TRANSFORMING THE UTILITY BUSINESS ENVIRONMENT

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The utility business community is facing major challenges associated with liberalisation of the market, unbundling, deregulation, organisation transformation, and establishing a sustainable business environment. In this transition process, utilities aim to provide a high quality of water and electricity supply to the customer cost-effectively.

Automation and information technology have developed rapidly in recent years, and have been implemented in utility business systems – planning, operation, maintenance, customer services and others. The advanced information systems were able to provide a breakthrough in transforming utilities from the classical electromechanical concept to the digital world. However, there is still a considerable gap in mirroring the correlation between overall water and energy flows (the product) with the financial flow (the money) to reach a sustainable and competitive business environment.

This paper addresses metering as a key factor in building a digital platform for utilities dealing mainly with water and electricity supply. It describes the digital transformation process, with metering at the heart of the transformation. Meters are not just the node of exchange where the product is converted to currency, but the 'eyes and hands' to link the product flow with the monetary transactions in all nodes of the system. Fast track implementation of large-scale enterprise metering systems will be the major challenge that utilities will face, both to keep a proper correlation between the product delivery and the financial balance, and to benchmark the performance of all units participating in the business process.

THE NEW BUSINESS CHALLENGES

The utility model can be presented in two major parts – the structure and the processes. In water and electricity utilities, the business structure has three major components: generation, transmission and distribution. The business processes are mainly planning, design, construction, operation, maintenance, customer services and associated supporting functions. This model dominated for more than 50 years, during which the supply of water and electricity was driven by governments to satisfy socio-economic growth.

The private sector and investment houses are now looking at utilities differently. They are viewed from two major standpoints – the product (water or electrons) generated at the source and delivered to the customer after being processed by complex network facilities, and the cash paid by the customer to guarantee a high rate of return on investment.

The private sector, mainly the banking sector, has become a major player in the utility business. The banks were reluctantly accepting a number of constraints, mainly the high level of investment, the ageing of the physical components, the network operation complexity and the lack of competition. However, there were major problems associated with system losses, both technical and non-technical, and the lack of proper measurement of these losses.

Losses dictated by the physics of the flow processing should not be more than 4-6% in a well structured network with optimal operation and maintenance. Actual losses, however, range between 8% and 25%, with the figure for most utilities above 12%. As an example, for a power sector with a total maximum load of 1000 MW, a 1% loss amounts to a minimum of $2.5 million per year. In some countries, this value may be doubled.

EFFICIENCY IMPROVEMENTS

The utility planners and operators were trying to concentrate on increasing the efficiency of the generators, transformers, pumps, and other network elements, optimising the network operations, and investing in the reduction of reactive power. Utility managers were trying to improve staff efficiency, and to modernise the workflows and customer services. Despite all this, a major breakthrough in loss control to satisfy the investors and bankers has not yet been achieved.

The private sector is calling for full control of the level of losses from all points of view – technical, managerial, financial and cash processing. Automation and information technology projects like energy management systems, distribution management systems, management and customer information systems and AMR have been encouraged. These technologies are becoming indispensable components of the utility sector.

A simple comparative analysis between the utility business and other businesses (banking, retailing, the mobile communication industry) is sufficient to demonstrate that the utility sector is not paying enough attention to the internal business processes and the application of profit/loss business policy. Moreover, the scope of services provided is still limited to product supply versus payment, with no variety to satisfy increasing customer demands.

Mirroring utility businesses into a comprehensive digital platform is a complex challenge. The utility is digitally modelled by three

major elements (see Figure 1). First, the product flow (electrons or water) moving from generation to customers. Second, the finances flow (money) received from the customer and moving up to cover costs, expenses and budgetary components. And third, the data and information flow, which crosses all the business components.

DIGITAL UTILITY : A REALITY

The digital utility is no longer a concept but a reality, due to the availability of data flow and software applications. The network data is being received from remote terminal units (RTUs) and processed by the supervisory control systems (SCADA). Relays, intelligent electronic devices and sensors are found at substations, feeders, pumps, pipes, and network devices to maintain system operation and stability. Data processing is used for customer and billing information systems, and other enterprise intelligent systems.

