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Smart Grid Technology and Consumer Call Center Readiness

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SMART GRID TECHNOLOGY
AND CONSUMER CALL CENTER READINESS

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Approved by

Advisor

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SMART GRID TECHNOLOGY AND CONSUMER CALL CENTER READINESS

Abstract

The following reasearch project deals with utility call center readiness to address customer concerns and questions about the Smart Grid and smart meter technology. Since consumer engagement is important for the benefits of the Smart Grid to be realized, the readiness and ability of utilities to answer consumer questions is an important issue. Assessing the readiness of utility call centers to address pertinent customer concerns was accomplished by calling utility call centers with Smart Grid projects and asking 6 simple Smart Grid and smart meter questions. The hypothesis being tested for this reasearch is that only a minority of utility companies will have systematically prepared their call centers to answer consumer questions. Results showed that utility companies do not provide enough information through their call centers. There is a significant oppportunity for utility call centers to better prepare and educate their customer service representatives and educate and engage utility consumers.

SMART GRID TECHNOLOGY AND CONSUMER CALL CENTER READINESS

Talk of energy reduction and green technologies have filled the information highway of today's global economy (The Electricity Advisory Committee, 2008). Companies are fighting to be the greenest, most efficient, cost effective, and environmentally friendly entity in their industry (United States Department of Energy, 2004). The current trends to reduce, reuse, and recycle our world's depleting energy has transformed the mission statement of many companies to focus on the environment rather than solely their bottom-line. At the same time there is a strong customer movement to be "green." Recently, consumers are interested in being green to save the environment (Price & Thomson, 2009). At the forefront of both helping utilities achieve environmental goals as well as helping the consumer reach their goals is the emergence of the Smart Grid (The Electricity Advisory Committee, 2008). According to the American Recovery and Investment Plan, "updating the way we get our electricity by starting to build a new Smart Grid that will save us money, protect our power sources from blackout or attack, and deliver clean, alternative forms of energy to every corner of our nation" (USEA 2009- GE session1). Companies that adopt the green mission and green products and services will ultimately catch the attention and maybe dollars of the consumers. One of the broader efforts in the United States is to update the electricity distribution system using digital technology. This effort is referred to as the Smart Grid. The Smart Grid will soon present itself around the country as energy saving mechanism to save energy, decrease pollution, and help consumer save money.

The trends in the electricity production industry are quite startling. Prices of electricity from suppliers of electricity whether it is produced by coal fired power plants, nuclear energy, other fossil fuels such as biomass, and even green energy like wind and solar are increasing. The average price of an electric bill in the United States has increased 6.5% from previous years (USEA, 2009- GE Session 1). As the cost of electricity rises electric bills are going to continue to increase. Even with the same use of electricity each year electricity costs go up. But electricity use has not stayed the same. Consumers acquire ever more electronic products that increase the amount of electricity used. So the cost of electricity is going up and consumers use more electricity each year (Electricity, 2010). The cost increases are therefore magnified. As a result of our current struggling economy, quickly rising electric bills have been an extra burden on consumers and businesses. Increasing utility prices leave less disposable income to consumers and businesses, meaning less money for consumers to spend to stimulate the economy. The negative trends in the energy producing industry provide a great opportunity for the Smart Grid to enter the market at a critical time of need. The Smart Grid will be able to offer a cost effective option to individuals and businesses to be able to conserve energy, while at the same time save on their electric bills.

Alternative sources of electricity production have been pushed as solutions to cost increases as well as environmental issues. According to Jim Rogers, CEO of Duke Energy, there are five sources of green energy: biomass, wind energy, solar, nuclear, and consumer conservation (Little, 2007). According to Dr. Richard Feinberg, Jim Rogers claims that if consumers use 5% less electricity there would be no need to build new coal fired electricity production plants for the next 50 years. There are many alternatives to coal fired energy plants

but they each have their own set of problems that both harm the environment and cost government and consumers. For example, wind energy is clean and renewable, but very expensive and inefficient. Wind produces less than 1% of total energy needs in the United States (Feinberg, 2010). The amount of land needed to build wind turbines capable of producing electricity for a large amount of need is virtually impossible. Nuclear is a very clean and efficient source of energy, but consumer fears about these plants makes it virtually impossible to build new nuclear facilities. Even if new plants were started now, it would take over 20+ years for nuclear to produce the electricity needed to replace dirty coal production. Solar is a possible option to combat the energy problem too, but the high priced panels and costly installation make implementing this kind of energy in residential and commercial properties very difficult. Solar energy is only effective if there is sun and that is not the case in many parts of the U.S. Most importantly, utilities would have to have coal electricity production plants on line to provide energy when consumers want it when there is no sun and no wind.

World energy consumption as a whole has almost tripled in the last 40 years and is expected to triple once again by 2050 (USEA-GE Session 1). The increase in consumer and business energy usage continues to strain the electric provider's ability to compensate accordingly to the prominent needs. "While more power plants can be constructed, dwindling supplies of fossil fuels are driving up costs and disrupting fuel supply chains. To ensure electricity can be produced reliably and in the quantity needed, alternative sources of electric power need to be developed" (Galing, 2009). Utilities can continue to build expensive fossil fuel plants, but customers fight the construction of these plants because they are major polluters. The Smart Grid would be a perfect solution to this detrimental electricity shortage and pollution

problem. “Electricity needs to be used more efficiently and the components of the grid must be used to their fullest potential. A Smart Grid with smart sensors, predictive algorithms, two-way communications, and smart control devices would be able to use both current and new infrastructure to the maximum extent possible” (Galing, 2009). The technology is available and the savings have real potential to change our energy production in the future, but what is the Smart Grid really comprised of?

