



Smart Metering

Big Data and the Value of Analytics

WHITE PAPER

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Executive Summary

Smart metering is a required change within the utilities sector which will inevitably create challenges and opportunities for energy retailers and distribution network operators alike.

Taking place across three phases – smart meter deployment, smart meter systems operations and smart meter management – the challenges and opportunities are not simply logistical. They are also focused on the need to understand target market customer segments and the response of those customers to the smart metering initiative overall. In addition, there must be a clear understanding of how smart meter data can create additional value for a utility in its day-to-day operation.

In this context, smart meter data and additional data from home appliances and distribution networks will result in truly big data, forcing the industry to revolutionize and democratize its approach to analytics from here forward.

Smart metering is the first step toward smart grids and, as such, the use of an analytics solution will prove to be a very effective complement to the smart metering project.

Used to its full potential, this will enable utilities organizations to get closer to their customers – creating insight, building loyalty and driving more effective acquisition initiatives. Smart metering will deliver tangible customer benefits including more accurate billing, less need for on-site visits and more innovative services from suppliers.

Smart Metering: What Is It?

The implementation of smart metering systems and the replacement of gas and electricity meters will follow three logical steps:

In phase one (the deployment process), the smart meters will be installed in all houses, while in phase two (the smart meter operations phase), the data from smart meters will be collected by the utilities. In the third phase (the smart meter management phase), the assets on the wall will be maintained and monitored.

Throughout those phases, data will be collected and value gained to create insight and make relevant decisions.

In the UK, which is taking a comprehensive nationwide approach to smart meter rollout, the business case suggests that smart meters will return £7.1 billion (US\$11.35 billion) in benefits to energy providers, their customers and society at large. That said, the rollout carries implications for all energy companies including distribution network operators and energy retailers.

Analytics

Big Data, Big Difference

Telecommunications company Telstra operates in an extremely competitive environment. To increase the efficacy of its marketing, the company turned to business analytics and predictive modeling from SAS to help enhance customer service, provide relevant and value-added products to its clients, and help secure and grow its market share.

Analytics processing has been reduced from 11 hours to 10 seconds, and a 15 percent improvement is forecast for customer retention campaigns.

Smart meters utilize computing and remote communications technologies to help customers monitor more accurately how much energy they are using and communicate directly with the energy supplier, minimizing the need for meter readings through on-site visits.

The aspiration is for smart metering to deliver modern and efficient utilities systems whereby retailers will be able to issue accurate bills, customers will be able to see the energy they are using in a more granular way, and the environment will benefit through a significant reduction in energy waste. This will reduce the costs of serving the customer – savings which can then be passed on to the customer or invested in delivering more innovative services.

Smart Metering: Why Is It Important?

Where regulations or the business climate are pushing for smart meter implementations, the first decision that utilities must make is whether to be reactive or proactive in accommodating smart meters and the changes they will inevitably bring.

The road to a positive, proactive approach begins by understanding the technology that underpins smart metering. A smart meter records consumption of energy in intervals of an hour or less and communicates that information back to the utility for billing purposes and can also provide information on power quality.

This advanced metering infrastructure enables two-way communications between the meter and the utility provider's central system. The other critical technology for smart meter systems is the information technology at the utility that integrates the smart meter networks with the utility applications, such as billing systems, customer information systems and meter data management systems.

With the application of high-performance analytics technologies and techniques, real business benefits and competitive advantage will be realized through the intimate understanding of markets, customers and operations.

Big Data

Defined

Big data occurs when the volume, velocity and variety of data exceeds an organization's storage or computing capacity for accurate and timely decision making – and when the volume, velocity or volatility of data requires an organization to move beyond its comfort zone in its use of technology.

Phase One: Smart Meter Deployment

Utilities companies do have a challenge in completing the rollout within schedule and cost while achieving acceptance from their customers.

They run the serious risk of cost overruns unless the project is very well-managed. And without proper understanding of the segment of target customers, there is a danger that smart meters will not deliver the promised energy savings to households and businesses.

To maximize the chance of success at the deployment phase, a clean customer database is important. And advanced segmentation needs to be modeled for selecting customers in a more targeted way than the usual selection of a ZIP-code-based rollout.

