ELECTRIC POWER RESEARCH INSTITUTE

Synthesizing Utility Experiences in Educating and Engaging Customers in Smart Meter/ Smart Grid Deployments

A Summary of Workshop Presentations and Dialogue

2012 TECHNICAL REPORT

Synthesizing Utility Experiences in Educating and Engaging Customers in Smart Meter/Smart Grid Deployments

A Summary of Workshop Presentations and Dialogue

EPRI Project Manager
M. Wakefield

ELECTRIC POWER RESEARCH INSTITUTE

3420 Hillview Avenue
Palo Alto, CA 94304-1338
USA

PO Box 10412
Palo Alto, CA 94303-0813
USA

800.313.3774
650.855.2121

askepri@epri.com

www.epri.com

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THE FOLLOWING ORGANIZATION PREPARED THIS REPORT:

Electric Power Research Institute (EPRI)

NOTE

For further information about EPRI, call the EPRI Customer Assistance Center at 800.313.3774 or e-mail askepri@epri.com.

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The following organization prepared this report:

Electric Power Research Institute (EPRI)
3420 Hillview Ave.
Palo Alto, CA 94304

Principal Investigators
C. Haddad
G. Horst
B. Neenan

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Abstract

The Electric Power Research Institute (EPRI) and Commonwealth Edison (ComEd) co-sponsored a Synthesizing Utility Experiences in Educating and Engaging Customers in Smart Meter/Smart Grid Deployments workshop that was held July 7–8, 2012, in Chicago, Illinois. The workshop objective was to explore issues and encourage dialogue about experiences in designing and implementing effective customer education awareness campaigns in conjunction with wide-scale deployment of smart metering.

The workshop was structured to allow equal time for panelist presentations and interactive dialogue with the audience. It was organized into five topical sessions as follows:

1. Getting Ready: Designing an Effective Customer Education and Awareness Strategy
2. Talking the Talk: Implementing Customer Education and Awareness Campaigns
3. Following up: Engaging Customers to Realize AMI Benefits Sooner, Rather than Later
4. Managing Implementation – Walking the Walk
5. Key Takeaways: Lessons Learned (Sometimes the Hard Way)

Sessions 1 and 2 included discussions around customer education and outreach, employee engagement, pre-deployment testing, data collection and privacy, messaging and media strategy, and managing customer expectations and concerns. In session 3, Bernie Neenan of EPRI talked about AMI benefits from a number of perspectives. In sessions 4 and 5, panelists discussed successful strategies (and the challenges that informed them) that they used to manage smart meter installations, develop back office processes, and undertake the switch-over from manual to automated readers. Panelists and workshop participants touched on technology acceptance, challenges, and keys to success when managing implementation.

Keywords
AMI benefits
Customer education
Data privacy
Employee engagement
Customer engagement

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Section 1: Introduction

The Electric Power Research Institute (EPRI) co-sponsored a workshop with Commonwealth Edison (ComEd) entitled: *Synthesizing Utility Experiences in Educating and Engaging Customers in Smart Meter / Smart Grid Deployments*. It was held on July 7 & 8, 2012 in Chicago, Illinois. The workshop was intended to explore issues and encourage dialogue about experiences in designing and implementing effective customer education awareness campaigns in conjunction with wide-scale deployment of smart metering. It included utility representatives with experience in fielding a smart meter program, and others that are anticipating doing so in the near future.

The workshop was structured to allow equal time for panelist presentations to convey experience and offer insight and advice, and interactive dialogue with the audience. The workshop was organized into five separate sessions as follows:

1. Getting Ready: Designing an Effective Customer Education and Awareness Strategy
2. Talking the Talk: Implementing Customer Education and Awareness Campaigns
3. Following up: Engaging Customers to Realize AMI Benefits Sooner, Rather than Later
4. Managing Implementation: Walking the Walk
5. Key Takeaways: Lessons Learned (Sometimes the Hard Way)

According to the Institute for Electric Efficiency (IEE), as of May 2012, 36 million smart meters have been installed. IEE estimates that approximately 65 million smart meters will be deployed by 2015.[1] Figure 1-1 below illustrates total meter installations since December 2007.

[1] Institute for Electric Efficiency. Utility-Scale Smart Meter Deployments, Plans & Proposals: IEEE Report May 2012.
http://www.edisonfoundation.net/iee/Documents/IEE_SmartMeterRollouts_0512.pdf

