AMR/AMI for Water Utilities

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• **AMR - automated meter reading**
  - a technology which automatically collects metering data and transfers that data to a central database for analysis and billing purposes, generally called “smart meters”. Detailed water usage data can be collected continuously at regular intervals (for example, every 30 minutes) and can be read remotely via an automated process, with the usage data sent to the utility’s management and billing system. AMR can consist of a number of various methods, ranging from a simple drive-by meter (where the meter reader cruises down the street automatically downloading the meter data) to one way communications with the utility.

• **AMI - advanced metering infrastructure**
  - starts with smart meters and adds two-way communication between the meter and utility, and between the meter and consumer. This means that in addition to providing readings, the meter can also receive (and often act on) instructions sent from the utility or consumer.
Similar Operational Benefits

- reduced meter reading costs
- reduced costs associated with field visits and customer calls
- improved billing accuracy and improved cash flow
- improved outage information and response
- more efficient asset management and distribution engineering design.

<table>
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<tr>
<th>Benefits ascribed to installation of an AMR system</th>
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<td>- Increased revenue from previously unaccounted for water</td>
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<td>- Reduced meter reading costs including both regular cycle reading and special reads</td>
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<td>- Reduction in safety / security issues</td>
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<td>- Reduced GHG</td>
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<td>- Increased customer service</td>
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<td>- Help identify and pinpoint losses (customer and system)</td>
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<td>- Help detect theft of service</td>
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<td>- More efficient billing</td>
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<td>- Improved cash flow</td>
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<td>- Conservation/Efficiency Improvements</td>
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<tr>
<td>- Provide outage management and detection</td>
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<td>- Intangible benefits</td>
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The Use of Water Smart Meters

- Improve the understanding of water consumption and flow patterns
- Track and predict changes in trends and demands
- Highlight anomalies
- Warn of high or low flows
- Identify leaks or other waste minimization opportunities
- Shift water consumption to other parts of the day
Finding Leaks

Water Consumption of a Shopping Centre’s Female Toilets
from Monday 28/11/05 to Sunday 18/12/05

1st Leak
2nd Leak
Finding Leaks

ProfilePLUS

Time Period: Dec 5, 12:00 AM through Dec 5, 11:00 PM
Customer Name: Gertz, Trent
Address: 437 Hollender Rd
Meter ID: Q01531315

Hourly Consumption Graph

Peak Hourly Consumption of 136 Gallons was recorded on December 5, 7:30 AM
Total Consumption recorded for the period was 929 Gallons
Billing Disputes

Daily Consumption Graph

Peak Daily Consumption of 2,410 Gallons recorded on Thursday, May 12
Total Consumption recorded for the period was 27,770 Gallons
Conservation Program Violations
Remote (Virtual) Turnoff

ProfilePLUS

- Time Period: Nov 15 through Dec 15
- Customer Name: Johnston, Mia
- Address: 1455 Vineyard Court
- Meter ID: 32318

Peak Daily Consumption of 318 Cubic Feet was recorded on Wednesday, December 4.
Total Consumption recorded for the period was 6570 Cubic Feet.

New Residents In
Old Residents Out
Better Water Use Prediction

Water Consumption of Cooling Towers from Saturday 05/11/05 to Saturday 12/11/05

Colder Days

Hotter Days

NO LEAKS

Date and Time Logged
Determine Timing of Water Use

Meter #: 70613559
Total Consumption: 6482.00 Cubic Feet
Peak Consumption: 4.00 on Jul 31, 2005 @ 4am

Hourly Consumption for August 1, 2005
CEC 500-07-022
ACWA Smartmeter Case Study

- ACWA (Association of California Water Agencies), Water & Energy Consulting, Coachella Valley Water District
- Emphasis upon peak electrical demand reductions
- Case Study
  - Installation of TOU (smart) customer water meters in City of Palm Desert
  - Catalog of water smart meters, capabilities, characteristics, costs, and installation
  - Water use profiles for: residential, commercial (strip mall), irrigation
  - Integration of smart meters into water agency operations
  - Development of TOU water rates
  - Assessment of water use shift out of summer afternoon period
  - Impact of water use shift on agency operations
  - Peak electrical demand reduction impact
Survey Of AMR/AMI in California Water Agencies

Figure 3. Predominant Water Meter Supplier

- **Badger**
- **Sensus**
- **ITRON**
- **Ramar/Hershey**
- **Datamatic**
- **Master Meter**
- Other/Mixed
Over 50% of public water agencies in CA have some AMR installed (approximately 20% are completely AMR), 60% are planning on installing/evaluating AMR in the near future. The initial main reason for AMR installation is meter reading cost.

**Figure 5. Expected Benefits of AMR**

- Increased revenue
- Reduced meter reading costs
- Safety / security issues
- Reduced GHG
- Customer service
- Identify losses
- Theft detection
- More efficient billing
- Improved cash flow
- Outage management
- Conservation
- Other

![Bar chart showing the expected benefits of AMR.](image)
AMR Issues

Figure 6. Concerns About AMR

- Other
- Vendor support
- Compatibility with existing system
- Ease of installation and maintenance
- Integration with current billing system
- Cost of AMR
- Technical obsolescence
- Industry standards
- Meter battery life
AMR Decision:
What kind of meters or meter readers, where installed, how read, billing compatibility

Figure 4. Evaluation Criteria for AMR Selection

- Price
- Dependability
- Support
- Warranties
- Experience
- Storage of information
- Ease of installation
- Software compatibility
- Transmitter range
- Level of technology
- Battery life
- Compatibility w/existing
- Other

Reading Technologies
- Gas Meter
- Electric Meter
- Water Meter
- Handheld
- Mobile
- Network
- Metering Data
- Utility Billing System
Fixed vs. Network Configuration Consideration
Recommendations

• If you aren’t investigating AMR for your system - start
  – contact other water utilities about their experience - evaluation criteria, implementation issues, performance issues

• If you have AMR - start thinking about AMI

• If you have AMI - start think about other uses than you are traditionally used to
  – Distribution system integrity (remotely identify location and extent of water main breaks, control water loss during breaks, restore service after outages)
  – Reduce electricity use and cost ((increase off peak pumping and treatment, leak detection)
  – Provide increase customer support and involvement (web access)
  – Reduce chemical use ( predict changes in water use and timing)
  – Monitor compliance with watering restrictions/conservation programs
  – Increase theft detection
  – Remote turn-off/on