What is the Smart Grid

The Smart Grid is the name of a set of improvements to the electrical distribution system that “bring the philosophies, concepts and technologies that enabled the Internet to the utility and the electric grid. More importantly, it enables the industry’s best ideas for grid modernization to achieve their full potential” (United States Department of Energy, 2004, pp. 15). The Smart Grid has the ability to bring together the basic electrical infrastructure and a sophisticated information infrastructure to create a very successful technology (USEA 2009- GE Session 1). Basically, “the Smart Grid offers a solution that will maintain a sufficient, economical, and reliable supply of electricity well into the future far better than an attempt to fix or expand the present electric grid” (Galing, 2009). With country wide implementation of the Smart Grid technology, utility companies will be able to contribute to US energy independence, reduce pollution, reduce the effects of global warming, create a more reliable energy distribution system, increase their ability to fix system outages significantly faster, and prevent wide scale energy outages.

The Smart Grid is made up of four key components that allow it to accomplish these stated goals. The first two components are implemented through “smart sensors and devices

inside and outside of the home or business” (Galing, 2009). Another element of the Smart Grid is its “two-way communications between utilities, grid operators, consumers, and grid components” (Galing, 2009). The two-way communication offered by the Smart Grid allows customers to closely monitor their electric consumption and it allows electric providers to monitor their customer’s grids to assure they are always functioning properly. As a result of this two-way communication, utility companies can redirect electricity to areas of coverage experiencing brown and black-outs much quicker. The final component of the Smart Grid involves “high speed computing, software, and display devices to monitor current and anticipated future grid conditions and control and protect the grid” (Galing, 2009). This computing technology is featured in smart meters inside the home. Customers will soon be able to monitor their energy usage and make smarter choices in the future.

One of the most outstanding features of the Smart Grid technology is the sophistication of in home smart sensors and devices. Most of the Smart Grid technology will be used to create a “smart home” model in residential areas around the United States and the world. The smart home will consist of many Smart Grid elements that will allow each resident to save in multiple areas. The smart thermostat will be the most commonly used element of the Smart Grid. It will be fully programmable and will provide up to date readings to the customer of their energy usage in KWh and in dollars (USEA, 2009- GE session 2). The Home Energy Monitor (HEM) will be installed as a complete energy usage tracking device; monitoring water usage and renewable as well (USEA, 2009- GE session 2). This energy manager will then use the Smart Grid technology to spark similar savings in common home appliances such as refrigerators, washer and dryers, range and microwave, and the dishwasher (USEA, 2009- GE session 2). The Smart

Grid will allow these high energy consuming products to function more efficiently. By introducing a sleep mode, a usage delay, and a quicker functioning time, these large appliances have the ability to save residents quite a bit of money (USEA, 2009- GE session 2).

Another important feature of the Smart Grid system is that it “creates reliable and instantaneous two-way communications between utilities, operators, consumers, and grid components” (Galing, 2009). This way if an outage occurs in the area of service, the electric provider will be able to instantaneously attend to the issue without continued delay and inconvenience for the customer. The utility knows where the break in service has occurred in real time and can respond accordingly. With this information utilities can reach out and contact affected customers immediately creating greater customer satisfaction to make matters even better. “The Smart Grid will be “self healing” in that it would automatically reroute electricity and reform itself to prevent further damage and catastrophic failure” (Galing, 2009). The digital connection with the utility will be very helpful for customers and utility companies alike. The Smart Grid can also act as a preventative measure for utility companies to utilize to prevent future electric problems within the grid. An electric company that has implemented Smart Grid technology can keep a constant eye on the grid and provide immediate response and quick recovery.

The Smart Grid will also introduce a demand optimization program. Through a demand optimization program, the Smart Grid gives the utility the ability to manage consumption during peak hours by effectively allocating the electricity in the grid accordingly. A quote from a GE presentation on the subject of the Smart Grid stated that “demand response is the 5th type of fuel” (USEA, 2009- GE session 2). Demand response is so important to the Smart Grid

infrastructure because it forces electricity companies to only distribute energy to its consumers on an as-needed basis. This way unnecessary energy seepage doesn't occur through appliances that aren't currently being utilized. This technology and ability will even be more important when consumers have electric vehicles that need to be recharged.

“The cost of fully deploying the Smart Grid will be well over the \$68 billion; the expected amount to be spent in the United States on Smart Grid enabling technologies between 2009 and 2014” (Galing, 2009). This initially high cost will, in fact, be much more economical than producing additional power plants, power lines, and other elements of the current structure grid system. Even though the costs may be initially high and consumers may have to pay part of the costs with slightly higher electric bills, the Smart Grid has the ability to save consumers money that at least balances out the increased cost. In this particular situation, the benefits to consumer, government, business, and environment, outweigh the significant upfront costs of installing the new Smart Grid technologies into homes and commercial entities.

The Smart Grid also has the flexibility to be paired with other energy saving mechanisms to make a residential area or business greener. Pairing the Smart Grid with smart thermostats, consumer interfaces, smart lighting, more efficient appliances, and smart meters will have positive repercussions for our environment and our economy (USEA, 2009- GE session 1). The Smart Grid also has the ability to more easily incorporate alternative renewable energy into the distribution system. By allowing renewable energy to flow through the new Smart Grid system, this paves the way for increased usage of wind and solar energy in the future.

