WSAA WATER EFFICIENCY

INFORMATION PACK FOUR

WATER SERVICES
ASSOCIATION OF AUSTRALIA

CONTENTS

CUSTOMER DRIVEN, ENRICHING LIFE

The Water Services Association of Australia publishes this series of information packs on behalf of the Australian urban water industry to present the current situation on key issues of relevance to the industry.

The urban water industry is striving to achieve four outcomes by the year 2030. By working together with a common goal WSAA members intend to be:

> **The most efficient trusted and valued service providers in Australia**

> **A compelling voice in national policy making**

> **A valued partner in urban and land use planning to enrich communities**

As well as taking a strong role in the:

> **Stewardship of the urban water cycle**

The urban water industry is committed to ensuring customers and communities have the water they need to live their lives. To achieve this we support a diversified portfolio of water sources accepting that some water sources have multiple roles.

ABOUT WATER SERVICES ASSOCIATION OF AUSTRALIA (WSAA)

WSAA is the industry body that supports the Australian urban water industry. Its members and associate members provide water and sewage services to approximately 16 million Australians and many of Australia's largest industrial and commercial enterprises. WSAA is always willing to innovate and seek new and smarter ways of doing things and prides itself on making decisions that are based on sound knowledge and research.

SUMMARY POINTS

- The efficient use of water is a key part of building Australia's water security.
- Using water wisely is a way that many customers can make their personal contribution to the environment, while benefitting financially through water and energy cost savings.
- Reduced water demand also benefits customers as it defers the need for large-scale water supply infrastructure.
- The introduction of temporary water restrictions should only be a response to a sudden and unpredictable emergency and not viewed as a water efficiency measure.

A DEFINITION OF WATER EFFICIENCY

Water efficiency is 'any measure that reduces the amount of water used per unit of a given activity, without compromising the achievement of the value expected from that activity.' Since the 1980's utilities have invested sporadically in water efficiency either on the back of a period of severe water restrictions, in response to regulation or at the request of their customers. This investment has generally occurred where the business case has predicted it will be cost effective, the community supports the initiative and robust analysis indicates it will save water.

Why invest in water efficiency?

A more consistent, diverse and incremental approach to investment in water services has minimised the impact of climate uncertainty and significantly reduced (if not eliminated) the need for severe water restrictions in the future. Refer to WSAA's information pack on 'Urban water security' for further details.

Part of this approach is the routine investment in cost effective water efficiency programs even in times of plenty. This limits per capita demand, meets customer expectations, improves productivity in the industry and eliminates waste. With population growth, and climate and economic uncertainty impacting the industry, water efficiency investment provides a buffer to this.

Maintaining a baseline investment provides a good platform to launch more aggressive water efficiency programs as water security drops. It also readies the community for short term water conservation measures (i.e. those measures that reduce the volume of water used and could impact on the water users' amenity or level of service) that may be necessary should a sudden and severe drought hit. Such measures should not come as a surprise to the community as utilities are encouraged to publically communicate annually the water demand forecasts and supply situation before summer, so decisions regarding ramping up water efficiency programs or implementing water conservation measures can be made.

Management of water use above or below the approved forecast needs to be prioritised and acted upon accordingly. Setting a water efficiency benchmark

could be a part of this process. Evaluation and regular reporting of water efficiency programs is encouraged to support legitimate long term investment and improve business confidence in water efficiency.

Water efficiency programs and savings

Urban water utilities have run water efficiency programs for their customers since the 1980's. These were scaled up and new programs added during the Millennium drought. The savings made by customers had a marked impact on avoiding critical water shortages. These measures and the efforts of customers resulted in significant water savings of about 350GL/year across Australia's major cities during the drought (Table 1). Total per capita consumption in Melbourne, for example, dropped 43% from 423 litres per day (lpd) in the 1990's to 241lpd in 2009/10 helping to conserve precious dam water for high end uses (Figure 1).

