A business case for IoT

How to calculate ROI on IoT in water utilities

Executive summary

$1.4 dollars back on every $1 spent

This paper provides a summary analysis of the business case for water utilities to invest in Internet of Things solutions.

Research from Nucleus3 shows how a mid-sized water utility may expect to see a net benefit of $7.550M over 10 years. For utilities looking to apply this business case to their own businesses, the cost-benefit analysis can be viewed as a 1.40:1 ratio, meaning for every dollar an authority spends on intelligent equipment and asset monitoring, they could realise $1.40 dollars in benefits.

This paper only estimates the direct benefits arising from intelligent water solutions and does not include wider benefits such as the long-term environmental value of smarter water management. Nor does it include the intangible benefits to the utility's brand.

Taking these benefits into account will increase the potential return on the investment in IoT solutions. Such an ROI demonstrates digital technology and intelligent platforms are potential game changers for water utilities.

Read on to learn more about how IoT solutions can deliver significant benefits across multiple areas of water utility management.

Introduction

Today every water utility faces three major challenges. The first is managing water resources to ensure supply and quality remain high as water becomes scarcer. Second, utilities need to do this while managing and maintaining complex and costly networks of assets. And third, utilities have to improve the experience they deliver to end customers, reducing the incidence of leaks and overflows to protect property and the environment.

Scalable Internet of Things (IoT) solutions offer better ways to manage water resources and ensure quality. Intelligent equipment and asset monitoring help reduce operational costs, and connected, digital sensors and tools deliver insights that enable utilities to predict and plan for future usage.

However, quantifying the return on investment in transformative technologies can be hard. It is particularly true of IoT solutions as each industry, segment and organisation has its own goals, challenges and operating characteristics.

In order to help utilities build a business case for IoT deployments, we commissioned Nucleus3 to evaluate the ROI for a mid-sized water utility implementing an IoT-enabled intelligent water solution.

Our sample utility company

The benefits and costs set out in the following use cases have been created based on a hypothetical water utility. The company has between 50 to 100 thousand customers and is seeking to evolve through the adoption of technologies, systems and process so that they can become a progressive intelligent digital utility.

The business has progressed well and has already adopted many best practices where it was economic and prudent to do so, with centralised management of the distribution network, process control systems for plant and equipment, customer information systems and advanced infrastructure asset management capability.

The authority is seeking to adopt further technology and systems to support water and wastewater operations for the benefit to the business, its customers, the environment and its stakeholders.

Benefit use cases

For the purposes of this paper, we have singled out eight use cases which deliver the highest benefits over the 10-year timeframe in the analysis. A variety of other cases where smaller benefits are realised are grouped together.

Benefits and costs are calculated using 'net present benefits' (NPB). NPB is defined as incremental positive or negative variance to the base case, over a period of 10 years. It is important to note this does not take into account unqualified benefits, for example, improved reputation and enabling technology capability.

Deferred network capital expenditure

Positive customer behaviour changes

Reduced manual meter readings

Avoided legacy meter replacement & install (offset cost)