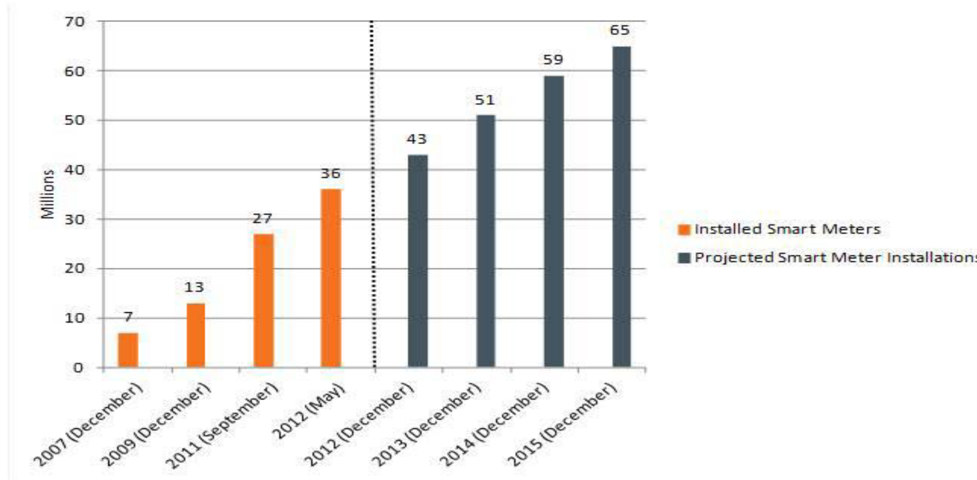

Figure 1-1
Smart Meter Installations in the US: 2007-2015 (millions)

Source: Institute for Electric Efficiency, Federal Energy Regulatory Commission
http://www.ferc.gov/legal/staff-reports/11-07-11-demand-response.pdf

The following summary of the presentations and ensuing discussions represents the opinions of the presenters and audience members, and may be different from EPRI's research results.

Section 2: Session 1: Getting Ready: Designing an Effective Customer Education and Awareness Strategy

The focus of this session was on how the smart meter installation effort was designed and planned. The guiding questions were as follows:

- What considerations are foremost in designing an effective stakeholder education and outreach program to enable smart meter / smart grid acceptance, adoption, and success?
- What customer and stakeholder issues must be addressed before actual technology deployment begins?

These questions, among others, helped guide the first session's presentations and dialogue. The presentations and ensuing discussion in this session focused on customer education and outreach, employee engagement, pre-deployment testing efforts, and data collection and privacy. A summary of the discussion of each of these perspectives follows.

Customer Education & Outreach

Education and marketing techniques regarding customer benefits, program messaging, stakeholder engagement and engagement of low income customers were presented and discussed by the workshop participants.

A common theme was the significant focus on community relations, as conveyed by several utilities in the context of program design. The grassroots approach taken by one utility in terms of program marketing included engaging members of the community within the pilot area by recruiting them to work as representatives ("ambassadors") for the pilot program. The utility also found it valuable to utilize already established community events. An assumption that customers would come to utility sponsored events turned out to be incorrect, but success was found in their participation in other major community events that the community was already familiar with. In addition, the utility explained their sequence of 10 customer touch points planned for engaging the customers early in the process and often. Another utility shared their motto when developing and implementing education and outreach strategy, which was: "…to think like a customer and focus on what is important to them". They also identified customers who volunteered and actively participated in initial pilots as good candidates to act as advocates to the program.

Stakeholder engagement was another central topic of discussion. Keeping media and community leaders informed was identified as an important component to designing a successful deployment. Identifying key constituent groups early in the process and constantly engaging them was also noted as a valuable way to move customers from a stage of awareness to advocacy. One utility engaged people in an important stakeholder group to support the project.

In terms of messaging, several approaches were presented. One utility created a video of customer testimonials talking about the smart grid program, while another created a video with a message from the executive leadership. Several workshop participants echoed the importance of not overselling the benefits of smart meters. One utility suggested emphasizing customer choice and control, but to be cautious when communicating things such as potential bill savings.

An incentive based approach to recruitment as a means to spur a reduction in energy usage was also discussed. One approach presented was the use of the OPower report that provided neighbor comparisons of energy usage. Another utility explained an incentive implemented by which the participants with the largest reduction in energy usage won a Chevy Volt.

Education played a central theme in the panelists' presentations. One utility emphasized the need for simple, informative messaging because the average customer does not think in terms of kWh usage. Several studies, including one conducted by EPRI in 2011, suggests that basic energy usage education is needed for consumers to fully realize the benefits of the smart grid.[2]

Several utility presentations in this session as well as subsequent sessions suggested an approach to customer education that was a multi-step process. That is, the customer has to undergo a process of learning from awareness to having the knowledge and motivation to take effective action to decrease energy usage. One utility proposed that customer engagement is a journey, involving multiple interactions with customers that must be undertaken to effectively engage the customer base. The study mentioned above also suggests a serial, process-based approach to go from awareness to action. Figure 2-1 below illustrates the potential steps a customer goes through from influence and awareness of smart meters/smart grid technology to an understanding and motivation to take action.

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[2] Grid Strategy 2011: Consumer Engagement 2011 Consumer Engagement Strategic Focus Priority Topic. EPRI, Palo Alto, CA: October 2011. 1024565. Pg 4-2.

Figure 2-1
Potential Process from Awareness to Action3

All panelists agreed that education is needed for both customers and stakeholders, but also for utility employees in terms of company messaging and training for system implementation.

