WSAA WATER SECURITY

INFORMATION PACK FIVE

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

- Water security is about balancing the future supply of water with future demand. It is important to achieve this balance without the need for long periods of outdoor water restrictions.
- The predicted drop in rainfall of 10% by 2030 and 20% by 2050, and the increase in the severity and occurence of floods, bushfires and drought, will affect the security of public water supply in Australia's most populous areas.
- Most jurisdictions have diversified their water supplies to improve water security.
- Adaptive planning is the industry's way of managing risk associated with variables which influence demand for water including climate change and population growth.
- Different supply and demand solutions will be implemented in the future, with customers and the community fully engaged in the planning process.
- All options should be on the table to allow customers and communities to make fully informed decisions. Policy bans on water supplies such as rural-urban trading and drinking recycled water distort decision-making.

INTRODUCTION

For many years now, the Australian urban water industry has supplied safe and secure drinking water services to its customers. Significant investment in surface water dams designed to meet a demand projection based on population growth estimates and trends in household, commercial and industrial consumption made this possible. Dams in protected catchments provided a safe, low cost water supply. They also provided the added benefit of storing water in years of high rainfall, to supplement years of lower rainfall backed up by restrictions during occasional drought.

This approach served the industry and customers well until the 2000's when the worst drought on record hit most of southern and eastern Australia (the Millennium drought) significantly impacting on reducing stream flows into dams. For example in Victoria these stream flow reductions were four times greater than the decline in rainfall (CSIRO 2010) and in Canberra were almost six times, much worse than in previous droughts affecting Canberra (ACTEW 2013) (Figure 1).

The drought reduced national GDP by almost 1% and the net welfare
costs of mandatory restrictions amounted to several hundred million dollars per jurisdiction per year (PC 2011). With further droughts likely, and the severity expected to get worse, the industry invested in climate independent sources
of water resulting in:

- Investment in desalination increasing from 0GL in 2005 to 500G in 2012
- Supply of recycled water increasing by 130% between 2000 and 2009
- Water savings across Australia's cities of approximately 350GL/yr (WSAA 2013).

A DEFINITION OF WATER SECURITY

The UN defines water security as

"the capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne

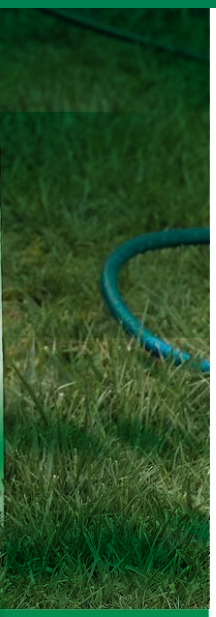
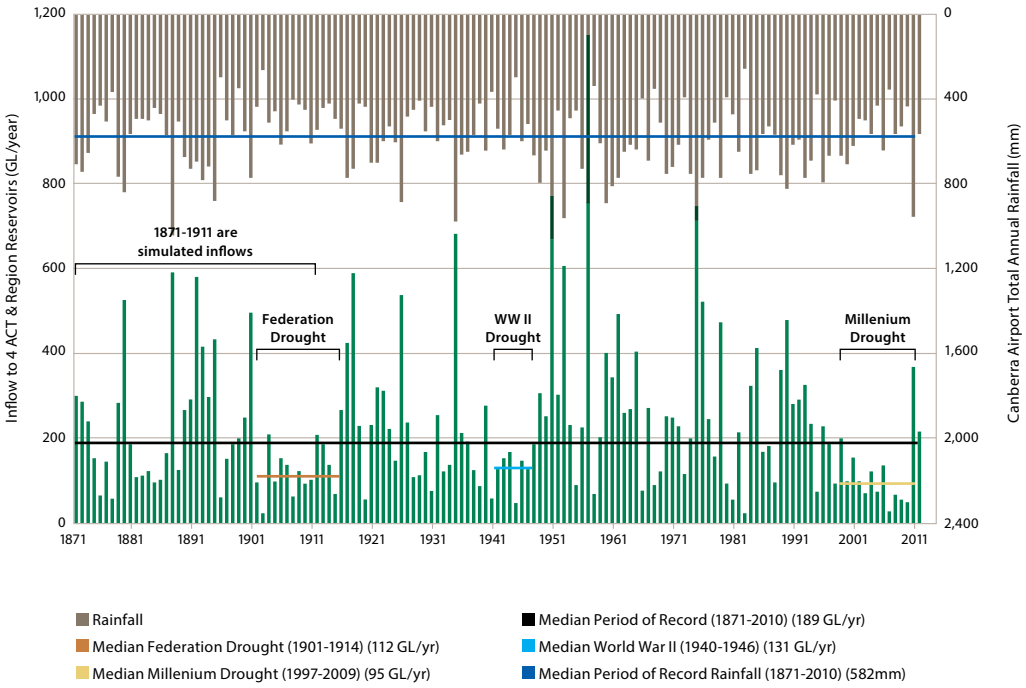