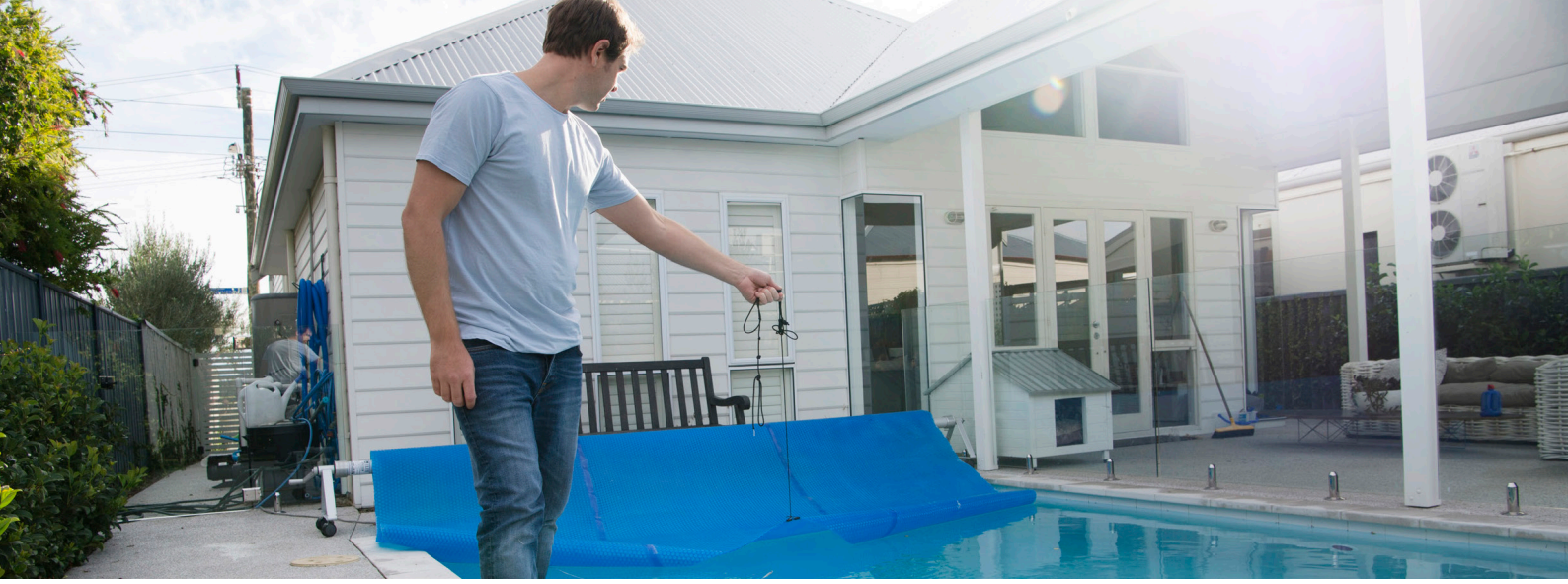
Reduced non-critical SCADA OPEX

Reduced non-revenue water

Improved billing and credit management

Avoided bulk water purchases

Other benefits



Defer network capital expenditure

Estimated benefit of $8.752M

IoT solutions can play a significant role in shifting capital spend away from network upgrades.

Improved water management and equipment monitoring means the utility can extend the life of existing infrastructure such as treatment plants, storage, trunk mains and water main.

Upgrades and renewals can be deferred into later years, reducing the need for funding from treasury or permitting the same capital to be redirected to more needy network infrastructure projects. Moving or reducing the baseline capital budget forecast helps the utility reduce its interest and capital raising costs.

Positive customer behaviour changes

Estimated benefit of $3.854M

The authority can make more accurate and more frequent consumption data made available to its consumers. Offering advice and bill prediction services means the utility can engage with its customers to create mutually beneficial water saving behaviour.

Not only is this good for the customer and the environment, but it can help the utility establish a positive long-term relationship with the customer. Reducing customer demand directly benefits the utility through lower operating costs, which can be passed onto consumers through subsequent water rate reset periods as a savings or avoided cost increase.

Reduce manual meter readings

Estimated benefit of $2.842M

The utility can reduce the operational costs of manual readings by using connected digital water meters.

Manual meter reading is susceptible to transcription errors and access issues, resulting in wasted trips and estimates being substituted for reads.

Digital water meters are read at least daily with high success rates and are not susceptible to transcription errors. Logged interval data is typically collected for intraday consumption readings, along with alarms and events.

Avoided legacy meter replacement & install

Estimated benefit of $2.427M

Our example water authority may choose to defer the normal sample testing, chronological or volumetric meter replacement program and sweat the asset instead. The utility's management team can use data and analytics from the IoT sensors and platform predict equipment degradation and schedule maintenance accordingly, giving a new lease of life to assets.

Reduce non-critical SCADA OPEX

Estimated benefit of $1.664M

Real time Supervisory Control and Data Acquisition (SCADA) carriage services are customarily limited to one size for all SCADA applications for the utility and sized according to the most demanding application for data rate, bandwidth, latency, coverage, quality and security.

