SMART METERING
LESSON LEARNT
CASE STUDIES - SMART METER PROJECT IMPLEMENTATION & ROLLOUT – LESSONS LEARNT FROM EUROPE, US AND AFRICA.

• THE SOUTH AFRICAN CATALYST FOR SMART METERING
• GLOBAL CONTEXT FOR SMART METERING
  • Key Drivers
  • Smart Meter Global Deployment Map Snapshot.
• CASE STUDIES (US, Europe, Africa)
  • Europe: EDF, Netherlands, UK
  • North America: US/Canada
  • Africa: South Africa
• EMERGING TRENDS & SOME LESSONS LEARNT
• CONCLUSION (KEY TAKE-AWAYS)
SOUTH AFRICAN TRIGGER & KEY DRIVER

2007
Power Outages

2008
Smart Meter Legislation

Deadline for implementation Jan 2012

2012
NRS 049 Specification

All Consumers >1000 kWh p/m
GLOBAL CONTEXT FOR SMART METERING
ELECTRICITY SMART METERING
KEY DRIVERS

- Energy Efficiency
- Market Deregulation
- Distributed generation
- Architecture for Smartgrid
- Deferred Generation Capacity Investment or Supply-side shortage.

- Supply-side shortage
- Revenue Protection: Fraud
- Revenue Collection: Prepayment
- Prestige
SMART METERING (AMI) & PREPAYMENT DEPLOYMENT SNAPSHOT

AMI Active
AMI Imminent
AMI Planning
Prepayment Active
Prepayment Active & AMI Planning
Prepayment Planning

Map showing deployment status across the world.
• Europe
  • France
  • Netherlands
  • UK
• North America
• South Africa
MAIN DRIVERS FOR SMART METERING IN EUROPE

• The Energy Services Directives (2006/32/EC, ESD)
  • Article 13(1) of the ESD demands that member states ensure that final customers are provided with competitively priced individual meters that accurately reflect consumption and provide information on the actual time of use.
  • The goal of this Directive and thus the objective of introducing individual meters and frequent bills is to ultimately save energy.

• Third Energy Package and particularly Directive 2009/72/EC.
  • This Directive demands in Art. 3(11) that, in order to promote energy efficiency, Member States or regulatory authorities shall strongly recommend that electricity undertakings optimise the use of electricity by, for example, introducing intelligent metering systems or smart grids.

• Additionally, the recast of the Energy Performance of Buildings directive (2010/31/EU, EPBD) includes a provision on the introduction of intelligent metering systems.

• An additional push can be expected from the work of the Smart Grid Task Force of the European Commission and the ongoing work of European standardisation bodies.
1) Market Drivers
• Market deregulation
• To allow new resellers
• Architecture for smart grid
• Energy efficiency,

2) Pilot
• Date Installation: 2010
• Quantities: 300,000 meters
• 2 areas: Lyon and Tours (Urban and rural)
• 3 suppliers for meters & communication:
  • Supplier 1 & 2: 100,000 meters 3,500 concentrators
  • Supplier 3: 100,000 single phase meters only
• 1 supplier for system and integration (ICT)
• Technical aspects:
  • PLC for LAN: sFSK 2,400 bites/sec
  • GPRS for WAN

3) Mass Deployment
• Deployment Date: 2012
• Quantities: 35,000,000 points
• Functionalities
  • 2 tariffs bank: one for distributor, one for the reseller.
  • 4 Quadrant meter
  • Integrated contactor 100 A
• Local communication for installation and commissioning
• LAN communication: PLC sFSK PLAN
• Local link for end user: one way RS 232 type
Legislation is in final preparation for a mandatory rollout. The goal is from January 2012 to only install electronic meters and have a 95% coverage by the end of 2016. This goal was enforced by a government decree in August 2010. The regulator defined some guidelines and minimum functional requirements for electricity meters. A cost-benefit-analysis with a positive result was presented in 2007. The rollout of gas smart metering is under discussion.
CASE STUDY. NETHERLAND.

