

Smart Metering goes Smarter

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The cost of electricity relative to other consumable products and energy sources were for many years relatively cheap. Furthermore was the maintenance of infrastructure still within the means of utility budgets. The growing cost to maintain this infrastructure in combination of the growth in demand and the rise in electricity prices caused utilities to seek for more efficient ways to manage their electricity supply and recovery of cost.

The only way to come to grips with reality is to implement Smart Meter Solutions to be more efficient and smarter regarding the delivery of services. The cross subsidising of electricity is also creating huge losses due to the fact that the difference in consumption between low and hi consumption is closing more sudden than ever expected.

The trend internationally is to move to Smart Grids, which is the implementation of proper management systems on the distribution grid to allow for 3rd party suppliers of electricity. Smart Grids can not be implemented without the introduction of Smart Meters to monitor and manage the electricity supply and distribution to a Smart Grid. The billing to consumers from various 3rd party suppliers at various tariffs and time slots e.g. Solar power, will not be possible without the introduction of Smart Meters.

1 Introduction

Smart metering is a common term used for any metering solution smarter than a mechanical analogue metering device. The NRS 049 specification published in South Africa in 2008 cleared many of these myths and put Smart Metering in a new bracket, making it clear to the world what South Africa, as one of the largest and cheapest producers of power, understands as a Smart Metering solution.

City Power in South Africa installed a Smart Meter solution which currently is one of the closest solutions to comply with the Smart metering requirements defined in NRS 049. This solution went a step further and consolidates multiple services, e.g. Demand Management, Pre-paid/Conventional/Time-of-Use Metering, Management of Electricity, Telecommunication, Data (Internet) and soon, Gas and Water.

Smart Metering, as a result, provides for accurate and real-time management of services, demand management, logistics support and customer relations management.

2 Why the sudden interest in Smart Metering after decades of no change

3 Smart Metering Challenges

3.1 Technical

The change from traditional metering, which mostly experienced no change for the last thirty years, to Smart Metering has a huge effect on your company's technical resource pool. This situation requires an employee compliment of highly technical skilled personnel in areas not required till the arrival of Smart Meters.

The change of skills required is not only limited to manufacturers of meters but also to the utilities which need to manage and maintain these new meters and infrastructure.

3.2 Impact on Consumers

Electricity today is the main energy source and the introduction of Smart Meters has a major effect on the independence of consumers regarding their use of electricity.

It would not be fair or acceptable to consumers for utilities or service providers to introduce Smart Meters without consultation. The constant flow of information to consumers is a major requirement before and during the implementation of Demand Side Management (Scheduled or un-scheduled), Load Management or Time of Use.

Utilities or Service Providers need to make sure that their choice of Smart Meter partner is capable to manage and deliver the communication to consumers at times when Demand Side Management (Scheduled or un-scheduled), Load Management or Time of Use is introduced. This will not only eliminate the confusion with consumers in what is happening with their main source of energy, but will also minimise the high demand on the utility or service provider call center.

3.3 Financial

The impact on the industry has at least three issues to deal with. One is the high cost of introducing Smart Meters to the market, secondly the steep rise in the cost of electricity and thirdly the demand on the network infrastructure. To sustain service delivery of current demand and the growth rate currently is more than expected. The cost of distribution, maintenance and support of electricity to consumers are also more than what was experienced in the former years.

Smart Meter Solutions with value added services alleviates the costly exercise to replace old metering infrastructure with Smart Meters. The value added services support the return on investment and thus makes smart metering a viable option and the best choice for proper service delivery now and in the future. The typical value added services expected for smart meters to day includes demand management, water metering, gas metering, telephone and internet services. This is currently available in the market and will grow exponentially in the future as we have seen with all other high tech industries e.g. cell phones, PC's, etc.

4 Why Go Smarter

The requirements from utilities drive the metering industry to embark on more sophisticated solutions in order to address the many facets of the electricity services industry.

4.1 Remote Metering

The miss conception today is that remote metering or AMR is in most instances regarded as Smart Metering. AMR solutions are available for many years but the functionality of such systems is limited to meter reading and if you are lucky, simple tampers reporting.

The metering industry requires advanced tamper management with real-time response and support. This is only possible by real Smart Meter solutions with reliable two way communication which will support data carrier capabilities to manage proper communication to consumers and firmware upgrades on a regular basis.

4.2 Demand Management

Demand Side Management is a very broad term and should be viewed within three categories.

4.2.1 Scheduled Demand Side Management

Scheduled is mainly used to coincide with the typical consumption patterns with consumer on a natural day regarding the weather and the day of the week. The consumption is predictable although provision should be made for active working consumers and consumers in retirement or working from home. In some areas the latter are a noticeable percentage of the area and should not be ignored.

4.2.2 Emergency Demand Side Management

Emergencies are totally un-predictable and the Smart Meter solution should have the capability to plan strategic demand management solutions considering various scenarios. These scenarios should be pre-planned and set up upon which operators of the system could select an option in relation with the emergency on short notice without the help of specialised engineers whom are not always available 24/7.

