WATER SERVICES ASSOCIATION
of Australia

17 January 2006

Water Study
Productivity Commission
Locked Bag 2, Collins Street East
MELBOURNE VIC 8003
By email: waterstudy@pc.gov.au

Dear Sir/Madam

Submission to Productivity Commission Study 'Rural Water Use and the Environment: The Role of Market Mechanisms'

The Water Services Association of Australia (WSAA) was established in 1995 and currently has 29 members and 26 associate members from across Australia and New Zealand. WSAA's Members provide water services to more than 15 million urban based customers, including many of Australia's largest industrial and commercial businesses. The Association provides a forum to discuss issues of importance to the urban water industry and, where appropriate, is a focal point for communicating the industry's views. In this context WSAA has a major interest in the future sustainability of water supplies to Australia's cities.

The key functions of WSAA include:

- The production of WSAA*facts* on an annual basis which is the compendium of approximately 120 indicators on the urban water industry.
- The management of the AAAAA water efficiency labelling scheme.
- Development of codes of practice for water supply and sewerage networks
- Appraisal of new products for the industry.
- Delivering projects and research of national significance.
- Representing the urban water industry at the national level.

After reading the Productivity Commission Issues Paper it is clear that the scope of this study concerns the agricultural use of water as 90% of all water extracted from the environment is used by the agricultural sector.

Nevertheless, WSAA believes that it is important that the Productivity Commission, when undertaking this study, be aware of the importance of water markets in providing water to our growing cities in the future. The Productivity Commission would already be aware that one of the outcomes in the National Water Initiative for the urban water section is to 'facilitate water trading between and within the urban and rural sectors' (Section 90 sub-section iv).

There are only a limited number of examples currently where there is water trading between the urban and the rural sectors has taken place. While it is expected that such trading will grow in the future as the cities confront increasingly more difficult and expensive options of providing water for rapidly growing populations, it is important to keep into perspective that these volumes, whilst crucial to the efficient allocation of resources to the cities and to industry will represent only a very small proportion of total water use.

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The challenges confronting our cities from a water perspective can be summarised as follows:

1 Serving a rapidly growing urban population – the population of Australia's major cities is predicted to increase by 35% by 2030.

2 Achieving ongoing savings through water conservation – most of the easy and cheap water conservation measures have already been targeted and further measures are likely to be intrusive, more expensive and unlikely to deliver the magnitude of water savings experienced in the past.

3 Increasing variability of rainfall has resulted in inflows to water storages serving our cities decreasing quite rapidly over the last decade. Perth has experienced the most dramatic reduction in inflows where for the last eight years (including 2004) the stream flows have been 64% less than those experienced up to 1974. Reductions, although not as dramatic, have been experienced by all other urban water supply systems.

4 The urban water industry must play its part in ensuring that our streams have sufficient flows to ensure that they are healthy. This might mean additional environmental flow releases from urban and rural water systems.

5 Increased affluence and community expectations of improved levels of service. As the affluence of our community increases their expectations of reliable supplies of water increases. There is evidence that the community will not accept intrusive water restrictions on an ongoing basis and many people still value green gardens and gardening as a recreational pursuit.

6 All of the above challenges need to be addressed in a sustainable manner. This is why the industry now broadly adopts a triple bottom line assessment of projects to ensure that projects do not result in adverse environmental and social outcomes. There is often a direct trade off between a water outcome and increased energy consumption. This trade off needs to be understood so that the urban water industry does not respond to drought without understanding the greenhouse gas implications.

What is not widely understood is that, with the exception of Sydney, the other capital cities in Australia have opportunities to trade water with the agricultural sector without the need to build any infrastructure. There are further opportunities to create greater inter-connection between rural and urban water systems with minor capital works. Compared to other options such as desalination and recycling, water trading is very attractive from both a financial and environmental perspective.

An argument is often promoted that if the cities were able to trade with the agricultural sector that it would lead to the demise of irrigated agriculture. The figures do not support this argument. Given that households only use 9% and manufacturing and other industries 7% (ABS Water Account 2000-2001) trading between the cities and agriculture will always be at the margin because of the sheer difference in the magnitude of the volumes of water used by agriculture compared to the cities.

From an efficiency perspective there is a great deal of merit from having a trading system that involves the cities as the use of water in a city represents a higher value added use than the majority of irrigated agricultural uses. A trading system will have the advantage of

revealing the willingness to pay of various water using sectors. WSAA is currently undertaking a study on the economic value of urban water using the COPS model at Monash University to model water trading scenarios.

There can also be environmental benefits for rural to urban water trading. There are instances where it makes sense for farmers to retire their irrigated land where productivity is marginal and environmental impacts significant. Separation of water allocation rights from land and a free trading system could allow transfer of water to an urban sector which could afford to financially assist these farmers to retire (or indeed improve their farm). This could benefit the farming sector, the environment and urban water users.

Whilst trading may give rise to environmental benefits it is also possible that it could be associated with environmental negative externalities (i.e. salinity or adverse impacts on biodiversity). In such circumstances governments may choose to introduce pricing instruments to address such externalities. We would argue strongly that in such instances these instruments should be applied in a non-discriminatory manner so as to not to preclude water trading between urban and rural areas.

