Five Ways to Build a Smarter Business Case for Smart Grid at Municipal and Cooperative Utilities

Before the term "Smart Grid" took its place among some of the trendiest buzzwords in the industry (think: renewable portfolio, Internet of Things, modern grid), it is interesting to note that despite the branding of the day, the fundamental issue of the necessity to implement automation throughout the energy distribution system remains unchanged. At their core, as not-for-profit public power entities, municipal and cooperative utilities are charged with delivering the highest quality power service at the most affordable rates possible. Operating to these responsibilities further requires the need to carefully and thoughtfully investigate any potential technology investments in order to maximize the long-term benefits to their members and constituents. Public power utilities are often in a unique position where building a positive business case for a smart grid investment requires looking beyond the surface layer of the payback associated with automating meter reading and taking trucks off of the road.

In working closely with public power utilities to identify and articulate the business case for smart grid, five top-line drivers toward automation continue to emerge as commonalities that work to justify the case for cost-effective, flexible, and efficient AMI and Smart Grid. However, many municipal and cooperative utilities are increasingly taking the justification a step further by diving deeper and first articulating synergies between various high level AMI drivers and then assigning monetary value to these synergies. As referenced in a recent survey* of North American public power utilities, this holistic approach and long-term view coincidentally appears to be emerging at a time when utilities are more focused than ever on showing a strong return on investment from AMI and Smart Grid.

*A complimentary copy of this report can be obtained from the Tantalus website: www.tantalus.com

The Process: Capturing the Benefits of AMI on Paper
Each utility has a different set of operating conditions and priorities. There are of course many similarities, but the value of each application differs depending upon a number of variables. These variables may include the access to funding, existing policies, customer density, power supply availability/contracts, community and organizational culture, availability of labor, customer mix, etc.

The benefits of AMI are captured in essentially three ways. The first is by calculating a return on investment. The benefits of these applications can be measured with some assurance where the avoided cost/savings value is readily available. An example is the number of truck rolls required given the annual number of required meter connects and disconnects.

This first method (calculating ROI) also has a variance whereby the avoided cost/savings is more difficult to define. For these applications, most utility professionals agree there is benefit, but the magnitude of the return is less certain. An example of this may be a time-of-use rate plan. We expect retail customers to respond to pricing signals but it's difficult to know to what extent. In these types of cases, the return on investment (power supply cost savings) is estimated.

The second method measures system reliability. Utilities use standard reliability measures capturing the number of outages, the duration of outages, and customer impact. By using AMI to improve system reliability, there are efficiency benefits the utility enjoys (reduced truck rolls, less overtime labor); however the vast majority of the benefits flow to the customer. It is estimated that for many commercial customers, the cost they incur due to electrical outages is nearly equal to their cost of electrical power. Clearly, this presents a significant economic development opportunity.

Real World Case Study Highlight…

One municipal utility currently uses a meter reading system that only communicates one way - from the meter to the office. As a result, whenever a meter reading is required, for example if a customer is moving out, a truck must be rolled to read the meter. The number of non-typical meter readings required by this utility each month is estimated at 750, yielding an annual estimated saving of $450,000. This estimation includes vehicle related expenses as well as other avoided manual expenses such as reductions in labor.

The third method captures benefits that are non-quantifiable. The benefits of these applications are documented, but there is no attempt in the analysis to quantify them. Many of these applications are related to customer satisfaction. Providing a tool for customers to view their electricity consumption history via a smart device is an example.

In working with municipal and cooperative utilities to help articulate the case for Smart Grid for mid-market public power utilities, the following drivers have emerged as the most advantageous means to justify the initial technology investment as well as provide long-term value to the utility.

1. Ability to Leverage Existing AMR Assets

In many cases, a previous investment in AMR has been in place for many years, and although it may still be functional, it is likely unable to support advanced applications that require two-way communication. In addition, these assets are often not fully depreciated, making a system change out unfeasible. The ability to leverage these proven assets by incorporating them into a migration strategy then becomes a very attractive alternative.