Importance of the Smart Grid

The Smart Grid has positive repercussions for utility companies around the country.

“Deployment of the Smart Grid has begun to occur across the 3,000-plus electric utilities in the United States” (Galing, 2009). The over 3,000 utilities in the United States will benefit from the powerful and smart electric infrastructure. Many utilities are beginning to experiment and plan for the Smart Grid program. Since the Smart Grid is simply an add-on to the existing grid system, simple installation and coordination is all it would take to implement the innovative system. As the new infrastructure would require considerable amount of construction on the current grid system, the Smart Grid would provide additional jobs to those in the electric field. Job stimulation in this sector of our economy would boost our country’s economic standing, thus decreasing overall nation-wide unemployment (Budiardjo, 2010). The Smart Grid would have steep initial costs through installation and part production, but the eventual benefits would more than pay for themselves in a few years.

The Smart Grid has additional benefits that it can offer to participating energy providers. The Smart Grid technology will allow electric companies to directly communicate with end consumers. “Knowing how the grid is operating, and what could be expected to happen based on the current state of the grid, would allow operators to react to problems in near real-time, thereby helping preclude outages and other electric problems” (Galing, 2009). The constant communication will not only increase the safety and security of the grid itself, but it will shine a more positive light on utility companies for their quick responses to customer concerns. The Smart Grid has the ability to improve utility power reliability and operational productivity through its two-way communication program (USEA, 2009- GE session 3). The improvement in processes can eventually lead to developing a better reputation for utility companies in our country.

The new grid system has some added cost saving benefits to offer utility companies who implement the technologies into their power grids. “The Smart Grid will lead to a reduction in capital costs for utilities since fewer power plants and associated infrastructure will be required” (Galing, 2009). The new grids will also “reduce maintenance and inspection costs as the meters are, for the most part, self regulating” (USEA, 2009- GE session 3). After being released from their primary duty of performing home visits to directly address customer’s needs, energy workers will be able to fully complete their responsibilities of further research and development and grid monitoring in a more productive manner. This new reality will lead to high rates of productivity within each electric company and greater returns for less hours of labor. As the new grids will be more reliable and technologically advanced, there will be a significant decrease in loss of revenue during a blackout (USEA, 2009- GE session 3). As the customer and the utility company are in constant communication with one another, the problems can be resolved much quicker and easier than ever before (USEA, 2009- GE session 3).

The current grid system in our country is significantly outdated and in need of renovations. “Since the current grid is rapidly aging and many grid components are older than their expected lifetimes, outages and other reliability issues are occurring more often than in the past” (Galing, 2009). The current grid system needs to be technologically advanced enough to be prepared for the increasing energy demands that will be placed on the system in the near future. The innovative Smart Grid technology will be added to the existing grid and introduce technologically advanced elements through its more efficient infrastructure. “Since power would flow through a Smart Grid more efficiently with less line loss, the Smart Grid can partially offset the need for more power plants and additional transmission lines” (Galing, 2009).

The Smart Grid systems can have a positive impact on the economic landscape of our country. The Smart Grid has the ability to put more technically savvy Americans to work. Hundreds of utility companies within the United States will soon directly benefit from the implementation of the Smart Grid technology. Our economy would indirectly benefit from the increase in skilled labor jobs that will become available as the Smart Grid project begins. As new jobs are created to construct the new grid system, national unemployment rates will significantly decrease, the current job market will become less competitive and more accepting to all talent levels, and our national education system may even get an influx of new scholars wishing to acquire further schooling to participate in the Smart Grid project (metacafe.com).

The Smart Grid technology can positively affect and protect our environment. “By 2030, energy usage will be such that fossil fuels alone will be unable to meet this increased demand” (Galing, 2009). The Smart Grid technology has the ability to build more renewable types of resources to lessen the strain on electric grids (USEA, 2009- GE Session 1). The Smart Grid’s ability to increase energy efficiency in all areas of electric consumption will also produce positive repercussions to the environmental landscape (USEA, 2009- GE session 1). One such benefit to the environment is that the Smart Grid has the ability to eliminate green house gas emissions by utilizing the demand supply method (USEA, 2009- GE session 3). The demand supply process provides energy to users on an as-needed basis. This will prevent unnecessary release of energy during peak hours and instead reserve that would-be wasted energy for other more important uses (USEA, 2009- GE session 3). The Smart Grid also allows utility companies to better comply with green house gas legislation (USEA, 2009- GE session 3). The legislation to

protect the public health and welfare of our country will be adhered to as a result of the Smart Grid.

Wasted energy and large utility plants are a major producer of green house gases in the U.S (Chuang, 2008). Most electricity is produced by coal fired plants and although “clean coal” is an expression that is often used, there is currently no such thing as clean coal. Coal-producing electric plants are a major source of environmentally damaging CO2 emissions. Increasing demand for electricity will require increased usage of the coal plants. “The International Energy Association (IEA) estimates that the use of coal for electricity production will rise by about 50% by 2015 and almost double by 2030 from rates in 2005” (Galing, 2009). The need for additional construction of coal powered plants is definitely not slowing down. To combat the rising rate of coal usage in national power plants, implementation of the Smart Grid would instead offer a greener alternative for electric production.

The grid technology places a digitized electric system over the electric distribution of energy, making the power companies smarter and better able to deliver energy with less waste. It is estimated that approximately 290 thousand tons of CO2 emissions will be eliminated from our atmosphere per year after the Smart Grid system is implemented (USEA, 2009- GE session 1). If the Smart Grid implementation could make electric consumption 5% more efficient, over 42 GW of energy could potentially be saved (USEA, 2009- GE session 1). The 42 GW of saved energy would be equivalent to the energy output of over 42 large coal powered electric plants (USEA, 2009- GE session 1). By delaying further production of coal powered plants and saving massive amounts of energy every day, the Smart Grid promises a more environmentally friendly future in the United States and potentially around the globe.

