Improving Meter Inventory with RFID
(AMR/AMI Implementation Impact)

April 25, 2006

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Our Agenda

- Issues with AMR/AMI metering deployments and ongoing meter management
- Potential RFID solutions for metering issues
- Two utility applications
- Future utility applications of RFID
- Industry observations
Business issues with AMR/AMI deployment and meter life-cycle management

- Large-scale AMR/AMI meter deployments present unique implementation issues

- Identifying and resolving these issues is a key driver to minimizing unintended impacts and maximizing project success

- In addition, ongoing meter life-cycle management issues require greater focus in today’s asset-driven performance world

Knowing the solutions in advance is key to project success
Large-scale AMR/AMI deployments can present a number of potential challenges:

- Supplier reliability
- Manufacturing schedule
- Product/solution performance
- Deployment logistics
- Back-office integration
- Business process redesign
- Customer impacts
- Regulatory compliance

“As the project gets underway, logistics management becomes a major challenge in maintaining the schedule.”

“At times, it seems an AMR project has a million moving parts, including meter control and management…”

“... the key to staying on schedule is having the material when it’s needed.”

Source: KEMA interviews of utility representatives
Logistics management is a critical driver to AMR/AMI project success

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<tr>
<th>Key Deployment Issue</th>
<th>Logistics Challenge</th>
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<tr>
<td>Inventory visibility</td>
<td>Ability to track specific meters at key points in the supply chain</td>
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<td>High volume data throughput</td>
<td>Capability to minimize data transcription errors and impacts to other revenue cycle business processes</td>
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<td>Regulatory compliance</td>
<td>Validation of internal controls to meet Sarbannes-Oxley and state-driven requirements</td>
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Post-deployment meter management also presents similar business issues

- **Asset management**
  - Stock accuracy = What is our current meter inventory level (central stores/field locations)?
  - Excess inventory = What minimum levels of field inventory are required?

- **Inventory tracking/traceability**
  - Stock location = recall identification
  - Meter forecasting = How accurately are we capturing inventory turns?

- **Process confirmation**
  - Field installation = How effectively/accurately are our revenue processes tracking meter sets/ replacements?

- **Regulatory compliance**
  - Stock location = What data/financial controls do we have to verify asset-driven revenue steams?
Incorporating RFID is being considered as a solution to resolve these and other meter management issues.

### Key Management Question

- During a recent AMR deployment, a major utility used the best solution available at the time: bar-coding.

- However, this utility is now considering the use of RFID solutions to improve its ongoing meter logistics issues.

Is RFID ready for “Prime Time” in utility meter management? (or is this bar-coding on steroids?)
RFID technology works similar to bar-coding, but performs more effectively.

- Tag
  - Passive vs. active
  - Internal vs. external
- Reader (Portal and handheld as needed)
- Communications to and from readers and controller software
- Communicating data to and from back-office systems
- Database/integration software
- Enterprise applications (e.g., WMS, ERP)

RFID functionality is rapidly replacing bar-coding to reduce/eliminate manual processes and improve data efficiencies.

Key advantages of RFID technology:
- Non-line of sight
- Automated tracking (portals)
- Less susceptible to damage
- Larger data capability
- Can be read-write
- Can verify date and time of action
RFID technology is rapidly maturing

- **RFID innovation**
  - **Second Generation**
    - Faster read rates
    - Dense read capability
    - Improved security
  - **Decreasing costs**
    - Tags
    - Readers
    - Portals

Movement toward individual item tracking (Third Generation)

- **Viability of RFID applications across multiple industries is increasing**
Many industries are already using RFID to resolve their own core business issues

- Consumer products goods industry
- Education
- Entertainment
- Government
- Healthcare/Pharmacy
- Manufacturing/Industrial
- Retail (e.g., Wal-Mart)
- Travel/Transportation
- Oil/Gas

When will utilities embrace this technology?

BP's chief technology officer states they will explore the potential benefits of the technology and "position BP to take full advantage of this emerging capability."
RFID can improve meter logistics by automating manual processes

- Reduce/eliminate meters lost due to errors/incomplete paperwork
- Improve supply chain efficiencies
- Improve inventory control/material processing

A site survey examines the capability of Tag and Readers within the operating environment.
SEMPRA Energy identified a number of meter installation issues

- **Limited visibility**
  - Inability to forecast meter demand
  - Excess/unclear inventory

- **Lost meters & revenue**
  - Limited meter asset tracking
  - Unidentified meter locations

- **AMI**
  - Track meter attributes
  - Handle increased meter volumes

### Areas of Opportunity & Comments

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<th>Areas of Opportunity</th>
<th>Comments</th>
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<tr>
<td>Limited visibility</td>
<td>Difficult to forecast demand for meters</td>
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<td>Unclear how many meters are in stock (in the warehouse and on trucks) at any given time</td>
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<td>Excess meter inventory</td>
<td>Limited supply chain visibility encourages employees to hold excess inventory</td>
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<td>Volume of meters</td>
<td>With new initiatives being started the organization needs to provide ongoing support for increased meter activity.</td>
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<td>Increased need for tracking individual meter attributes is not currently supported.</td>
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<td>Lost meters/Unbilled revenue</td>
<td>Because a meter is not tracked through the warehouse to installation, there are no records about where some meters have been installed.</td>
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<td>Unbilled revenue occurs until these meters are found.</td>
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<td>Inefficient process</td>
<td>Meter receipts and issues are not tracked full within the Supply Chain key-entered into SAP.</td>
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**Conclusion:** Inefficient to manually enter receipts into SAP
SEMPRA conducted a proof-of-concept exercise and closely analyzed RFID costs and benefits.