FIG. 1 INFLOWS TO CANBERRA RESERVOIRS



pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability" (United Nations 2013)

To the United Nations 2013, water security is a critical issue for the 21st century, along with the growth in cities. Both of these issues are critical to WSAA members. Specifically for WSAA members, water security is about reliable supply of water in the future.

It is about balancing the future supply of water with future demand. It is important to achieve this balance without the need for long periods of outdoor water restrictions, unfavourable to customers and communities.

Balancing future demand and supply of water depends on three main things:

> climate

> population growth

> support for water efficiency, from the community and policy makers.

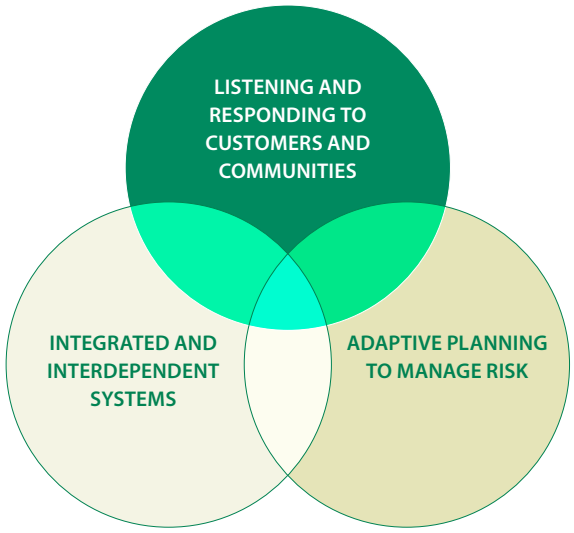
PLANNING AND MANAGING FOR URBAN WATER SECURITY

Australian cities are well positioned in the global context to manage the impacts of climate variability. Australia has experience of drought, but the future is uncertain and becomes more so the further one looks out.

WSAA members work continuously to reduce the uncertainty of factors such as the effect climate may have on supply, and the impacts population growth and demographic change may have on demand. Uncertainty, however, never disappears so WSAA members continually examine the residual risk. Supply-demand balances are regularly reviewed and updated based on new information relating to key risks.

Customers and community expect now that they will have a greater say in their water future. Therefore planning and management requires engaging with customers and communities to better understand their needs and wants. I t also requires adaptive planning to manage climate and economic risk and the integration of various water sources with water efficiency measures (Figure 2).

FIG.2 URBAN WATER SECURITY – KEY ELEMENTS



1. Listening and responding to customers and communities

The level of service of a water supply system includes reliability of supply, pressure and water quality. Understanding the level of service expected by a community is a critical factor in determining the investment required in water infrastructure and water efficiency measures.

Examples include Willingness to Pay surveys, and hedonic pricing is used to estimate economic values for ecosystem or environmental services that directly affect market prices. It is most commonly applied to variations in housing prices that reflect the value of local environmental attributes. It can be used to estimate economic benefits or costs associated with environmental quality, including air pollution, water pollution, or noise; and environmental amenities, such as aesthetic views or proximity to recreational sites. Decision-making for levels of service evaluates both the costs of proposed options, and the benefits from the customer's and community's perspective.

Tailoring products and services to customer groups is a key focus for the industry. Sydney Water recently identified five clear customer segments, according to the needs and priorities of its residential customers (Fig. 3) (Jenkins 2012). Sydney Water is now considering future product and service development in:

> price structures or mechanisms that may either reward water efficiency or enable customers to have some control over their water usage and bills. This may include the potential use of smart meters

> sustainable energy

> an emergency plumbing service.