Another area that is not widely understood is the inter-dependency between water trading and third party access to infrastructure. There is little doubt that third party access is going to become a significant issue for the urban water industry and an active water market involving the agricultural sector would open up many opportunities for third parties to sell water directly into an urban market. Two possible scenarios that could unfold are as follows:

1 A group of farmers who no longer wish to farm could sell their water to a large urban based industrial user and then apply for third party access to the urban water utility's infrastructure to enable it to convey the water to the customer.

2 A large industrial user in the city could purchase a farm with water rights and apply to the urban water utility for access to infrastructure to enable the water to be conveyed to the city.

Of course water trading between rural and urban utilities is also a possibility. The above examples assume that the rural and the urban systems are already interconnected.

For the above reasons it is strongly suggested that the Productivity Commission consider the implications of rural to urban water trading even though the brief for this study restricts the scope to rural water use. As outlined above, the days of thinking about urban and rural systems separately are fast fading given that the systems are already connected to a degree and that the cities face significant challenges in providing water for rapidly growing populations. Water markets will become an increasingly attractive option for the cities in the future, as the greenhouse implications of desalination and recycling become more widely known in the community.

For your information I have attached a copy of the WSAA Position Paper 'Testing the Water' which outlines the achievements of the urban water industry since the 1994 COAG reforms, the challenges it confronts and the responses from State governments and urban water utilities to these challenges.

If you wish to discuss any aspect of this submission please do not hesitate to give me a call on 03 9606 0678 or email at ross.young@wsaa.asn.au.

Yours faithfully

Ross Young
Executive Director

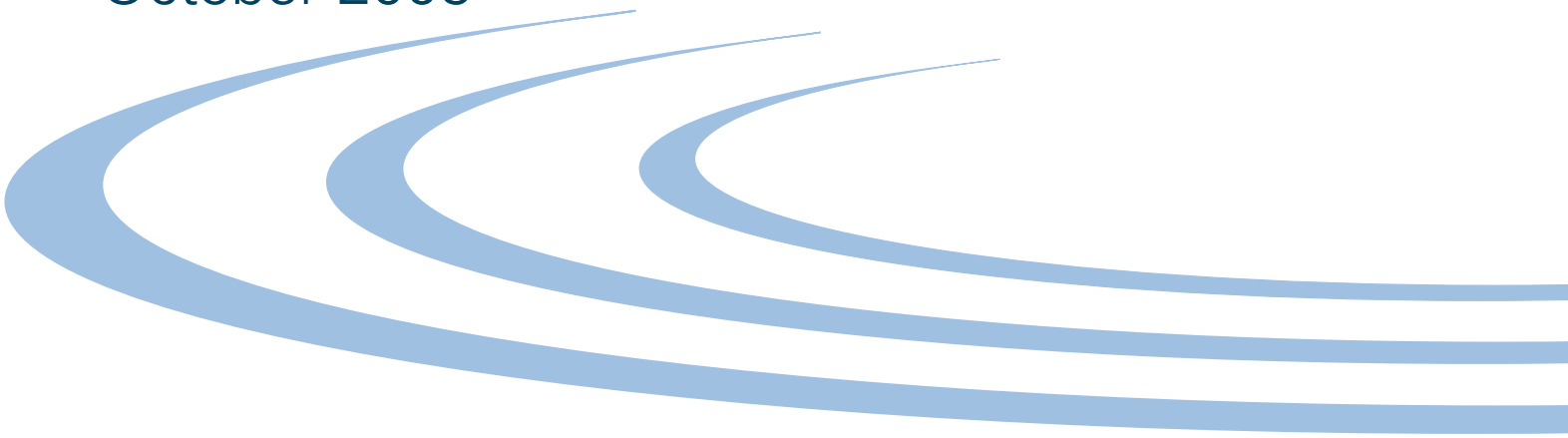
Att

WATER SERVICES ASSOCIATION
OF AUSTRALIA

Testing the Water

Urban water in our growing cities: the risks, challenges, innovation and planning

WSAA Position Paper No. 01
October 2005



Testing the Water

Urban water in our growing cities: the risks, challenges, innovation and planning

Contents

WATER SERVICES ASSOCIATION OF AUSTRALIA

Overview of WSAA

The Water Services Association of Australia (WSAA) is the peak body of the Australian urban water industry. Its 28 members and 25 associate members provide water and sewerage services to approximately 15 million Australians and to many of our largest industrial and commercial enterprises.

WSAA was formed in 1995 to provide a forum for debate on issues important to the urban water industry and to be a focal point for communicating the industry's views. WSAA encourages cooperation to improve the water industry's productivity and performance and to ensure the regulatory environment adequately serves the community interest.

The functions of WSAA can be summarised as follows:

- be the voice of the urban water industry at the national level and represent the industry in the development of national water policy,
- facilitate the exchange of information and communication within the industry,
- undertake research of national importance to the Australian urban water industry,
- develop National Codes of practice for water supply and sewerage systems,
- appraise new products on behalf of the water industry,
- manage the Smart Approved Watermark Scheme for products and services involved in outdoor water use and voluntary labelling scheme for water using internal appliances, and
- produce information on the industry in the form of WSAA*facts* on an annual basis.

