How Market Liberalization and Changes in Energy Regulations in Europe Drive the Adoption of Smart Metering Systems

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There is a New Metering Generation

- Transitioning from…
  - Electro-mechanical to digital
  - Isolated to networked
  - Basic measurement to rich base functionality
  - Limited to flexible tariff plans
  - Fixed function to remote upgradeability
  - “AMR” to “AMI”
“The Americans have need of the telephone, but we do not. We have plenty of messenger boys.”
  – Sir William Preece, Chief Engineer, British Post Office, 1878

“When the Paris Exhibition closes electric light will close with it and no more be heard of.”
  – Erasmus Wilson, Professor at Oxford University, 1878

“The horse and buggy is here to stay, but the automobile is only a novelty, a fad.”
  – The president of the Michigan Savings Bank to Horace Rackham, Henry Ford's lawyer, 1903

“The cinema is little more than a fad. It's canned drama. What audiences really want to see is flesh and blood.”
  – Charlie Chaplin, 1916

“I have traveled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last out the year.”
  – Business books editor at Prentice-Hall, rejecting a manuscript on data processing, 1957
In the End, Economics Always Wins Out
Our Industry Blurs AMR, AMI and Smart Metering

- There has been no clear and consistent use of the terminology within the industry

- AMI and smart metering is, in fact, not limited
  - More than just two-way communications
  - More than just kWh monthly and interval metering data
  - More than just supporting meter reading applications
  - Should not utilize electro-mechanical meters
Some Industry Definitions of AMI

- An advanced metering infrastructure is a comprehensive, integrated collection of devices, networks, computer systems, protocols and organizational processes dedicated to distributing highly accurate information about customer electricity usage throughout the power utility and back to the customers themselves.

- Such an infrastructure is considered “advanced” because it not only gathers customer data automatically but does so securely, reliably, and in a timely fashion while adhering to published, open standards and permitting simple, automated upgrading and expansion.

- A well-deployed advanced metering infrastructure enables a variety of utility applications to be performed more accurately and efficiently including time-differentiated tariffs, demand response, outage detection, theft detection, network optimization, and market operations.

- Advanced metering infrastructure (AMI) supports increased functionality in revenue meters, two-way communications to take advantage of that functionality, and new system applications that utilize information from advanced meters. AMI has the potential for dramatic improvements in utility operations, reliability, and customer service. Much more than just automated meter reading, AMI serves as the primary information-gathering system for utility operations.
What AMI and Smart Metering Really Are

- **AMI provides true two-way meter communications**
  - Scheduled communications
  - On-demand and real-time communications
  - Secure and encrypted communications
  - AMI is not simply AMR with two-way communications

- **AMI and smart metering also provide**
  - Customized interval meter data and peak demand readings
  - Forward and reverse measurements with programmable calculations
  - Dynamic rate capabilities (TOU, RTP, CPP)
  - Power quality and reliability data
    - Voltage and current readings, power factor, and frequency
  - Real-time control and demand response functionality
  - Outage and theft detection
  - Prepayment services
  - Integrated software-controlled disconnect switch
  - Remote programmability and firmware upgrades
  - Ability to add new functionality

- **AMI sets the stage for local area (in-home) communications**
Regulatory Developments in Europe

- Kyoto Protocol and European gas emission allowances
- **Sweden Government’s meter reading requirements**
  - Monthly meter reading for all customers by 7/09
  - Hourly meter data for customers with greater than 63A service by 7/06
- **Netherlands’ proposed legislation**
  - Starting in 2008, all residential customers will begin to get a smart meter
  - Proposed time frame is 6 years
- **UK’s Regulator Ofgem is exploring the use of smart meters**
Next-Generation Smart Metering Has Already Taken Hold in Parts of Europe

“… Enel will save 500 million euros in operational costs a year, which will repay the investment in four years,“
— Vincenzo Cannatelli, Enel's head of distribution and markets

“…during the tender process, a generation change in technology took place…”
— Göran Lundgren, CEO of Vattenfall distribution

“…will not only be able to improve our efficiency and lower our costs to the benefit of our shareholders, but also improve our quality, reliability, and responsiveness to the benefit of our customers."  
— Paul Corton, CEO of Continuon Netbeheer
What can AMI and Smart Meters do?

- Smart Meters create a paradigm shift and drive a change in generation planning and peak shaving strategies

- Utilizing AMI and Residential Smart Meters …
  - Creates a real time market for energy
  - Reduces peak demand
  - Protects the system/generators from capacity shortfalls
  - Eliminates theft and fraud
  - Helps optimize T&D and generation resources
  - Opens access to all smart meter data
  - Makes smart meters pay for themselves

- Everything you need to do today as well as in the future
  - …but only if your meters, network and processing are truly smart enough and obsolescent resistant!
AMI and Smart Meters Benefit Many Organizations

- Field Operations
- Work Management
- Customer Service
- Generation
- Customer contracts
- Capital Investment
- Installation & Services
- AMR & Billing
- Demand Forecasting
- Roll Out
- Quality
- Reads
- Customer Information
- Trends
- Distribution
- Distribution Automation
- Revenue Protection
- Purchasing and Logistics
Smart Metering Data Empowers Many Stakeholders

- Consumers can choose to use energy based on real-time costs
- Load serving entities can reduce costs and increase productivity and reliability
- Regulator’s can set rates based on best practices and target incentives
- Grid Operators can make sure the region optimizes transmission and generation resources
AMI and Smart Metering Bring Utilities to a New Level

Business Process Changes delivering ROI

Opportunity Cost of Investment

Investment Cost

Manual meter reading
- Monthly kWh reads

Automatic Meter Reading (AMR)
- One-way or two-way
- Monthly kWh reads
- Interval data
- Basic theft detection
- Outage/Restoration Detection

Advanced Metering Infrastructure (AMI)
- On-demand reads
- Programmable load intervals
- Bi-directional and net metering
- TOU, RTP, CPP pricing options
- Demand response
- Gas & Water metering

Smart Meters
- Solid-state platform
- Integrated communications
- Integrated disconnect switch
  - Remotely disconnect
  - Remotely connect
- Power quality data
  - Voltage readings
  - Current readings
  - Power Factor
  - Frequency
  - Detailed power outage data
- Advanced theft detection
- Remote programmable
- Remotely upgradeable
- Internal expansion port
  - Future functionality

Future Applications
- Home area network gateway
  - > PLC (i.e. LONWORKS®)
  - > RF (Bluetooth)
- Enable various customer based applications
  - > Demand Response
  - > Prepayment
  - > Load Control

Opportunity Cost of Investment

Investment Cost

Future Applications
Summary

- AMI and smart metering deliver substantial benefits to utilities and consumers
- AMI is dramatically more beneficial than AMR with two way communications
- AMI and smart metering, done correctly, can be a new platform for energy policy
  - Creates a paradigm shift in the industry and
  - Creates a new tool for generation planning
Q&A / Discussion
Thank You