ONLINE BULK METERING AND BILLING TO IMPROVE SERVICE DELIVERY AND REVENUE COLLECTION

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1. Introduction

The larger bulk consumers contribute a major part of the revenue stream of most electricity utilities. These consumers need special attention and service arrangements. In a new electricity distribution dispensation these customers will have to be handled in a more professional way to ensure better service to the customer as well as more effective revenue collection. Value-added products and services need to be incorporated into the service package of these customers. These customers however constitute a variety of customer groups and requirements. A "one service suits all" is not a business approach to suit all customers. The needs and requirements of each of these customers will have to be determined individually and a service compiled to suit particular requirements. One of the areas where service improvement can be accomplished is by upgrading the metering system to provide more information for managerial purposes.

2. Automated Meter Reading (AMR).

AMR is in short an intelligent meter that can be read automatically (remotely) via some communication medium. AMR is not a new concept at all. According to the authoritive Scott report on AMR deployments across the world, 43,8 million meters in 5381 projects are in operation. Radio is the preferred communication medium but power line communication is rapidly gaining ground.

The decision to use AMR by many utilities have been taken for reasons other than return on investment [2]. Most users want an accurate bill, fair price and reliable service[2]. In deploying AMR one thus have to make very sure what the reasons and cost for such a system would be. Value must be added to the service delivery and the customer should realize and use the additional services to be cost effective.

Most utilities realize that especially with more complicated tariff structures, profiling information will be required for larger customers. AMR can be used to provide that information. The main issue however remains namely: "How do we present and manage the data that we collect via AMR systems?" It will have to be converted to useful straightforward information that can be interpreted by the customer. The next few sections will thus cover the management possibilities and some technicalities of AMR.

3. Emerging standards

The bulk metering arena is largely based on proprietary protocol standards between the meter and remote metering equipment. This normally implies that one should implement a reading system that can communicate via different protocols to the

different brands of meters installed. A working group (NRS 071) is currently being established to standardize the bulk meter protocol in the RSA. The proposed standard is the emerging DLMS standard developed in Europe. Although not many meters are currently available with this protocol implemented, it should become more readily available in the near future.

4. Data communication systems

Most electronic bulk electricity meters can communicate with computer systems via the optical port for setup and data recovery. Options on most of the meters allow the addition of a standard serial port to be used for external data communication systems. The serial port can be connected to a modem to enable remote computer systems to interrogate the meter via a number of different communication media. The communication system used to interrogate the meter is the main cost factor as far as the equipment is concerned. One can use a variety of systems like the Internet, WANs, LANs, PSTN, cell phone, fibre optics and radio networks to read the meter. These technologies are all available depending on where the meter is located. The issue to be addressed however is the cost and availability of a particular medium. Because the bulk consumers normally also represent the larger electricity accounts the cost of the communication medium is probably not as critical as in the case of a small consumer.
In the Mangaung example, GSM systems are used due to the fact that it is available throughout the service area (Bloemfontein, Botshabelo and the rest of the Southern Free State) and the cost reasonable. It was thus not necessary to create any infrastructure.

5. Internet services

Once all the data is collected it should be converted to information. The source and format of this information is critical. Most of the electricity customers are not specialists on the intricacies of tariffs. The bottom line for them is the cost of the service. One thus has to ensure that information is made available in a format suitable for a particular customer. Most customers refer the account to the clerk at the commercial division where the main function is hopefully to pay the account.

The Internet provides an ideal vehicle to distribute information to all the relevant consumers by making detail information available under a password protection system to allow a particular customer to view his metering and billing data.