Appreciation

I am grateful to Karen Campisano, WSAA*facts* Project Officer, for providing substantial research in the preparation of this document.

Ross Young, Executive Director, WSAA

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ISBN 1 920760 21 0

Executive Summary

Although only 16% of water extracted from the environment is consumed by cities and towns, ensuring the safe and reliable supply of water for our growing cities is essential for the future prosperity of Australia.

The urban water industry has a proud record of reform and has been innovative and effective in responding to change in the past. This is reflected in the industry's achievement of reforms contained in the 1994 COAG agreement. However, the industry now faces significant challenges in being able to provide reliable supplies of water to our cities in the future as the population of Australia's capital cities is projected to increase by 35% by the year 2030 and the variability of rainfall and potential climate change impacts are decreasing yields by up to 25% in some of the water supply catchments serving our cities.

The challenges now facing the industry include:

- developing new and alternative sources of water such as recycling whilst protecting public health and minimising the impact on the environment,
- achieving further reductions in per capita consumption through water efficiency programs when significant gains have already been achieved in this area,
- contributing to the improved environmental health of our rivers and streams, and
- ensuring that all of the above can be achieved in a manner that is sustainable and acceptable to our communities.

In the context of the above challenges and the ongoing drought conditions that prevail across much of Australia, governments and urban water utilities have developed water resource strategies, which include supply and demand side measures, to ensure that our cities will have reliable supplies of water for the future.

An urban water balance sheet has been compiled using the information contained in the water resource strategies for each of our capital cities relating to:

- proposed new sources of water to be developed,
- proposed alternative sources of water such as recycled water, and
- ongoing savings in per capita consumption from water efficiency programs.

The balance sheet shows that even though population growth will drive increased water consumption in our cities, the combination of measures contained in water resource strategies results in no water deficit by 2030.

However, the measures contained in the water resource strategies all have significant risks associated with them and there is always uncertainty in long term planning which relies on assumptions about the future. The risks include population growth exceeding forecasts, uncertainty in water consumption forecasts, yields declining due to climate change, and making the water markets work, just to mention a few. For this reason constant monitoring and reviews of these strategies will be essential.

The solutions contained in the water resource strategies are different to past solutions and this time involve diversifying water sources so that out cities are not totally dependent on dams which are becoming more unreliable sources of water due to increased rainfall variability. In order to diversify water source options, proposals include greater use of ground water, inter-basin transfers, water trading between rural and urban users, recycled water for non-potable purposes, stormwater and desalination. An adaptive management approach will be adopted taking into account new technologies and approaches as they evolve.

Underlying this approach is the need for appropriate water policy at the national and state level to support the efforts of the urban water industry in meeting the challenges of the future.

Introduction

Water is one of the most important issues facing Australia today

Australia is a highly urbanised country with more than 80 per cent of the population living in urban areas within 100 km of the coast. Despite this, water policy development in Australia has historically focused on the challenges facing the agricultural sector. This stands to reason given that agriculture uses 67 per cent of all water extracted in Australia compared to the 9 per cent used by households[1] and the 7 per cent used by manufacturing and industry. However, given that most Australians live in cities, and these cities are experiencing water restrictions due to the ongoing drought, meeting the challenge of providing reliable supplies of water for our growing cities has become an issue of national importance.

The drought has highlighted to Australia's 15 million plus urban consumers the fragility and unreliability of our rainfall. It has also raised concerns about adequate access to water. In the past, politicians and water utilities would have responded to these concerns by embarking on a dam building program to 'drought proof' our cities. The large dams around our cities are living testament to this philosophy. While these dams have served our urban communities well, over the last 20 years, with the exception of Perth, no new water sources have been developed for our cities. At the same time, the urban population has increased dramatically.

From the 1980s it became unfashionable to build dams for cities. Community concerns about the environmental impacts of dams and the fact that most river basins were already fully allocated (or over-allocated) left few options for socially and environmentally acceptable dam sites. The 'no new dams' mantra grew and still exists to this day.

The prevailing wisdom was that cities would have to live 'within their own means' and population growth would have to be accommodated through the introduction of water conservation measures. From the mid-1980s, per capita consumption has dropped significantly in our cities largely due to pricing reforms, greater use of water efficient appliances and dual flush toilets, and water efficiency programs that established a water saving ethos in the community. In Melbourne, per capita consumption has declined by 19 per cent compared to the average per capita consumption for the 1990s. There are, however, limits to the gains we can make through further reductions in per capita water use. As urban communities become more affluent, they are demanding higher levels of service and there are limits to the extent to which they will tolerate restrictions that impact on their standard of living.

The ongoing drought has coincided with increased community debate about climate change and its potential impacts on our rainfall patterns, and hence on our water resources. There is a belief that the current drought is different from previous droughts and the rainfall patterns we are experiencing are a sign of things to come. The threat of climate change and increasingly unreliable rainfall patterns has highlighted the high risk associated with relying on surface sources of water solely, such as dams, to serve urban populations.