Part of the Session 1 discussion focused on engaging low income customers. Several workshop participants conveyed examples of difficulty engaging low income customers. One utility suggested utilizing focus groups to develop and implement better engagement strategies. Another utility suggested that the best way to reach low income customers is to work with agencies that these customers rely on and trust. One lesson learned cited by a panelist is the need to have a strategy and process in place at the start, yet also emphasized the importance of being flexible and willing to make adjustments along the way as needed; "Expect the unexpected." was the summation of that utility's experience.

Employee Engagement

A well trained and organized staff is important to encourage active employee engagement and understanding of the company's smart grid vision. Before smart grid initiatives started to build momentum around the world, panelists observed that internal coordination between different departments for key day to day operations was minimal. The increased functionality of smart meters and smart grid technology in general militates for cross-departmental coordination. For example, IT, Communications, Marketing, and System Operations need to closely coordinate efforts throughout a smart meter deployment.

AMI brings with it the need for cultural change in the utility. Panelists suggested that should be used advantageously; get the entire work force involved. One utility emphasized the importance of engaging the operations department at the

[3] Ibid, Pg 4-3.

start of the deployment or project. The panelists and participants also discussed smart grid training for company staff. One utility indicated that 2,500 employees had participated in a smart metering training course to date. One of the panelists discussed a program at their company that used an incentive based approach for employee training to engage staff.

Pre-Deployment Testing

Another common theme surfaced during the first session around the importance of pre-deployment testing on a controllable scale. Testing on the front-end can help minimize issues prior to scaling up a smart meter deployment. One comment shared by a panelist is to carefully consider the delivery and timing of supporting materials and tools in conjunction with a smart meter deployment.

Data Collection & Privacy

How to manage the tremendous amount of data made available by smart meters is another important consideration when designing a customer education strategy. The increased data raises several challenges including data management on the utility side, potential data privacy concerns for the customer, and the design of measurement, verification and analysis techniques necessary to derive the most value from this increased information.

Data from smart meters could reach, according to one utility, 10-15 terabytes. Managing this increase in information will require organized planning efforts and multi-departmental coordination, as mentioned above. Coordination between the IT and communications groups, in addition to others within the organization, will be important in deriving the most value from the data for both the utility and customers. Several utilities echoed the importance of working with IT personnel very early in the process to assist with data collection, storage, and analysis plans. One utility reported that the development of a diverse project team comprised of several departments working closely together as one of the key aspects contributing to their success.

Data privacy concerns were discussed when the question was posed to the panelists regarding data transfer. All the panelists indicated that they have established a policy that they will not (and in some cases cannot by law) share the customer's energy data with a third party. Within one utility's service territory, the data can be released only if the customer provides a signed release of the information. The data concerns were also discussed in the context of cyber security on the utility side. That is, if knowledge was gained as to loads on the system by geographical area the potential for an act of vandalism could be present. Several options for increasing data privacy were discussed including the potential of providing customers with a USB web key that would take the customer to their personal information when inserted into a computer. Providing paper reports mailed to the customer's residence was also mentioned by several utilities.

The measurement and verification portion of smart grid pilots was also discussed generally with emphasis on accurate analysis, determining the statistical significance of results, and extracting the most value from the diverse range of data available. One utility indicated that one of the main lessons learned in the early deployment of their pilot was the importance of understanding the control group measurement methods prior to deployment so that plans can be adjusted to make the program measures accurate.

Section 3: Session 2: Talking the Talk: Implementing Customer Education and Awareness Campaigns

In this workshop session, panelists offered recommendations for the implementation of education and outreach practices to build awareness and acceptance of forthcoming deployments. The presentations and discussion highlighted the need for external stakeholder education and engagement, messaging and media strategy, and managing customer expectations and concerns.

External Stakeholder Education and Engagement

Engaging a diverse mix of stakeholders early in the process was emphasized. A lesson learned shared by one utility was to keep the media and community leaders informed to help minimize potential pushback. Hiring local workers, for example to set meters and provide support services whenever possible, was also suggested to increase the number of ambassadors for the project. Another utility sent letters and met with community leaders, city council members, neighborhood groups, local congress people, etc. to make them feel connected to the process. For example, informing the local police of installs in the area can help minimize adverse consequences of field personnel as they worked in neighborhoods. That panelist also suggested the utility make offers to speak before various community and business groups about the smart meter deployment specifically, and the smart grid program generally. The importance of creating pre-install documents and a communications plan was also discussed. Tailoring the message to the priorities of specific groups and stakeholders is one way to communicate the value of deployment.

Messaging & Media Strategy

The communications strategy was presented by panelists and discussed by workshop participants. Quickly responding to media questions or requests with factual, credible, and supportable information was the strategy presented by one panelist. Utilizing customer and third-party testimonials was also suggested as a best practice to foster widespread customer acceptance. Further, leveraging early adopters in campaigns and media events was suggested as a method for successful program messaging. Strategies for both proactive and reactive media engagement were utilized by workshop participants. The use of social media to communicate outage status was one example given by a panelist.