Emergencies should be classed and related demand management solutions need to be configured by specialised demand management engineering teams. This will enable the operator to act immediately during emergencies without losing the network or parts thereof damaging infrastructure and frustrating consumers.

4.2.3 Planned Demand Side Management

Maintenance of generation plants, distribution networks, etc. is an every day occurrence. The challenge is to still keep reliable service and still be able to maintain your infrastructure. This does not always need to relate to switching off your service for a period of time but if it does, you need to have the means to communicate reliable information in real time to your consumer. Your consumers rely on your service not only for convenience but mostly to generate income to pay for your service.

Most of the maintenance could be done by re-routing your supply and demand managing your consumer. These situations could be managed by planning your demand manage process before hand, inform your consumer in real time and execute the planned demand side orders on time. We all know that maintenance schedules are often impossible to keep and therefore you need a real-time communication channel which will keep your consumer posted on progress via cell phone messages, e-mail and the user interface of your Smart Meter solution at the point of service delivery.

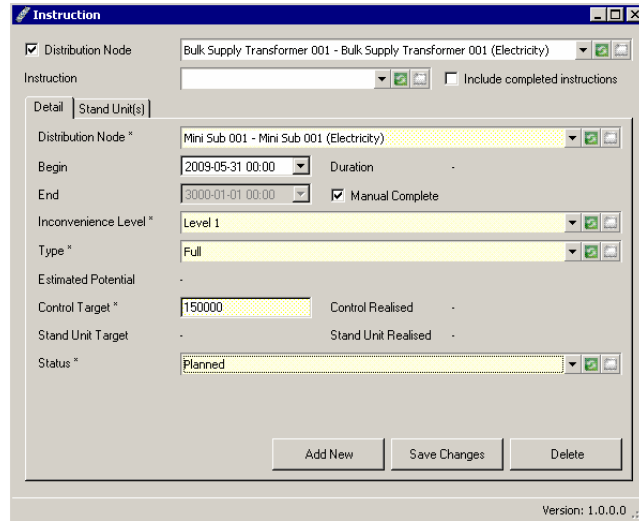
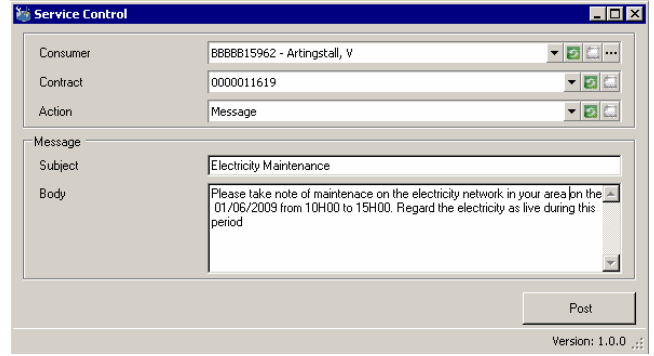
4.3 Load Limiting

Load limiting has the potential to be one of the best methods of preventing blackouts but could also be

your worst enemy regarding customer service and service delivery.

Any solution presenting load limiting should have strong media capability to communicate messages to the consumer's cell phone, e-mail and the Smart Meter user interface. The solution should also consider the fact that the main account holder is not necessary the actual consumer of the service whom will be load limited, e.g. tenants. The capability should be available to communicate to the actual consumer of the service.

Consumers do not appreciate the fact that they have a limited service although they pay the basic fee or line rental for a service related to their breaker capacity. Utilities should therefore select a Smart Meter solution which has an unlimited number appliance Demand Controller capability per household. This will enable the utility to control various non-essential appliances without inconveniencing the consumer. Service providers today are rated by the convenience level of their service delivery. Electricity, water and gas are services which intrude directly on the private lives of consumers and should be managed un-noticed, especially when the limitation is on the utility service capacity and not on the ability of the consumer to pay for the service.



4.4 Communication to consumers

Delivery of services from utilities have till now managed these services very much in isolation of their consumer and which is not good enough anymore. We live in a global village and we are evaluated in relation to world standards. To name a few occurrences which need to be communicated to your consumer real-time when it happens are, Maintenance, Cable theft, Power shortages, Power Outages, New services, Information on current services, General Utility Information, etc.

4.5 Consumer Training

Consumers are not aware of the requirements of utilities regarding the move to Smart Meters. They are not the one with the problem so to say. Consumers are only aware of the deterioration of current services and their constant efforts to sort out their account with the utility and trying to understand the inconsistency in the manner their accounts are managed by utilities.