It generally appears that a new norm regarding water use behaviour has emerged, with support for low level permanent water efficiency measures and no significant bounce-back in demand (as shown in daily water use levels in Sydney in Figure 2). Recent customer surveys by urban water utilities verify this support (eg in Melbourne this support is at about 70-80%).

The types of programs that are now well established and likely to continue include:

> Effective leak management programs operated by utilities

> Permanent Water Efficiency Measures (use of trigger nozzles, restricted use of sprinklers, no hosing of driveways and paving areas)

> Smart Approved Watermark (Australia's water conservation quality mark label for efficient products and services)

> Water Efficiency Labelling Scheme (WELS star rating label for residential tapware, toilets etc.)

> Preparation and implementation of water efficiency management plans or WaterMAPS by large non-residential customers (Western Australia and Victoria)

> Minimum water efficiency standards for rental properties (New South Wales and Queensland)

> BASIX (minimum water efficiency standards for new and renovated homes-NSW)

FIG. 1 MELBOURNE'S STORAGE VOLUME 2002 – 2011 (SHOWING IMPACT OF WATER CONSERVATION)

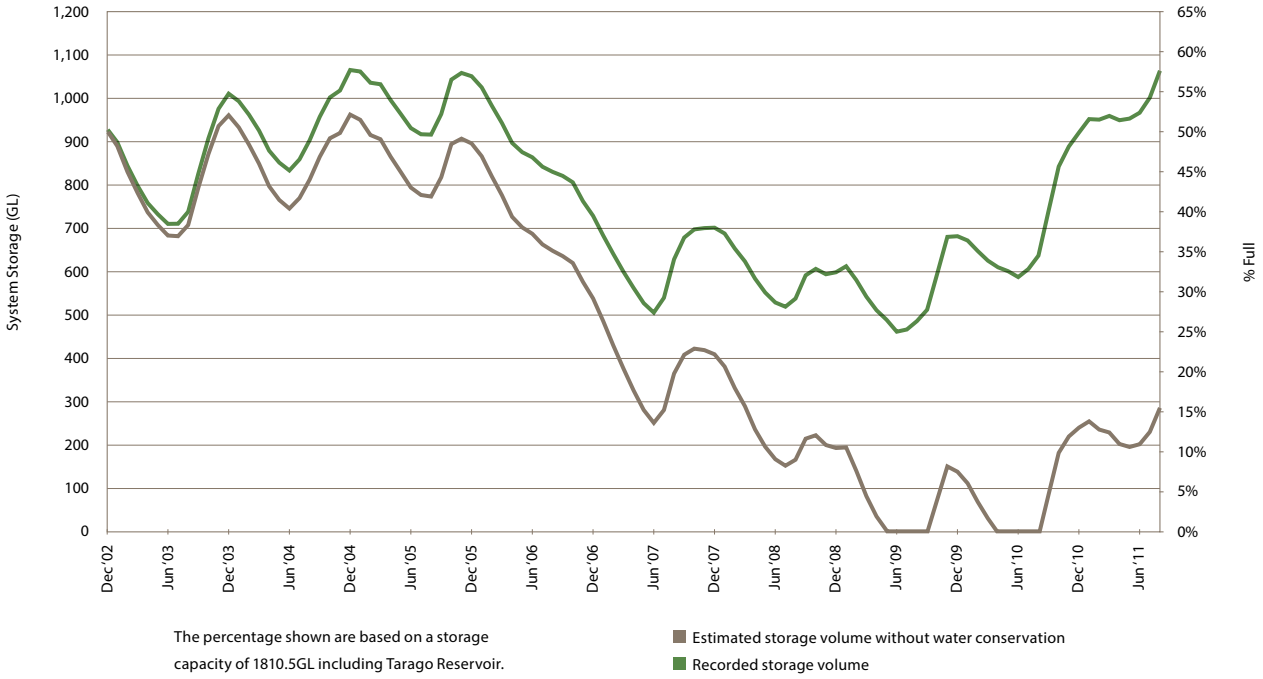
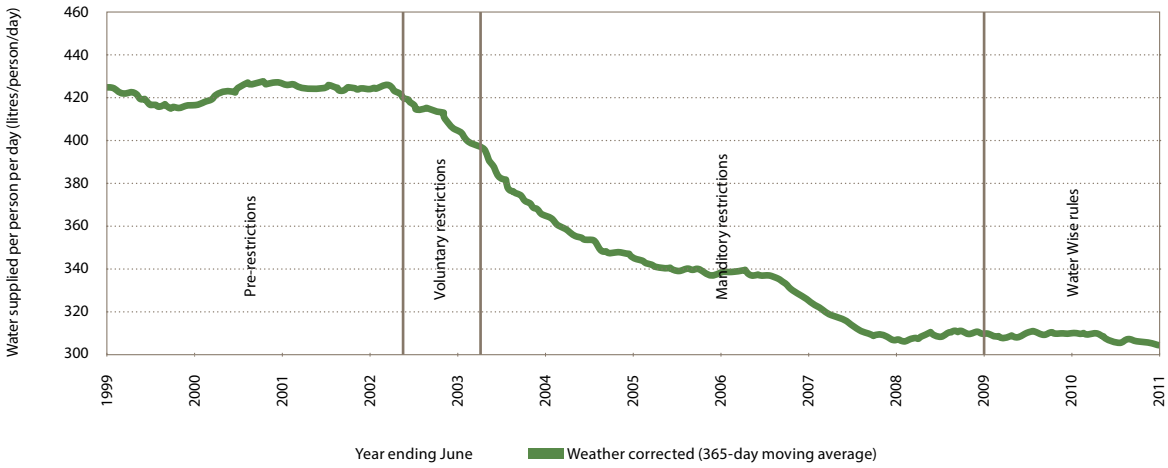