The talk of climate change has led to a genuine fear in the community that our cities are going to run out of water. Some commentators have started to talk of an 'urban water crisis' and have called for new dams to be built for our cities.

[1] ABS Water Account 2000-2001

Introduction
continued

All Australian cities and major urban areas now have water resource strategies that include significant supply-side measures. These new sources of water are different from past solutions—this time the industry will evaluate new technologies that will allow it to diversify its sources of water to reduce the risks of increasingly unreliable rainfall associated with potential climate change and population growth.

This paper outlines the response by State Governments and urban water utilities to the challenges in providing safe and reliable supplies of water to our growing cities. The analysis shows that if the actions in the various water resource strategies are implemented and achieve their stated objectives, by 2030, despite the population of our cities growing by 35 per cent, there will be adequate water to maintain the high quality of life and urban landscapes that Australians have come to expect. Of course, there are risks and challenges associated with implementing the measures contained in the water resource strategies and it is for this reason that governments, utilities and the community can not afford to be relaxed.

The urban water industry has a proud record of reform and innovation in response to the challenges it has confronted in the past. The fact that we don't face a broad-based urban water crisis today, despite nine years of drought, no new storages and surging urban populations, reflects the industry's willingness to recognise the challenges and explore innovative responses.

An important component of the urban water industry's response to the challenges ahead will be to access water through water markets. Given that households in Australia only use 9 per cent of all water extracted, the cities will be able to access water without unduly impacting on agricultural output. There are many opportunities for win/win situations where funding from the urban sector, efficiency of rural infrastructure can be improved, with water savings passing to urban communities.

The measures contained in the water resource strategies reflect the objectives of the National Water Initiative and the commitment of the urban water industry to deliver on the actions required. The industry looks forward to working with State Governments and the National Water Commission in implementing the strategies and in ensuring that urban water issues are given the focus they deserve. After all, Australia is a highly urbanised country and water policy in Australia needs to reflect this.

Ultimately Australia's aim should be to ensure the best sustainable water outcomes for people, business, industry, agriculture and the environment.

Water use in Australia – a snapshot

Water extracted in Australia is overwhelmingly dedicated to the agricultural sector. As shown in the figures below, urban water use, including household, manufacturing and other uses, accounted for only 16 per cent of the 24,909 GL consumed in Australia in 2000–01. The agricultural sector, by comparison, accounted for 67 per cent of water used.

These figures give a breakdown of water use in Australia, the proportion of urban water used by different user segments, and how water is used by households. They illustrate where there is scope to reduce consumption or reallocate resources to achieve improved water resource outcomes.

Figure 1: Water use in Australia

24,909 GL was consumed in the Australian economy in 2000-2001

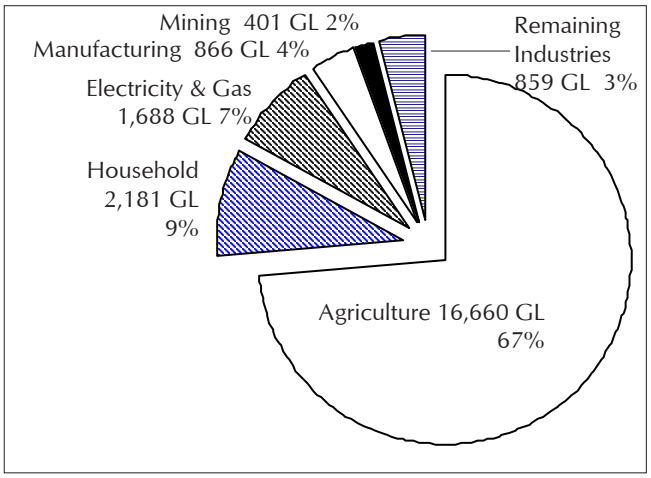


Chart data from ABS Water Account 2000-2001

Figure 2: Urban water consumption

Shown as percentage of total consumption

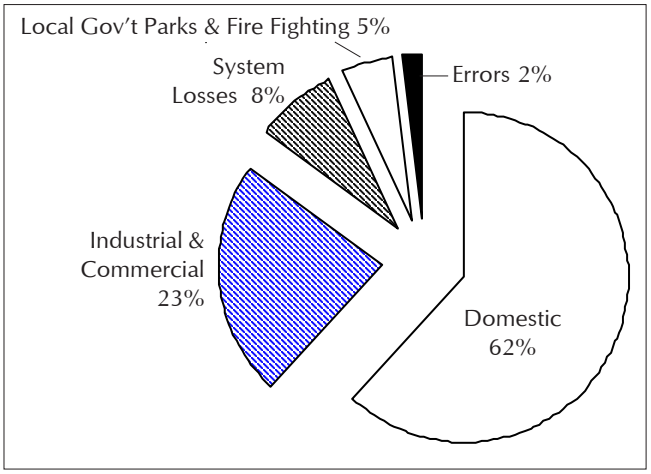
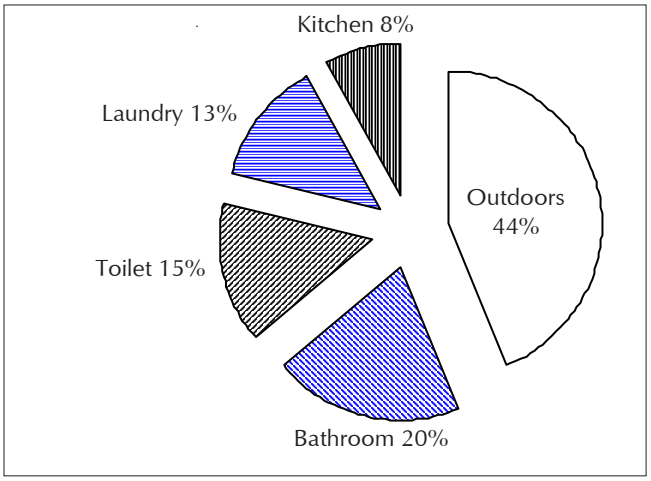