However, the implementation of automatic meter reading systems is still limited. Manufacturers, solution providers, utility managers and engineers are proud of the level of data processing taking place to manage and control the product flow, but the financial flow is still dependent on manual readings or the limited functionalities of some automated reading facilities. Utilities are happy to manage high voltage breakers by remote control, but do not do the same for the low voltage major device (the meter). This matter requires serious attention from the industry.

AN ENTERPRISE UTILITY METERING SYSTEM

The overall digital utility model cannot be completed without on-line reading, processing, and correlating the metering data from all system nodes. The latest published survey and benchmark study (highlighted in *Metering International* 3/2004) indicated an AMR implementation rate of less than 20%. Utilities are still not aware of the capabilities of the latest AMR systems, which are able to support services such as bill control, load management and dynamic tariff offerings. The metering community has not addressed challenges associated with investment risks, customer loyalty, market deviations and business rules. Moreover, there has only been a limited effort to advocate metering solutions to support business unbundling and restructuring.

We recommend the fast track implementation of an enterprise metering system with the following major components and functionalities:

Customer metering (CM):

The market can be reached with the variety of AMR technologies available today. At present the emphasis is on utility benefits and requirements, but more functions and services must be made available to customers. The meter must facilitate utility-customer-utility communication. As an example, load management is still being addressed in utility terms, whereas a delay of 10% of asset development in a 1000 MW utility by peak shifting will delay an investment of $100 million for a number of years. However, it is important to promote the meter as a device able to manage customer bills based on customer behaviour, lifestyle, demands and needs.

Network metering (NM):

Remotely controlled metering should be installed at major components of the network – generation, transmission, distribution. The metering system should not only address the water and power exchange in the business structure, but should manage the complexity of the transaction processes within utility companies, exchangers and retailers. Control centres were dealing with economic distribution functions to minimise the cost of energy generated and transmitted; now independent system operators are interested in delivering power to meet technical requirements, taking into consideration business rules and constraints.

System and devices metering:

The metering system should be spread throughout the network components and devices to track the product flow. In addition to the meters at the point of distribution, meters can be installed at the MV feeder heads, MV/LV substations, LV feeders and customers. Internal control settings and flow measurements are needed at the technical and financial level in the unbundled structure, to monitor, follow, control and identify the profit/loss operations of different business units. For example, utilities are not just interested in a transformer's capital and operational expenses, bur are questioning the loading, billing and revenues from clients connected to this transformer.

The enterprise metering system provides on-line correlation of the generated, transmitted, distributed, consumed, billed and paid water and energy. Moreover, metering will drive change in the water and electricity business market, allow a focus on the customer, and enlarge the scope of services available. The investment required for large-scale implementation of metering systems is minor compared to utility capital investments, and will be the major challenge facing utility decision-makers in the 21st century. MI

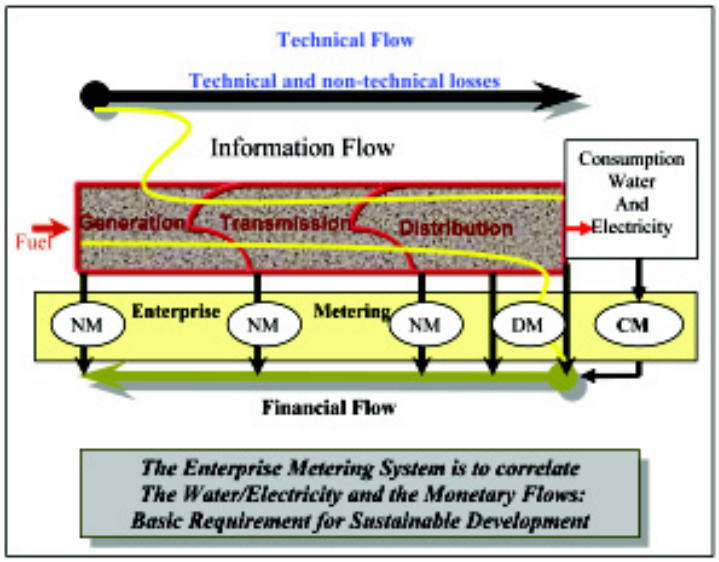

Figure 1 – Digital modelling of a utility

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