Rollout Challenges

Replacing standard meters with new smart meters not only poses a logistical challenge to the retailers but also makes it imperative for them to understand customer segmentation and the likely response of each of those segments to the smart meter initiative.

How utilities seek to address these challenges in their strategic and operational planning will dramatically shape the program's success and necessitates a command center for continuous monitoring and program optimization.

Likely challenges will include:

- Which target segment to prioritize, taking into consideration socioeconomic and demographic inputs?
- Will the target segment utilize smart meters to lower their bills by optimizing their energy use?
- How to plan the best installation strategy for each target customer segment?
- Do I need to hire additional staff?
- Do I contract with third parties, or simply reshuffle internal field crews?
- How will this deployment affect pre-existing projects?
- Will it impact routine maintenance, repairs and emergency coverage?
- How will I have a consolidated view of all the smart meter rollout projects by multiple teams?
- How do I ensure higher utilization rates and faster rollouts?
- How do I improve my spare parts availability?
- Can I monitor the effectiveness of my program by viewing the sentiments of customers?
- Can I efficiently analyze feedback on faults, installation progress and problems to the planning system before undertaking course corrections?

First impressions are critical. If the deployment doesn't go smoothly, customers are less likely to embrace the new technology. Analytics has made a significant impact in creating greater efficiency across the entire value chain of the energy sector, including utilities. A smart meter optimization program with the rollout planning powered by an analytics-driven solution will give utilities the best chance of ensuring smooth, widespread smart meter adoption, now and in the future.

Looking ahead, when the smart meter rollout gathers momentum and reaches maturity, analytics can be effectively applied to address issues such as cyberthreats and protection of privacy, thereby giving customers the confidence to engage.

Mitigating the Risks in Rollout

There are multiple stakeholders in a smart meter rollout program:

1. Rollout program/project managers.
2. Installation planners.
3. Service-level managers.
4. Supply chain managers.
5. Customer segment analysts.
6. Internal technicians.
7. Contract technicians.
8. Smart meter suppliers.
9. Customers.

From customer segmentation to work order planning and parts availability, deviation from plan in one area can have significant effects on achieving the rollout's overall objectives. These stakeholders need to work in unison and in agreement through a centralized command center, providing an integrated planning and optimization environment.

Targeting the right segment of customers is critical to the successful rollout of smart meters. There are many influential factors that need to be considered to identify the right segment of customers – such as customer voice, compliance, customer value, loyalty quotient, technical savvy, customer vulnerability, customer density, terrain, weather, response to smart meters, sociodemographic profiles and more.

Predictive modeling capabilities give the best output for customer segmentation and, based on the initial segment response supplemented with call center insights and feedback, these can be continuously monitored to improve the desired effectiveness of the rollout program.

From a logistics perspective, smart meters are digital and have a different hook-up configuration. Their installation requires different skill sets for residential meters and for industrial meters – and for integrating the communication technologies, which could also vary in the different places a meter is installed.

The deployment also requires a substantial investment of work hours over and above normal maintenance and repair operations.

There are many other factors that stakeholders need to consider. Examples are parts availability, initial smart meter demand, training and certification time and costs, technician installation efficiency, and the impact of added workload on routine and emergency jobs in terms of both time and costs. Rollouts in dense urban areas and in rural areas may require different approaches too.

Strong program management for monitoring and evaluating the efficiency and effectiveness of the rollout is required. This will help organizations understand how to distribute the installation workload optimally to meet the desired utilization factor and program success.

That utilities launching smart meter deployment programs will plan ahead is not the question. Instead, the ability to undertake course corrections with optimized response to field situations and scenario analysis is the key consideration.

Using analytics and scheduling, the best plan route for the whole portfolio of projects and activities or its subsets is highlighted based on optimization techniques. Utilities companies can input decision criteria like resource allocation, capital limitations, time horizon and benefit realization to give themselves the best chance of a successful rollout.

Oklahoma Gas & Electric

With the help of smart meter data analytics, the analysts at Oklahoma Gas & Electric can do in hours what once took days. They are able to evaluate customer data that is refreshed every 15 minutes rather than once per month. This allows them to create and measure the effectiveness of customer programs that decrease energy consumption.

Phase Two: Smart Meter System Operations

Once the meters are installed and delivering data to the utility, the operational part of the smart meter system begins.