Fig. 2 DAILY WATER USE IN GREATER SYDNEY 1999 - 2011



CASE STUDY ONE – HUNTER WATER (NSW)

Hunter Water plans to construct a scheme to provide high quality recycled water to industrial users in the Kooragang Island area. The majority of the water will be used by Orica, a company that supplies fertiliser and explosives for the mining industry. The scheme will divert treated effluent to a new Advanced Water Treatment Plant (AWTP) at Steel River.

Water efficiency at Kooragang Island is a critical requirement to minimise the cost of new infrastructure and to avoid the high treatment costs associated with the AWTP. Importantly, a further constraint on the system will be the availability of wastewater.

The project will divert treated effluent from the existing effluent pipeline for Shortland Wastewater Treatment Works. If demand from recycled water users increases, then effluent from further afield will be required, this would involve significant new infrastructure and conveyance costs.

FIG. 3 AVERAGE PERTH RESIDENTIAL WATER END USE BY AREA (%)

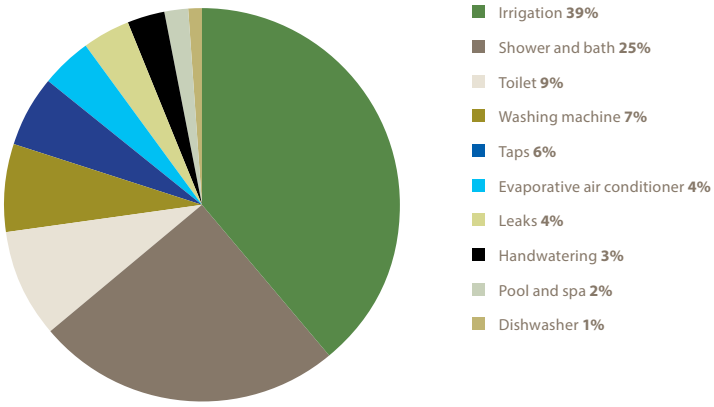
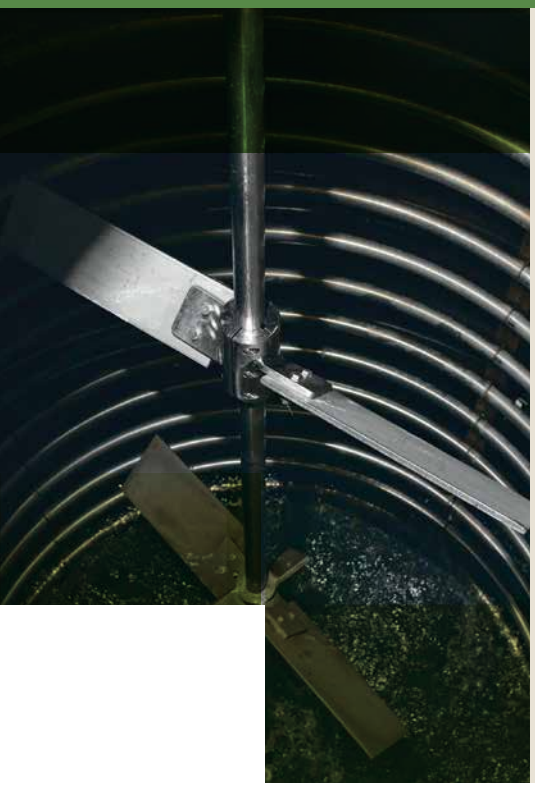


TABLE 3 **A SNAPSHOT OF SOME OF THE WATER SAVINGS MADE FROM WATER EFFICIENCY PROGRAMS AROUND AUSTRALIA OVER THE LAST 10 YEARS**

City/Town/Region	Annual water savings (ML)	Best performing programs
Sydney	120,000	> Permanent Water Wise Rules > Leak management > Business water efficiency programs
Perth	90,000	> Permanent water efficiency measures (2 day/week sprinkler roster) > Communications and water loss management programs
Melbourne	60,000	> Showerhead exchanges > Watersmart rebate program > waterMAP program (non-residential customers) > Target 155 Campaign
Adelaide	55,000	> Permanent Water Wise Rules > Residential appliance rebate/exchange programs > Industrial, Commercial and public open space water efficiency programs
Canberra	25,000	> Permanent water conservation measures > Communications, education and awareness raising programs > Toilet and showerhead retrofit programs > Large non residential customers demand management program
Hunter region (NSW)	1058	> Showerheads and tap retrofits
Ballarat	1000	> Technical water efficiency programs

CASE STUDY TWO – TOLLMAN, A CUSTOMER OF CITY WEST WATER (VIC)



Tollman Pty Ltd is a contract chemical manufacturer that formulates, blends, packages and distributes chemicals for a number of industries, including agriculture, mining, paper, building/construction, cement and recycling throughout Australia.

A Cleaner Production Consultant from City West Water discussed water saving opportunities with Tollman and, after studying other business examples and researching suppliers, Tollman decided to trial a new Cleaning in Place (CIP) system to reduce their use of wash water.

By changing the washing method from a boil out method to a CIP method, Tollman found they could reduce their water use from 16-24,000 litres per wash to 700 litres per wash. The system includes a portable orbital high pressure cleaning nozzle, which is situated inside the cleaning tanks. The use of these nozzles eliminates the need to fill the tanks fully with water and boil them out with steam.

The change in process has resulted in water savings of 3.7 million litres per year, which is approximately equivalent to one third of the site's total water use. The discharge of trade waste has also been reduced by the same volume.

The environmental benefits of this change were significant, including reduced gas consumption of one terajoule per year, reduced total dissolved solids or salt discharge of 1.5 tonnes per year, reduced greenhouse gas emissions of 50 tonnes of CO2e per year and reduced downtime by 624 hours per year.