Managing Customer Expectations & Concerns

Managing customer expectations and concerns in a timely fashion was discussed by workshop panelists and participants. Addressing meter safety and privacy concerns, and knowing your customer base, were the main topics that surfaced in regard to customer expectations and concerns. The extent of meter safety concerns, such as radio frequency (RF), varied among the workshop participants. One utility indicated that 1/3 of meter refusals (which in total were low relative to the number of smart meters installed) were due to RF concerns, while another utility indicated that 3-4% of customers in the field indicated they do not want a smart meter. Another potential issue utilities should work to eliminate is fire hazards caused by faulty circuitry.

Knowing your customer base and segmenting communication messaging is one approach to managing customer expectations and concerns. Developing a diverse range of strategies to engage each customer segment as appropriate is one potential approach. For example TV, radio, social media, email, door hangers, and truck decals can be used to accurately communicate the value of smart meters.

Section 4: Session 3: Following Up: Engaging Customers to Realize AMI Benefits Sooner, Rather than Later

In this session, Bernie Neenan of EPRI talked about AMI benefits from a number of perspectives. The purpose was to ask and address three questions:

- How important to the utility business case for AMI are benefits attributed to changes in consumption behavior?
- What kinds of behavioral changes can be induced by AMI that otherwise or previously were not feasible?
- What kinds and levels of consumption impacts should we expect from deploying AMI?

Benefits Attributable to AMI Investments

Soft versus Hard Benefits

Figure 4-1 conveys AMI benefits on two spectrums; whether they are hard or soft and the degree of measurement uncertainty. Hard benefits are cost savings that can be readily measured by the utility. In contrast, soft benefits are those which either are derivates, like changes in service quality (for example, reliability) and those associated with actions that individual customers take, enabled by AMI, to improve their well being. The figure suggests that hard benefits (e.g., meter read costs, back office savings,) are more likely to be certain than softer benefits, especially those that inure generally to society rather than to specific customers (e.g., environment and national security benefits).

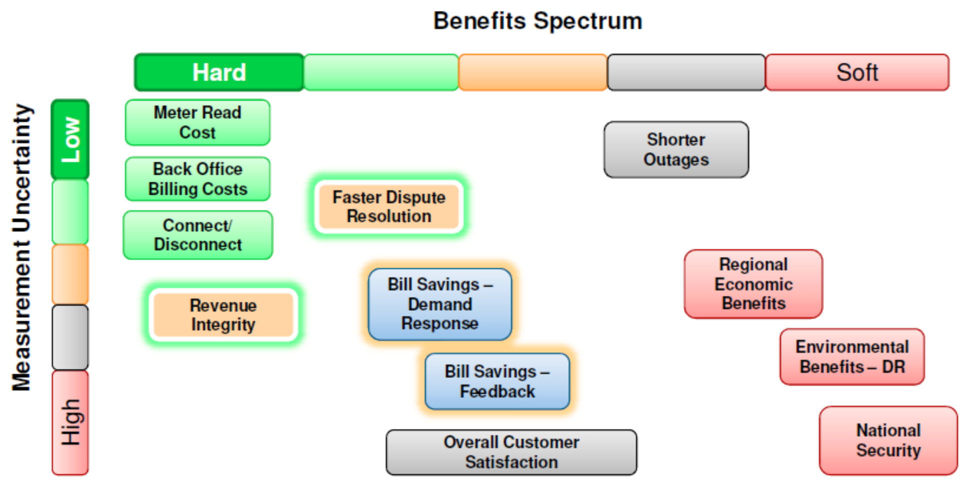


Figure 4-1
AMI Benefits

Figure 4-2 provides estimates of AMI benefits provided by several utilities to rationalize AMI investments. The extent to which societal (softer) benefits contribute which ranges from under 20% to almost 80%, suggests that in most cases the AMI investment decision may depend upon the credibility of the estimates of the soft benefits.

