

GET SHARP

Smart Metering is still at a nascent stage in India, where it is being tested and implemented by only a few utilities equipped with technology and deep pockets to do so. However, it provides a sea of possibilities in streamlining and advancing our home energy infrastructure.

A smart meter is an electronic device that records consumption of electric energy in intervals of an hour or less and communicates that information at least daily back to the utility for monitoring and billing. Smart meters enable two-way communication between the meter and the central system.

Traditional meters only measure the total consumption, providing no further breakdown of information; smart meters on the other hand measure site specific information, allowing utilities to introduce different prices for consumption based on usage during the time of day and according to the season. This works in a way that in case electricity generation is constrained due to various reasons and has to be bought from other gencos, the price fluctuates, depending on which the meters will automatically charge the customer.

But this has its own set of pros and cons. Proponents believe that billing customers at a higher rate for peak times will encourage consumers to adjust their consumption habits to be more responsive to market prices and could delay the construction of additional generation, thereby

controlling sharp rise in electricity prices. There are some concerns, however, that low income and vulnerable consumers may not benefit from intraday time-of-use tariffs; besides the inherent ability of smart meters to provide two-way communication and data readings remotely could result in large layoffs of meter readers.

The smart metering business case is broad and complex, as the technology has the potential to impact the entire electricity system, from generation investment and dispatch, through network optimisation, all the way to retail operations and beyond into the home. The most commonly pursued benefits, however, have tended to be focused on the retail area, particularly the core areas of meter reads and consumer service support. While the benefits are becoming well characterized in the retail area, it is clear that many of the potential benefits from distribution optimisation and capital efficiencies are commonly discounted or ignored.

“The benefit of any smart metering to a utility is that the utility gets a better view of the customer’s usage of electricity by the customer. While, the benefit to a customer is that a customer can

also get a better view of his usage, through the customer portal and thereby control the usage of electricity. The customer and the utility can work closely to implement multiple programs such as time of day billing, demand management programs etc.,” asserts **Manu Rishi Puri, Principal, Accenture Resources Group.**

TECHNOLOGY

Of all smart meter technologies, one critical technological problem is communication. Among the solutions proposed are: the use of cell and pager networks, satellite, licensed radio, combination licensed and unlicensed radio, and power line communication. One would find: fixed wireless, mesh network or a combination of the two. There are several other potential network configurations possible, including the use of Wi-Fi and other internet related networks.

“To date no one solution seems to be optimal for all applications. Rural utilities have very different problems from urban utilities or utilities located in difficult locations such as mountainous regions or areas ill-served by wireless and internet companies,”





“TO CUT CARBON FOOTPRINT AND BILLING EXERCISE”

Anil Sardana, Managing Director & Chief Executive Officer, Tata Power

What are the smart metering options that Tata Power offers?

Tata Power is the first Indian power utility to launch the Automated Demand Response (ADR) project with smart meters in Delhi last year. It is one of the first projects in the world where ADR and AMI (Advanced Metering Infrastructure for Smart Meters) are conceptualised together. The project is implemented in partnership with IBM, Honeywell, Landis+Gyr with participation of select industrial and commercial consumers of Tata Power Delhi Distribution; and has been rolled out post the approval of the Delhi Electricity Regulatory Commission (DERC).

Tata Power, Mumbai installed

Automatic Meter Reading system in year 2009, covering all industrial and commercial consumers as well as DT check meters. The data from meters is captured in central server every midnight using GPRS modems. The process of meter reading and billing was thus fully automated and requires no human intervention. In year 2013, one of the largest Radio Frequency based smart metering projects in India was installed in Mumbai covering about 5,000 number low end residential consumers. This project included the installation of meters with built in RF communication modules, data concentrator units (DCUs), head end software and meter data acquisition (MDAS).

Metered data is collected every hour through RF mesh network communication and transmitted to a central server using GPRS network. Meter data received is used for automated generation of bills without human interference.

How does your DMS system for Mumbai tie up with smart metering?

The DMS system along with FLISR (fault location, isolation, switching and restoration) system instantaneously determines fault location and restores power supply to consumers (in the unlikely event of a power failure) automatically in the shortest possible time.

(For full interview, log on to www.powertoday.in)

states **Anil Kadam, Senior Manager - Solution Architect (Utility Management), Schneider Electric India Pvt. Ltd.**

Commenting on the India specific scenario Sardana shares, “Tata Power is the first Indian power utility to launch the Automated Demand Response (ADR) project with smart meters in Delhi last year. It is one of the first projects in the world where ADR and AMI (Advanced Metering Infrastructure for Smart Meters) are conceptualised together. The project is has been rolled out post the approval of the Delhi Electricity Regulatory Commission (DERC).”