Figure 3: Water use in Australian households

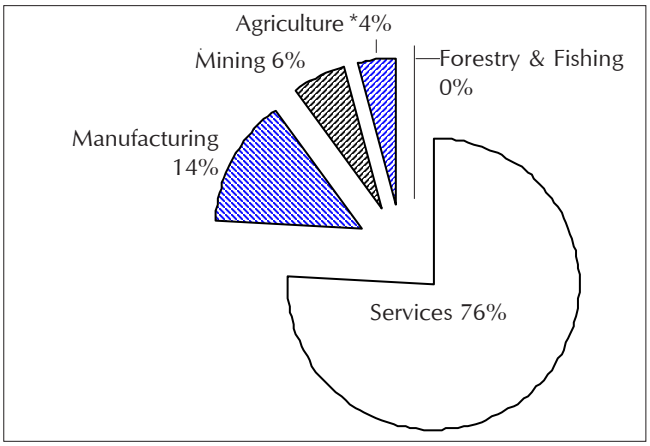


The economic importance of the urban water industry

Most Australians live and work in cities – and that is where the greatest proportion of the country's economic value is generated. The agricultural sector produces less value added than the services, manufacturing or mining sectors and yet consumes the majority of Australia's water, including mains water.

In 2004, the WSAA engaged the Centre of Public Studies (COPS) from Monash University to build on earlier research to model the impact of long-term economic growth and water use, differentiating between metropolitan and non-urban water use. Industry and water use data was disaggregated into 35 industries and 27 regions.

Figure 4: Industry Gross Value Added -Industrial Production 2001



*Agriculture includes output of both irrigated and non-irrigated agriculture

Source: ABS Corrigendum to Water Account Australia 4610.0 15 November 2004

The research recognises that water users, particularly industries, rely on different water sources:

- self-extracted (directly from the environment)
- mains (pipe or channel for a fee)
- reuse water/treated wastewater provided to another user (ABS excludes on-site reuse).

Not surprisingly, the research shows that the value added associated with mains water usage by agricultural industries is substantially lower than that associated with both manufacturing industries and service industries.

A record of reform and innovation

The urban water industry has a proud record of reform and has been innovative and effective in responding to change and to the unique challenges facing urban water managers in Australia.

Council of Australian Governments Water Reform Framework

In February 1994, the Council of Australian Governments (COAG) agreed to implement a 'strategic framework to achieve an efficient and sustainable water industry'.

Since then, the urban water industry has achieved all but one of the COAG water reform framework milestones. (While the water industry has not explicitly identified externalities in prices, they are imlicitly incorporated in prices as urban water is priced well above its marginal cost of supply, delivery and treatment.)

The industry has supported, investigated and implemented reforms in areas such as:

- charging for water on a volumetric basis and two-part tariffs,
- separating policy and regulation from service delivery,
- annual benchmarking, and
- removing the shield of the Crown.

The urban water industry is totally committed to implementing the actions contained in the National Water Initiative. As outlined in Table 1, the industry is already making good progress in implementing the actions contained in the Urban Water Reform section of the National Water Initiative. The urban water industry will continue to liaise with the National Water Commission (NWC) in completing these actions and in other important policy areas to maintain the reform momentum.

The outcome for the Urban Water Reform component of the National Water Initiative is as follows:

Urban Water Reform

Outcome

Section 90.

The parties agree that the outcome for urban water reform is to:

i) provide healthy, safe and reliable water supplies;
ii) increase water use efficiency in domestic and commercial settings;
iii) encourage the re-use and recycling of wastewater where cost effective;
iv) facilitate water trading between and within the urban and rural sectors;
v) encourage innovation in water supply sourcing, treatment, storage and discharge; and
vi) achieve improved pricing for metropolitan water (consistent with paragraph 66.i) to 66.iv)).