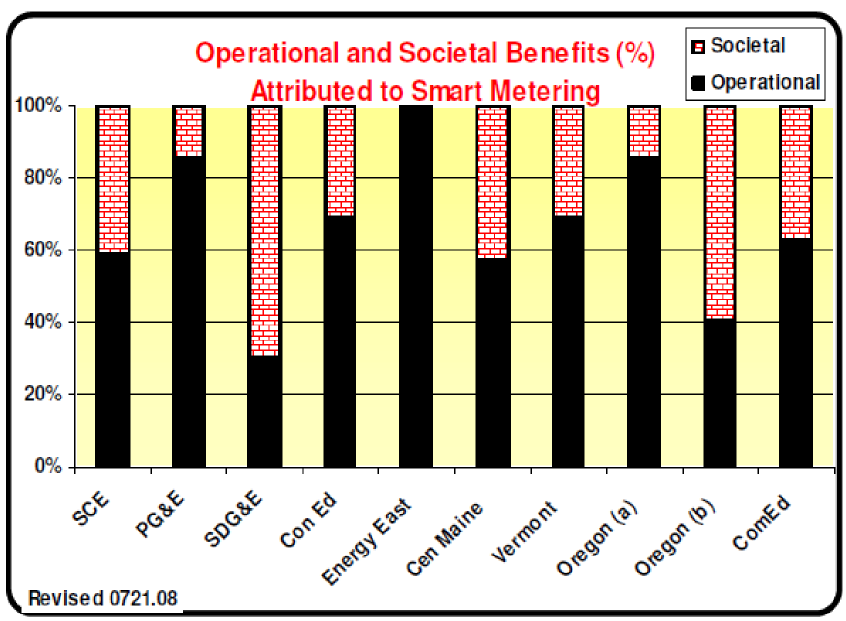


Figure 4-2
Benefits Attributed to Smart Metering – First Wave Analysis (2008)

How Many AMI Meters and When

Large AMI installations, like the over two million installed by CenterPoint, over four million by Southern Company, and over five million in California, attract a lot of attention, but are they representative of a general national trend? Figure 4-3 shows that AMI meter installations to date are about 36 million (about one in four) and forecasted installations by 2015 are 65 million meters, which amounts to about 45% of all electric meters in the U.S (about 150 million).

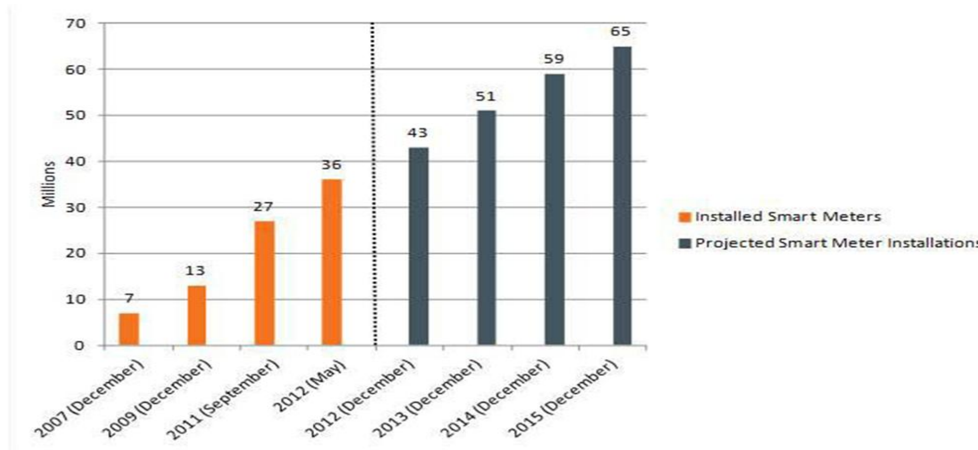


Figure 4-3
Smart Meter Installations in the U.S. 2007-2015 (millions)

Source: Institute for Electric Efficiency, Federal Energy Regulatory Commission
http://www.ferc.gov/legal/staff-reports/11-07-11-demand-response.pdf

Figure 4-4 portrays the 2015 installation estimates on a map of the U.S. Fourteen states are projected to have less than 100,000 AMI meters installed while 11 states will likely have changed out virtually all conventional meters to AMI or a predecessor technology. Looking at these numbers another way, in 2016 three-quarters of the electric meters are left to be changed out and therefore the benefits attributable to AMI are still an important determining force for when it will be deployed.

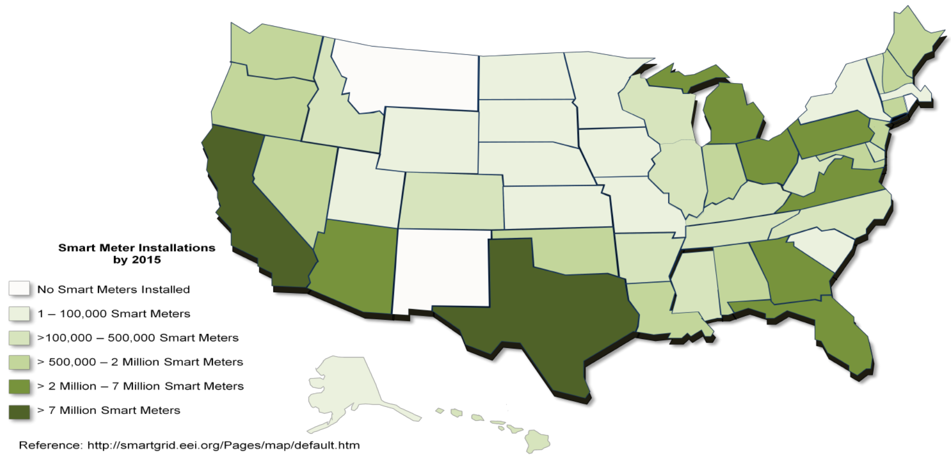


Figure 4-4
U.S. Smart Meter Installations by 2015 (EEI)

