DETAILED

SECTOR | Water
STAGE | Strategy and Planning, Operations and Maintenance
TECHNOLOGIES | Sensors / IOT, Big Data, Data Analytics

SUMMARY

Smart meters collect and transmit real time water usage data from residential and industrial end users. The usage data assists in reducing water loss, demand forecasting and optimising network operations, as well as increasing community water efficiency. The latest versions of these devices take advantage of increased innovation in communications technology and data analysis systems and, more importantly, have drastically reduced in cost to make these more affordable. Smart metering has often been likened to the use of internet banking where every transaction can now be seen online rather than waiting 3 months to receive a statement.

Installation of meters by water companies has primarily been driven by the need to collect billing data. There are opportunities for using this data to improve water efficiency and the customer experience. The need for enhanced water utilisation and better understanding of customer demand and expectations, in coordination with advancements in metering technology, has contributed towards a global shift towards digital metering and intelligent networks within the water industry.

Meters are typically manually read at specified time intervals ranging from several weeks to months. This is labour intensive and poses safety risks to field teams. The lack of data granularity makes it impossible to do meaningful data analysis to inform water saving policy.

Smart metering data insights regarding customer consumption and network operations will allow the water sector to operate water networks more efficiently and create a more engaging experience for customers. Studies have shown a decrease of 7-22% of water consumption after the installation of metering technologies\textsuperscript{1,2}.

There are multiple potential end users of the data apart from water utility businesses, such as the government and academia, who can use the data to enhance our broader understanding of how people consume water and subsequently better inform policy and investment decisions. Examples may include deeper insights into consumption and price / income elasticity, willingness to pay and scarcity pricing. Technological advances and increasing data granularity can tell customers the exact location and cause of leaks inside their premises.

\textsuperscript{1} Ornaghi, C. et al. The effects of the universal metering programme on water consumption, welfare and equity. Oxford Economic Papers. 2019
\textsuperscript{2} Davies, K. et al. Water-saving impacts of Smart Meter technology: An empirical 5 year, whole-of-community study in Sydney, Australia. Water Resources Research 50 (9) pg. 7348-7358. 2014
VALUE CREATED

**Improving efficiency and reducing costs:**

- Reduce water utility operating costs (for example, in areas of billing or process optimisation)
- Earlier identification and remedy of leaks on the customer side, increasing utility revenue by reducing water loss
- Reducing water consumption through smart metering can reduce the cost of sourcing bulk water, treating it and transporting it. An example in Singapore where water usage is already low for a developed country, showed smart metering reduced consumption by a further 5%\(^3\). Further studies have shown smart metering saving up to 46% of total water usage for customers through finding leaks\(^4\).
- Better understanding of user demands can lead to better public investment decisions

**Enhancing economic, social and environmental value:**

- Reduced use of water restrictions. Digital water metering and intelligent network devices can support the lessening of water restrictions by providing a range of alternative mechanisms to stimulate consumption reduction.
- Intergenerational equity digital water metering and intelligent network devices provide the infrastructure and the information required to influence long-term water policy and vision, and thereby support the sustainable supply of water resources for future generations.
- Reduced energy consumption and greenhouse gas emissions. The more efficient usage of water with digital meters will reduce water and sewage pumping rates, and will also reduce the volumes being transported to water treatment plants. This can ultimately reduce the energy consumption of pumping stations and treatment plants.
- Increased resilience to climate change driven water scarcity by making better use of limited water resources.

**POLICY TOOLS AND LEVERS**

**Legislation and regulation:** Regulators allowing tariff flexibility is important to allow customer to receive benefits from reduced water use. With new granular data available from smart metering, lower tariffs are possible during ‘off-peak’ times when water and sewage pumping loads are lower (in turn lowering pumping costs for water businesses) to incentivise load shifting. It is however important to learn lessons from the energy industry by ensuring any new tariff structures do not serve to confuse customers. This is particularly true for previously unmetered customers on fixed water rates that are set against property size or included in other land owner rates. With the collection of additional data, data security on customer data needs to be ensured through data governance standards.