For utilities with one-way ERT (encoder, receiver, transmitter) technology in place that requires metering personnel to walk or drive by to collect meter reads, a solution to overlay this system with two-way communication provides a viable path forward toward adopting two-way AMI. The ability to run these two systems concurrently throughout the migration process is a key factor in justifying the cost of implementing new technology. The utility is able to continue to leverage the one-way AMR system, upgrading to smart meters once ERT assets are fully depreciated or once the ROI from additional AMI applications reaches a level high enough to justify the cost of the upgrade.

2. Operations & Maintenance Savings through Automation

The first application for AMI that is often cited is the ability to remotely read meters. This is clearly an important benefit. However, it's often assumed that the avoided cost of manual meter reading and reduced truck rolls alone will pay for an AMI system, which is rarely the case. However, the benefits of being able to read meters remotely extend well beyond simply using an automated system to read meters once a month. With AMI, meters can be read on specified intervals (every hour for example) or as required. This kind of functionality opens many possibilities for the utility including new rate options for customers, checking power quality and reading a meter while the customer is in the office.

Real World Case Study Highlight…

For a multi-service utility (electric, water, and gas), the ability to remotely read these services greatly reduces or eliminates the need for replacement vehicles. For one utility, the number of non-typical meter readings required each month was estimated at 100. By automating meter reads and reducing the wear and tear and general use of these resources, the utility could yield an annual estimated saving of $46,800 in reduced vehicle and labor expense.

Other advantages of the automation of meter reading include the near real-time availability of more accurate and timely energy data, which benefits the utility through the ability to improve customer service and satisfaction. For instance, with instantaneous access to historic and real-time billing data, customer service representatives can reconcile bill disputes within minutes, rather than through an exhaustive investigatory process.

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3. Remote Disconnect/Reconnect of Electric Service

The ability to remotely disconnect and reconnect electric service from the office with a few mouse clicks has long been touted as a significant advantage of AMI. The basic implementation of smart meters with integrated remote disconnect/reconnect capability provides an immediately recognizable and accelerated revenue stream for utilities who elect to apply service charges for power disconnect/reconnect.

4. Prepayment of Electric Service

A significant advantage of AMI and Smart Grid is that many systems and applications are designed to work optimally together, using real-time data capabilities to compound the benefits of each. The utilization of prepay along with remote disconnect/reconnect is a good example of applications that can build upon each other while providing an improved service option for customers and members.

Electric service is unique in that the customer pays for the product well after it has been consumed. The risk to the utility is that if the customer does not pay, the account goes into bad debt and paying customers cover this loss through increased rates. To mitigate this risk, utilities often require deposits before the service is connected. However, in many cases, the deposit is insufficient to cover the balance or is a prohibitive amount for cash-based customers. This typically occurs because credit is extended (before the service is disconnected) for an extended period, often between 60 and 90 days.

Real World Case Study Highlight…

AMI systems, when coupled with a remote connect/disconnect switch in the meter, permit service to turned on and off from the utility office. To perform the required connect/disconnects today, on utility estimates the number of truck-rolls required at meters at 1,500/month. This translates to an estimated avoided cost of $900,000 annually by remotely managing this task. This estimation factors in avoided manual activity expenses associated with truck rolls such as vehicle related expenses and reductions in labor expense, which can be significant.

Numerous studies have shown that prepay, when used as an educational tool, has the potential to change consumer awareness and behavior in terms of energy usage. It enables the utility to provide payment flexibility and increase consumer control of energy while eliminating the need to collect large cash deposits for activation of service. For the utility, coupling prepay with remote disconnect/reconnect affords the same benefits of operational savings associated with reduced truck rolls, reduced field exposure for employees, and quicker service response times.