Customer Benefits/Engagement

The Smart Grid not only offers significant benefits to our environmental landscape and economic system. The Smart Grid also has the potential to bring added benefits to individual consumers through the new and improved grids. However, Full customer acceptance of the new grid system is crucial to be able to reap all of the benefits that the Smart Grid has to offer. However, consumers must want to be involved rather than being forced into something they may not want or understand. If information regarding the Smart Grid is readily available to the end consumer through utility call centers, through utility websites, and through the media, customers will begin to gain knowledge about the technology in which they could soon become a part of. The Smart Grid will demand their attention and require them to make choices they have previously not had to make. Unless technologies and processes can be developed that require little consumer involvement and are easy to use, full development of the Smart Grid may not be possible. When overall consumer acceptance becomes strong, individuals will begin to monitor their energy usage more closely and start making smarter choices in the future with the help of the new grid.

The Smart Grid has the unique ability to allow individual customers to manage when and how they use their electricity in a given day (What Exactly Is A Smart Grid, 2009). By “enabling customer self-service,” individual users will be able to take a more proactive role in their daily energy usage and savings (USEA, 2009- GE session 3). “However, consumers must want to be involved rather than being forced into something they may not want or understand. Among other concerns, consumers will almost certainly demand that the Smart Grid be easy to use” (Galing, 2009). The Smart Grid has the ability to evoke consumer empowerment (USEA, 2009-

GE Session 1). Customers will soon be able to take responsibility for their electric consumption and savings all on their own. This, in turn, will give customers added autonomy in how they manage their electric usage from day to day. The Smart Grid will demand their attention and require them to make choices they have previously not had to make (Galing, 2009). But, “until all consumers become advocates for the Smart Grid, development will be delayed and may not be deployed in some areas” (Galing, 2009).

The Smart Grid technology has the ability to “reduce outage frequency and duration” and “reduce blackout probability” (USEA, 2009- GE session 3). The electrical blackout is the most prevalent problem that consumers report to their electric providers over the phone and online. On most automated menus for utility call centers, “reporting a blackout or power loss” is the first numbered option. With the Smart Grid’s ability to alleviate the constant stress of black outs throughout the grid system, this gives the utility associates more time to concentrate on making the grid function at a high level of efficiency and quality.

The Smart Grid has the amazing ability to “Improve power quality” (USEA, 2009- GE session 3). Through its sophisticated monitoring and distributing technology, customers will no longer be disappointed with their service. Customers expect to have their appliances and home electronics work when they turn them on each time. The ability for utilities to meet these needs and expectations are typically questioned each time a customer faces a blackout or brown out. With the Smart Grid systems in place, customer uncertainty levels will most certainly decrease and more credibility will be given to the utility companies in this country.

Meters will have the ability to replace customer calls to the utility company call centers when reporting an electric outage (USEA, 2009- GE session 3). This will save the customer the

time and energy of waiting for many minutes on hold as their lives are stalled when they are left in the dark. The meters also have positive repercussions for the utility company by potentially eliminating portions of the call center workforce and cutting overall costs. The smart meters encourage the digital communication between the end consumer and the utility company at all times. Because the two parties are constantly aware of changes and alterations to the grid system, this lessens the need to obtain additional information through the utility call center.

36% of the whole population of homeowners is segmented in the savers category. Initial installation costs are important to this customer as well as net monthly savings. The customer in this group can be categorized into basic, comfort, and convenience savers. Their homes are older and their average monthly electric bill is typically over \$75. They are able to be flexible in their appliance spending and replacement to save an extra buck on their overall electric bill (USEA, 2009- GE session 2). "I would run a washer and dryer at off-peak times. If you could save more by running things at different times, why not?" says an energy user from the saver customer segment (USEA, 2009- GE session 2). This "saver" customer would be the perfect target market for the Smart Grid technology.

The addition of the Smart Grid into the residential electricity system would save consumers over \$42 million per year in electric bill savings (USEA, 2009- GE session 1). Those that participate in the Smart Meter savings programs will have the ability to save almost 10% on each additional electric bill (USEA, 2009- GE session 1). "As consumers become more aware of the need to use electric power more wisely, and as a result of paying more for the electricity they use, consumers will demand some form of rate relief. This can be accomplished by

allowing consumers to use electricity when it less expensive. The Smart Grid can accommodate this need and also usher in real-time electric pricing. When real-time electric pricing becomes more common, consumers will need to use the capabilities of the Smart Grid to reduce their electric bills and, as a consequence, modify their usage behavior” (Galing, 2009).

Current Smart Grid Industry

“The market for Smart Grid enabling technologies in the United States is currently about \$6.4 billion. This market is expected to grow at 20.8% compound annual growth rate through 2014, when it will be about \$16.5 billion” (Galing, 2009). The Smart Grid market is increasing in popularity of late because of many alarming trends that are currently showing up in the energy industry today. The push towards greener energy, the drastically increasing electricity prices, and the emergence of new technologies makes the current electric grid system ready for adjustment (USEA, 2009- GE session 3). The world electric supply itself is in a challenging situation. World energy consumption is expected to triple by 2050 as the availability of fossil fuels is quickly dwindling (USEA, 2009- GE session 3). This analysis suggests that there may come a time when demand for energy around the world will exceed the supply.