Water usage

Agricultural water use accounts for around 65% of water consumption across Australia; in comparison customers of urban water utilities use only around 16% of available water. Across Australia's capital cities household customers use 70% of water supplied, 20% is used in the commercial/industrial sector and 10% is lost. In some regional areas like Gladstone in Queensland the split is almost directly opposite to this due to greater industrial use.

Very recent residential water use studies found a high amount of indoor water use in showers (29.5% in South East Queensland (SEQ), 30% in Melbourne and 25% in Perth) and significant household leaks i.e. 6% (South East Queensland and Melbourne) and 4% (Perth). As an example Perth's household water use is broken down as shown in Figure 3. But this may not be representative of water use on the east coast as in Melbourne and Sydney less water is used outdoors and more in laundries and showers.

In most cities an analysis of commercial/industrial customers water use shows many are using small amounts of water and far fewer are using large amounts. This is why many non-residential water efficiency programs target individual larger users achieving outstanding results. For instance, the waterMAP program in Melbourne required all non-residential customers that used over 10 ML per annum to develop a water management plan (waterMAP). This program resulted in water savings of 17 GL over a four-year period.

Demand for water

There are four main factors that determine the demand for water - population growth, climate change, housing type and density and changing demographics.

There are a wide range of other factors that affect the prediction of demand for water (otherwise known as demand forecasting), these include:

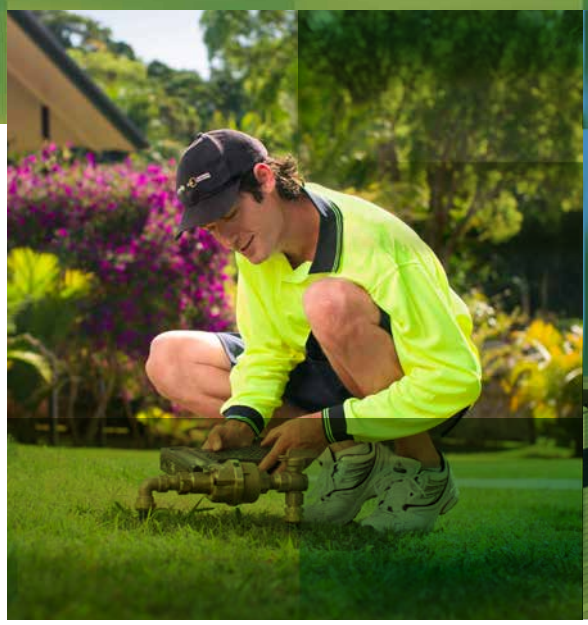
> The performance of water efficiency programs such as the installation of water efficient appliances, behaviour change programs designed to reduce water use, communications programs, permanent water efficiency measures (PWEMs)

> The level of bounce back in demand after a period of water restrictions

> Affluence and lifestyle

> Higher prices for water

> Economic growth.



ENERGY – WATER NEXUS

Factors driving energy demand and their relationship to water efficiency

There are currently two main issues affecting energy network businesses; these are costly augmentations of the network to meet short lived spikes in demand, and rising unit costs of supply as higher costs are recovered from flat or falling volumes. The three main drivers of peak demand in the residential sector are air conditioning, water heating, and pool pumps and filters.

Hot water use and water efficiency

Studies by WSAA and CSIRO on the energy-water nexus in the urban water industry have identified how dominant end-use energy is in the overall energy profile through the urban water cycle (Kenway et al. 2008). In fact nationally, a 15% reduction in the use of residential hot water would completely offset the total energy used by the utilities providing water to those households in 2006/07. For householders, simply shifting to a WELS 3- star rated showerhead can decrease energy consumption for hot water by approximately 50% (where those households have considerably greater-than average water use). Showerhead retrofit and exchange programs across Sydney and Melbourne households have saved a combined total of 8.5GL/yr.

