Smart Meters are an important component of ComEd's ongoing effort to modernize the electric system and provide better service. The company has already installed 1.5 million across its region. The purpose of these smart meters is to provide consumers with more information about their electricity usage.

Smart Meters: The Future of Power

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Abstract

Smart Meters are an important component of ComEd's ongoing effort to modernize the electric system and provide better service. The company has already installed 1.5 million across its designated region. The purpose of these smart meters is to provide consumers with more information about their electricity usage. The online energy-management tools aid in the ease of accessibility. Consumers can also register to receive alerts via phone or email when their usage is higher than usual. Consumers are also encouraged to register to receive weekly summaries of daily usage via email. This will allow consumers to make adjustments that could help save energy as well as lower their electric bills. Unfortunately, some consumers tend to think that smart meters, like most advancing technologies, are unnecessary and an invasion of privacy. This is due to how smart meters operate. Smart meters are designed to automatically send readings to ComEd. This helps diminish estimated bills and prevents a meter reader from having to travel to the consumers' home. Smart meters can also provide better utility operations. This is safer and more economically efficient; workers will be able to respond more expeditiously to outage restoration. Although much about this new technology is known by ComEd, little is known by the general public. Thus, I intend to shed light on this new technology that, in reality, is the future of power.

Keywords: ComEd, Electric, Meter

Introduction

"Smart meters are digital electric meters that securely send electricity-usage information to ComEd." (What is a smart meter, 2016). They are an important component of ComEd's ongoing effort to modernize the electric system and provide better service. "ComEd plans to install approximately 4 million smart meters in all homes and businesses across its northern Illinois service territory by the end of 2018." And has already installed 1.5 million (What is a smart meter, 2016). Their purpose is to provide consumers with more accessible information about their electricity usage. ComEd's online energy-management tools can assist in the ease of accessibility. Consumers also have the option to register for alerts, sent to their cellular phone or e-mail address, when their usage is higher than usual. These features will allow consumers to make adjustments for energy preservation and lower their electric bills.

Unfortunately, some consumers tend to think that smart meters, like most advancing technologies, are unnecessary and an invasion of privacy. This is due to how smart meters operate. Smart meters are designed to automatically send readings to ComEd. This helps diminish estimated bills and prevents a meter reader from having to travel to the consumers' home. Smart meters can also provide better utility operations. This includes "detection of meter tampering and the ability to expedite the transfer of electrical service" if a consumer moves to another location in ComEd service territory. (What is a smart meter, 2016). This, in turn, aids in the reduction of operating costs and electric bills. "When the smart grid is complete, smart meters can notify ComEd when an outage occurs and when power is restored." (What is a smart meter, 2016). Employees will be able to respond more expeditiously to outage restoration. Much about this new technology is known by ComEd, but little is known by the general public. The

Midwestern U.S. population could benefit from knowledge about this new technology because, in reality, smart meters are the future of power.

The following questions will guide the presented research on the new technology of smart meters and allow a platform to prove that they are, indeed, the future of power. First, there will be a detailed report of what exactly a smart meter is and where the idea of the smart meter originated. Next, data, and an analysis of that data, will be presented to show when it is likely that smart meters will become a commonly used technology - as opposed to an exciting new idea. Lastly, the research will feature graphical evidence explain how smart meters are the future of power based on the projected success of the smart meter installment and customer satisfaction. The sources of study will include information and documents published by ComEd, testimonials from users of the smart meter, and any other data relevant to research on smart meters.

Smart Meters

Moreover, smart meters are an important component of ComEd's ongoing effort to modernize the electric system and provide better service to its consumers. It is true that smart meters are designed to automatically send readings to ComEd. However, this is only to benefit the consumer and the environment. The goal and expectation of smart meters is to provide consumers with more readily available information about their electricity usage.

What is this new technology?

"A smart meter is a digital, electric meter that collects energy-usage information and securely sends it to ComEd." (Recognize the impact of the price, reliability & location, 2016). Its goal is to reduce estimated bills. According to ComEd, it is an important component of the future

smart grid. These meters will allow consumers to track how much energy they are using and give them a chance to implement changes, ultimately helping them save money. The term 'smart grid' is often mentioned when learning about smart meters. Similar to smart phone technology being the product of merged computers and cellular phones, smart grid technology combines computer power with the foundation of the electric grid. This grid is the framework that provides electricity. It consists of poles, wires and substations.