The need for the Smart Grid is becoming more and more apparent with the prevalence of new environmental policy and the rising prices of alternative forms of energy. Recently popular environmental programs like CAIR (Clean Air Interstate Rule), implemented in 2005, will proactively reduce air pollution beginning with emissions from vehicles (U.S. Environmental Protection Agency, 2010). “In 2015, CAIR will provide health and environmental benefits valued at more than 25 times the cost of compliance with the program” (U.S. Environmental Protection Agency, 2010). Fuel prices have recently been climbing to unaffordable levels for

some consumers. The recent trend towards going green and energy conservation has paved the way for the Smart Grid technology to take hold in the electric utility world.

The bulk of the financial assets dedicated to the Smart Grid market will go towards smart sensors and devices which need to be placed throughout the grid in consumer homes and office buildings (Galing, 2009). The ability for utility companies to allocate most of their resources to the smart meters makes this Smart Grid project one that will produce quick and measurable positive results. The smart meters are the portion of the new grid systems that will make the most impact on the current grid and on current end consumers.

Abundant amounts of power outages around the country translate into huge losses for utility companies, almost \$100 billion a year (USEA, 2009- GE session 3). Through the two-way communication facilitated by the Smart Grid technologies utility companies will be able to anticipate future problems with the grid system before chaos strikes. For instance, if a brown out was about to occur in a particular area of service, additional energy would be automatically rerouted through the monitoring of in-home smart meters from the utility company to completely prevent loss of electric service. The Smart Grid has the potential to completely eliminate the occurrence of black-outs and brown outs in the future. This not only eliminates the potential hassle of loss of service for customers, but allows utility companies to focus their efforts instead on continuing to make the grid system more efficient and reliable in the future.

Hypothesis

There are a number of benefits that will accrue to utilities when they implement Smart Grid technology (e.g. more reliable energy distribution, less expensive energy experiences, and better more reliable information about their systems). The largest impact of the Smart Grid will

be when the customer fully engages in the technology and is able to save 5-10% of home energy use. This will lower demands on the system, lower or stabilize bills, and let customers contribute to a greener world. When consumers have a smart meter and their access to information that will allow them to make decisions affecting the energy use in the home, they will save money and contribute to a less polluted world. These decisions are estimated to allow energy savings of \$46-117 billion over the next 20 years (The Electricity Advisory Committee, 2008). However, these savings depend on the willingness and engagement of customers.

While utilities understand the technology that makes the Smart Grid smart they do not seem to have fully considered the consumer part of the Smart Grid. Who will teach the consumer what the Smart Grid is and what they (the consumer) need to do to get the most of the Smart Grid technology. Consumers do not appear to know or understand the consumer part of this equation (Feinberg, 2009). This suggests that the consumer will turn to their most frequent point of contact with the utility for answers to questions. This point of contact is the call center (Anton, 2009). If the call center (the 1-800 number centers that companies have for consumers to call if they have questions or problems) is not prepared to answer consumer questions consumers will become frustrated and less likely to engage with the Smart Grid technology. This could lead to Smart Grid projects that fail. It would be somewhat ironic if after spending billions of dollars to help the consumer the consumer refuses to engage as the utility wants them to not because the technology does not work but because the utility was not prepared to answer their questions and teach them what to do.

I predict that although utilities know what the Smart Grid is only a minority of utility companies will have systematically prepared their call centers to answer consumer questions.

Utility call centers will not be prepared to answer customer questions and concerns about the new grid. Some utility call centers will not know what the Smart Grid is or will simply not be able to elaborate on its benefits to customers. I foresee many electric company utility companies sending me through multiple transfers over the phone before I am able to speak with someone who is versed on the subject matter. In an ideal situation, utility company call centers should be instantly familiar with the Smart Grid technology and be able to explain the system in detail, or transfer me to a different department representative that can.

One way that utilities will be able to help consumers be more knowledgeable about Smart Grid technology is by being available through their call centers to address pertinent concerns. Utilities need to be ready and able to face their consumers on all things Smart Grid. Using the call center as a strategic opportunity, utilities need to take on the challenge of engaging and building lasting relationships with their consumers so that together, electric company and energy users can conserve as a team. My research will assess if utilities are prepared to handle the onset of this technology and consumer concerns. The data from this research may make utilities more aware of the need for consumer education and the role that their call centers might play in that education.

METHODOLOGY

I contacted the call centers of 100 electric companies (using a database from Utilipoint; a prominent utility consulting company) from around the country at various stages of planning and deployment of Smart Grid technology to detect their readiness to answer common Smart Grid questions. The Utilities surveyed are listed in Table 1. All of these companies, in theory, should be well versed on the topic of the Smart Grid and prepared for all related questions. For

each utility, I will dial the general 800/866 contact center telephone number that is available from the utility web page. The following 6 questions were developed to not waste customer service representative time yet get a quantitative record of the call centers readiness to address consumer questions about the Smart Grid:

1. Is your company doing anything to implement Smart Grid technology?
2. Do you have information available about the Smart Grid?
3. Do your customers have smart meters?
4. Does your company have a smart meter program where consumers will get smart meters?
5. Do you have information about smart meters? How can I get this information?
6. Does your company have a corporate green/conservation philosophy? Where can I get that?