Water and energy efficiency in businesses

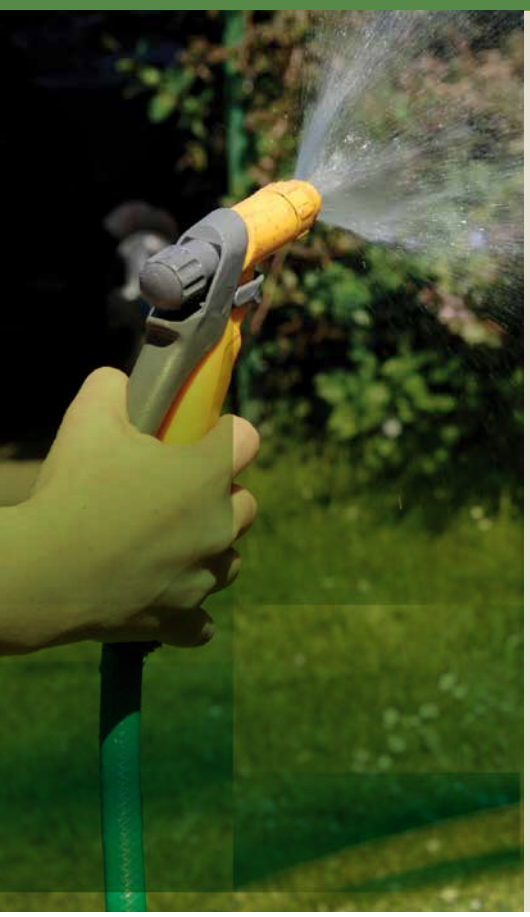
Many WSAA members have reported that non-residential water efficiency programs have had the added benefit of reducing energy use for their customers. This is why engagement with non-residential customers has become a focus not just on water but on energy given that for business customers the bottom line is often dominated more by energy costs than water. For example:

> An upgrade of cooling towers at a glass manufacturing plant is saving 22 million litres of water and 440,000 kilowatt hours of electricity each year at a one off cost of $443,000 (the dollar savings for energy equate to $35,000/year, and chemical savings are $30,000/year)

> City West Water's Steam System Efficiency Program involves providing free steam system audits and training to manufacturing, industrial and hospital customers to improve water and energy efficiency in these systems. Across the program they expect to save 239ML/year of water, 187,000GJ/year of energy and 10,400tonnes of CO2/year

> Replacing eleven showerheads at an aquatic centre saved $2400/yr in energy costs and using a pool blanket saved $180,000 in energy costs (before factoring in the cost of the pool blanket at $140,000)

CASE STUDY THREE – NATIONAL BUSINESS BENCHMARK WATER EFFICIENCY PROJECT



The National Business Benchmark Water Efficiency project aims to encourage businesses to develop, understand, and compare their water use benchmarks. The project is a collaborative effort between WSAA members, the Department of Sustainability and Environment (Victoria) and Smart Water Fund (Victoria). One of the key outputs from the project will be an easy to use on-line tool to house data within a water efficiency benchmarking framework. Benchmarking helps a business understand their performance over time and also facilitates comparison between businesses of a similar type. Businesses that know and understand their benchmarks can gain a competitive edge over others in their field. Benchmarking should be a continuous improvement process. A business that knows their water use benchmark can move from average to being an industry leader.

For example Longwarry Foods, located on the outskirts of Melbourne, effectively increased their production, decreased the amount of water they used per litre of milk produced and increased their profits. This was achieved by ensuring a thorough understanding of their own water and energy benchmarks, the benchmark of their industry sector and implementing a range of measures to maximise water efficiency at their site. Over a three year period, Longwarry Foods achieved a 423 % increase in turnover but only a 38% increase in water use . Managing Director Rakesh Aggarwal noted "Our focus on targeting water efficiencies helped increased our overall business growth."

Source Aquabiz, Issue 4 South East Water magazine for industrial, commercial and institutional customers

> Replacing 540 guest showerheads at a hotel with water efficient luxurious showerheads saved 12.6million litres/year and 3,600 gigajoules of gas per year, with great feedback from customers on the performance of the showers.