He continues, “Tata Power, Mumbai installed Automatic Meter Reading system in year 2009. The data from meters is

captured automatically in central server every midnight using GPRS modems and requires no human intervention. Besides, this recently in 2013, one of the largest Radio Frequency based smart metering projects in India was installed in Mumbai covering about 5,000 low end residential consumers.”

Utilities can use smart metering data to manage power distribution system more efficiently and avoid overloading of the grid or blackouts. The smart meter data collected in AMR system can be accessed by consumers. This data provides consumers an insight to the usage of electricity in their homes and offices and thus empowers them to take informed decisions for reducing power bills.

“We are able to consistently achieve a success rate of more than 98 per cent for the AMR system. Smart metering technology has also provided benefits in terms of lowering the carbon foot print involved in a typical manual meter reading and billing exercise. Also the accuracy of entire meter reading and billing system is very high as it does not require any human intervention,” points out **Anil Sardana, Managing Director & Chief Executive Officer, Tata Power.**

BENEFITS

According to **Manu Rishi Puri, Principal, Accenture Resources Group**, during their research, they have identified five critical success factors to help confirm sustainable benefits realisation from smart

metering across the full breadth of the business, from design through deployment:

1. **Putting the consumer and the community at the heart of the design:** One of the key lessons that has emerged is that deployment success is dependent on developing and communicating a compelling consumer value proposition. Consumers need to feel the solution has been designed for their benefit if it is to achieve behavioural change. During smart meter rollouts, consumers want to be engaged and educated and, once in place, they expect providers to leverage the technology to offer a new energy experience—one that is more personalised and proactive, particularly when it comes to saving money. A sound smart metering program can be delayed for years or even canceled if it fails to engage consumers and win buy-in.
2. **Managing the complexities of deployment:** The deployment of smart meters is a transformational change for many parts of the utility business, and cannot be achieved without appropriate leadership and coordination from the delivery team. Leadership needs to articulate a shared vision for smart metering and verify alignment across roles, responsibilities and metrics.
3. **Focusing on the people and process change:** Smart metering deployment is far more than an asset replacement and IT program and the change approach must reflect this. Operating the change management program in a manner that emphasises the new

DMS system for Mumbai & Smart Metering

The DMS system along with FLISR (fault location, isolation, switching and restoration) system instantaneously determines fault location and restores power supply to consumers (in the unlikely event of a power failure) automatically in the shortest possible time.

The DMS system is planned to be integrated with meter data management system (installed as part of AMR system) to obtain the dynamic status of distribution transformers as well as HT consumer loads. The DMS system uses this dynamic load data to decide the optimum network reconfiguration for restoration of supply during breakdown, and for deciding the switching optimisation in order to minimise technical losses.

Source: Tata Power

4. **Future proofing the technology:** While the concept of smart metering for consumer billing purposes is relatively mature, the technology is still evolving. So too are some of the uses of smart metering, with utilities, consumers and third parties all exploring new solutions to extract further value from their investments. Preferred communications technologies are changing, meter asset life is uncertain and some smart metering products are constantly evolving. Concerns over

these broad, rapid changes can stall smart metering programs in their early stages, as utilities pursue the objective of a future-proof solution. The ongoing evolution of the smart metering solution landscape should not prevent utilities from pressing ahead with their smart metering plans.

5. **Releasing further value from analytics:** The step change in availability of accurate load and power quality data from millions of end points offers enormous potential value in managing the network, generation and consumer relationships. However, delivering these solutions will require an advanced analytics capability that enables integration and examination of large quantities of data.

DRAWBACKS

One of the most problematic task to date is implementing security protocols that will protect these devices from malicious attacks and new exploits that are discovered against them. One proposed method of verifying the data provided by smart meters is through analysing the data in real-time to detect anomalies. By identifying exploits as they are being leveraged by attackers,



“IT HAS POTENTIAL TO IMPACT ENTIRE ELECTRICITY SYSTEM”

Manu Rishi Puri, Principal, Accenture Resources Group

What is the potential for smart metering in India?

Smart metering is still in an early stage, as there is no mass scale implementation done of any smart metering program. They need to start rolling it out for select customers, wherein a utility can get the return on investment (ROI) of smart metering.

By when do you see demand picking up?

The roll out of smart metering will take time as the demand is yet to pick up. Large scale orders of over a million meters will help bring down prices and help pick up demand.

GoI had announced 14 smart grid pilot projects, do you think it will boost smart metering too?

The programs were launched about two years back, a key initiative by the government. Some projects have been awarded and are operational. These are in the pilot phase and the success of these projects will help boost the application of smart metering.

How does smart metering benefit the customers and company?

The smart metering business case is broad and complex, as the technology has the potential to impact the entire electricity system,

from generation investment and dispatch, through network optimisation, all the way to retail operations and beyond into the home. The most commonly pursued benefits, however, have tended to be focused on the retail area, particularly the core areas of meter reads and consumer service support. While the benefits are becoming well characterized in the retail area, it is clear that many of the potential benefits from distribution optimisation and capital efficiencies are commonly discounted or ignored.