**Transition of workforce capabilities:** Training and upskilling workers to have the skills to effectively action the insights from smart technologies. This includes leak identification online and then leak detection in the field as well as the analysis of other insights, such as demand.

**Funding and financing:** Smart metering can be expensive. Consideration should be given to the larger benefits of smart metering (described above) and whether funding can be made available to assist with procurement and installation.

**Effective institutions:** Collaboration between government agencies to coordinate installation of smart meters, data collection and analysis will assist in realising potential benefits of water usage data to inform infrastructure decisions and water policy.

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IMPLEMENTATION

Ease of Implementation

Smart meters have been employed for several years and implementation risks are low. Water utilities that have meters will be familiar with meter roll outs. The use of smart meters is a logistics exercise in terms of procuring, distributing, and installing at customer connections. The more challenging component is meter data management and there are many tools available to help with this.

Cost

Currently metering costs are quite large (typically more the USD 100 per meter + installation costs + monthly telemetry costs). Multiplying these costs by the amount of connections can put metering projects beyond the budgets of most utilities. Metering selected sections of the network is a way of keeping costs down as utilities wait for technology to further reduce in cost.

Country Readiness

Developed countries with existing infrastructure and metering are best placed to realise the benefits from smart meter installation. Many countries are already installing smart metering. Costs are the main barrier as noted above. Developing countries may be able to make use of smart meters in urban areas though their water saving benefits are insignificant compared to upgrade and optimisation needed for the typically less well-maintained water infrastructure. There is an opportunity to “leapfrog” the current generation of technologies into next-gen smart meters.

Technological Maturity

The technology is fully developed and operational in many countries around the world. The next step for full technology maturity is lower device costs to enable full network roll outs.

RISKS AND MITIGATIONS

Implementation risk

Risk: There can be an impact on customer bills, known as “bill shock”, as more accurate meter reading is introduced. Some customers will pay more while others pay less.

Mitigation: Governments and water utilities can conduct community consultation and introduce smart metering through trials, subsidies or progressive staging. For example, a transitional tariff can be used where the switch to a metering charge can be delayed. During this period, customers can be provided with comparison letters at e.g. 3, 6, and 12 months, showing their current rateable bill and what the bill would be if they paid by meter. A higher ‘metered’ bill will encourage greater water efficiency; a lower bill should prompt a request to switch early.

Risk: Utilities do not reduce consumption in an effort to maintain income from water sales. This can occur where bulk water supplies are in abundance or where a retailer on sells from a bulk supplier.

Mitigation: Financial incentives can be provided to retailers to reduce water consumption where the marginal cost of water is high, i.e. where the cost to obtain new water sources is greater than the cost of selling more. Performance indicators and terms in retailer contracts can also help influence the shift toward smart metering.
Safety and (Cyber)security risk

Risk: There can be perceived health risks associated with smart meters as well as a risk users may not be fully informed to get the most utility from the smart meters.

Mitigation: Education on the purpose and safety of smart meters should be included with roll outs.

Risk: Personal information may be gathered from personal usage patterns of water use and privacy concerns may be raised by users.

Mitigation: Data security on customer data must be ensured through data security measures.

EXAMPLES

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<th>Example</th>
<th>Implementation</th>
<th>Cost</th>
<th>Timeframe</th>
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<tr>
<td>Suez Singapore</td>
<td>A trial by SUEZ and the Singaporean water authority PUB showed they can help change customer behaviour and reduce water use.</td>
<td>The project, which involved smart meters in 1000 households and an app that rewarded users for certain results, led to a 5% reduction in daily water consumption(^5). Good results considering Singapore already has very low water usage rates at less than 143 L per person per day (USA averages more than 300 L per person per day (USGS(^6))).</td>
<td>This program can be implemented immediately subject to supply availability. Results can be obtained as soon as it is installed.</td>
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