic Expectations

- *Expectations and Experiences:* Once expectations are set it can be quite challenging to alter them. The SGIS CBS utilities recognized the importance of understanding and appropriately setting customer expectations of the time-based rate programs and customer systems employed in the studies. For example, educating customers on how to use in-home devices properly and understand how they work is one of the keys to successfully setting appropriate expectations. There are other important aspects including setting expectations about the amount of bill savings customers can expect to receive. There is no more important source of customer frustration than finding out that the new rate had bill effects that were much different from what they expected.

[4] Business reply cards typically ask prospective participants to provide basic contact information (e.g., phone numbers and email addresses) and expressions of interest for enrolling in program offerings. They are typically followed up with more detailed invitation packages which explain program details and next steps.

- *Lessons Learned:* Many CBS utilities realized upfront the benefits of setting realistic financial expectations and so offered customers tools to do so. For example, several utilities provided bill calculators for use during the recruitment phase which allowed customers to run scenarios based on their appliances and usage patterns to estimate what their bills might be under new rates. Several utilities took an extra step and told participants they would receive monthly and/or at the end of the study a comparison of what their bill would've been under their old rates. When they were used, bill calculators and comparisons proved helpful in keeping customer expectations about bill impacts aligned with realties. For obvious reasons, bill calculators and comparisons perform better when using the customer's actual electricity consumption patterns, as opposed to generic ones based on estimates of average customer's usage patterns.

  With respect to enabling technologies, several of the CBS utilities realized they needed to be more exhaustive about verifying claims of performance, stability and support with vendors. For example, several utilities wished they had sufficiently verified equipment capabilities as claimed by vendors in order to appropriately set expectations with customers during the recruitment effort that this equipment was highly stable and operable. Many customers indicated a level of frustration with the technologies, feeling as though they were beta testing them, which was not what they interpreted their roles to be in the studies. Additionally, the CBS utilities set expectations concerning the level of technical support which recruits would receive during the study, but the reality was that this was often less than initially promised and in some cases, as mentioned, vendors decided to no longer support the technologies at all.

Avoid Confusing Messages

- *Expectations and Experiences:* As discussed, concepts such as smart grid, smart meters, time-based rates, and enabling technologies are complex and hard for many customers to understand. Without better education material, more effective communications methods, including consideration of how customers prefer to receive information, and more consistent messaging strategies, the chances for confusion and misunderstandings are very high. Many CBS utilities were concerned that being ineffective in these areas would interfere with the overall effectiveness of their recruitment efforts and therefore undermine the success of the study.

- *Lessons Learned:* As discussed the need to test, re-test, and refine messages and marketing materials does not go away after the planning stage but needs to continue throughout the recruitment phase and into the operations phase. Several of the utilities said that their educational and recruitment materials were not successful in explaining the complexities of

the various rate and technology offerings during the recruitment phase, and some customers felt they were misinformed about choices in participating in the study. Some utilities report that it is simply not possible to conduct too many tests and quality control checks on messages, and that this activity should be budgeted for at appropriate levels.

4. Operation Phase

The study operation phase covers activities undertaken after recruitment and during the period when program offerings are being implemented and delivered and includes re-enlistment, attrition, and customer satisfaction. CBS utility Expectations and Experiences and Lessons Learned are presented in two main areas: (1) needs for effective notifications and on-going communications with customers, and (2) needs for preparation when calling multi-day peak events.

4.1 Notifications and Communications

Effective communications with customers remains a critically important activity in the program operations phase. Time-based rates such as critical peak pricing or critical peak rebates involve utilities calling critical peak events which usually include day-ahead notification so customers can prepare themselves for taking actions to reduce electricity consumption during peak periods on the event day. All of the CBS utilities implementing these rates provided at least day ahead notification, and one utility had the capability of providing two-hour notification on critical peak event days when system conditions called for emergency actions.

Even time-based rate programs that do not include critical peak events still involve frequent communications with study participants. Customers often have questions about what will happen to their bills and whether or not their continuing participation will save them money. Customers are also interested in tips and tricks for reducing consumption and saving money on their new rates. The utilities found that preparing to notify customers about events and having well-honed answers to questions are important success factors for the operations phase. Following are several suggestions:

Conduct Training for Communication Skills

- *Expectations and Experiences:* When operating studies of time-based rate programs, customers can have contacts with a variety of utility staff members and vendors. Even the workers who are supporting installation and maintenance of smart meters, or who are installing customer-side devices, are often seen by customers as utility representatives so these individuals can be unexpectedly thrown into situations for which they might not be adequately trained. The SGIG CBS utilities learned, sometimes the hard way that it pays to spend the effort and make sure all employees and vendor personnel who interact with participants in regards to the study are well-informed and appropriately resourced to interact with customers properly, by being able to answer their questions, and providing information clearly and concisely.

