

# PREPAYMENT METERS: HOW TO FIND THE FUTURE WITHOUT LOSING THE PAST

By Elena Turanscaia and William Erasmus

*South Africa was not the first country to introduce electricity prepayment meters, but nevertheless it has been the main protagonist in electricity prepayment meter development and can be considered as the main user and supplier of electricity prepayment metering in the world today.*

The situation of the eighties, in which political protest, social pressure and township unrest resulted in problems and risks with reading the meters of billed customers, led Eskom, the South African national utility, to take the bold decision to get local industry to develop a basic, no-frills prepayment metering system.

Some of the problems which initiated Eskom's plan were:

- Consumers withholding payment for electricity.
- Access to meters in remote areas.
- Deposit management problems.
- Comprehension and lack of trust around fixed charges in a tariff structure.
- Ability to afford fixed costs in a tariff.
- Lack of postal systems in rural areas where households did not have addresses.

Prepayment was seen as a means of direct budgeting where the consumer was able to directly relate electricity usage with the amount of money required, while bringing the time between purchase and consumption to as short an interval as possible. This method also enabled consumers to make conscious decisions about expenditure such as food and other household requirements against the cost of electricity.

Initially meter manufacturers developed proprietary technologies, but now the Standard Transfer Specification (STS), developed in 1993, manages the secure transfer of credit in electricity prepayment and is the only globally accepted open standard for electricity prepayment systems, having been adopted by the International Electrotechnical Commission (IEC 62055-41). This standard was adopted by Eskom and other supply authorities, which have subsequently replaced all proprietary meters installed with STS-compliant technologies.

Prepayment meters require a robust design for a host of reasons, not least for the ability to withstand transients and other network anomalies from the high incidence of lightning in many regions of the country. This requirement has resulted in the meter designs of South Africa being superior to those sourced from other countries.

## PROBLEMS

Conventionally designed prepayment meters do not solve

electricity theft by default and require a supply authority to implement proper management of the system to analyse consumption and purchase patterns of customers, perform site visits and be on the alert for other factors that could indicate electricity theft. These requirements have necessitated a smarter meter design where two-way communication with built-in fraud detection, including value-added features such as remote connection and disconnection, TOU, DSM, etc., are required to ensure revenues and to provide improved customer benefits.

Today the existing technology has grown old and does not solve all utility problems. On the other hand, there are technologies and tools that solve problems like remote control and management of the meters, load control, time-of-use and anti tampering, which fall under the umbrella design known as automated meter management (AMM).

Besides these requirements, utilities are anxious to introduce new services for their consumers such as easy payment of electrical bills not only via the meter keypad but also via the Internet, mobile phones and other communication channels. So the goal for the manufacturers, particularly in South Africa, is to combine STS and AMM technologies.

The IEC has identified the need to provide a framework for standardisation of payment metering systems. TC 13/WG 15 of IEC works in liaison with the STS Association, the developer of the Standard Transfer Specification. The result of this activity is the IEC 62055 series of standards. IEC 62055-21 defines the framework for standardisation, describing the application processes, functions, data elements, system entities and interfaces. The standard deals with physical token carriers (PLC, PSTN, LAN, WAN, etc.) as well. It was stated that there may be a need to align the payment metering system specifications with that of the relevant parts of the DLMS/COSEM specification as defined in the IEC 62056 series. The STS specifications are to be published as IEC/PAS 62055-41.

While the framework for standardisation is defined in IEC 62055, the specifications are not detailed enough to make components produced by different manufacturers fully interoperable. Thus today the manufacturers may propose proprietary solutions, using the IEC 62055 standardisation framework as a ground for future convergence.