A record of reform and innovation
continued

In the following tables the symbols in the Progress columns represent:

✓ Completed or well under way,
P Partial progress
NP No progress at this stage

Table 1: Progress on implementing the National Water Initiative

Best Practice Water Pricing - National Water Initiative, Section 66

Action		Progress	Details
i	Continued movement towards upper bound pricing by 2008.	✓	The major cities already price water in the upper bound and regional centres must move in this direction.
ii	Develop pricing policies for recycled water and stormwater…by 2006 '.	✓	WSAA engaged ACIL Tasman/GHD to develop pricing principles for recycled water. These principles were released in WSAA Occasional Paper No. 12 'Pricing for Recycled Water' in February 2005. This paper outlines the principles to be used when determining the price of recycled water and then applies these principles to three different case studies. WSAA will work with the NWC to determine the best means of development stormwater pricing principles.
iii	Review and develop pricing policy for trade wastes…by 2006.	P	WSAA is working on the development of a National Waste Water Source Control Strategy and the Review of Trade Waste Guidelines. The guidelines have not been reviewed since 1994. The review, being undertaken by the WSAA Trade Waste Network will incorporate a new Framework for Trade Waste Management. The revised guidelines are based on the same framework as the National Drinking Water Quality Management Framework. The intent is to have these guidelines adopted as part of the National Water Quality Management Strategy and a draft is due by November 2005. WSAA is undertaking a project on cost reflectivity of sewerage provision including trade waste. This will be completed by June 2006.
iv	National guidelines for customers' water accounts to provide information on relative water use by 2006.	✓	Water utilities have already begun to provide water consumption information in relation to average consumption within their geographic area on customer accounts, and WSAA will become a central repository for distributing 'best practice' examples to the industry to ensure the adoption of this action across the WSAA membership.

A record of reform and innovation
continued

Table 1: Progress on implementing the National Water Initiative (Continued)

Urban Water Reforms - National Water Initiative, Section 91

Action	Progress	Details
i Implement mandatory appliance labelling.	✓	WSAA has been working closely with the Department of Environment and Heritage to ensure a smooth transition between WSAA's voluntary scheme and the new Commonwealth mandatory scheme (Water Efficiency Labelling Scheme) which is scheduled to commence on 1 July 2006.
ii Develop and implement a 'Smart Watermark scheme'.	✓	WSAA, in conjunction with the Australian Water Association, Irrigation Association of Australia and Nursery and Garden Industry Australia Ltd., has developed this scheme, which covers outdoor products and services. An application has been made to the Australian Water Fund so that the marketing and promotion of this scheme can be increased. This scheme compliments the Commonwealth Government's Water Efficiency Labelling Scheme.
iii Review the effectiveness of temporary water restrictions, public education strategies and low level restrictions.	P	Some water utilities have reviewed restriction policies and implemented permanent low level water restrictions. WSAA plays an important role in disseminating information so that any important matters learnt can be shared throughout the industry. There is a need to ensure that restrictive policies are not too blunt in their impact and do not result in perverse outcomes or deliver a smaller water saving in relation to the social impact they create.
iv Respond to system losses such as leakage, excess pressure and overflows.	✓	The water utilities have adopted the Infrastructure Leakage Index as the tool for driving continuous improvement in leakage. This is reported annually in WSAA*facts* . Trials have been conducted to determine the impact of reduced pressure on water consumption and improved asset lives. Results are promising at this stage and have been distributed to the industry. Comparisons with the performance of utilities in the USA, Europe and South Africa with WSAA members show that Australia leads the world in leakage management and water loss.

A record of reform and innovation
continued

Table 1: Progress on implementing the National Water Initiative (continued)

Innovation and capacity building to create water sensitive Australian cities - National Water Initiative, Section. 92

Action	Progress	Details
i National health and environmental guidelines for Water Sensitive Urban Design by 2005.	✓	The process of developing national guidelines for recycled water is well underway with a draft paper to be submitted to the Environmental Protection and Heritage Council Standing Committee in August 2005. It is expected that the guidelines will be released for community and stakeholder consultation following the EPHC and NRMMC meetings in October 2005.
ii Guidelines for evaluating Water Sensitive Urban Design options by 2006.	✓	WSAA has undertaken a project to develop a framework for evaluating the sustainability of alternative options for water industry projects. The methodology is currently being evaluated using contemporary projects as pilots. Once the pilot projects are complete the framework will be formally released for use across the water industry.
iii Evaluate 'icon water sensitive developments' to identify knowledge gaps by 2005.	NP	WSAA will be discussing with the NWC the most appropriate way of progressing this action.
iv Review institutional and regulatory models for achieving Water Sensitive Urban Design by 2006.	NP	WSAA will be discussing with the NWC the most appropriate way of progressing this action.
v Review incentives to encourage innovation by 2006.	NP	WSAA will be discussing with the NWC the most appropriate way of progressing this action.