5. Energy Theft and Diversion

When combined with AMI, the effectiveness of traditional energy theft detection strategies is increased dramatically. With the right alarming technology in place, the real-time data delivery and event notification features of AMI can help pinpoint and distinguish between technical and non-technical losses, or theft. This can translate to millions of dollars in savings.

Real World Case Study Highlight…

A Southeastern U.S. municipal serving 25,000 customers analyzed prepay as a driver to justify an AMI investment. The business case analysis factored in financial factors such as the additional revenue the utility would gain in program participation fees, the ability to avoid write offs for bad debt, and the added benefit of reduced consumption due to increased consumer awareness of energy usage. In a conservative case, this utility would reach breakeven and positive revenue in year 8 when the benefits of prepay were combined with additional savings in efficiencies due to the automation of many related manual processes.

AMI systems provide utilities with many tools that may virtually eliminate theft. Some of these include:

- ◆ Granular meter data that greatly enhances exception reporting (identifies when meter readings are outside of expected ranges or odd).
- ◆ Meter tampering alarms which notify utility personal when a meter is being tampered with.
- ◆ Unauthorized movement of meter locations, a common theft method.
- ◆ Transformer check metering which aggregates the sum of the meters at a point in time against the load on a transformer at that same point in time. Differentials indicate a possibility of theft.

Again, utilizing other AMI applications such as outage management and voltage monitoring in conjunction with asset protection and revenue assurance, the effectiveness of each application is strengthened as is the business case justification for the system.

Implementing AMI Strategically for the

Smartest Payoff

Often, utilities have taken the approach that deploying AMI as quickly as possible is the shortest path to start building ROI. While this is true in many cases, for utilities relying on phased monetary and workforce resources throughout the deployment, or for those faced with other budgetary constraints, strategic deployment offers a solution based on the most favorable payback. In essence, this approach allows the AMI system to pay back into itself, a result that compounds over time.

Real World Case Study Highlight…

One government-owned South American utility leveraged strategically deployable transformer monitoring devices, real-time data, and advanced analytics software to effectively identify and remove thousands of unauthorized electric connections which translated to millions of dollars in non-technical line losses. This utility leveraged the initial success of these initiatives to bolster additional plans to further strengthen its revenue protection programs, increase service reliability, and improve electrical safety conditions throughout the country.

In one case involving a municipal utility in the Southeastern U.S., an analysis of more than 50 AMI drivers was narrowed down to the top four applications which, deployed strategically over time, would provide the most favorable ROI on AMI.
The envisioned deployment was scheduled over five years allowing sufficient time to match internal resources capabilities to deployment demands. The order in which applications were to be rolled out was determined strategically based on highest expected returns as follows:

1. Prepay Deployment – The majority of customers who would benefit from prepayment services were expected to adopt this option within three years. The cash flow forecast in the business case captured growth in bad debt savings over the first three years.

2. Theft Detection – The mitigation of financial loss due to theft followed the entire five year deployment schedule. The full benefit is realized in year five.

3. Remote Connect/Disconnect – Initial deployment of disconnect meters were to be targeted to dwelling units with high turnover and customers choosing the prepay option where a disconnect meter is required. The majority of benefits were expected to accrue in the first two years.

4. Remote Meter Read – Since remote meter reads can fall anywhere on the system, the expected benefit will follow the five year deployment plan.

Conclusion

The most prudent method in evaluating AMI based on financial drivers is to quantify and consider a combination of hard benefits that deliver revenue streams such as prepay, remote disconnect/reconnect, and soft benefits such as reliability improvements, asset optimization, and the extension of useful life of existing equipment. A significant benefit of AMI is that depending on the capabilities of the network platform, the system will continue to pay long after the system cost itself is recovered through the implementation of other value-added applications such as conservation voltage reduction or peak power demand reduction, load control, energy storage control, and distribution automation. This extended ROI affords the utility much more cash flexibility and options such as reducing rates or offsetting the capital cost of future projects. uhi

Author Profile

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