THE ROLE OF REGULATION

Temporary water restrictions

Temporary water restrictions do have an impact on reducing water use (Figure 2) and can contribute to a step change in water use. They come at a cost through the loss of gardens and public open space affecting amenity and lifestyle, and economically impact on the garden industry. For these reasons, WSAA believes temporary water restrictions are not a water efficiency measure; they are reserved for a sudden and unpredictable emergency.

The willingness of customers to save water during the drought has led some utilities to work with government to regulate for permanent low level 'common sense' water efficiency measures; savings from these are significant (see Table 1).

A recent study by the Australian National University has found that 'households now prefer low level water efficiency measures to a situation with no restrictions but are more opposed to higher level restrictions than they were in 2003 and are willing to pay more to avoid them (McNair & Ward 2012).

Other mandatory water efficiency measures

These include:

> Water Efficiency Labelling and Standards Scheme (WELS);

> Minimum water efficiency standards for new and renovated homes e.g. BASIX (NSW);

> The preparation and implementation of water efficiency management plans (WEMPs) or WaterMAPS by large nonresidential customers (e.g. WA and Victoria); and

> Minimum water efficiency standards for rental properties (NSW and Queensland).

CASE STUDY FOUR – BASIX (NSW)

BASIX is a planning policy requiring all new houses and residential units to be designed to use up to 40% less drinking water and emit up to 40% fewer greenhouse gas emissions than the average NSW dwelling. Economic analysis conducted in 2009 estimated that to 2050, new BASIX certified dwellings will generate a positive benefit to New South Wales of between $1.20 and $1.60 for every dollar spent complying with BASIX, most of which accrues directly to individual householders through lower energy and water bills. The total net benefits (minus compliance and administration costs) of BASIX for NSW to 2050 are estimated to lie within a range of $294 million to $1.1 billion. Forty-six per cent of these benefits are from BASIX certified dwellings already approved for development.

The dollar value energy and water bill savings through BASIX compliance are estimated at between $7,123 and $10,249 for an average four-bedroom Western Sydney household built in 2006, or between $158 and $228 a year to 2050 (an average home's lifespan is estimated at around 40 years). A two-bedroom Sydney high-rise unit, with lower occupancy and energy targets, can expect to save between $3,273 and $3,451, or between $72 and $76 a year to 2050. Results from Sydney Water analysis have found that from 2007-08 to 2010-11 the sample of BASIX dwellings assessed had achieved 41%, 38%, 36% and 36% in drinking water savings. 84% of BASIX homes have a tank or recycled water supply for toilet use, laundry use and/or irrigation. Other statistics include:

> 32% and 29% respectively of all BASIX homes have installed taps and toilets with a 4 star WELS ratings (behind the 3 star requirement); and

> 31% and 38% respectively of all BASIX homes have installed clothes washing machines and dishwashers with WELS ratings of four stars or higher.

Source: NSW Government, Planning (2011) Five Year Outcomes Summary BASIX Building Sustainability Index

CASE STUDY FIVE – WORKING WITH COUNCILS TO PROVIDE VALUED WATER SOLUTIONS (NSW)

Sydney Water's Council Partnership Program (CPP) continues to work with councils to help small businesses improve their water management efficiency. The CPP has achieved water savings of 2142 kL/day since it was launched in June 2009.

Paul Mulley, Sustainability Specialist in Business Planning and Capability said since the program started we have worked with 18 Councils and recently engaged two more; Blue Mountains City Council and Pittwater Council.

'We have trained 30 council project officers in business water auditing and co-funded employment of 16 water efficiency project officers. The program was developed as a more cost-effective way of working with our small to medium business customers to support the delivery of water efficiency targets.

The council officers work within their local community to provide water efficiency advice to small business owners. A further benefit of this program is developing strong networks and working relationships with councils who are important stakeholders for Sydney Water.'