The survey questions will assess utility company call center's knowledge of the Smart Grid technology itself, their knowledge of programs offering smart meters to consumers within their area of coverage, the availability of other similar types of energy saving programs through the company, and the questions will provide an overall assessment of the quality and efficiency of the call as a whole. The call may be altered slightly if additional questions are asked of me by the customer service representative during the course of the call. On the questionnaire I will record the responses for each question along with quotable comments and insightful information about the technology.

The CSR (customer service representative) at the beginning of the call will be told that I am moving to their area of coverage in the near future and that I have a few questions

concerning the services that may be offered to me through Company X. I will then proceed to tell them I have recently been introduced to the Smart Grid technology and was curious if Company X provided the service to residential customers at the beginning of each call. This way I will provide a reasonable rationale as to why I am contacting the electric provider when I am not currently a customer and do not live in the covered area.

The data collected will be analyzed in light of what we know about the state of the utility in implementing a Smart Grid program for consumers. I will combine all results in a spreadsheet and calculate individual results for each question. It is expected that utilities that have a more advanced Smart Grid program will be more ready to answer consumer questions and have information to provide them.

RESULTS

1. Is your company doing anything to implement Smart Grid technology?

Forty-six percent of companies are currently making plans to implement Smart Grid technology now or in the near future. Many of the tested utility companies were in the infancy stages of Smart Grid technology implementation. A majority of the utility companies predicted a 2011-2012 completion date for the installation of in-home smart meters and the implementation of the Smart Grid technology into the current grid system. About 11% of the utility companies reported from their call centers that they weren't familiar with the Smart Grid technologies and asked for further clarification from me as to what it was. All of the utilities contacted have Smart grid projects.

Some of the utility companies that had plans to implement elements of Smart Grid technology utilized automated meter readers (AMI). Automated meter readers are a type of

technology that “automatically collects consumption, diagnostic, and status data from water meter or energy metering devices (water, gas, electric) and transfers that data to a central database for billing, troubleshooting, and analyzing” (Automatic Meter Reading, 2010). The AMI readers allow remote monitoring of electricity use eliminating the need for at home readings from utility workers. “Another advantage is billing can be based on near real time consumption rather than on estimates based on previous or predicted consumption. This timely information coupled with analysis, can help both utility providers and customers better control the use and production of electric energy, gas usage, or water consumption” (Automatic Meter Reading, 2010). The AMI readers aren’t the exact same as the smart meters, but they still utilize the Smart Grid two-way communication technologies.

A minority of companies claimed that they were aware of the Smart Grid technology but were afraid to implement it as it would eliminate jobs within the company. They feared that the technological advancements provided by the Smart Grid would lessen the need for actual employees completing the tasks. Those companies that accepted the Smart Grid technology were funded by various sources. Many companies within the 100 utilities were funded by federal grants to reform the current grid system with the Smart Grid and install smart meters in the homes of their customers. The acceptance of these federal grants put into place a timeline for many of the utility company’s implementation process. Some companies that were initially hesitant about rolling out an area wide Smart Grid operation began with a trial pilot program. These programs allowed a select group of customers in a small area of coverage to receive meters in their homes to test the effectiveness and usability of the Smart Grid technologies.

A few companies that were utilizing the Smart Grid technologies customized their programs and developed a unique name. The PeakSmartPlus program was implemented at the Public Service of New Hampshire utility company and utilized many techniques of the Smart Grid. Many companies offered real time pricing programs that read hourly rates on customer's meters and allow them to save energy on their monthly bills. Time of Use programs were implemented by a few companies that offered end consumers to utilize energy at off peak hours to save money. Power Cost Meters are meters that are purchased at Home Depot or Lowes and utilized with the Smart Grid technology at many utility companies. Peak Saver Thermostats were also installed in many areas around the country and they mimicked the technologies of the smart meter.

2. Do you have information available about the Smart Grid?

Thirty four percent of call centers provided me with additional information about the Smart Grid. Many of the tested companies provided me with additional information about the Smart Grid that was accurate and informative. The availability of extra information about the new grid system demonstrated the preparedness of call center associates to answer questions from consumers. Many of the companies that didn't provide extra information about the Smart Grid ended up transferring me (sometimes multiple times) with no able to give me more information.

3. Do you have information about smart meters? How can I get this information?

Forty one percent of call centers reported having programs where customers would receive smart meters now or in the near future. The majority of the companies that explained future smart meter programs had different names and some unique added functions for their

operations. In many cases call center representatives indicated that AMI readers were synonymous with the smart meter capabilities.

4. Does your company have a smart meter program where consumers will get smart meters?

Thirty Nine percent of utilities reported that they have smart meters available to consumers now or will in the future.

5. Do you have information about smart meters? How can I get this information?

Thirty two percent of call centers gave me more information about smart meters. Twenty six percent of the utility companies gave me further information about the smart meters without transferring me to a different associate or department. The information that was given without the transfer was much more helpful, clear, and concise than information gathered after transfer.

6. Does your company have a corporate green/conservation philosophy? Where can I get that?

Ninety percent of call center utilities report having a corporate/green philosophy that guides the business decisions of the company.

Conclusions and Implications

Call centers need to be ready to provide information and educations about the Smart Grid and smart meter to consumers. That there were 34% of utility call centers that were prepared to answer further questions about the Smart Grid and the 32% of call centers that provided additional information about the smart meter is on one hand encouraging (it could have been worse). Yet given that the 100 utilities contacted all had Smart Grid projects, the results are not very encouraging and prove that utility call centers are not ready to address

pertinent customer concerns when it comes to the Smart Grid technology. There is a significant opportunity for utility call centers to be more knowledgeable about the Smart Grid technologies and the potential benefits it can offer to energy consumers.