The reason ComEd is upgrading to the electric grid is because technology has completely altered how we function in this age. (Recognize the impact of our price, reliability & location, 2016). Little miscalculations are a thing of the past. Technologically constructed algorithms make results precise every time. The smart grid will produce fewer, shorter outages since ComEd will be able to better monitor this new grid. Also, response to problems and interruptions will be faster. These improvements are called operational efficiencies. This means that they cause costs to lower for everyone – manufacturer to consumer. Other benefits include secure access to more information about a consumer's electricity usage, smarter energy preservation, and access to elective pricing programs.

During the installation process, a smart meter is installed in place of the older meter [Figure 3]. The cost for a ComEd customer to receive all of the latest improvements is only $3 per month (Recognize the impact of the price, reliability & location, 2016). That's only $36.00 a year, which is more than some people spend in a day, especially in big cities. Moreover, customers may find that the online energy-management features are not only easier to access, but easier to understand [Figure 2]. This new idea takes outdated routines and securely alters them into a device that the upcoming generations can easily use and understand. Its cryptographic

technology was once limited to international banks and the U.S. Department of Defense in order to block hackers. Now, ComEd uses it, encrypting any customer-related data that is transmitted.

When will it become the norm?

Throughout the years, information technologies - cellular devices, ATMs, WiFi - have greatly improved the way that we live and function. Now, however, they are beginning to be geared toward developing a smart grid that is suitable for the economy of the 21st century. Although individuals may have their reservations, smart meters do not use any sort of surveillance or invade one's privacy (ComEd grid modernization, 2016). The modernization of the current electric system only includes "replacing the standard analog meters… with new digital meters" (ComEd grid modernization, 2016). The only instruments that make the meters smart are the identifiers. This does not mean that a meter can identify a specific person and collect their personal information. The only functions of a smart meter include Electronic transmissions to ComEd that makes visits from meter readers unnecessary and monitoring service voltage in order to ensure sufficient service. Any data received is encrypted prior to transfer over a secure network, and is mostly just numbers (ComEd grid modernization, 2016).

"ComEd is modernizing its electric infrastructure to provide customers with a stronger, more reliable electric system. ComEd also plans to introduce new, state-of-the-art technologies to create a smart grid that supports the 21st century economy." (Learn more about system improvements, 2016). With ComEd making these changes, it is only a matter of time before what they implement truly becomes the norm. There will soon come a time when smart meters and their technology will not be a foreign concept but an expected one. Their goal is to benefit everyone from the ground up. ComEd wants to protect the electric system and also customer-

related energy-usage data. That is why this new technology is not just an interesting idea with no follow-through. These new implementations solve many internal issues an make the process of receiving reliable power much more efficient. Moreover, the most recent security features are beyond the customers' concerns. Security at the highest level is evaluated, required for all project areas, and built into the company's framework. Customer data is always encrypted and only available to authorized personnel. Also, the authorized personnel must complete a multifaceted authentication process before they can access secured data sources. This ensures that the privacy of customer data is constantly maintained.

The same way it is normal for people to use an ATM or deposit a check online, it will be normal for people to have smart meters. The same precautions taken with previously introduced technologies are still taken; they are also improved since we are ever-evolving. The company has been among the best and most reliable for decades. That is not going to change; their reputation is on the line. ComEd requires information systems to be tested regularly to prevent hackers, identify potential weaknesses, and also ensure that the uppermost standards of cybersecurity remain upheld. "The confidence of the customers is what has enabled ComEd to serve northern Illinois for more than a century." (Learn more about system improvements, 2016). Being interviewed by two managers within the company, and seeing the facilities, it is clear that ComEd is a highly regarded and reliable company. Customer satisfaction is very high on their list of priorities.

How is it the future of power?

Everyone loves efficiency. At one point the microwave was a new technology and now it is hard to imagine life without one, especially for younger generations. Smart meters are vital to

implementing the smart grid and moving forward in technological advancement. Some customers, however, are concerned about "potential health risks associated with smart meters, including the effects of radio frequencies (RF) emitted from these meters." (Frequently asked questions, 2016). Radio frequency is "the energy associated with electromagnetic waves." (Frequently asked questions, 2016). All wireless technology produces these emissions, so it is difficult and nearly pointless to try to escape or minimize exposure to them.

Although smart meters have radio technology, one would get more RF exposure from a cell phone than a smart meter. Even cordless phones, microwave ovens, and baby monitors emit more RF than smart meters. Various studies have been conducted to find a correlation between RF and human health. Unsurprisingly, there is no evidence to support the claim that a smart meter's RF emissions are the cause of any health risk [Figure 1]. Moreover, smart meters fully comply with the Federal Communications Commission (FCC) regulations on health and safety. Actually, the FCC permits the emission RF signals much higher than what the smart meter emits.

