

**WATER MANAGEMENT IN REAL TIME –
KNOW EXACTLY THE ‘WHEN, WHERE & WHY’ OF
YOUR WATER CONSUMPTION**



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WATER MANAGEMENT IN REAL TIME – KNOW EXACTLY THE ‘WHEN, WHERE & WHY’ OF YOUR WATER CONSUMPTION

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ABSTRACT

Automatic meter reading, or **AMR**, is the technology of automatically collecting data from a water or energy meter and transferring that data to a central database for billing and/or analyzing. This saves employee trips, and means that billing can be based on actual consumption rather than on an estimate based on previous consumption, giving customers better control of their use of electric energy, gas usage, or water consumption.

AMR technologies include handheld, mobile and network technologies based on telephony platforms (wired and wireless), radio frequency (RF), or powerline transmission.

1.0 BRIEF HISTORY

The primary driver for the automation of meter reading, is not so much to reduce labor costs, but to obtain data that is otherwise unattainable. Many meters, especially water meters, are located in areas that require an appointment with the homeowner. Gas and Electricity tend to be more valuable commodities than water, and the need to offer actual readings instead of estimated readings can drive a utility to consider automation.

While early systems consisted of walk-by, and drive-by AMR for residential, telephone based AMR served well for commercial or industrial accounts. What was once a need for monthly data became a need for daily and even hourly readings of the meters. Consequently, the sales of drive-by and telephone AMR has declined in the US, while sales of fixed networks has increased.

The US Energy Policy Act of 2005 asks that electric utility regulators consider the support for a "...time-based rate schedule (*to*) enable the electric consumer to manage energy use and cost through advanced metering and communications technology.

2.0 ADVANCED AMR AND AMI

Originally AMR devices just collected meter readings electronically and matched them with accounts. As technology has advanced, additional data could then be captured, stored, and transmitted to the main computer, and often the metering devices could be controlled remotely. This can include events alarms such as tamper, leak detection, low battery, or reverse flow. Many AMR devices can also capture interval data, and log meter events. The logged data can be used to collect or control time of use or rate of use data that can be used for water or energy usage profiling, time of use billing, demand forecasting, Demand response, rate of flow recording, Leak detection, flow monitoring, water and energy conservation enforcement, remote shutoff, etc.

Advanced Metering Infrastructure or AMI is the new term coined to represent the networking technology of fixed network meter systems that go beyond AMR into remote utility management.

The meters in an AMI system are often referred to as smart meters, since they often can use collected data based on programmed logic.

Advanced Metering systems can provide benefits for utilities, retail providers and customers. Benefits will be recognized by the utilities with increased efficiencies, outage detection, tamper notification and reduced labor cost as a result of automating reads, connections and disconnects. Retail Providers will be able to offer new innovative products in addition to customizing packages for their customers. In addition, with the meter data being readily available, more flexible billing cycles would be available to their customers instead of following the standard utility read cycles. With timely usage information available to the customer, benefits will be seen through opportunities to manage their energy consumption.

The benefits of smart metering are clear and proven.

- Accurate meter reading, no more estimates
- Improved billing
- Accurate Profile Classes and Measurement Classes, true costs applied
- Improved Security for premises
- Energy Management through profile data graphs
- Less financial burden correcting mistakes
- Less accrued expenditure
- Less time chasing call centers to provide meter readings
- Transparency of “cost to read” metering
- Improved procurement power though more accurate data - “de-risking” price.

Many authorities are moving towards complete AMR solutions.

3.0 CASE HISTORY

3.1 Managing and monitoring Multi-site water use utilizing existing meters, Radio Transponders and self powered GSM equipped AMR equipment.

(A project initiated by the Facilities Management Section, Essential Services, Queensland University of Technology Brisbane.)

They faced the issue of what AMR system or combination of system to choose.

The choice of 6 common types

1. Conventional Water Meter
2. Meter with RF output
3. Meter with data logger – manual read
4. Meter with data logger – Automatic read and email
5. Meter with data logger – Automatic read, alarm, email, sms or PLC output
6. Meter with data logger – Automatic read, web based interrogation

Offering unlimited options

- Multi-site management
- Alarm / alert features
- Drive by reading
- Identify peak use times
- Identify abnormal peaks
- No more time consuming manual reading
- Leak Detection

In meetings with QUT we outlined 4 major areas that needed monitoring:

1. Demand Management
2. Resource Management
3. Cooling Tower water use
4. Irrigation water use

The multi campus university has a number of council owned boundary meters supplying water for all the functions; potable, fire, cooling towers, irrigation, research etc. To understand the draw off demand and to identify major use / leaks etc, it was decided to log the use at each meter and then review that usage for further investigation should it be warranted.

By fitting the existing Boundary pulse capable meters with reed switches and an AMR system that logs & reads data, then transmits the data via GSM messaging technology to a central email address.

The GSM equipped AMR reader logs usage at five minute intervals and wakes up to send the data back to the nominated email address at 6am every morning. It is powered with Lithium batteries which offer a life of approximately five years. Using the software supplied with the system, the data can be viewed as graphs, tables etc for review and decision making.

3.2 Cooling Tower & Irrigation

A Radio Transponder system was installed on the in-let & out-let meters of the cooling towers. This allowed 90% of the meters to be read from one position on each campus with a hand held device. The result was that the reading time was reduced from 2 days to 10 minutes per campus to read all the Meters.

This reduced the labour by one person & also allows the meters to be read Daily instead of weekly. The Daily reading of the Supply & Waste of the Towers allowed the systems in place to be fine tuned to reduce the amount of water & chemicals being run out into the trade waste.

On each campus the main Irrigation lines were individually metered and Radio Transponders attached. This allowed daily monitoring of usage.

Two Leaks were detected on the Kelvin Grove Campus with the radio system installed.

These systems allow complete visibility of the water usage of multiple sites across a 24 hour period. The system is useful in identifying leaks, major draw off and irregular use.

The systems help to identify & monitor significant water use reduction and subsequent cost savings.