The Super-Connected Bathroom

Reducing water consumption in commercial buildings with intelligent data-driven technology

CAROMA

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Introduction

Despite being on the driest populated continent on Earth, Australians use more water per person than most other countries in the world. Some reports suggest that Australia's per capita water consumption averages at 100,000 liters per person, with each person consuming 340 litres of water per day.[1] Over the next few decades, the demand for water will only increase as populations grow and the impact of climate change puts further pressure on public water supplies.

In the commercial built environment, bathrooms are among the biggest water users. In a typical home, the bathroom accounts for around 40% of water usage.[2] Extrapolate this figure across large, highly-trafficked commercial facilities and you have a significant amount of water consumption year after year.

Building managers and owners are under pressure to maintain sustainability credentials to keep high value tenants – this means addressing the issue of water consumption. Implementing sustainable design features and products within a bathroom can not only help save owners money on water bills, but it can also increase the value of the building itself and contribute to broader environmental outcomes.

For years, Australian governments have encouraged the adoption of water-efficient bathroom fixtures. For example, the Water Efficiency Labelling and Standards (WELS) scheme was started in 2006 to help architects, designers and owners compare the efficiency of different bathroom products. Nowadays, water-efficient fixtures are commonplace, yet reducing water use remains a critical issue across the country. The question is – where to next?

With the growth of smart technology, there is an opportunity to leverage data-driven solutions to drive further efficiencies. Building managers are already monitoring and controlling critical resources and functions in digital buildings, such as power, lighting and ventilation – similar opportunities exist for commercial water management. Plugged into a building management system (BMS), real-time water usage data can help building managers make smarter decisions to conserve water, encourage sustainable user behaviours, prevent water leaks and reduce maintenance costs.

In this whitepaper, we take a closer look at water-efficient design solutions for modern bathrooms, and uncover how smart technology and data can deliver long-term, sustainable benefits for the commercial built environment.


“If you can’t measure it, how can you improve it? The interconnectedness of bathroom fixtures in modern bathrooms provides opportunities to collect real-time data about water use right down to the product level across an entire building.”

The state of bathroom sustainability

Since the droughts of the early 2000s, government-initiated water efficiency initiatives in Australia have advanced rapidly. Targeting both residential and non-residential buildings, there was a large scale roll-out of low-cost efficiency programs focused on hardware modifications such as more efficient showerheads, toilets and tapware.

The introduction of the WELS scheme helped drive the uptake of water-efficient fixtures and appliances. Mandatory labelling and minimum efficiency standards gave the market confidence in specifying water-efficient fixtures. This led to a high penetration of efficient toilets, showers and tapware across all types of buildings and facilities.

The use of water-efficient fixtures remains an effective approach to reducing bathroom water consumption. Consider the following facts and figures:

- **Toilets.** A dual-flush toilet will save approximately 20% water usage in comparison to an older style toilet. Efficient 4-star WELS rated toilets are now becoming the dominant models specified for Australian buildings, offering a 3.5L flush which can save 50kL and $148 each year on water bills for a standard household.[3]
- **Showerheads.** An inefficient showerhead can use 15L-25L of water per minute.[4] Compare this to a 4-star WELS rated shower at 6L/min, which can save approximately 105kL and $315 per year.
- **Tapware.** The best-performing water-efficient taps have a 6-star WELS rating with a flow rate of 4L/min or less.[5] Compare this to an old inefficient tap with a flow rate of 15L/min.

The WELS scheme estimates that using water-efficient products could save Australians more than $2 billion by 2030, an average saving of $175 per household each year.[6] In heavy-use settings, such as commercial buildings, even greater savings can be achieved.

However, as a broader strategy, a focus solely on water-efficient fixtures is already reaching its maximum potential. The market has become so saturated that any future large-scale initiatives to encourage further adoption will have a limited affect.[7] In addition, despite recent technological advancements, the efficiency of fixtures and appliances is approaching maximum limits.[8]

These trends indicate clearly that we need to focus more on just hardware when building a sustainable future. The ability to monitor and control of water usage can help reduce water consumption on a larger scale. With smart technology becoming a common feature in modern Australian buildings, the next frontier in water reduction will be data-driven.