2. Adaptive planning to manage risk

Adaptive planning is the industry's way of managing risk associated with variables that influence demand for water including climate, population growth etc. A number of utilities have created approaches (Figure 3) incorporating:

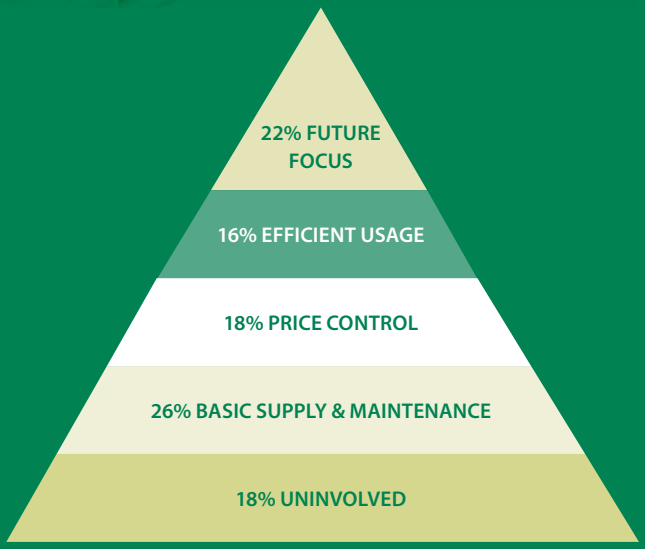
> the identification of flexible portfolios of water supply and water efficiency options. These may be at the site scale (eg household rainwater tanks), the local scale (eg third pipe recycled water schemes) and at the city/regional scale (eg large scale seawater desalination plants)

> scenario planning, combined with risk assessment

> development of severe drought contingency plans.

In light of high investment costs, long lead times and asset lives, growing community expectations, and consequences of failure; water supply managers need to develop flexible plans for the long term (50 years).

FIG.3 **CUSTOMER SEGMENTS**



CASE STUDY ONE – ENGAGING COMMUNITIES ON LONG TERM DEMAND AND SUPPLY PLANNING STRATEGIES

Water Forever, a 50 year demand and supply strategy for Perth, won the Australian Water Association (AWA) WA Water Communication award for 2008. Development by the Water Corporation involved a significant community engagement program, the most comprehensive ever undertaken by the Water Corporation. More than 2,350 people provided comments, 2,175 people registered to receive regular updates, 98,000 people visited the website, 2,200 people attended forums, 1,600 people visited shopping centre displays and over 1,800 people participated in online surveys.

This activity demonstrates that the community embraces a wide array of engagement channels. It provides a model for future planning and engagement exercises in the water industry.

The portfolios of responses can range from things like rainwater tanks and greywater systems at the local scale through to large-scale sources like seawater desalination plants.

These are supported by appropriate permanent water efficiency measures, pricing, and tariff structures to promote efficient water use. All are assessed within a sustainability framework.

The scenarios run across the spectrum of a very wet to a very dry climate, in combination with very high to very low demand. All are underpinned by low to high population growth predictions, and other trend influences (eg energy prices).

As conditions can, and do change, regular reviews of portfolios, scenarios and trends is a priority.

Importantly, the assessments and resulting outcomes of the above approach are 'location-dependent'. Climate, weather, geography, population growth, and so on vary. It is not a 'one size fits all.' At the local scale or the city-scale, a grid-connected, diverse set of water sources, underpinned by efficient water use, offers significant resilience.

CASE STUDY TWO – MELBOURNE METROPOLITAN WATER BUSINESSES (WSDS 2012)

The Melbourne Metropolitan Water Businesses embarked on their most recent strategy in 2012 where they identified key trends, scenarios and from these developed an envelope of supply and demand curves (Fig. 4). Two investment strategies were applied to the four trend scenario paths; a reactive strategy drawing on large-scale drinking water options and a proactive strategy that first considers the small-scale non drinking water options before introducing the larger ones. The results of testing these against 'shocks' related to the key trends indicated that the proactive strategy could cope better with extreme shocks but the 'price to pay' would be potential over-investment if shocks are mild and not extreme (Mukheibir et al 2012).