- *Lessons Learned:* It is important to train and equip call centers and customer service representatives appropriately and for there to be procedures in place for them to know when to engage more knowledgeable staff to answer the more difficult customer queries. Although not tried, some utilities said that including communications and customer relations skills in requests-for-proposals when hiring vendors and equipment installers could be a valuable step. Several utilities commented that they had success raising employee awareness through company newsletters, internal emails, and other means when studies of new time-based rate programs are in effect. All of the utilities noted the general need for and value of training utility staff and vendors about study details. The aim, they said, was not to make everyone experts but to equip them with the basics so that even when they did not know specific answers, they were at least able tell customers where to find better information through mechanisms such as dedicated phone lines, email box addresses, web sites, and lists of frequently-asked-questions.

Expect Notification Errors

- *Expectations and Experiences:* It is important to have reliable and effective ways for letting customers know that critical peak days are being called. With proper notification, customers can make plans to alter their consumption to take advantage of financial incentives and/or avoid on-peak charges. Typically, utility processes rely on broadcasts using various communications channels, including email, voice, and text messages, and web announcements. Issues arise if notification systems fail to work as expected and customers get billed for critical peak rates when they didn't know a critical peak event had actually occurred. Designs of notification systems and messaging differed among the SGIG CBS utilities making it difficult to draw broad-based conclusions. For the most part, and in most cases, after initial missteps CBS utility processes and procedures worked properly and the vast majority of participating customers received notifications of critical peak events. However, quality control procedures and prior system testing protocols were not perfect and, as with most software systems that are relatively new and being implemented for the first time, glitches inevitably happen causing customer problems and confusion unnecessarily.

- *Lessons Learned:* In most cases, initial utility processes for notifying customers about critical peak events did not work reliably and effectively. In many cases, significant numbers of customers did not receive notification, and often these errors were not discovered until after-the-fact. Sometimes the problem was internal to the utility. Sometimes the problem was with the email service providers of the customers. Discovering the scope of the problems can be very labor intensive and involve reviewing email bounce backs and

checking computer logs. The CBS utilities report that there is need for inclusion of quality assurance activities to ensure successful distribution and delivery of notification messages including having IT staff available when alerts are sent out to ensure that they went out, and to determine, to the best extent possible, that those messages were delivered and if not why so that future messages may be successfully delivered.

Use Web Portals as Active, not Passive Tools

- *Expectations and Experiences:* Today, web sites are essential to all aspects of business operations, including the myriad operations of studies of time-based rate programs. Web portals involve time and resources, not only in their development, but also in their maintenance and updating. The SGIG CBS utilities are all using web-based tools and have used a variety of mechanisms for engaging customers during the operations phases of their studies. Some of the web sites include dashboards for telling customers where they stand in terms of monthly consumption and cost, others have bill comparison calculators that allow customers to pro-actively evaluate potential bill impacts with the new rates, and most include pages with frequently-asked-questions and tips for reducing electricity consumption during peak periods such as how to accomplish pre-cooling. Applications for all of these approaches met with challenges in getting customers to visit the websites and use them.

- *Lessons Learned:* The problem with web sites is that they are not "if we build it, they will come" undertakings. For the vast majority of the SGIG CBS utilities, the number of web sites users was lower, and in some cases, much lower than expected. Without drivers, many customers did not take the time to explore and use the web portals. Given the time and expense involved in their creation, the utilities are eager to find ways to increase the usefulness of the web sites. While many believe that as customers get more familiar with the sites, use will naturally go up, others are making changes to the sites to make them more customer-friendly. One of the utilities noted that web sites, call centers, and other tools are not substitutes for personal communications with utility staff who are knowledgeable and prepared to answer questions and address issues. Because of time and resource constraints it is not often possible for these types of interactions to routinely occur, but at least one of the utilities was pleased that they had set up systems to allow for such interactions to happen when needed.