Bathrooms are getting smarter

Smart technology is already impacting commercial buildings. The global smart building market size is project to grow to US$109.48 billion by 2026, with a 12.6% compound annual growth rate.[9] In real terms, this means more building processes will be interconnected, providing building managers the ability to automate, monitor and control key functions. Leveraging IoT (Internet of Things) connectivity, it is possible to assess and influence systems – from lighting and ventilation to fire safety and security – to maintain a comfortable building environment all-year round.

Bathrooms have seen their fair share of technological innovations in recent years. This includes the emergence of ‘smart’ toilets with water-saving flushing controls, and showerheads that allow users to pre-set spray types, water flow and temperature. The tapware market has seen the introduction of sensor-activation technology that enables hands-free operation. Even bathroom mirrors are getting smarter, incorporating digital screens that can display weather information and news alerts. More and more devices can also be integrated with a BMS or other building automation apps.

What does an interconnected bathroom ecosystem mean for water management? A comparison can be drawn to smart lighting systems. Building managers can monitor how much energy is being consumed by different lighting systems as well as patterns of usage. Based on this data, sensor lights can be programmed to provide light only to occupied areas, or dim lights based on a reading of ambient light levels. Building managers can make smarter decisions as to when, how and to what extent lighting systems should operate, leading to reduced energy costs.

Similarly, the ability to monitor and control how much water is used by bathroom fixtures across a building can help building managers make informed decisions about water consumption. Based on usage patterns, building managers can make decisions about water flows and temperature at a product level. For example, a smart showerhead combined with a control interface and mixing assembly allows the setting of spray types, water flow duration and temperature based on which settings are more efficient. But this is only the beginning.

The future is data-driven

If you can't measure it, how can you improve it? The interconnectedness of bathroom fixtures in modern bathrooms provides opportunities to collect real-time data about water use for every fixture across an entire building – from number of activations to how much water is being consumed per use. With accurate and reliable fixture data, building managers can make even more significant water savings by influencing user behaviours, improving customer service, managing demand and reducing water losses. The result is a higher-performing building that is not only greener, but also worth more to potential tenants and investors.

DRIVING SUSTAINABLE BEHAVIOURS

Combined with fixture data, understanding how users are using the bathroom can help drive sustainable user behaviours. For example, urinals consume 3.7L less per flush on average than a standard toilet. The building manager may notice that urinal use is low for a given floor and implement strategies for encouraging urinal use when appropriate. With each urinal flush that is encouraged, there is a potential 3.7L of water savings. In another example, smart shower interfaces can be programmed to have max temperatures, and building managers can set shower session limits to discourage long wasteful showers. Any water savings can then be tracked and monitored, allowing building managers to assess the success of any improvements.

IMPROVING SERVICE AND MANAGING DEMAND

An analysis of usage patterns can highlight inefficiencies in the network, enabling building managers to better manage water supplies. For example, interconnected systems can monitor water flows and pressures across a building or area. Building managers can increase pressure to different parts of the building in times of high demand. Real-time data can also indicate any sudden changes to usage patterns, prompting building managers to quickly adjust levels of service.

PROACTIVE MAINTENANCE

Real-time fixture data enables a proactive approach to cleaning and maintenance that will drive greater efficiencies in resourcing and minimise downtimes. If you know how much a fixture has been used, it is easier to plan maintenance that will extend its useful life. Building managers will also have data indicating if the fixture is nearing the end of its life, allowing them to plan to replace the fixture in a timely manner. It is even possible to know how clean a bathroom is with sanitaryware and tapware usage data, which can help optimise cleaning schedules.