It is well understood by ComEd and others aware of the process of technological advancement that smart meters are the future. They "will eventually replace standard meters that most customers have today" (Frequently asked questions, 2016). One new interesting technology that these smart meters contain is the low-power radio:

> One low-power radio transmits electricity-use information back to the utility for billing purposes; the same job that meter readers now perform. Transmissions are intermittent, which means this low-power radio does not continuously broadcast all day long. The other low-power radio allows energy-usage data to be sent to an in-home device, such as an energy display or a "smart thermostat" that the

> customer would elect to purchase and install within their home. This radio is neither turned on nor used unless the customer requests that the smart meter be connected to one of these in-home devices. (Frequently asked questions, 2016).

Due to the proximity of other devices within the home, exposure to the emissions of a smart meter should be the least of one's concerns.

"The safety of ComEd's electric infrastructure for its customers and employees is the top priority for ComEd." (Frequently asked questions, 2016). In this regard, "ComEd plans to install smart meters in all homes and businesses across its northern Illinois service territory by the end of 2018." (ComEd's smart grid initiative reference card, 2016). The way consumers can tell if they have a smart meter is by checking the "Meter Information" box atop their bill. If the meter number is nine digits in length and starts with a 2, it is a smart meter. Also, analog meters will have moving dials while a smart meter features a "Silver Spring Networks" sticker. However, before a smart meter is installed consumers will receive notification from ComEd with specific installation details. The installation is free and only takes approximately 10 minutes. Brief interruptions in the electric service should be expected and is not cause for concern. Furthermore, the implementation of smart meters will aid in Illinois preparation for accommodating the evolving energy and economic demands. (ComEd's smart grid initiative reference card, 2016).

Conclusion

Smart meters are an essential component of ComEd's modernization plan. The company aims to install 4 million across northern Illinois, its service territory, before 2019. (What is a smart meter, 2016). ComEd has installed 1.5 million already. Their purpose is to provide consumers with more information about their electricity usage. The online energy-management

tools aid in the ease of accessibility. Consumers can also sign-up to receive alerts when their usage is higher than usual. This allows consumers to make adjustments that could help save energy as well as lower their electric bills.

Unfortunately, rumor has it that smart meters are unnecessary and invade users' privacy. However, even though the smart meter is designed to automatically send readings to ComEd, it is not a spy or a device that can be used for spying. Smart meters can help diminish estimated bills and prevent a reader from having to travel to the consumer's home. Smart meters can also provide better utility operations. This includes the detection of tampering and the capability of expediting electrical service transfers. (What is a smart meter, 2016). This implementation also aids in the reduction of operating costs. "When the smart grid is complete, smart meters can notify ComEd when an outage occurs and when power is restored." (What is a smart meter, 2016). This is safer and more economically efficient because workers can respond quicker to outage restoration.

Furthermore, smart meters will allow consumers to track how much energy they are using. Smart meters will also give consumers a chance to implement changes; which will ultimately help them save money. Smart grid technology combines computer power with the foundation of the electric grid. The reason ComEd is upgrading to this smart grid is because technology has completely altered how we function (Recognize the impact of our price, reliability & location, 2016). The newly implemented, technologically constructed algorithms make results precise every time.

These operational efficiencies cause costs to lower for everyone – manufacturer to consumer. During the installation process, a smart meter is installed in place of the older meter. The cost for a ComEd customer to receive all of the latest improvements is only $3 per month (Recognize the impact of our price, reliability & location, 2016). This new idea takes outdated routines and securely alters them into a device that the upcoming generations can easily use and understand [Figure 4]. Its cryptographic technology was once exclusive to international banks and the U.S. Department of Defense in order to block hackers. Now, ComEd uses it, encrypting any customer-related data that is transmitted.