4.2 Multi-Day, Critical-Peak Events

In July, 2013, successive heat waves across the country caused air conditioning and peak electricity levels to soar. At the time, several of the SGIG CBS utilities were implementing CPP and CPR programs to provide customers with incentives for reducing their use of electricity

during peak periods. Depending on system needs, heat waves lasting several days can result in a utility calling successive critical peak events. In the summer of 2013, multi-day events were called by several of the SGIG CBS utilities, including ones that lasted 3, 4, and even 5 days in a row. In all cases, multi-day events created some challenges for consumer engagement. Following are several suggestions:

Refine Notification Frequency to Avoid Confusion

- *Expectations and Experiences:* As mentioned above, utilities send customers notifications of critical peak events via several different channels including email, voice and text messages, and web announcements. When they sign-up for the study, customers are asked how they would like to receive notification, and many customers choose to be notified via several channels. As a result, when critical peak event days are called, many customers receive multiple notices. Utilities notify customers of critical peak days the day before the events, but some utilities also send notifications to customers the day of the event, so that they will have time to plan steps for changing their activities, reducing their electricity consumption, and saving money during peak periods. However, during multi-day events, some CBS utilities giving both day before and day of notifications found that customers got confused because they received too many and overlapping notices. For example, on the first day of a multi-day event, a customer receiving the day of notice by text and email would also receive the day before notice for the next day's event also by text and email. That's a total of four notices in one day!

- *Lessons Learned:* Customers do in fact appreciate advance notification but can experience messaging overload. In response, several CBS utilities sought to refine their processes to reduce the number of notices and the amount of customer confusion. One utility decided to outright eliminate day of notifications during multi-day events.

Have Plans for Addressing Customer Complaints

- *Expectations and Experiences:* Multi-day events can cause extra burdens and inconveniences as customers may need to do more planning for rescheduling activities or endure hotter and stuffier homes for longer periods than expected. In these situations, the CBS utilities were concerned those customers complaints would overload call centers and might reach the tipping point to cause dropout rates to soar.

- *Lessons Learned:* Customers did complain more than normal during multi-day events, but call centers were typically well equipped to effectively address most customer issues. In post-event focus groups, many customers said they understood and were willing to accept

the utilities' rationale for calling multi-day events. One utility used a dedicated email mail-box for customer questions and complaints. During critical event days, customers emailing the dedicated utility mailbox received an automatic and immediate response that included explanations of what was happening and why. Automated messages like this from the utility were adjusted regularly over multi-day events to provide additional information as events and conditions evolved. As a result of these and other steps, customer frustration with the multi-day events were generally lower than expected as were drop-out rates.

5. Evaluation Phase

The study evaluation phase covers activities undertaken after program operations and during the period where decisions are being made about ending study-related activities and evaluating possibilities for the future, including additional studies and larger-scale roll-outs. CBS utility Expectations and Experiences and Lessons Learned are presented in two main areas: (1) needs for setting appropriate expectations for customers when ending the study, and (2) needs for preparing for roll-out decisions.

5.1 Ending the Study

Closing out a study can be a source of confusion for participants particularly when there is a high level of acceptance and satisfaction with the new time-based rate program and/or customer system. In these cases, there is often interest by customers in staying on the rates. However, unless provisions are made in advance for doing so, it may not be possible. When customer systems like IHDs and PCTs are involved, decisions about what happens to those devices when the study ends needs to be made in advance for close-out to occur smoothly. Following are several suggestions:

Have Plans for Dealing with Customer Devices

- *Expectations and Experiences:* Several of the CBS utilities installed IHDs and/or PCTs as part of their study of time-based rate programs. The research objectives for these studies typically involved determining the effects of the devices on levels of demand response and customer acceptance. The question of what to do with the devices after the study ended was not determined by nearly all of the CBS utilities in advance. The decision about if and how to extend vendors' support for the devices varied among the studies as well.

- *Lessons Learned:* It is best to determine up front what will happen to the devices after the study is complete. The lowest cost alternative in most cases was to inform customers that they could recycle the equipment as they do with other consumer electronics such as computers and televisions. This approach worked fine, but several utilities warned about adding customer burdens without informing participants of this obligation in advance. In those instances where customers liked the devices and wanted to keep using them, utilities found it was important to manage their expectations about what they will and will not be able to use as a part of post study customer communications.

Take Steps for Reaching Closure

- *Expectations and Experiences:* Customers generally appreciate some form of notification from the utility when studies such as these are complete. Most of the CBS utilities conducted post-study customer surveys as part of their program evaluations and these were generally effective in reminding customers that the program was over. Several utilities decided to move from the study directly to a larger-scale roll-out, and in these instances there was another communications step in letting customers know that they could continue to be on the new rate(s).

- *Lessons Learned:* In maintaining positive customer relationships, the CBS utilities found it important to reach closure with participants on the end of the study. One of the utilities plans to send out thank you notes as a way to accomplish this. The utilities also determined, in some cases belatedly, that implementing a close-out plan was important for informing other utility personnel that the new rate offerings were no longer in effect. This enabled customer service representatives and others to accurately answer customer queries on the topic.