Key Drivers
- Energy saving objectives consistent with EU Directives.
- Realize cost savings through more efficient network operations and data exchange
- Simplicity for the end consumer.

Feedback
- Dutch Senate rejected proposed legislation including a compulsory roll out of smart metering for reasons of privacy and security. Proposed legislation and smart meter standards were being revised.
- Dutch Parliament adopted legal framework for voluntary installation of smart metering in November 2010. Customers may choose between four alternatives (from keeping conventional meters to full AMM).
- Compatibility and interoperability issues to be addressed. Collaborative effort with parties in energy sector defining the functionalities of the smart meter: National Technical Agreement (NTA 8130) and now the DSMR V4.0.
- In the mean time Oxxio (4th largest energy supplier) has installed 100 000 residential smart meters!
A two-year pilot phase will be carried out in 2011–2012. Following an evaluation of the results a 6-year rollout phase could start in 2013. A multitude of pilot projects has been restarted.

**Pilot phase**
- Grid companies are doing several pilots to prepare for basic roll-out
- Example: Amsterdam Smart City

**Basic roll-out**
- Grid company places smart meters at new buildings, large-scale renovations, replacement of existing meters, when involving "More with Less" meters and upon explicit request

**Large-scale roll-out**
- Start after evaluation basic roll-out
- The grid company must roll-out smart meters to the connections in its grid
  - Time line: 6 years

**Structural to-be situation**
- The grid company has a monopoly on the installation and maintenance of all smart meters
- > 80% of customers have a smart meter based on results of evaluation

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**Back to the Drawing Board**

**2010**  
**2011**  
**2012**  
**2013**  
**2019**
CASE STUDY. UNITED KINGDOM

Market
• Dual fuel (electricity + gas) -> 47 Million meters
• Mandatory rollout for larger customers until 2014 (electricity & gas),
• Mandate in place for domestic electricity & gas rollout until 2020.
• The main energy suppliers, rather than distribution networks, are responsible for the rollout

Drivers
• Market Deregulation
• Moderate consumption at peak times
  • Boost energy efficiency
  • Reduce carbon emissions
• Transform customer experience
• Evolve prepayment to smart payment

Feedback from trials
• The regulator (Ofgem) initiated the Energy Demand Research Project (EDRP) with around 58,000 households.
• Four suppliers (EDF, Scottish and Southern Energy, Scottish Power and E.ON) installed smart meters, in-home displays, financial incentives and other feedback mechanisms.
• A final report is expected in 2011.
• Some suppliers (British Gas, First Utility, npower) have already begun installing smart meters including customer response trials.
CASE STUDY. NORTH AMERICA

Market
- North America has the largest installed base of smart meters in the world
- > 65 Million contracted end points in the US & Canada (2008 to 2015) – Pike research
- Multi-Energy (electricity + water+ gas)

Drivers
- Demand Management.
- Market deregulation.
- Operational efficiency
- Energy Efficiency.

Feedback from trials
- RF is preferred technology.
- Less sensitive to interoperability issues as smart metering systems can be in independant networks.
- Deployment schedules a major challenge [4000 to 12000 meter installations per day!]

Sad Socket Gets Smart
- You'd be sad, too, if you were leaving your customers in the dark
- …if you were using 1950s technology.
CASE STUDY. SOUTH AFRICA

Drivers
- Generation Supply Shortage
- Revenue Protection Issues.
- Energy efficiency (PCP)

Market
- High-end Residential Customers using >1000kWh p.p. (estimate 670,000 – 1Mill)
- What about Commercial and Industrial customers who contribute to the morning peaks?