Behavioral Inducements that may be Enabled by AMI

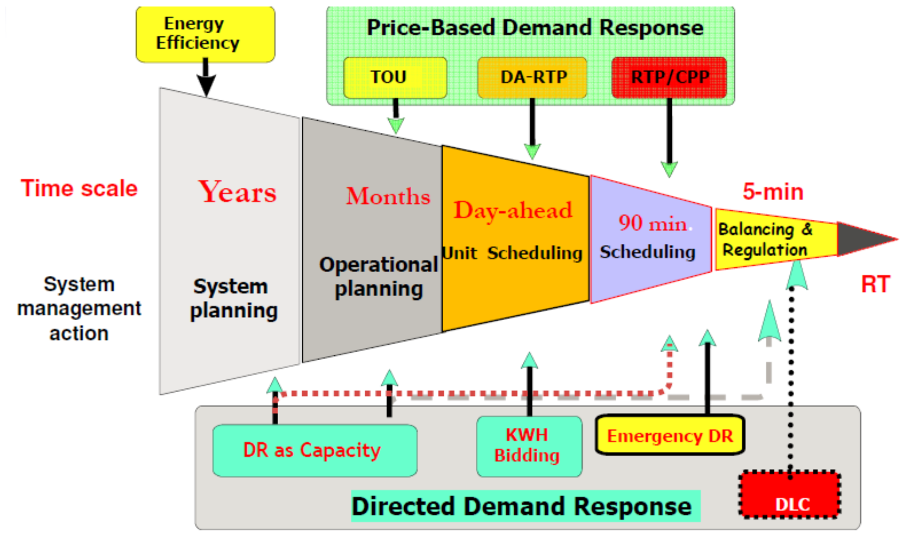
AMI technology allows for measuring premise usage at a very low level of granularity and making that data readily available for processing to issue bills, to monitor premise response during periods of high prices or when load control programs have been activated, and for delivery to customers, either through a utility-provided web access or directly from the meter to monitoring or control devices in the premise. Enriching the kinds and availability of data opens up new avenues to influence when and how customers use electricity in ways that produce benefits for customers and society.

Some of those benefits are soft and some are hard. All contribute to justifying the AMI investment, but only to the extent that they were enabled by AMI. The enabled behavioral inducements of interest can be classified as follows:

- Pricing structures that better reflect electricity cost of supply than do conventional, non-time differentiated rates
- Information and feedback (synonymous as used here) that provides customers with data about when and how they use electricity, and a context for modifying consumption behaviors
- Control technologies that allow customers to carry out behavioral changes associated with subscription to more complex pricing structures or motivated to do so from more and better usage information.

Price Inducements to Change Behavior

Retail electricity rates are typically based only on charges for demand (measured as kW) and energy (kWh): in the case of residential premises, usually only the latter and at a uniform (not time or volume differentiated) rate. This is at odds with how electricity is supplied and the cost of doing so. Figure 4-5 illustrates how the electric system is planned and operated, portrayed by the sequential time-scaled steps that comprise the center of the figure. Because supply and demand have to match continuously and instantaneously, the system is planned years out, managed to meet foreseeable conditions seasonally and monthly, and dispatched on a daily, and ultimately minute-by-minute basis, to react to changing supply and demand circumstances. This describes how the supply-side operates. Changes in when customers use electricity influences these processes, and therefore if demand can be modified, then the system configuration might be improved to lower costs and improve reliability.



Source: The Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them. Feb. 2006.. USDOE

Figure 4-5
Integrating DR into Wholesale Electricity Markets

Figure 4-5 shows how demand changes can influence system operations. On the top, it shows how energy efficiency and prices effect system cost. Energy efficiency measures reduce the amount of electricity required to meet customers' needs, and thereby reduced supply costs. These are durable changes because once installed they have a predictable and lasting effect. Pricing structures can achieve permanent changes in when electricity is used, but they also can induce temporary changes in usage behavior, which equates to their mimicking a dispatchable supply resource. As the figure indicates, pricing structures can provide substantial value to dispatch, but only to a point. Responding to streaming prices sent more often than an hourly is likely beyond the load management capability of most customers. But, some may be able to accommodate fast priced changes for infrequent and short duration periods.

The bottom of Figure 4-5 illustrates other ways to alter electricity usage behavior. Electricity demand portrayed as a resource, albeit with limited availability, provides additional ways to influence supply to reduce costs, especially under the conditions that pricing structures are likely to be least effective. Demand response (DR), is the commonly used term to refer to programs that offer customers periodic, episodic inducements to change electricity. These inducements are offered as a add-on or option to the rate the customer is served on, which can be a standard, non-time or volume differentiate rate structure. By adding the demand response option, the utility (or other electricity supply agency) has available, for limited purposes and duration, dispatchable load that it can used to resolve supply/demand incongruencies that cause price to elevate precipitously, or that endanger system reliability. Customers that accept such an option trade security of supply, albeit under limited circumstances, for a billing discount or other form of payment- that lowers their electricity bill, all other things being equal.[4]

The pricing structures and demand response options listed in Figure 4-5 are already offered in many parts of the country to many or most customers. FERC estimated that programs available in 2010 provided system operators with over 58 GW of price responsive and dispatchable load, which amounts to 7.5% of total U.S. peak electricity demand.[5] AMI might make it possible for more customers to participate generally, it may induce more to subscribe to pricing structures and options that are more time-responsive, and it might induce those already enrolled to offer even greater load adjustments.