5.2 Roll-Out Decision Making

There do not seem to be simple recipes about making decisions for rolling out large-scale time-based rate programs after the study has been completed. For most utilities, decision making is a shared process involving senior utility executives and external regulators, governing boards, or city councils. Much usually hinges on having top quality data and analysis about the study's impacts on customer responses and satisfaction levels. Business case analysis that includes information on program cost-effectiveness from the utility, customer, and societal perspectives is also helpful for decision making. Several utilities warned to be prepared for skepticism about the study's effectiveness so having clear and concise business case materials on costs and benefits is paramount. Education of others about the study's results, lessons learned, and best practices are on-going needs during the post-study evaluation phase. Following are several suggestions:

Conduct Comprehensive Evaluations

- *Expectations and Experiences:* Studies generate a large amount of data on program impacts, benefits, and lessons learned. Conducting comprehensive evaluations was a DOE requirement for the SGIG CBS utilities. All were at least two-year studies, and the utilities were required to submit interim evaluation reports after year one, and final evaluation reports after the study was complete. (See Appendix A for links to these and related

reports.) The utilities who decided to roll-out larger programs subsequent to the study noted the value of the evaluation reports for assisting decision makers with determining next steps. However, not all of the SGIG consumer behavior studies were intended to inform future full-scale roll-outs. These utilities said they also found the evaluation reports useful in determining how to engage customers in other existing utility-offered programs.

- *Lessons Learned:* Most of the utilities stated that comprehensive evaluations are an important part of successful studies. They indicated that documents need not be lengthy but they do need to include all of the relevant findings and explanations of the data and methods that were used in the analysis. If one of the goals of the study is to determine next steps in a larger-scale roll-out, it is very helpful to have specific analysis objectives regarding the levels of impacts needed for cost-effective programs. Key metrics for this include the level of reductions in peak demand, overall energy savings, bill impacts, customer acceptance, and customer retention. Analyses of these metrics are key elements of the comprehensive evaluation reports. When customer systems are involved, the costs and benefits of deploying these need to be evaluated to assess their cost effectiveness. Process evaluations that assess how the studies were implemented and operated are also valuable for guiding utilities in larger-scale roll-outs with lessons learned and best practices, but can also inform other utility offerings of a similar ilk.

Educate Decision Makers about Evaluation Results

- *Expectations and Experiences:* One of the success factors reported by the utilities was the importance of buy-in by regulators and senior managers during the planning phase for the study's primary purposes, goals, and objectives. In driving toward next steps at the completion of the study, these people need to be informed of progress and results. This can be a time-consuming process as it often requires coordination among many different departments within the utility and framing results to address the specific concerns of the various audiences. Senior managers and regulators often require in-depth briefings and discussions to determine what the studies found, the range of options for next steps, and gain a better understanding of the implications for participants, utilities, ratepayers as a whole, and society. Information about the results of consumer engagement activities is important for decision making.

- *Lessons Learned:* In making decisions about next steps, several of the CBS utilities found it necessary to re-double education efforts to remind internal utility executives and managers as well as external policymakers and stakeholders, about the study's initial purposes, goals, and objectives and the results of assessments as to the extent these aims were met. If the results of the study show cost-effective levels of demand and energy impacts, and favorable

reviews by customers in terms of acceptance and retention, then the next step involves a corporate assessment about the role of the new rate offerings in achieving overall plans for resources and demand-side management, and after that acceptance by regulators, governing boards, and city councils. Decision makers had interest in the results of consumer engagement activities including surveys and focus groups.

6. Major Findings and Next Steps

Utilities found that these lessons learned presented are more than just good things to do, they are practical steps that can reduce risks and increase efficiencies and thereby lower project costs and increase the chances of successful outcomes, such as reaching desired levels of recruitment and customer acceptance. Consumer engagement is viewed as an essential function that often involves breaking new ground for many utilities. As such, sharing experiences and lessons learned is a valuable way to replicate best practices and avoid repeating common mistakes.

6.1 Major Findings

Consumer engagement activities need to be to be ongoing, adequately funded, and integrated explicitly into every phase of the studies to ensure success. Those CBS utilities who undertook a substantial and dedicated level of effort in the early phases on activities that promote positive consumer engagement, such as general customer education, market research, and stakeholder and community outreach, believe those activities paid significant dividends in the subsequent customer recruitment and operations phases.

A few of the CBS utilities sought to understand why customers refused to get engaged during the customer recruitment phase, as a way to better understand how future enrollment activities could be made more effective. During the implementation phase nearly all of the utilities included a variety of different means (e.g., publication of newsletters, blog posts, and use of social media) for keeping customers involved and engaged in the study and solicited their feedback on what was and was not working to improve customer experiences going forward.