The application of proven business analytics solutions to high-quality data generated through the smart metering process and other data available in the enterprise will bring significant business benefits for energy companies and their customers.

The impact of smart meter data on detecting technical and nontechnical losses, rate/tariff optimization and more accurate load forecasting will create additional value for customers using advanced analytics.

Phase Three: Smart Meter Management

Once meters are installed and delivering data to the utility system, they become assets that must be maintained.

Specific analytical applications for that phase could include early-warning and fault detection systems for the detection of outages, and fraud control to assure that regulatory schedules are kept and OPEX expenditures related to false alerts and maintenance are minimized and controlled.

Often an official body requests regulatory reports that make statements of the health of the smart meters where the available data needs to be prepared according to specific patterns.

Benefits

Following are some examples of the benefits of smart metering in phase two and phase three of the project.

Debt Management

Efficient debt management offers significant operational value for energy retailers. Over the past five years, the number of households in debt has remained stable, but the amount of debt owed has increased steadily. Since the time frames for payment have remained the same, weekly payment demands have increased concurrently. Analytics may allow utilities organizations to forecast debt more accurately and improve debt management along with timely and targeted help for those customers who may be about to enter debt.

Demand Management

Analytics applied to data from retail and new smart metering databases will also help retailers accurately predict demand for electricity and, if appropriate, actively manage that demand. With the increasing penetration of wind and solar power, generation will become increasingly intermittent. At that same time, patterns of demand will change with the introduction of smart home appliances, electric vehicles and heating, and microgeneration. These factors will mean that efficient management of demand becomes increasingly important.

“We are fortunate to be able to leverage collective knowledge to make the best possible decisions and effect this type of transformational change, thanks to the advances made in the field of analytics. Transformational change, in turn, will enable us to reduce consumption, increase supply and enhance our ability to safely deliver cleaner energy in an increasingly complex environment.”

Mikael Hagstrom
*Executive Vice President of SAS Europe,
Middle East, Africa and Asia Pacific*

Customer Segmentation

Smart metering increases the transparency of energy use and cost. The implication of this is that retailers will need to find innovative ways of maintaining and increasing profit in an environment where customers are increasingly well-informed. With analytics applied to smart metering data, utilities organizations will have better tools to distinguish between customers based on their time of energy use, and this can be reflected in pricing and product offerings to optimize service and profit. This would allow for accurate forecasting to predict situations before they become challenging for customers and companies alike.

Switching

Retailers will need to find innovative ways of keeping and attracting customers in an environment where customers are increasingly well-informed and switching is simpler and faster. Analytics can be used to identify and attract new high-value customers, and retain and develop the loyalty of existing value-added customers. Companies could also identify customers who are high-risk – and decide on the right strategy for managing that risk.

Conclusion and Next Steps

Smart meter implementation and management are underway in many regions of the world today, and organizations throughout the energy sector will be faced with big data. They must now devise a strategy for managing the challenges involved and extracting the most value and insights from their data. SAS suggests that the best response includes the application of high-performance analytics to generate customer insight and support business decisions.

High-performance analytics allows you to:

- Process more data (ultimately all of it), instead of just a sample, thus definitely getting a more accurate output.
- Process data more often, enabling frequent testing and model refinement.
- Run more complex algorithms, such as optimization.
- Implement a game-changing technology that allows you to detect and react to changing conditions much faster.

The benefits of analytics are visible early in a smart metering project, and utilities must consider building an “analytical road map” for all the phases of the project, commencing with the deployment process. This will deliver measurable business benefit throughout the three phases of a smart meter rollout as highlighted earlier, and will transform the way utilities work in the future. With that in mind, smart metering can be considered as a building block of the future smart grid where the handling of big data and the creation of business value from it will be even more relevant and important.

References

Learn more about SAS for the utilities industry:
sas.com/utilities

Read a customer story: Oklahoma Gas & Electric looks to the future with SAS®:
sas.com/success/oge.html

View the webcast: Managing Data to Maximize Smart Grid Benefits:
video.webcasts.com/events/penn001/40161/index.jsp?adid=ws

Learn about optimizing smart meter deployment:
sas.com/resources/solution-brief/105997_1012.pdf

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