The following phrases illustrate the main comments from customer service representatives at many utility call centers that show a lack of preparation for customer concerns about the Smart Grid technology:

- “I don’t know what that is, can you explain that to me” – concerning the Smart Grid technology and smart meters
- “We have nothing like that technology”
- “We only have traditional digital meters that are read at the end of each day”
- “We are thinking about implementing the technology in the near future, but there is a possibility of taking away existing jobs if we implement the Smart Grid now”
- “You would need to contact the public relations or human resources department to address those issues” – concerning the conservation philosophy of the utility company
- “Why are you requesting this information?”
- “No one knows where to send you, what is the Smart Grid” – after transferred multiple times to departments that were unaware of what I was talking about

The utility call center is the first touch point between the end consumer and the electric company. If the customer service representative creates a pleasurable and helpful experience for the customer over the phone, this interaction will reflect well on the company. When electric company call centers are more prepared for consumer questions on the Smart Grid, customer acceptance of the technology will increase. Increased customer acceptance of the

Smart Grid technologies will allow the system to be used to its full potential as multiple benefits will be reaped through at-home smart meters.

Although call centers are not yet ready to discuss the Smart Grid with consumers they are ready to discuss how their utility is addressing “green” issues. This is clearly in line with the cultural change that has occurred in the past 5 years and is really the underlying foundation for Smart Grid projects. In the past, consumers typically have thought that utility companies are not positive icons of environmental responsibility. The findings of my research show that utility are becoming environmental. This suggests that future decisions will not be solely based on their bottom line but may support and encourage changes in consumer attitudes and behaviors. Ninety percent of the utility call centers contacted reported their companies have implemented a great amount of green and conservation policies and programs. Utility companies are making more gestures to conduct business that is safe for the environment. This is good news for the utility industry and will lead to a greener and more efficient future for both the electric grid system and for our environment. The green/conservation philosophy maintained by many utility companies will lead to a reduction in coal powered plants that drastically pollute our environment and lead to massive amounts of money spent in construction costs to produce additional infrastructures.

There were many different types of programs that the tested utility company call centers were currently offering to end consumers. Many of the programs were quite impressive and innovating which gave me confidence in the environmental consciousness of our country’s utility companies. One of the main conservation programs that was offered by many of the tested utilities was the ability for end consumers to pay an extra fee to purchase blocks of

renewable energy or customers were provided the option to donate a portion of their energy bill to renewable sources. A few companies offered classes on energy conservation and going green to customers in main area of coverage. There were many programs that provide cash back options if customers take advantage of renewable resources along with the usage of the grid. With the new grids ability to also utilize renewable energy such as wind and solar, it was easy for customers to take advantage of this program.

Many companies offered a paperless e-bill option instead of traditional mailings. Sometimes certain companies even allowed more time to pay the bill if customers took advantage of this option. Many utility call center representatives referred me to their company's website to participate in online energy audits and to learn more energy saver and go green tips to save money and our environment. A few companies offered Cash for Trash programs that offered monetary incentives to recycle old electronics and purchase new Energy Star appliances instead. A few companies had a similar rebate program set up to allow customers to changing old, inefficient, light bulbs to florescent. One final program that a few energy companies offered was a Time Advantage Plan where customers save energy when they use electricity at off peak times 7pm to 12 noon during the week. Overall, there was a great availability of corporate green and conservation information on websites of a majority of the companies claiming that they had a "go green" attitude.

Best Practices

Experiencing the call centers of all 100 utility companies with differing levels of readiness to address Smart Grid issues allows me to suggest a list of best practices. Whether these are really best practices remains to be tested.

These best practices can potentially be useful to utility call centers to allow them to be as prepared as possible for possible Smart Grid questions.

A summary of the best practice techniques are as follows:

- Provide detailed information about the Smart Grid without transfer or hold.
- Construct a Smart Grid tab on the utility company website.
- Add an additional Smart Grid information option on automated call center menus.
- Provide customers with a separate hotline for Smart Grid questions and concerns.
- Fully implement the smart meter in customer homes.
- Provide friendly customer service representatives.
- Allow utility call center callers to dial zero immediately to speak with a live representative.

The utility companies that gave very detailed information about the Smart Grid technology over the phone without multiple transfers were also noted as best practice. Utility customer service representatives with readily available information made the call center a one stop shop for all that I wanted to know concerning the Smart Grid. It was beneficial for me as a researcher to hear what utility companies believe the new grid is and what it can offer to its current customers. If the customer is quickly briefed on the technology and learns to understand and accept it, then the Smart Grid systems will be better utilized for all of their unique benefits.

A few utilities had a separate Smart Grid or smart meter tab on the homepage of their company website. I viewed this as a best practice indicator because the presence of the Smart Grid on the website of the utility highlighted how important the technology was to the company. The Smart Grid tab was referred to me by a few customer service representatives at the utility call centers to provide me with further information on the technology. Many companies that didn't know much about the technology referred me to the website to answer my questions. Having a Smart Grid tab readily available to customers on the homepage of a utility company's website will lead to quicker information gathering by those that are seeking. Its presence will also spark interest in customers to take a look if they are initially unfamiliar with the new grid.

Some best practice utility companies transferred me to the Smart Grid customer service department to address all of my questions. These same companies were instantly aware of the specialized department and transferred me right away. As long as the transfer was quick and to the correct department the first time, this option was very helpful. The well versed customer service representatives were very knowledgeable about all things Smart Grid. Speaking with the Smart Grid department allowed me to engage in conversation for a short period of time while still getting all of my questions answered.