A record of reform and innovation
continued

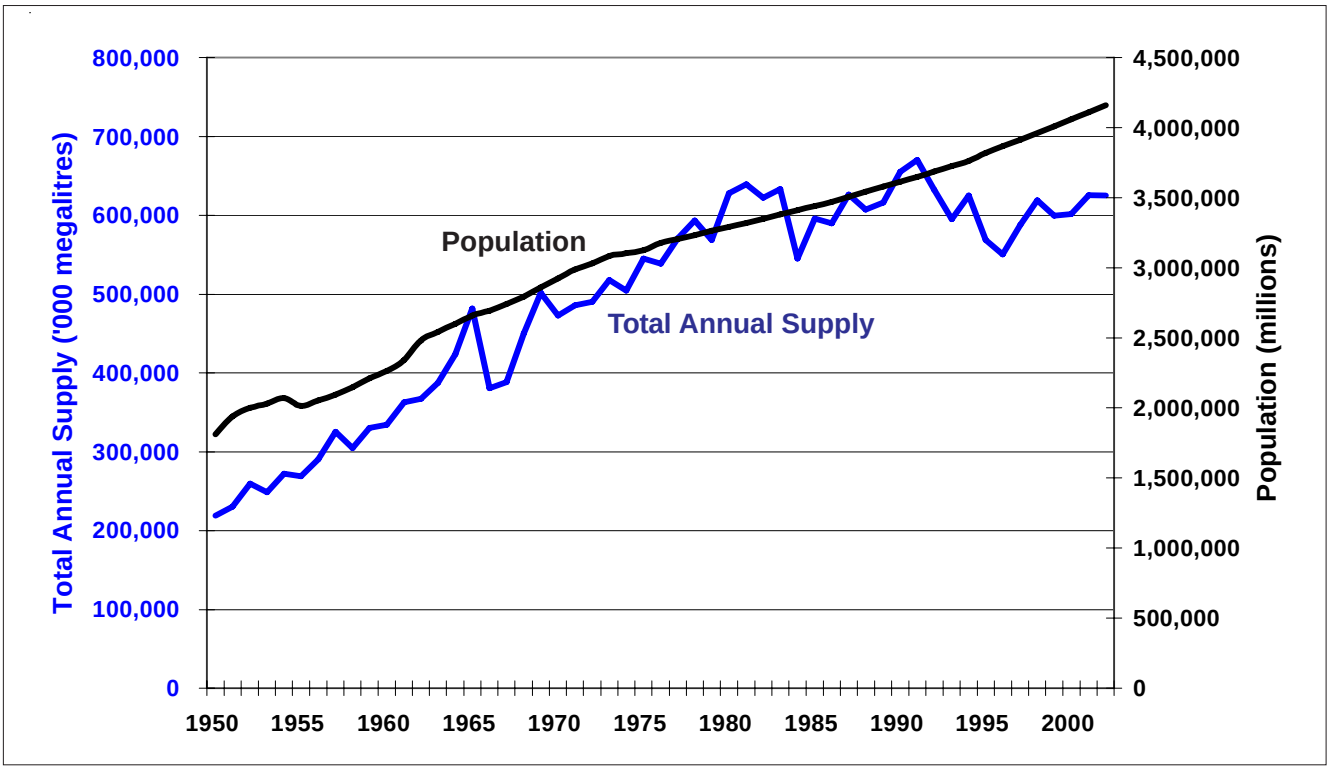
Reducing per capita water use

Through significant pricing reforms, community education, promotion of water conservation messages, and the introduction of dual flush toilets and like measures, there have been substantial reductions in per capita water consumption in urban areas over the past two decades. It is easy to forget that only 20 years ago some areas within our cities were not metered and water was charged on the basis of property value with no signals for customers to conserve water. Now all urban water utilities have two-part tariffs with a fixed charge and a variable charge based on water consumed.

The combination of these measures has had a powerful impact on community attitudes to water, which has resulted in declining per capita consumption.

Figure 5 shows how changes in water consumption in Sydney accommodated population growth. Until 1985, population growth and water consumption largely followed each other in Sydney. At that point, population growth continued, but water consumption flattened off. This allowed Sydney to accommodate an additional 700,000 people without using more water.

Figure 5: Sydney's water consumption in relation to population growth



Adapting to potential climate change

There is still great debate about whether the current drought is part of the normal cycle of rainfall variability that has always existed in Australia or whether it represents a change in rainfall patterns induced by climate change. The urban water industry, in the face of this uncertainty, is adopting a prudent approach and implementing adaptation strategies. Planning for water resources has always involved managing uncertainties, such as population growth, changes in household types, water consumption behaviour and other socioeconomic influences. Climate change is yet another element of uncertainty that needs to be factored into water supply planning in the future.

The urban water industry is responding to the challenges by exploring alternative supply options, implementing demand management and education strategies, promoting water efficiency labelling schemes and appliance rebates, managing water leakage, promoting water sensitive urban development, assessing the sustainability of supply and demand options, and continuing to contribute to research and collaboration.

Improving operational efficiency

Urban water utilities across Australia have introduced operational efficiencies and improved their financial and commercial performance. In the capital cities, real operating revenues per property fell by more than 10 per cent between 1987–88 and 1999–2000 (with a fall of more than 30 per cent in Melbourne) and real operating costs across the industry fell by almost 20 per cent. These improvements were accompanied by higher dividends and tax equivalent payments to State Government shareholders.

Achieving high standards

The urban water industry has continually improved standards of service delivery to its customers, while achieving ongoing compliance with public health and environmental requirements. For example:

- environmental outcomes have been improved following major investment in upgrading sewerage treatment facilities, and
- industry adoption of the Australian Drinking Water Quality Framework has promoted a risk-based approach that manages all 'barriers to entry' for pathogens, from the catchment to the tap, and has resulted in an overall improvement in drinking water quality standards. The Australian urban water industry is recognised as a world leader in this approach.