A number of suppliers offer this service. They thus read the meters and provide the infrastructure to display meter and billing data on a website. The customer can decide what information is required and is able to download relevant consumption data for further analysis. If the customer has the necessary knowledgeable people available, the consumption can be managed. Many companies make use of third party or head office based energy managers and the information on the net is an ideal medium to make the information accessible to all interested parties. This function can however also be provided on the utility's own web server as part of an integrated information service to all customers

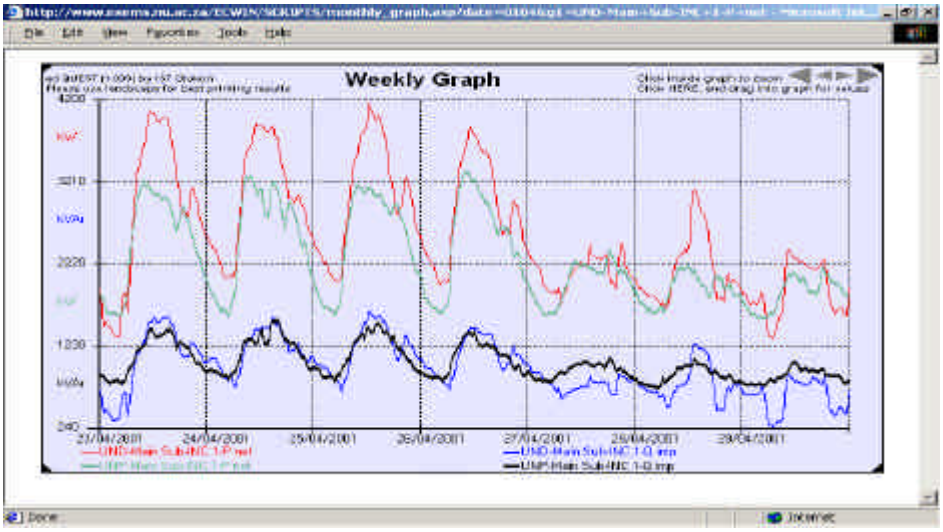
If this is the extent of the service then many customers will probably not use the information available to them and merely pay the account. Most utilities implementing AMR initially use it to generate more detailed usage billing and not for its added value features [4]. One has to add value to the operation for own use as well as to provide education and information to the customer.

6. AMR software available

Web software as well as a suite of accompanying software is available in South Africa to perform the AMR functions. This software can provide the following functions namely:

a. Read meters at pre-determined times
b. Store information on a industry standard database (thus accessible to all standard software packages)
c. Meter database and management
d. Provide tariff comparison functionality
e. Generate various reports
f. Provide profiles, trends and graphs (refer to figure 1)
g. Provide customer access to meter and billing data via the Internet
h. Provide alarm and SMS notification functions
i. Automatically send customer reports via email
j. Provide power quality reports if connected to the relevant monitoring equipment
k. Provide billing information
l. Provide download files to customer

Figure 1: Internet based load curve



7. Classes of Customers

The Mangaung area is not a highly industrialized region. This implies that the bulk consumers are a mixture of various entities, each with it's own requirements namely;

a. Office buildings
b. Educational institutions

c. Government buildings
d. Factories
e. Shopping Malls
f. Holiday resorts
g. Service providers e.g. water supply pumps

The specific need of each one of these groups is currently being analyzed to enable the utility to offer them service package and management information to suit the particular client's need. A more elaborate time of use tariff will also be available to pass the energy management possibilities of the Eskom Megaflex tariff on to the customers. By doing this, the larger customers can contribute towards the utility's demand management efforts.

8. Customer service package

To improve the customer service and add value to the AMR functionality the following service package is proposed :

a. Metering information online;
b. Direct access to a person who will be responsible for that particular account;
c. Frequent visits by the account manager;
d. Tariff consultation and support (access to standard as well as negotiated tariffs);
e. Energy management consultation;
f. E-mail complaints facility
g. Online billing information;
h. Online payment (Internet or bank transfer);
i. % Discount incentive for early payment.

9. Online billing

The Internet based software will generate an accumulating bill ranging from the first billing day up to the current day. The customer will thus be able to monitor the bill as it is being generated every day. At the end of a particular month the bill will be compiled for that month and the customer can either directly download the final bill or it will be e-mailed to him. The customer is expected to pay this bill via the Internet banking services or by direct bank transfer. A paper bill will thus not be sent. To make the project viable the customer is expected to settle his bill before the Eskom account has to be paid by the distributor. Within 10 days after billing has taken place, the distributor thus pays Eskom with the revenue collected from the end users and does not have to carry the burden of interest on money not collected yet.