Another best practice element of my research was when utility companies offered a separate number to contact for the Smart Grid technology program. Some utility company call center representatives provided me with a separate number that would deal with my Smart Grid questions. Although this was an added step to my information gathering call, the fewer number of automated options and friendliness of the Smart Grid savvy employees made it

worthwhile. I was also able get a better sense of what stage these companies were in when it came to Smart Grid implementation.

A select few of the 100 utility call centers currently reported having full installation of smart meters for all customers. The few companies that currently had smart meters available to customers were able to more clearly convey the consumer benefits of the technology. Full implementation of the smart meters within residential homes caused the utility call center customer service representatives to be versed on the smart meter and Smart Grid technology in general. Customer service representatives at smart meter ready utility companies had specific statistics about the acceptance of the technology and the existing environmental and customer benefits the meters are offering end energy consumers.

Another best practice criterion was the existence of friendly, helpful customer service employees during my call to each utility call center. Although overly helpful customer service representatives were rare, it was refreshing when utility call centers provided me with friendly service. My call center experience was so much more enjoyable when the representative called me by name and fully addressed my questions in a professional and polite manner. Those call center representatives with added enthusiasm were noticed and appreciated. There were a few companies where the customer service representative got excited and energized in his/her voice when they started speaking about the Smart Grid. It is contagious when a company's front line representatives are so passionate about a product with the end consumer.

The final best practice strategy was when utility call centers offered a short automated menu where the caller would be able to dial "0" to get a live representative right away. Allowed me to speak with a real person faster and ask specific questions. If I wasn't obtaining research

through the calls I made to the 100 utility call centers I would have hung up after the long wait and hassle that some companies caused by forcing me to wait through tons of menu options.

The Smart Grid is an important update to the current grid system that combines electrical engineering and utility management techniques to develop a two-way communication system between consumer and utility company. The Smart Grid is important for saving electricity. By utilizing the Smart Grid technology, electric companies will be able to anticipate exactly when their customer base will need the energy instead of having a steady flow sent through the currents at all times. By anticipating energy use of customers, utility companies will be able to provide a more efficient, cleaner type of energy in the future.

The energy provided through the new grid will be of higher quality and more reliable than in the past because of its ability to redirect energy towards areas about to experience a black or brown out before they are affected. The great amount of end consumer benefits offered to the customer through the Smart Grid brings holds the end user accountable for continuing to save and conserve energy in the future. Pairing the unique abilities of the Smart Grid and full consumer acceptance and engagement will allow the United States and potentially the whole globe to utilize energy in a cleaner, more efficient way in the future. The call center is a strategic tool that utilities will have to use to accomplish this and they are not yet ready.

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Table 1: 100 Tested Utility Companies

Utility
Allegheny Energy
Alliant Energy
Ameren Corp.
American Electric Power (AEP)
Anaheim Utilities
Arizona Public Service
Austin Energy
Avista Corp
Baltimore Gas & Electric
Black Hills Corporation
Centerpoint Energy
Central Hudson Gas & Electric
Central Illinois Light Co.
Central Maine Power
Central Vermont Public Service Corp
Chattanooga Electric Power Board
City of Mesa
City of Tallahassee, FL
Clay Electric Coop
Cleco Power
Cobb Energy Management Corp./Cobb EMC
Colorado Springs Utilities
Commonwealth Edison
Consolidated Edison
Consumers Energy

CPS Energy
Crescent EMC (Energy United Electric Membership Corporation)
Dayton Power & Light
Detroit Edison
Dominion Virginia Power
Duke Energy
Duquesne Light
E.ON U.S.
El Paso Electric
Empire District Electric Company
Energy East
Energy Futures Holdings Corp.
Entergy Corp.
FirstEnergy Corp.
Florida Power & Light
Hawaiian Electric Co.
Idaho Power Co.
Indianapolis Power & Light
IntegrYS Energy
Jackson Electric Membership Corp
JEA (Jacksonville Electric Authority)
Kansas City Power & Light
Knoxville Utilities Board
Lee County Electric Coop Inc
Long Island Power Authority
Los Angeles Department of Water & Power
Madison Gas & Electric Company
Memphis Light, Gas, and Water

MidAmerican Energy Co.
Middle Tennessee Electric Membership Corp
Montana-Dakota Utilities Company
Nashville Electric Service
National Grid
New York State Electric & Gas
Niagara Mohawk Power Corporation
NIPSCO (Northern Indiana Public Service Company)
Northeast Utilities
Northwestern Energy (formerly Montana Power Co.)
NSTAR Electric & Gas
NV Energy
Oklahoma Gas & Electric (OG&E Electric Services Inc)
Omaha Public Power District
Orange and Rockland
Orlando Utilities Commission
Pacific Gas & Electric
PacifiCorp
Pennsylvania Power Company
Pepco Holdings, Inc.
PNM
Portland General Electric
PPL Corp.
Progress Energy
Public Service Electric & Gas Company
Public Service of New Hampshire

Puget Sound Energy
Sacramento (Calif.) Municipal Utility District
Salt River Project
San Diego Gas & Electric
SCANA
Seattle City Light
Snohomish County Public Utility District
Southern California Edison
Southern California Water Company
Southern Company
Sumter Electric Coop Inc
Tacoma Public Utilities
Tampa Electric Co. (TECO)
Tucson Electric Power
UGI Corp.
United Illuminating
Vectren Corp.
We Energies
Westar Energy
Withlacoochee River Electric Coop Inc
Xcel Energy