PRICING

The urban water industry has a sound record of using pricing to improve the efficiency of water use. The introduction of user pays pricing in Perth in 1978 was a seminal point in using water prices to influence demand and to raise the revenue needed to provide high quality and reliable water services to customers. User pays pricing is now almost universal in Australian cities and, more recently, the use of inclining block tariffs has begun to send stronger pricing signals to urban high water consumers. For example South East Queensland, Melbourne and Adelaide have three inclining blocks.

The most recent study into the elasticity of demand for water found:

> It takes about a year for households to adjust from their immediate to long term position

> If water usage prices were increased by 10% the total decrease in demand over a year would be 1.1%

> That once a household upgrades the efficiency of its appliances its long term price elasticity is almost halved

> The importance of developing individual price elasticity estimates for different user groups

> The combination of a forecast increase in the proportion of housing units, new houses with smaller property sizes, and improvements in penetration of and efficiency of water using appliances will reduce the ability of water usage prices to influence residential demand.

INNOVATION

Smart metering and big data have the potential to increase efficiency and productivity in the industry through

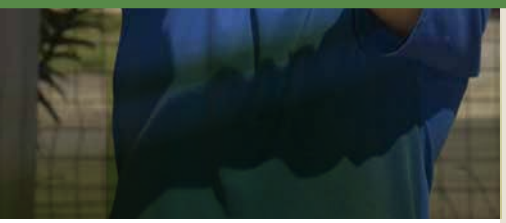
> Reduction in under billing caused by undetected meter degradation

> Earlier identification of leaks

> Frequent, timely and actionable provision of information empowering customers to better control and understand their water use.

Smart Approved WaterMark

CASE STUDY SIX – PROMOTING INNOVATION IN WATER EFFICIENCY



Smart WaterMark is Australia's water conservation label, identifying and certifying water-efficient products and services. Over 300 technologies and practices have been certified to use the Smart WaterMark label following rigorous assessment by an independent Technical Expert Panel. Set up by industry and government as a not-for-profit partnership, Smart WaterMarkdelivers water efficiency by:

> Assisting households and businesses to select water efficient products and services, allowing them to achieve water efficiency goals in a manner of their own choosing.

> Providing a common national approach to water efficiency labelling for government, water utilities, industry and retail.

> Providing water-saving accreditation to water utility efficiency programs (such as the WA Waterwise Approved Program) and is a vehicle to assess and identify innovative water-saving products, driving market transformation.

> Developing a national platform for water efficiency research including hosted web server for water efficiency information and product update service, which is actively used by sustainability departments.

> Removing the need for individual organisations to duplicate the Expert Panel certification process the scheme is the most cost-effective way of achieving water efficiency certification.

> Developing cutting edge water conversation tools such as the *"Every Bucket Counts"* online calculators and the *iSaveH2O* efficiency app.

Both small and large utilities servicing cities and regions are either trialling or planning the roll out of meters to about 60% of Australia's population. As smart meters gather significant data, combining this with the power of social media could transform customer services and water use behaviour.

For example, householders in Perth engaged in the Water Corporation's H2Ome Smart program have access to a web-based dashboard showing their water use in real time and that of others in the program. Participants are saying this information is making them work hard to improve their position on the leader board. They are also using the real time data to compete with family members.

Another innovative program is the Smart Approved Watermark, which is Australia's water conservation quality mark label for efficient products and services.

CONCLUSION

Using water wisely will always be part of the water security equation in Australia. Utilities will continue to evaluate and offer options to customers to help them make choices about their own water efficient targets. Programs such as Smart Approved Watermark, the Water Efficiency Labelling and Standards Scheme, and BASIX in NSW are now well established programs that will continue. Permanent water savings rules are a common sense approach and can be compared to the 'Do the Right Thing' litter campaigns of the 70s and 80s, these programs have 'hard wired' savings for the future.

An added bonus is that using water wisely improves our industry's productivity by delaying investment in future capital projects. For helping a customer to reduce their water use can indeed be considered as much of a 'service' as supplying a customer with water.

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