Feedback and Information as a Behavioral Inducement

Feedback is defined as the provision of information and data to customers in a form that helps them understand when and how they use electricity, and formulate ways to alter their usage behavior to their own benefit. That benefit might be reducing the electricity bills, but it also might make it possible for the customer to expand its use of electricity from which it realizes benefits. Figure 4-6 portrays a categorization scheme for feedback mechanisms. Going from left to right, the mechanism involves providing data either more often or in a more detailed fashion, or both. Generally, the cost of providing information increases as one moves from left to right.

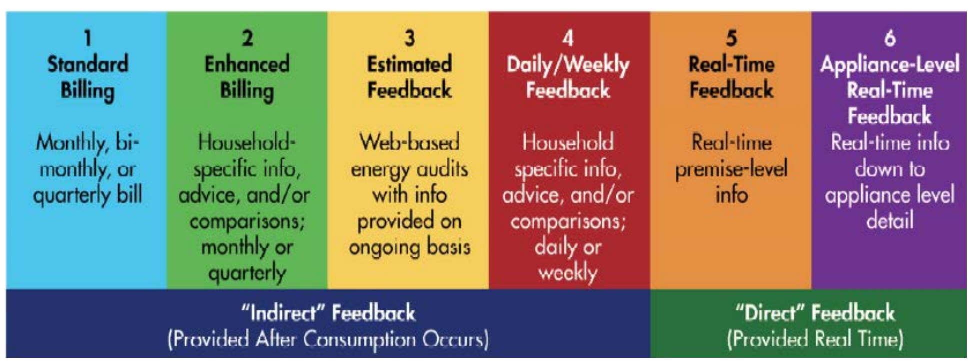


Figure 4-6
Characterization Schema for Feedback Mechanisms

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[4] The benefit realized from the option payment might be in part, or wholly, spent on buying more electric services because doing so provides value to the customer. Hence, the customer's bill could be higher, but it receives greater benefit from this arrangement than it would on the standard rate without the call option payment.

[5] FERC. February 2011. Assessment of Demand Response and Advanced Metering: Staff Report.

The standard for bill information serves as a baseline on the left-hand side. The monthly bill includes the amount due and some information about usage compared to that of a previous period, sometimes the previous month and in other cases usage at the same time the year before. The next feedback mechanism (enhanced billing) differs in that the feedback involves a comparison of usage either to that of other customers of similar circumstances (a normative comparison) or to performance relative to historic usage and goals the customer has set for itself (a positive comparison). This information is generally provided on a separate sheet if it accompanies the bill, and may be sent separately (by mail or email) specifically to call attention to the message it carries.

Estimated feedback (Category 3) provides individualized information like Category 2, but it is more detailed and developed based not just on past consumption of the customer or a peer group, but as the result of an in-depth audit conducted on the customer's premise to ascertain what devices are present and how they are used. Usually a web-based system is used to facilitate the customer providing the requisite information and so the utility can respond with more detailed portrayals of how electricity usage can be reduced to the benefit of the customer. They include, generally, device or premise-specific recommendations such as to install compact florescent light bulbs , service the AC system, caulk doors and windows, install occupancy sensors for lights, etc., based on the model's interpretation of the customer electricity usage level and profile.

Category 4 raises the degree of measurement, and therefore awareness, by offering information and tips more often, weekly or even daily. This might be accomplished by expanding the webpage capability of a Category 3 service, but it requires gathering premise data more often. This is where AMI helps. It provides the ability to read meters frequently and supply data to support more recent and hence possibly more timely information that customers can use to control their electricity usage. This presents a critical decision stage for utilities considering providing feedback. Do they make arrangements so that the meter register (kWh primarily) can be sent directly to a device in the premise, such as a in-home display (IHD), or do they read the meter more frequently, bring the data back to the utility and make it available to the customer via a web page? The former may be less costly to the utility in terms of data delivery. The customer must purchase an IHD device, but the utility must install the transmitter in the smart meters to make this possible, which raises the cost of the system. Supplying data to the customer via the web requires that the customer have a PC or similar platform to accept the data, and the utility incurs additional expenses in developing a communication system that can handle the increased meter polling traffic. For conventional billing, meter reads twice a day are sufficient, but a considerably larger (and more expensive) communication network would be required to allow polling all meters (every hour, for example), and developing and operating a meter data management system.