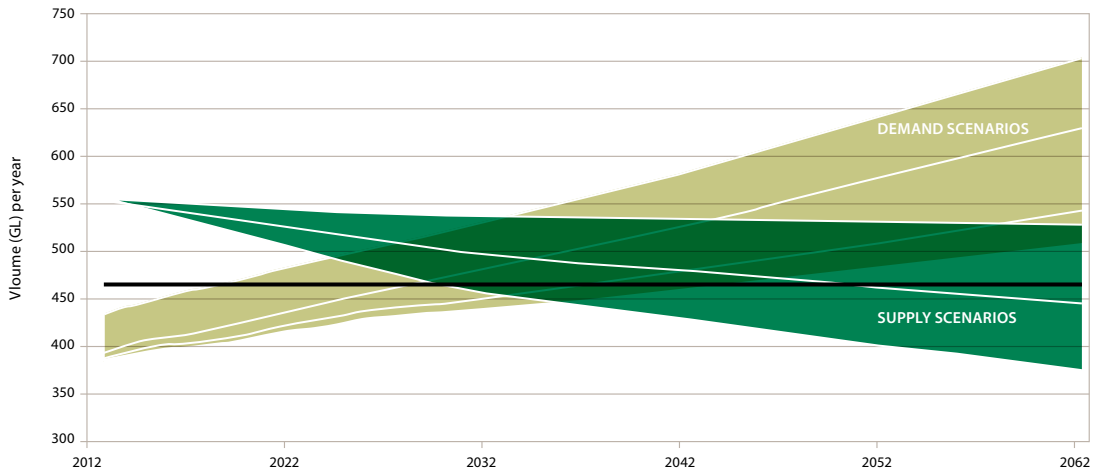
Key trends

> Climate change – driver for supply
> Catchment bushfires – driver for supply
> Population growth – driver for demand
> Water consumption patterns – driver for demand

Scenarios

> Wet climate and low demand
> Median climate and medium demand
> Dry climate and high demand
> Return to dry climate and bounce back demand
> Energy prices – cost

FIG.4 ENVELOPE FOR SUPPLY AND DEMAND (GL) UNDER VARIOUS SCENARIO PATHS (WSDS 2012)



INTEGRATED URBAN WATER MANAGEMENT AND INTERDEPENDENT SYSTEMS

According to the National Water Commission (NWC), integrated water cycle management extends into the regional-catchment scale. It incorporates the planning and management of all potential supply sources linked to an urban centre including surface water, groundwater, recycled waste water, greywater, storm water and desalinated sea water.

Management objectives include:

> minimising the impacts of urban development on the water balance, and the environment

> addressing water scarcity in cities and towns by diversifying supply options to include all components of the urban water cycle, at the local, regional and city scale.

TABLE 1 **KEY FINDINGS ON ENERGY USE IN URBAN WATER UTILITIES**

Services	Key findings
Contribution to overall primary energy demand	15 utilities serve 70% of Australians with a total energy demand of 7.6PJ; this is around 0.3% of Australia's overall primary energy demand.
Water services	The uptake of desalination has influenced the energy demand profile for water supplies in Australian cities. In South East Queensland, desalinated and recycled water made up around 10% of the water supplied in 2009/10, with the treatment energy for these making up more than 40% of the total energy for water supply treatment and pumping. Electricity used to supply water services dominates greenhouse gas emissions. In Melbourne, grid electricity is only 55% of total energy used but makes up 90% of energy related emissions. The energy for urban water services is still a relatively small fraction of the total energy associated with urban water use (approximately 12%). Shifting to a WELS 3- star shower rose can decrease energy consumption for hot water by approximately 50% for households with considerably greater-than-average water use. For houses with average water use, low flow showerheads can reduce total household energy consumption by 19%1.
Sewage services	Energy use dependent on level of treatment. Canberra has the highest per capita energy use because of the high (tertiary) treatment requirements prior to discharge to inland waterways.
Energy generation	Energy generation is on the increase. Sydney Water now operates 11 gas cogeneration and hydroelectric facilities supplying about 20% of Sydney Water's energy needs and saving $4 to $5 million per year.

Water links to all sectors of the Australian economy, in particular to agriculture, mining and electricity generation. Water management faces challenges posed by population growth, by urban expansion, by environmental degradation, climate change and variability, as well as social pressures. It is constrained by regulatory, legal and institutional frameworks.

At the broadest level, natural and societal resources fall into five major interdependent sectors (ATSE 2012):

> water
> agriculture
> energy
> human health
> and ecosystem function

The energy-water and energy-water-carbon nexus are hot issues in the urban water industry.

To better understand the issues, WSAA has now published two papers on energy use in the provision and consumption of urban water in Australia, in partnership with CSIRO, (WSAA and CSIRO 2008 and 2012). Table 1 includes key findings.

Given the significant agricultural potential for recycled water (which includes the nutrients) and by products from sewage, a broader focus for the industry in the future is the energy-water-waste-food nexus.

CONCLUSION

To ensure our communities remain liveable and our economy remains productive, the Australian urban water industry plans and manages systems and infrastructure to meet water needs. Engaging with customers and communities to determine what these needs are and how best to meet them is very important to us.

Planning and management addresses factors such as climate change and population growth. Meeting water needs is also influenced by the extent to which both the community and policy makers accept different portfolio options. These options include water recycling, desalination, dams, and water efficiency.

Even though we cannot predict the future, the industry continually updates plans to reflect new information as well as trends. We also know that the best system is a diverse system where local, regional and city scale water sources (some independent of climate), work together.

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