Consumer Attitudes and the Benefits of Smart Grid Technologies

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The electric utility industry is undergoing a paradigm shift. Traditionally a one-dimensional business with the sole responsibility of delivering power to consumers, it is transitioning into a dynamic mode of operation through the deployment of AMI. There are numerous companies with a variety of technologies vying to help utilities achieve their goals. A fundamental question regarding these efforts is, "How motivated are consumers to manage their electricity consumption?" If they are uninterested, then there may not be opportunities for many of the systems and services being introduced into the market. On the other hand, if they are interested in cutting energy costs, we need to determine what motivates them and whether they are willing to pay money to achieve their goals.

Consumer Interest in Energy Savings

Parks Associates' 2009 Residential Energy Management Survey determined the average expenditures for electricity among U.S. households are over \$170 per month during high-cost periods and over \$75 per month during low-cost periods. It is not surprising based on these facts and the current difficult economic times that more than 80% of consumers are very interested in learning about ways to cut energy expenditures (Figure 1).





Smart Energy Summit is an annual threeday event hosted by international research firm Parks Associates. The event examines the opportunities and technical and business requirements inherent in the consumer programs and advanced systems and services made possible by Smart Grids and Residential Energy Management solutions.

The event focuses on the roadmap for the emerging in-home energy management technology market, featuring market research with results from Parks Associates' landmark Residential Energy Management service, offering consumer and industry research and strategic insight.

The next Smart Energy Summit will take place in Austin, Texas, in February 2012.



Consumer Interest in Lowering Energy Cost

Parks Associates' research reveals over 50% of all consumers consider it very important to buy energyefficient or environmentally friendly products.



High Level of Interest in Lowering Energy Costs



Source: 2009 Residential Energy Management Survey © 2011 Parks Associates. All rights reserved.



Interest in Learning about Money-saving Products and Programs



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Figure 2

Nearly 75% want to know how they can reduce electricity consumption. Utilities and their partners have numerous opportunities to tap into this demand with products and services that can reduce the amount of electricity required for typically power-hungry systems. However, these solutions must be properly designed to meet consumers' needs and budgets.

The 2009 Residential Energy Management Survey found high levels of interest in savings programs. Most consumers are very interested in learning about moneysaving products and programs from utilities (Figure 2). Many electric utilities have launched or are in the process of developing programs that can help consumers reduce electricity consumption, especially during periods of peak demand. Some of these utility programs are possible thanks to smart grid deployment, and others employ legacy one-way control communications to turn highload systems off during peak demand periods.

When pressed for their reasons, consumers overwhelmingly point to cost savings over other reasons, such as environmental concerns or limited product selection (Figure 3).

Measuring the importance of energy efficiency in products is one aspect of the consumer mindset. How much they are willing to pay for efficiency is another. Some consumers are willing to pay a premium for a flat-screen TV that uses 20-40% less electricity than other models, with the amount rising as savings increase. However, not everyone is willing



Reasons for Energy-efficient Purchases

Figure 3

to pay more, even for assured savings of up to 40%. Reasons for this stance vary-for some, electricity costs are low enough not to warrant concern while others do not value energy efficiency.

Many utilities have or are in the process of introducing rate programs that allow for utility control of thermostats, water heaters, and other electricity-hungry systems during peak demand periods. Others are implementing Time-of-Use (TOU) billing programs in which customers are charged different rates based on the utility's cost structure. Some of these programs require special equipment in homes.

We asked respondents of the 2009 Residential Energy Management Survey about their willingness to pay for equipment in order to participate in programs that guaranteed 10-30% savings on their monthly electricity bill. The good news for utilities trying to build business models with these types of programs is that most consumers are willing to pay "something" for the required equipment. The bad news is that amount may not cover the total cost of equipment and installation. Hence, developing viable business models will require innovation on the part of both utilities and their vendors.

Interest in Monitoring and Control

Consumers can connect a variety of sensors (motion, door/ window, power, water, etc.) and possibly a camera to an Internet connection via a special gateway, standard router, or PC. The sensors feed information to a website maintained by a service provider. Users can receive notifications or transmissions on a mobile device, via email, or on a private website should a change in status or an alert occur.

iControl is an early player in this area and collaborates with ADT Security so ADT customers

The increasing availability of residential broadband has sparked the market for remote home monitoring services.

can access their home status when away and receive alerts across multiple devices. Another early participant in this market is Alarm.com, which sells its service through independent security dealers.

In addition, companies can build on these services by offering remote control offerings for systems such as HVAC, lighting, security, and door locks. Cable TV system operators and telephone service providers are actively exploring



remote home monitoring services as opportunities to expand service bundles and retain customer loyalty. Several communication service providers including AT&T and Qwest are already offering such services.

Parks Associates believes adoption of remote monitoring systems and services will occur gradually and only after consumers become aware of these capabilities. However, major service providers might ignite consumer demand

> and accelerate adoption by developing remote home control and monitoring services that complement their Internet, voice commu-

nications, and content services.