Key requirements
- Specified in NRS049 standards. (being revised presently)
- Complex tariffs
- Real-time data to consumer
- Load restriction in the meter
- Load management
- Remote disconnection /reconnection
- Smart payment/prepayment
- Split metering
- Micro-generation and export energy considerations. (Solar panels)
- Modular communication options
- Remote software and firmware upgrades

Feedback from trials
- Key requirements
Specified in NRS049 standards. (being revised presently)
Complex tariffs
Real-time

- Lack of available unified smart metering standards encompassing both prepayment and post payment needs. (Full interoperability)
- RF, PLC, Long wave Radio solutions.
- Many proprietary solutions installed.
- Lack of sufficient funding limiting pilot size
- Lack of end consumer involvement
EMERGING TRENDS

HELLO! I'VE COME TO REPLACE YOUR OLD METER WITH THIS AMAZING MARKET COMPLIANT ONE!

Value Added Service
LESSON LEARNT (1)

DEPLOYMENT CHALLENGES

- Initial expected deployment plans (2005-2010 projections) of smart metering not materialising as envisaged.

- There are large number of “Pilots” of varying sizes in progress to evaluate impact and learn while technical, legal and social issues are addressed. A significant slowing down of execution indicating a cautious approach.

- Lack of skilled resources and general capacity to deploy projects on a large scale without proper planning and prior to evaluation of pilot results.

- Indications are that momentum picking up in 2011 and new targets set towards 2020.

ECONOMIC BARRIERS

- There are many parties involved, and the benefits of smart metering may accrue to parties than do not necessarily bear the costs.

- Large scale AMI deployments take long and are costly. Opposition from regulators to increase the tariffs further and ask final users to pay for it.

- Business case justification or target segment strategy not always clear.

- Funding Issues - Many AMI Pilots planned but delayed.
LESSON LEARNT (2)

END CONSUMER CHALLENGES

- Initial lack of involvement/education. (Dutch case, Improving in UK)
- Need to be convinced of benefit and savings to them.
- Concerns about security, privacy & health

TECHNOLOGY CHALLENGES

- Standardisation taking longer than expected.
- Convergence of Technology well progressed but not fully there in totally inter-operable manner.
- Lack of interoperability between different smart meter systems. No open registered standards exist which properly scopes all of the different functions (metering, communications, presentation, and network). Availability of multi-vendor Technology modularity progressing especially in larger scale multi-vendor pilots. (Eg EDF and DSMR 4.0)
• “Gudrun” storm hit west Sweden in January 2005, during a smart meter project implementation phase.

• 25,000 metering points were affected for 9 months, with lots of consequential impacts.

• Supplier had project responsibility, but Utility could not restore their poles quickly in mid-Winter.
MAIN CHALLENGES FOR THE IMPLEMENTATION OF SMART METERS IN SOUTH AFRICA

- Communication Infrastructure Development
- Delivery Time
- Clear Strategy (Tariffs, Load management, Load limiting, funding)
- Price Competitiveness
- Long Term Product & System Compatibility
- Delivery Time
- After Sales Service and Support
- User Friendliness
- BEE Compliance
- Skills Shortages
- South African Smart Metering Market
TAKE AWAYS

» Learn from others Experiences – Learn from early adopters while adjusting for our specific context.

» Business Case – Be clear on this. Are you solving a short term DSM problem or a want smart metering for all the long term benefits that span across the value chain.

» Communication Technology – The communication layer is critical for the success of AMI. No one solution fits all.

» Meter Interoperability – Essential for a competitive Smart Meter implementation and drives Technology Innovation.

» Conduct Pilots Small pilots with single vendors and proprietary solutions are a “No go”, especially while issues like standardisation and required functionality are still work in progress. Use Pilots to prove end to end solution/interoperability for mass roll-outs.

» Process/Technology/People – Drive the AMI vision through firm processes, Technologies and practices, and up-skill People to ensure a solid support structure.

» Meter Deployment Process – Establish realistic deployment plans within your constraints. Not all implementations will work the same.

» Smart Metering is NOT about the meter.

» Engage with the End Consumer. Engage with the End Consumer. Engage with the End Consumer.
“The only way to meet the energy demand in a carbon constraint environment is through government policy and regulation but Politics is more difficult than Physics”

Clay Sell (Deputy secretary DOE – US)