Categories 5 and 6 raise the level and content of information available to customers by making total premise electricity usage immediately available and in addition making device-specific usage available, respectively. With more data available, customers may be able to better recognize when they use power inadvertently or out of sorts with goals they have established and make adjustments on the fly.

Enabling Technology to Enhance Behavioral Inducements

Enabling technologies make it easier for customers to gather and analyze data on electricity usage and take action to adjust usage when the situation warrants. Examples are IHDs (which are associated with feedback Category 4 and higher), home area networks (HAN) and associated automated device controls (which become feasible with feedback Categories 4, 5 and 6), and programmable, communicating thermostats (PCT). The later does not need a smart meter—there are several large-scale demand response programs operating in the U.S. that do not rely on the meter to enable load control. Some argue that enabling technology is necessary to expand demand response, especially for programs that require very fast response to event curtailment orders, because households and businesses are unlikely to participate if they have to constantly monitor the situation and manually change device settings when events are called (in some cases with only a few minutes or seconds of event notice).

What Benefits can be attributed to Smart Metering-enabled Behavioral Changes?

As suggested earlier, in projecting benefits associated with changes in electricity demand attributable to smart meter installations there are already many programs in place that have altered electricity demand without the benefit of AMI technology. Utilities have successfully controlled load directly (demand response) through conventional communication networks (primarily telephone) and price response has been activated by installing an interval meter at the participating premise and sending prices by voice mail and text messages. New benefits must therefore be associated with expanding the level of participation in existing programs, increasing the degree of response by current participants, or by opening up new ways to induce changes in electricity demand.

Universally installed AMI by itself may account for expanded participation in existing demand and price response programs because it eliminates the need to set an interval reordering meter when a customer enrolls. These meters are expensive (several hundreds of dollars) and usually the reading must be handled external to the main meter reading and billing systems, which adds costs. A universal AMI system makes every premise a potential participant, at least in principle.

AMI installed at existing demand and price response participating sites allows changing the granularity of measurements so that the customer can move among various offerings, some of which might only require daily peak and off-peak energy readings (time-of-use rates), while others require hourly or even more frequent readings. Flexibility translates into increased choices for customers, which expands the potential extent of participation. Moreover, it means that as non-participants consider joining a program, they can consider not only what is available today, or what they can accommodate today, but also take into account other ways to alter electricity usage.

Smart metering opens up new ways to influence electricity demand through feedback categories 4-6. Extensive research is underway to determine what effect feedback has on electricity usage. Extensive studies of Category 2 suggest that monthly reports that compare the customer to other inducements could see up to 2% reduction in overall electricity (kWh) usage. Adding more and more readily available information on premise use, in the limit for each device (Category 6), might result in even higher reductions of electricity usage, which reduce the participating customer's bill, and results in additional system benefits that inure to all customers and to society. But, costs may go up disproportionally.

Opportunities for using technology to display information and use it to execute control strategies are expanding, in large part because of advances in ways to communicate between and among devices (including sending commands to the home from a cell phone), and research to convert behavioral desires into operational scripts that respond to exigent circumstances, like premise occupancy and weather. These may expand participation in load control programs because the premise controlled can balance the need for load reductions with what changes in the premise are tolerable, taking advantage of natural diversity in the demand for electric device provided services.

The benefits discussed above that are attributable to smart meter technology are speculative. Research must establish a cause and effect relationship between the feedback mechanism and the extent to which it might be realized in the general population of customers and businesses. Moreover, the smart meter may have to share the benefits with other technologies that make the behavioral change possible. The AMI meter itself provides the required level of measurement, but that information must either be displayed (an IHD for example) or it becomes a data source for other analytical (HAN) and control devices that actually cause the demand change.

Section 5: Session 4: Managing Implementation – Walking the Walk

In the closing session, panelists discussed successful strategies (and challenges that informed them) they employed to manage smart meter installations, develop back office processes, and undertake the switch over from manual to automated readers. Panelists and workshop participants touched on technology acceptance, challenges, and keys to success when managing implementation.

Challenges & Keys to Success

The key messages from session 4 are summarized as follows:

- Purchase meters with all the functionality you will expect to need to avoid network replacement and delays
- Expect the unexpected and be open to adjusting the plan
  - Software/hardware updates
  - Data-driven changes
  - Customer need changes
- Establish and monitor metrics
  - For example, monitor customer complaints to understand and address root causes (i.e. meter location, customer type, and issue)
- Establish a project team that is cross-functional while acting as a consolidated unit
  - Ensure engagement of the operations department
  - Consider whether dedicated or shared staff is appropriate for the scale and timing of your deployment
- Put processes in place to address post-deployment accuracy issues
  - Take photo readings of old meters prior to installing AMI meters
  - Keep old meters for a period of time after deployment
- Select vendors who use a customer centric model versus traditional utility model
- Ensure IT systems/processes are prepared to handle AMI data

- Build in rigorous, proactive testing and monitoring up-front rather than reacting to issues on the back end
- Determine end state data needs and filter data appropriately to get the information you need.

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Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com