The Telstra IoT service provides the utility with an IoT platform abstraction layer for multiple tiers of communications carriage so that each SCADA application can be right-sized according to the application demands. Non-critical SCADA applications are directly supported by the IoT Platform and ubiquitous Telco carrier coverage in lieu of traditional point-to-point or point-to-multi point solutions.

IoT for non-critical SCADA provides communications services at a lower cost per end point device relative to the incumbent SCADA comms service[1].

Reduce non-revenue water

Estimated benefit of $1.465M

Distribution water losses can account for between 10% and 20% of all water use in the network. Any reduction of non-revenue water loses results in a direct operational cost saving associated with the supply or manufacture of potable water.

IoT solutions provide several ways to reduce non-revenue water.

Our utility can reduce its water losses through regular collection of consumption data, leak detection, water balance, and analytics.

Leak rectification works on the network side of the meter - targeted and timed based on the data collected - will help reduce losses further[2].

The utility can employ remote meter reading, at more frequent rates and higher accuracy, to detect water theft or meter tampering, helping to achieve more comprehensive water billing.

1. Benefits are measured as a variance between IoT Communications costs for SCADA in lieu of the incumbent utility SCADA communications forinfrastructure services.

2. Associated rectification works are required to achieve this benefit which will likely have an associated bring forward cost to rectify. For the purpose of this model the rectification costs are assumed to be brought forward within the same financial /regulatory year.

Improved billing and credit management

Estimated benefit of $1.074M

The water utility can use the frequent data collected from water meters for actual monthly billing rather than quarterly or estimated bills. More frequent actual billing helps improve the utility's cashflow while also helping customers manage their finances through smaller monthly bills.

Sensor data can help the authority identify customer side leaks and inform the customer within days, helping to avoid bad debt and hardship cases.

Using digital water meters to improve billing and credit management processes also provides a host sub benefits to the utility including increased digital billing and reduced credit, collection and transaction costs.

Avoid bulk water purchases

Estimated benefit of $1.067M

Gaining a better understanding of water supply and usage through insights delivered by IoT sensors and algorithms will help our utility plan improve its management of water resources.

Using this deeper knowledge, studying the water network and identifying changes in customer behaviour can help the utility avoid or reduce purchasing and trucking in water from higher costs sources.

Other benefits

Estimated benefit of $3.890M

Our example utility will accrue a significant financial benefit from a wide range of smaller use cases and improvements. These include:

- Reduced occupational health & safety incidents
- Improved pressure management
- Improved energy management
- More efficient water supply quality management
- Improved network operations efficiency
- Spills and discharges avoided
- Improved customer service

Total estimated benefits over 10 years: $26.286M

Investment

Estimated cost of $18.736M

Costs incurred during the setup and deployment of the IoT-enabled intelligent water solution will offset some of the value of the benefits listed above. Typical costs will include:

Typical capex costs for the IoT project will include:

- Digital meter device costs
- Water meter install services
- Distribution zone monitoring
- Non-critical SCADA
- Program management and IT system set up

Ongoing operational costs include:

- Communications services
- IT system ongoing costs
- Customer engagement

Total net return on investment over 10 years: $7.550M

Conclusion

Summary of cost-benefit analysis	
Benefit/cost	**Estimated value**
Deferred network capital expenditure	$8.752M
Positive customer behaviour changes	$3.854M
Reduced manual meter readings	$2.842M
Avoided legacy meter replacement & install	$2.427M
Reduced non-critical SCADA OPEX	$1.664M
Reduced non-revenue water	$1.465M
Improved billing and credit management	$1.074M
Avoided bulk water purchases	$1.067M
Other benefits	$3.890M
Investment costs (including capex and opex costs over 10 years)	-$18.736M
Total net return on investment over 10 years	**$7.550M**

The above table summarises the ROI for the hypothetical water utility. This research suggests similar utilities can expect a return of 1.4 on every dollar invested in integrated, intelligent IoT water management solutions.

Discover how Telstra's IoT solutions for the water industry can help your business become an intelligent utility today, or get in contact with us about building your own business case for a better way to manage water.

Contact us

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