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this Intrusion detection system (IDS) will mitigate the suppliers' risks of energy theft by consumers and denial-of-service attacks by hackers.

Some groups have expressed concerns regarding the cost, health, fire risk, security and privacy effects of smart meters and the remote controllable “kill switch” that is included with most of them. Many of these concerns regard wireless-only smart meters with no home energy monitoring or control or safety features. There are also health and safety concerns that the meters due to the pulsed radio frequency (RF) radiation emitted by wireless smart meters.

Privacy concerns are also an important issue. One technical reason is that these meters send detailed information about how much electricity is being used each

time, which would allow to the utility company to infer behavioural patterns for the occupants of a house, such as when the members of the household are probably asleep or absent.

A solution which benefits both the provider and the user's privacy, would be to adapt the interval dynamically as smart meter power data usage patterns can reveal

much more than how much power is being used. Research has been done which has demonstrated that smart meters sampling power levels at two-second intervals can reliably identify when different electrical devices are in use and even what channel or program is being viewed on a television based on the electrical consumption patterns of these devices and the electrical noises that they emit.

Challenges

- Planning and deploying significant advanced, end-to-end meter technology systems (AMI) is an essential part of a utility's strategy
- Processing and assimilating massive volumes of data gathered from multiple AMI networks
- Maximising significant AMI investments through the vital translation of raw data into actionable, enterprise-level business intelligence.

Source: Schneider Electric

POTENTIAL

Smart metering is becoming the trend in many countries such as Italy, Sweden, Australia, Canada and UK. It enables power players to provide accurate bills without the need for manual reading of the meter; helps in managing supply and distribution remotely and assists customers reduce their consumption by providing accurate real time data on their consumption as and when required.

Smart metering and smart grid technology in the Indian power sector have recently attracted much attention to improve the performance of power utilities. Many countries in the west have already started using smart metering on pilot projects or in selective roll out for specific urban areas. India is a very important market for new emerging technologies such as this, as the country gets ready to transform its power sector.

Power utilities procure meters from various meter manufacturers. This ensures completion and the utility is able to negotiate competitive pricing. As a result, it is critically important that smart metering solutions are interoperable, enabling meters from multiple vendors to be incorporated into an 'open system'.

"Currently, the Indian meter manufacturing industry does not have standardised communications protocols, a gap that could prove problematic when sending data across a wireless network. The implementation of an 'open meter protocol' that is tailored to the requirements of the Indian utilities and optimised for real time monitoring over wireless mesh networks will prove invaluable and should be implemented as soon as possible. To witness a turnaround and make this technology mainstream, a collaborative approach through vendor partnership and an economics of scale needs to be

worked out before the large scale rollout of this technology," Sardana opines.

With growing economy of India and its ever increasing demand for electricity, use of smart metering technologies can offer varied benefits and help address some of the most pressing challenges of power sector like high AT&C losses, poor customer service, peak load management etc.

He adds, "government policies too are encouraging installation of metering for all customers. Adoption of smart metering technologies is emerging to be the most relevant next step. Realising the importance of smart meters, the Central Electricity Authority of India (CEA) had brought out

million meters will help bring down prices and help pick up demand," says Puri.

However, these technologies need huge investment and the industry does not have the financial capacity to fund for the technologies. Successful implementation would require support of government programmes to provide incentives for investment.

Adds Puri, "the 14 smart grid pilot programs were launched by the government about two years back. Some projects have been awarded and are operational. These are in the pilot phase and the success of these projects will definitely help boost the application of smart metering."

Value Proposition of Smart Meters

- Automated meter management yields invaluable information to help improve operations and business efficiency
- Enables large-scale AMI rollout and continuing benefits — lower operational costs, improved end-customer services and smarter, sustainable energy
- Reduces internal process requirements and their costs, increased operational efficiency
- Puts smart meter data to work for streamlined meter-to-cash and for effective decision making, improved grid operations, and enterprise-level processes such as planning and customer service

Source: Schneider Electric

a report outlining the functional requirements. Also, with the announcement of Smart Cities, the smart grid technologies are expected to gain importance. The smart metering will be the first step towards this cause."

"Smart metering is still in an early stage, as there is no mass scale implementation done of any smart metering program. They need to start rolling it out for select customers, wherein a utility can get the return on investment (ROI) of smart metering. Thus, the roll out of smart metering will take time as the demand is yet to pick up. Large scale orders of over a

Concludes Sardana, "while government is trying provide a push through enabling policies, which along with regulatory directives and mandates will propel faster implementation; additionally, integrating it with R-APDRP will help address the funding problems faced by most distribution utilities. The Smart Grid pilot projects are still in the testing phases, so we need to watch the space. Smart meters are important building blocks of the smart grid, so it will definitely help in boosting up the metering technologies too."

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— JOCELYN FERNANDES