Figure 2: Typical bill generated on an Internet based system

Customer: XYZ **Account Number:** nnn **Billing Date:** 2001-10-01

From 2001-09-01 00:00:00.0 to 2001-10-01 00:00:00.0

Electricity

Tariff	Description	Reading	Units	Rate[R]	Amount
Basic			1.000month	206.0000	R206.00
MD		1.000pf 14-SEP-2001 10:15	5257.453kVA	43.5500	R228962.11
Consumption	99P00041	13561006.25kWh on 30-SEP-2001	2583259.375kWh	0.1240	R320324.16
				Sub Total:	R549492.27

Total before VAT: R549492.27
VAT(14.0%): R76928.91
Total: R626421.18

In this project Mangaung will ensure that the larger customers receive preferential treatment. By improving the customer service at this level one will be able to respond to the requirements of these customers as well as be in a position to monitor and manage a large percentage of the revenue stream due to electricity sales. Standard municipal procedures do not provide improved service levels for these customers.

10. Financial implications

a. Interest due to long billing cycle

The 100 larger customers in the Mangaung area are responsible for at least 30% of the revenue collected for electricity sales each year. Normally these customers are billed and they only need to pay this bill by the 15th of the following month i.e. 6weeks after the billing date. The Eskom bill is normally due within 10 days of the billing date. Municipalities only expect consumers to pay 4 weeks after the Eskom account is due for payment. This arrangement implies that the municipality effectively pays interest on this outstanding amount for 4 weeks at a time or 12 months of the year. At a 10% interest rate this boils down to the fact that a significant amount is wasted in interest each year.

b. Metering cost

The cost of the metering system is R7000 per meter equipped with a GSM modem. The capital expenditure for this project will be the establishment of the metering infrastructure, internet link, database and web servers plus the appropriate operating systems and application software. The operational expenses will include Internet as well as GSM airtime costs.

The equivalent AMR services from a third party would cost in the region R200 per meter per month depending on the meter reading requirements. The additional capital expenditure to establish the web and database servers is thus well worth the cost because it also serves the purposed of connecting the

utility to the Internet as well as creating management tools to store and report on consumption data. These servers would have been necessary in any case and can thus be seen as a general upgrading of the IT system within the utility.

The questions that need to be answered are, "What financial gain does the utility get from this whole effort and who pays for the service?" There are a number of areas where the system will result in a financial gain. One can firstly assume that each customer has to pay for the service. In some implementations the larger customers are willing to pay for the access to the information. The operational cost for the system can thus be recovered. The customer receives valuable information to enable him to manage his energy consumption. The utility gains from the interest saved as well as revenue collection efficiency. If the total process results in a saving in energy supply cost then this effort will be a win-win situation.

As far as the capital cost is concerned one would in any case have to install a bulk meter at the customer's premises and the customer pays for this meter as well.
In the Mangaung business model the introduction of this service will not be for the account of the customer but be funded from the savings realized by a shorter billing cycle and higher revenue collection level.

11. **Improved customer service**

The advantage of the improved customer service cab be seen as:

a. Customer knows what is happening with his bill and consumption.
b. Can check tariff information.
c. Can take steps to manage his electricity costs.
d. Has direct access to support personnel within distributor.
e. Can expect preferential customer service.

12. Improved service management

a. Sales and metering data available online to all service departments i.e. systems operation, planning, revenue collection, revenue protection as well as the metering sections.
b. Meter is monitored on a daily basis. Frequent inspections are thus not required at these locations. Software alarms can be used to alert supplier if any un-acceptable readings are encountered.
c. Different tariffs can be modeled very easily to verify customer tariff efficiency.
d. The electricity distributor will have direct access to the consumption and billing information of an important group of customers who are contributing a large % of the annual revenue of the utility.

13. Conclusion

Following from the investigation and process so far the following conclusions can be made:

a. Larger customers contribute a significant % of sales revenue;

b. Service to these customers needs improvement.
c. Online information on metering and billing data can improve customer's capability to manage his consumption.
d. The infrastructure to enable information management can be outsourced or created internally depending on the business plan.
e. A shorter billing cycle can save a large amount of interest to the distributor and can partially be used to finance a better service to the customers.
f. Online meter reading and monitoring can simplify revenue protection procedures significantly.

14. References

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