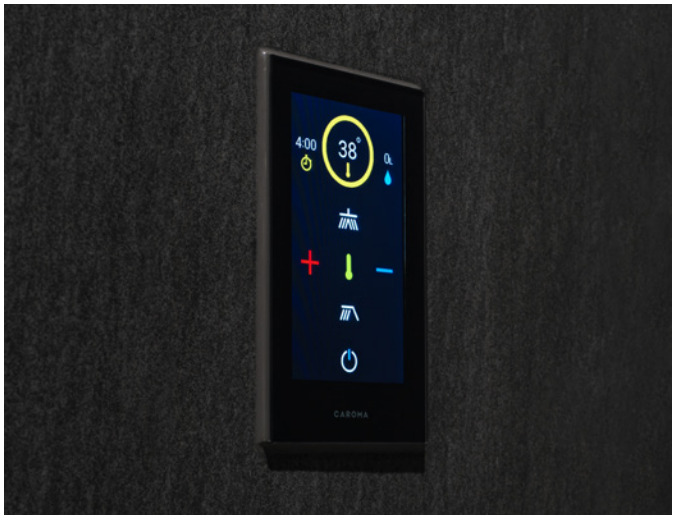
MANAGING LEAKS AND FAULTY FIXTURES

The Bureau of Meteorology estimates that non-revenue water losses average across the country at around 10% of the utilities' system input.[10] Accordingly, preventing leaks or responding to leaks quickly is an important factor in water conservation.

With smart bathroom technology, not only can leaks be identified quickly by smart in-line leak detection valves, but also from real-time fixture data. Building managers can receive alerts and warnings on fixture maintenance and connect directly to fixtures via a smartphone to further troubleshoot and adjust configurations. This capability has several benefits. Building managers are better placed to respond to leaks quickly before they become larger issues. Improved leak management contributes to network efficiency and reduces water waste. With the ability to isolate specific faulty fixtures remotely, building managers can identify the correct technician quickly and easily.[11]

INCREASING ASSET VALUE

By making their buildings greener, building managers and owners can increase the value of the building to tenants and investors. The type of continuous improvement of water consumption enabled by smart bathroom technology is a key component in achieving a high NABERS (National Australian Built Environment Rating System) rating. In Knight Frank's new Active Capital Report, an analysis of over 300 office building sales over the past decade found that buildings with green credentials, such as a NABERS rating, were worth more than those without.[12] Further, the higher the rating, the higher the premium.[13] This trend is being driven by forward-looking investors who view strong sustainability credentials as key to minimising risk, and tenants who have adopted environmental targets.[14]



Enabling the data-driven sustainable bathroom

WITH CAROMA SMART COMMAND®

Caroma Smart Command® is an ecosystem of intelligent bathroom products that enable building managers to monitor water use in real-time and make smarter decisions that reduce maintenance costs, while improving hygiene and up time. An innovative range of tapware, urinals, toilets, showers and leak detection valves integrate seamlessly with Smart Command® and incorporate touch-free technology for a more efficient bathroom design that requires less cleaning and maintenance.

Every Caroma Smart Command® fixture tracks activation data, which when coupled with flow rates and flush volume calculations, provides water consumption patterns from bathroom fixtures on the Caroma Smart Command® Cloud. This secure data can be accessed via browser on any connected device and can be simultaneously streamed to BMS to incorporate with other systems. Direct local connections to fixtures are facilitated via BlueTooth and mobile app. This information empowers the building or facility manager to make informed decisions and monitor the impact in real time, driving efficiencies such as cleaning and maintenance resourcing.

Data can enable quick identification of behavioural trends which if addressed could result in water savings, or help identify when a fixture may require maintenance based off number of activations, or it can inform on how hygienic a given bathroom is through cross-referencing sanitaryware activations with tapware usage. Environmentally-conscious design decisions may be based on historical data and feedback, delivering premium-end buildings which exceed the needs of tenants and investors.

The water savings enabled by Smart Command® are key to the sustainable bathrooms of the future. Water may be cheap, but its responsible use is important for ensuring our ecosystems have enough to operate sustainably. Through the continuous improvement of water consumption and management – buildings can increase or retain their NABERS Water rating and attract higher value tenants.

All Caroma fixtures are highly engineered and certified under WaterMark. They are also registered under the WELS scheme and designed to maximise water efficiency.

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