Research conducted over the past few years proves that some consumers are interested in remote home monitoring and likely to subscribe as these services become available. A recent survey asked consumers to rate their interest in several remote monitoring applications, and remote home monitoring via IP or web cameras scored the highest of the applications listed. Remote monitoring and control of thermostats followed, and remote lighting controls were third in popularity.

In Parks Associates' 2010 Residential Energy Management Survey, some, but not many, consumers already exhibit interest in and a willingness to pay for an energy monitoring service; however, we are at an early point in the life cycle of residential energy management solutions. The 2010 survey also measured the appeal of an in-home electricity monitor. Nearly one-half of all respondents expressed strong interest in such a device, but lack of interest was also substantial. In fact, 20% indicated that they are "not interested at all." Careful segmentation of consumers is required in order to target those with both an interest and willingness to pay for these types of solutions. We divided the "interested" consumers into three equal groups. Each group reported how much they would be willing to pay for an energy monitoring system if it would help save 10%, 20%, or 30% off their monthly electric bill by simply increasing awareness of their energy usage. More than 90% of each group are willing to pay something. These results point to a sizeable market for electricity monitors if vendors can profitably offer products for about \$100 and substantiate at least 10% savings in electricity costs.

100 %

The 2010 survey also asked consumers where they would want to see their electricity consumption information displayed. Currently, most prefer to see this type of information on a thermostat with an enhanced display. A wall-mounted display, separate from the thermostat and with a portable, inhome panel, was second.

Several formats currently favored by potential vendors, such as online applications and cell-phone displays, were not rated highly. Another, the television, also scored well below the most preferred displays. These low ratings may be the result of low consumer awareness and limited experiences with some envisioned displays, and they may shift as these displays gain greater usage. For example, EPB, an electric utility in Chattanooga, TN, offers triple-play

Energy Monitor Display Preference

"If you decided to purchase a device to monitor the electricity usage in your home, where would you want the information displayed?" (Among broadband households surveyed. % of purchasers preferring selected display type ...)



Internet, phone, and video service to its customers as well as electricity. If EPB customers could switch to a preset TV channel to view electricity consumption, would they prefer that over an enhanced thermostat or separate device? The answer is unknown as yet, but there is a good possibility many customers would prefer the TV.

Interest in Smart Appliances

Manufacturers are developing appliances that an electric utility can control temporarily to reduce power or delay normal operations during periods when electricity generation or acquisition costs are high. Owners can override the utility's actions, if desired, to avoid being inconvenienced.

The question is will consumers pay a premium for these smart appliances. Results of the *2010 Residential Energy Management Survey* suggest that most consumers will pay a modest premium if, and only if, they can save 10-30% on their monthly electricity bill. Although the results are positive (i.e., most consumers are willing to pay a premium for smart appliances), the amounts are only 7.5-8.5% of the total cost of the appliance. Such a small premium is unlikely to convince appliance manufacturers to develop such appliances without accompanying utility or tax incentives.

Major appliance manufacturers, including General Electric and Whirlpool, plan to offer some smart appliances in the next year or two. Whirlpool received \$19.3 million in stimulus funding, and GE's prototype smart appliances are involved in pilot programs with Louisville Gas & Electric, Reliant Energy, and Masdar City (Abu Dhabi, U.A.E). Panasonic and LG are developing smart appliances for the Japanese and Korean markets, respectively.

Here are some examples of how these appliances are likely to operate during peak electricity demand times:

- A refrigerator will delay its defrost cycle until the utility's energy cost is lower
- A dryer will reduce the wattage used by the heating coils
- A dishwasher will delay its start until a time of day when electricity rates are lower





The market for smart appliances will evolve slowly for the following reasons:

- Consumers are unlikely to replace existing appliances with smart appliances until existing appliances fail or become too expensive to maintain
- The premium most consumers are willing to pay for smart appliances is unlikely to cover additional material costs
- Public utility commissions (PUCs) will have to approve rate structures that accommodate smart appliances, a potentially time-consuming process
- Many consumers balk at allowing utilities to control their appliances

Parks Associates is continuing to monitor manufacturers, utilities, PUCs, and consumers to develop a clear picture of how and when the market for smart appliances is likely to emerge.

In Conclusion

Consumer attitudes about the benefits of smart grid technology are still in a formative stage. Most consumers are not aware of the term, much less the capabilities smart grid technologies will be bringing in the next few years.

A number of issues require additional investigation. Utilities, their partners, and all other players in this field must understand consumer attitudes and demands and how they will impact the return on investment for their offerings. These factors will determine the parameters of successful business models, and the full benefits of the smart grid will not be realized in the residential arena without engaging the consumer.

Several conditions are clear:

- Consumers are very interested in learning how they can cut their electricity costs
- Most are willing to pay to save
- Some consumers would allow utilities to control systems in their home, but many are not willing to relinquish control even if they can override utility commands