## ADDAX SOLUTIONS

The design strategy of the ADDAX Prepayment solution is one that combines existing proven techniques with those of a true AMM concept. In other words, ADDAX Prepayment

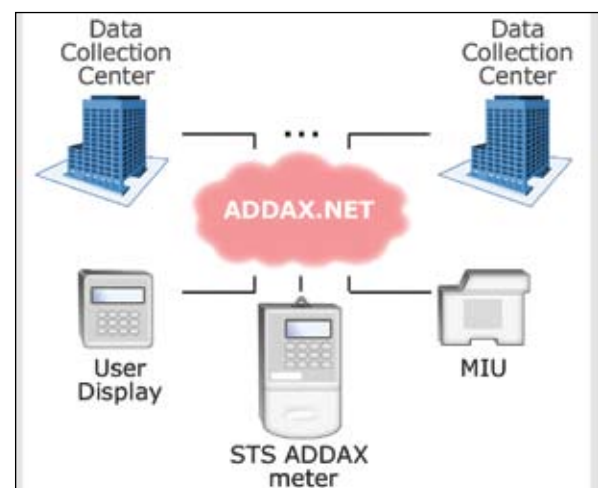


Figure 1 – The ADDAX Prepayment solution



Figure 2 - Simple ADDAX STS compatible meter

combines STS and AMM technologies, thereby allowing utilities to move to new technologies and requirements in a secure way. ADDAX Prepayment was developed on the proven ADDAX AMM platform, which has a global pedigree and provides for a truly integrated (water, electricity, gas, heat and street light metering) utility metering solution. The ADDAX AMM comprises different end-point devices (electricity meters, customer displays, MIU, etc.) and networking equipment for data transmission.

The ADDAX.Net data transmission network allows endpoint devices to exchange data with different data collection centres and between each other. A host of different types of physical environments can be used for data transmission – PLC low voltage, PLC medium voltage, GPRS, RF, wires and Ethernet.

In order to organise ADDAX.NET users' communication the TCP-UDP/IP protocol stack is used. At the same time every end point device supports this type of protocol stack. The electricity meters of the ADDAX AMM System are DLMS/COSEM compatible and have built-in means of data transmission to meet all types of different physical environments supported by the ADDAX.NET network.

In addition, ADDAX meters include a host of additional functionality such as remote connection /disconnection of consumers, anti tampering, load control, TOU and energy quality control.

A specific feature of ADDAX Prepayment meters, which are

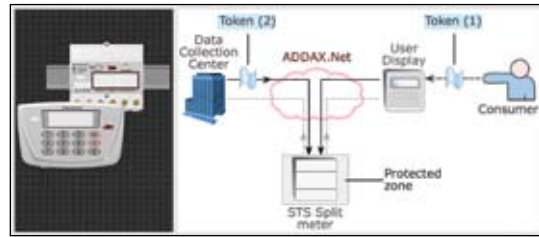


Figure 3 - Split ADDAX STS compatible meter.

STS compatible, is the additional built-in keypad enabling local token initiation. Tokens transfer to the ADDAX meter, therefore, may be implemented in the following two ways:

1. Simple manual input of the STS token via meter keypad.
2. Use of the ADDAX.NET data transmission network for token input via automated means.

**CONCLUSION**

South African and other utilities have a need to implement new prepayment and consumption management technologies, such as AMM, in order to improve utility and customer services while improving revenues from retail services.

At the same time, the existing customer billing system cannot be taken into consideration. This transition carries a high level of risk, which need to be minimised. The ADDAX solution, which provides new possibilities and at the same time supports existing proven technologies, seems most acceptable. **MI**



**ABOUT THE AUTHORS:** Elena Turanscaia joined ADD GRUP in 1998 as a marketing specialist. In 2005 she was appointed Executive Director, with responsibility for coordinating both the production and marketing activities of the company. She has two BSc degrees in General Management and Political Science from State University of Moldova and a Master's Degree of Business Administration from New Port University, USA.



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**ABOUT THE COMPANY:** ADD GRUP is the developer and producer of advanced metering infrastructure, including AMM and AMI solutions for utilities.

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