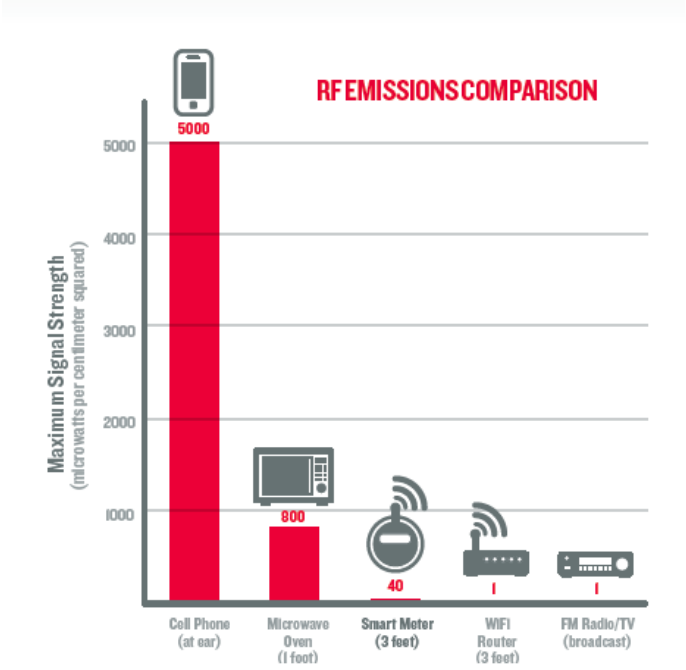
Throughout the years, information technologies greatly improved the way that we live and function. Now they are beginning to be geared toward developing a smart grid that is suitable for the economy of the 21st century. Despite what is widely suspected, smart meters do not use any sort of surveillance or invade one's privacy (ComEd grid modernization, 2016). The modernization of the current electric system only includes "replacing the standard analog meters… with new digital meters" (ComEd grid modernization, 2016). The only instruments that make the meters smart are the identifiers. Any data received is encrypted prior to transfer over a secure network, and is mostly just numbers (ComEd grid modernization, 2016).

With ComEd making these changes, it is only a matter of time before what they implement truly becomes the norm. There will soon come a time when smart meters and their technology will not be a foreign concept but an expected one. These new implementations solve many internal issues an make the process of receiving reliable power much more efficient. Security at the highest level is evaluated, required for all project areas, and built into the company's framework. Customer data is always encrypted and only available to authorized

personnel. Also, it is mandatory for the authorized personnel to complete a multifaceted authentication process prior to accessing secured data sources. This ensures that the privacy of customer data is constantly maintained.

The same way it is normal for people to use an ATM or deposit a check online, it will be normal for people to have smart meters. Smart meters are vital to implementing the smart grid and moving forward in technological advancement. Health risks should be of no concern because all wireless technology produces the same emissions as smart meters. Actually, one would get more RF exposure from a cell phone than a smart meter. It is well understood by ComEd and others aware of the process of technological advancement that smart meters are the future. Still, before a smart meter is installed, consumers will receive notification from ComEd with specific installation details. The implementation of smart meters will aid in Illinois preparation for accommodating the evolving energy and economic demands.

Appendices



Adapted from the California Council on Science and Technology smart meter study published in April 2011.

Figure 1

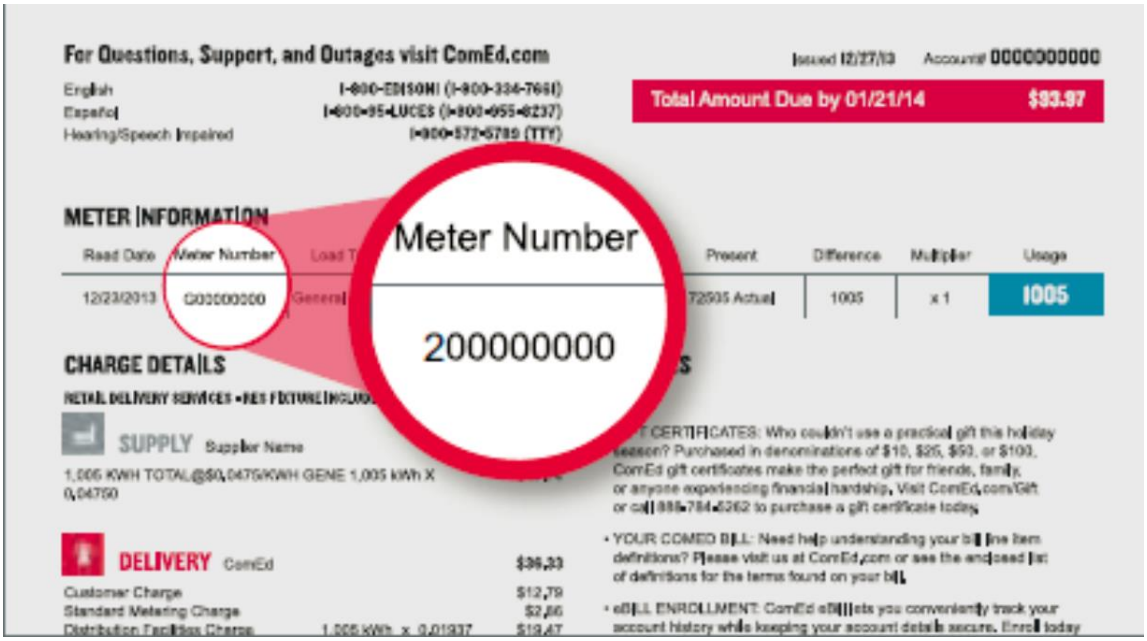


Figure 2

Figure 3

Figure 4

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