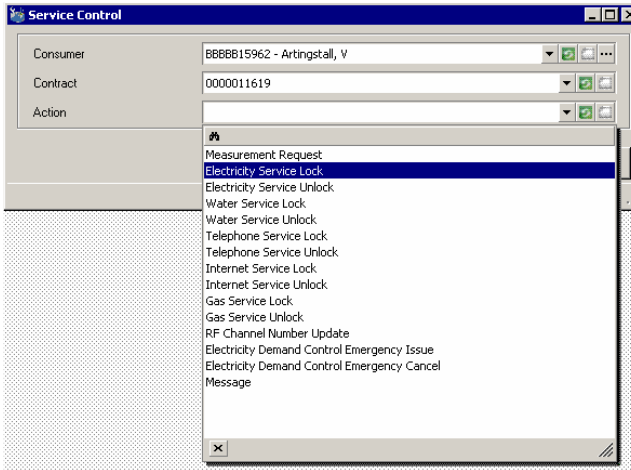
Utilities cannot just implement new technology without the buy-in of their consumers and ongoing training regarding these solutions. Consumers are very positive where efforts are made for the betterment of services but they need information. This is unfortunately a mammoth task and need constant and dedicated attention.

4.6 Tamper Management

Rules are made to be broken and far from your assets are close to your losses. This is no different where services are delivered and you are not in a position to be close-by to keep an eye on your equipment delivering and measuring these services.

Smart Meters however have multiple ways to monitor the installation and report to head office in seconds if tampers take place. This functionality is of no use if the utility does not act promptly on the actions of culprits trying to bypass the measurement system.

Unfortunately the service is 24/7 and so should the personnel be who can follow up the tamper actions of consumers to act within minutes of a tamper taking place. These actions could be from visiting the site to assess the damage to switching off the services till further investigation can take place.



mediums between meters, demand controllers, services hubs, management systems, ripple controllers, concentrators, etc. All of the communication between these peripherals is required to be in both directions to fall within the group of smart meters. The industry regards any solution with two way communication to be a “Smart meter solution” with no clarity on functionality.

Hefcom had for instance a situation, due to code on the meters to facilitate broadcasting, where a rogue signal triggered the broadcasting component to react on a garbage message. This caused the meters in the area of installation to use most of the capacity within the 433 MHz frequency which had a significant impact on remote controlled equipment such as security alarms, car alarms, gates and garage doors. Fortunately we could recover within days due to the functionality to remotely update software to meter and demand controller level.

4.7 Free Choice of Service Provider

Smart Meter technology allows the consumers to choose their own service provider. The consumers will be able to choose for different times during a day different sources of energy supply e.g. a Solar, Nuclear, Coal, etc. They will be able to allocate against their accounts via the internet the various suppliers of energy and will have free choice to pay for the cheapest tariff available at that time.

This is a unique feature of the Hefcom solution and to our knowledge the only Smart Metering Solution which can offer such functionality. This functionality avoids the situation where it is necessary to physically replace the installed base or to visit each site and locally upgrade each unit which would take as much time as the initial installation.

4.8 Billing

Electricity billing today is not to the standard of typical service providers such as phone, internet, fuel, etc. Consumers need to know exactly when they consume services and at what rate. Smart Metering provide the opportunity to consumers to get their exact consumption real-time with reports on their half-hourly consumption. Without this information consumers are not able to manage their consumption or make an assessment of the efficiency of their appliances in the home.

The adding of new functionality or fine tuning of software is a basic requirement for a Smart Meter Solution and will be a costly exercise if in the solution is not chosen wisely. The size of the consumer base currently and in the future, requires remote software upgrades and changes without visiting the installation physically.

For the first time ever consumers have access to information!

The hardware infrastructure of Smart Meters should be able to deal with at least five years of quarterly updates to cope with the growing requirements from utilities regarding value added functionality. Smart Meters have thirty years of catching-up to do and the solution of choice need to keep up with the demands of the consumers and industry requirements to start managing services in utilities as a proper competitive business.

Utility, Electricity, Consumption (Detail)					
Start Date: 2009-04-29					
End Date: 2009-05-29					
Service Contract: 0000016304 - J.F. Smith					
Interval: Day					
Measurement Date	Total Daily Consumption (Electricity)	Accumulated kWh (Electricity)	Daily Consumption (DSM-Geyser)	Accumulated kWh (DSM-Geyser)	Tariff
2009-04-29	R 8.23	1552.35	R 3.85	450.90	0.45
2009-04-30	R 5.70	1564.91	R 3.00	457.52	0.45
2009-05-01	R 9.48	1585.79	R 4.56	467.57	0.45
2009-05-02	R 12.61	1613.57	R 4.90	478.36	0.45
2009-05-03	R 15.04	1646.69	R 7.50	494.89	0.45
2009-05-04	R 10.25	1669.27	R 5.53	507.06	0.45
2009-05-05	R 15.47	1703.35	R 4.08	516.04	0.45
2009-05-06	R 17.04	1740.90	R 3.83	524.48	0.45
2009-05-07	R 16.30	1776.81	R 4.00	533.29	0.45
2009-05-08	R 15.98	1812.02	R 3.79	541.64	0.45
2009-05-17	R 152.38	2147.70	R 41.82	633.77	0.45

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5 Pitfall's of Smart Meter Solutions

The metering industry is offering a basket of “Smart Meters” ranging from various communication