Almost all of the CBS utilities gathered feedback from study participants during the evaluation phase to further understand how to make future time-based rate programs and customer engagement activities more successful. Going forward, electric power industry stakeholders who are interested in providing a wider range of time-based rate program offerings to customers (e.g., utilities, regulators, vendors, and third party providers) need to employ comprehensive and consistent consumer engagement efforts for meeting varied customer needs.

Another finding involves the potential need for utilities to re-think organization and management approaches when implementing time-based rate and related programs on a larger scale. The CBS utilities found, as have other utilities that are active in this arena, that implementation activities cross-cut a variety of utility departments and that skill sets are often

lacking in key areas such as marketing and market research.[5] Many of the CBS utilities established cross-functional teams and found these useful for managing resources and keeping the different departments focused and on the same page. Thus it is important for utilities to consider the organizational and management implications of becoming more heavily involved in offering large-scale customer facing programs.

In particular, there are needs to create more open lines of communication between disparate parts of utility organizations that suddenly must come together and work in a highly coordinated manner. Some of the CBS utilities kept their cross-functional teams in place after the studies ended and expanded the scope because management saw the increased efficiency that such coordination produced.

Again, for those electric power industry stakeholders who are interested in playing broader and more active roles in offering time-based rate programs, greater internal coordination and organizational effectiveness is often needed through cross-functional teams and other approaches. Many of the CBS utilities found these approaches to be highly beneficial.

Another finding involves how utilities work with vendors and other providers in the relatively immature customer systems industry. All of the CBS utilities experienced difficulties matching what was said in brochures about device capabilities and their actual performance in the field. In many cases performance expectations did not hold up under operational realities. This problem had implications for every phase of the studies especially when it came to the level and quality and commitment of vendors for supporting and maintaining the devices (recall one vendor stopped supporting their products mid-study). The electric power industry, as a whole, can view this experience as emblematic of the broader challenge of using new and emerging software and apps from small companies and start-ups that may require greater needs to verify and validate claimed performance before offering these tools to customers. Unless they know about it in advance, customers as a whole do not appreciate being beta testers of new technologies.

Without short changing creativity and innovation, the electric power industry needs to find more effective ways to work with vendors and ensure that fully verified and validated products and services are the ones offered to customers.

A last finding concerns the value of having utilities engaging each other in candid discussions during the course of implementing their programs. It is true that the SGIG CBS effort represents

[5] For example, several CBS utilities reported difficulties in finding staff with expertise in building and operating data bases and management information systems to handle increasing amounts of customer data.

a somewhat unique opportunity for DOE to play a role in fostering open and honest exchanges of information among utilities that would normally not interact with each other. However, the CBS utilities reported that they received substantial value from the series of facilitated discussions and that they got ideas from each other that led to direct improvements to their customer engagement efforts.

Going forward, regions, states, and industry groups can consider taking on this function to improve implementation efficiency, replicate best practices, and maximize the use of resources by avoiding the repeat of common mistakes.

6.2 Next Steps

DOE is planning to publish a series of reports over the next 18-24 months on the results of analysis on the SGIG CBS data and utility evaluations. Upcoming reports include: interim and final analysis reports on SGIG CBS program impacts including energy savings, peak demand reductions, bill impacts, and customer acceptance/retention; an analysis of energy and peak demand impacts over time (from year one to year two of the studies); an analysis of impacts on vulnerable populations such as low-income and elderly customers; and an analysis of the relative merits of alternative experimental designs for studies of time-based rate programs.

These and other SGIG reports on non-CBS topics such as electric reliability impacts, voltage controls and reactive power management and operational savings from advanced metering infrastructure will be posted on **www.smartgrid.gov**.

Appendix A. Where to Find Further Information

Web Links to Related SGIG Reports and Case Studies		
SGIG Program and Progress Reports and Case Studies	I.	Progress Report II, October 2013
	II.	Progress Report I, October 2012
	III.	SGIG Case Studies
SGIG CBS Projects	IV.	SGIG CBS Project Descriptions, and Interim and Final Evaluation Reports
Other CBS Reports	V.	Analysis of Customer Enrollment Patterns in Time-Based Rate Programs – Initial Results from the SGIG Consumer Behavior Studies, July 2013
	VI.	SGIG Consumer Behavior Study Analysis: Summary of the Utility Studies, June 2013
	VII.	Quantifying the Impacts of Time-Based Rates, Enabling Technologies, and other Treatments in Consumer Behavior Studies: Guidelines and Protocols, July 2013
	VIII.	Lessons Learned from SGIG CBS Projects