SEMPRA Stakeholders

- Metering
- Logistics
- Supply Chain
- IT
- Customer Service
- Account Management
- Vendors

These efforts were aided by an enterprise-wide focus.
SEMPRA is now conducting a three month RFID pilot project

- 2 warehouses: 1 gas, 1 electric
- 4 bases: 2 gas, 2 electric
- Estimated Cost: $600 to $800k
  - Includes IT integration and business/ systems design
  - Utilize tethered gas tags @ $3 to $4 each
  - 10,000 tags
  - Regular meter management savings (operational rounds) of $250k

Result: projected payback of 9 months
A full RFID roll-out has now been approved for SEMPRAs’s AMI program

- Vendor trials deemed successful
- Hard savings $600k/yr
- Soft savings $200k/yr
- $4.5M budget approved for roll-out
  - 1.3 million electric meters
  - 800K gas meters
- AMI program also presented opportunity to update meter inventory processes
  - Sempra to install 250K-800K meters/year
  - 3-year ROI
Automating meter inventory processes could increase operational efficiencies and reduce costs

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<th>Soft Savings</th>
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<td>Increased revenue (unbilled)</td>
<td>Reduced administration</td>
</tr>
<tr>
<td>Reduced FTE</td>
<td>Accurate inventory</td>
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<tr>
<td>Avoided FTE</td>
<td>Timely inspection reports</td>
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<tr>
<td>Reduced rework</td>
<td>Increased productivity</td>
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<tr>
<td>Reduced process time</td>
<td>Efficient recall process</td>
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<tr>
<td>Reduced inventory</td>
<td>Improved employee sat.</td>
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<tr>
<td></td>
<td>Avoid handling &amp; storage</td>
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Incorporating

An Eastern IOU that piloted RFID for pole tracking is now considering RFID for metering

- Piloting passive tags for poles
  - Problem: Hectic pace of storm restoration throws inventory into disarray
  - Likely to roll-out after pilot
- Considering RFID for metering
  - Problem: Inconsistent meter inventory tracking
  - PUC would favor it
  - Issue: Does responsibility lie with metering or asset management system?
RFID’s value and future in the utility industry is still unclear

- Through limited trials, RFID has been shown to improve meter supply chain logistics processes

- Key questions:
  - What results can utility managers draw upon from other industry applications of RFID?
  - How can other utilities seek similar results in their meter management processes?
  - What utility-specific products or solutions will be required from the vendor community to foster greater visibility of RFID technology?
  - What other AMR/AMI deployment challenges/risks can utility managers seek to resolve with RFID technology?
Incorporating

In addition to metering, we have seen other utility applications of RFID technology

- Tracking high-value equipment: transformers, poles
- Refueling management
- Emergency/maintenance kit verification
- Verify asset installation, inspections and maintenance
- Reductions in fleet costs: tire pressure, fuel efficiency impact
- Security/safety: Individual access control and tracking
- Track specialized tool usage
- Operator rounds in generation plants
- IT equipment tracking: computers, network equipment
- Document management for legal/regulatory departments
- HazMat container tracking
- Critical asset tamper control
- Underground cable ID
Increased utility industry visibility of RFID will be partially driven through vendor actions

- American Meter – installed RFID tags on gas meters for Sempra pilot and is willing to put into production – other meter manufacturers have shown limited interest
- Intel (chips/industry specialists) – starting to address utility industry
- Shipcom Wireless for meters (middleware) – Sempra pilot participant offering RFID-based meter management solution that is available for production
- IBM (asset management middleware) – developed RFID-based asset management system that can be used for meter management
- SAP (ERP system) – Sempra pilot participant offering asset management system eliminating need for middleware
- Symbol, Intermec (portals and handhelds) – both participated in Sempra pilot and offer general utility solutions; Symbol's portals or handhelds for RFID asset management are in place at two large utilities
There are a number of key drivers for RFID technology adoption

1. Start with a focus on resolving targeted business process issues, rather than fitting the technology to a solution

2. Closely integrate requirements analyses to specific vendor solutions (e.g., tags, readers, software, integrators)

3. Introduce applications through proof-of-concept trials to facilitate financial analyses and further implementation strategies

4. Evaluate RFID projects as a component of overall Asset Management or AMR/AMI deployment strategies
Thank you for your time

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