Water pricing

The price of water in our capital cities is based on the financial cost of providing water services. This includes recovering capital and operating costs, making allowances for depreciation and renewal, and returning a dividend to shareholders. This pricing structure allows water utilities to invest in urban water systems without the assistance of governments.

More recently, urban water utilities have begun to introduce step tariffs which target more discretionary use of water by increasing the price per kilolitre once a base allowance has been exceeded. This approach recognises the need to provide affordable water for essential use in the home, while encouraging water savings for more discretionary uses, such as garden watering.

Some examples of step pricing strategies already implemented by urban water utilities are outlined in Table 2.

Table 2: Step tariff charges for water consumption

Town/City	Price per Kilolitre ($)
Adelaide*	0.42 < 125 kL 1.00 > 125 kL
Melbourne	0.77 – 0.78 < 40 kL per quarter 0.91 – 0.92 40 kL – 80 kL per quarter 1.35 – 1.44 > 80 kL per quarter
Sydney	1.20 kL < 100 kL per quarter (increasing to 1.31 in 2008/09) 1.48 kL > 100 kL per quarter (increasing to 1.85 in 2008/09)
Perth*	0.42 (0 – 150 kL) 0.67 (151 – 350 kL) 0.91 (351 – 550 kL) 1.20 (551 – 950 kL) 1.50 (>950 kL)
Canberra*	0.43 < 175 kL 1.05 > 175 kL

*Source: WSAA*facts* 2004

The challenges

The urban water industry faces significant challenges in continuing to deliver an effective and efficient service to its diverse and growing customer base into the future. The impacts of drought, increasingly unreliable rainfall, changing climate and rainfall patterns, and increasing demand for urban and environmental uses of water, require us to explore and implement solutions on both the supply and demand sides.

Serving a rapidly growing urban population

The population of Australia's major cities is predicted to increase by 35 per cent by 2030 (ABS and State Government planning documents). That is an increase of 4.5 million people. The combined impact of increasing demand from a growing population and potential reduced yields due to anticipated climate change, drought and increases in allocations for river health, will require per capita consumption to decrease significantly if our cities are to stay within their current yields – unless new sources of water are developed.

Population increases of this magnitude drive the urban water industry to be innovative and open to change and explore all potential sources of water so cities are not totally reliant on reservoirs. Efforts include accessing new sources of water from catchments and aquifers; maximising the supply of potable water from existing supplies; continuing to implement demand management strategies; constructing desalination plants; and seeking alternative supply sources such as recycled water for non-potable purposes and stormwater. Increased recycling in an urban context is viable in certain circumstances, such as new residential developments and in commercial and industrial precincts. However, this must proceed cautiously to ensure significant public health and environmental risks are addressed.

Table 3: Projected population and water consumption in our major cities

City	Current Population[1] (000s)	Projected Population[2] in 2030 (000s)	% Increase	Adjusted Unrestricted Consumption[3] (ML/yr)
Adelaide	1,090	1,182	8%	190,383
Brisbane	931	1,509	62%	196,095
Canberra	357	486	36%	51,208
Darwin	101	168	67%	35,142
Gold Coast	472	800[4]	69%	69,899
Hobart	188	215	14%	40,679
Melbourne	3,497	4,573	31%	498,295
Lower Hunter	496	585[4]	18%	72,231
Perth	1,453	2,177	50%	262,359
Sydney	4,189	5,592[4]	33%	647,158
Total	**12,774**	**17,287**	**35%**	**2,063,448**

Sources:

[1] WSAA*facts* 2004
[2] ABS High, Modified
[3] 15% increase from WSAA*facts* 2004 data for cities where restrictions were enforced
[4] WSAA members

Achieving ongoing savings through water conservation

Over the past 20 years, rapid population growth has been serviced, generally without the construction of new storages, due to reductions in per capita demand achieved through low cost and highly effective water efficiency measures. Similar consumption savings cannot be achieved forever. Most of the easy measures have already been targeted and further measures are likely to be highly intrusive and may encounter community resistance.

There is also a risk that increasing affluence, along with community expectations of ever increasing living standards, could lead to higher per capita water use. It is vital that the urban water industry understands the social aspects that influence water consumption so that the appropriate messages and strategies can be adopted.

While the urban water industry will always encourage water conservation, we recognise that further demand management measures alone will not meet the demands of our rapidly growing cities and that the time has arrived to implement supply-side measures.

Community expectations of improved levels of service

Today's urban communities, while largely more water aware and supportive of calls for water conservation, are also more affluent and demand high levels of service. Except in times of extreme drought, people expect to have access to water to enjoy a lifestyle that includes attractive gardens and watered public reserves and sporting fields. Although permanent low level restrictions that preclude water being used for such purposes as hosing down paths have been introduced in a number of cities, there is evidence that ongoing harsh restrictions are a point of concern for the community. Water utilities must consult with their communities to understand the level of service the community expects. This will dictate the volume of water required to service a city and the frequency, duration and severity of restrictions.

The challenges
continued

Responding to potential climate change threats – planning for uncertainty

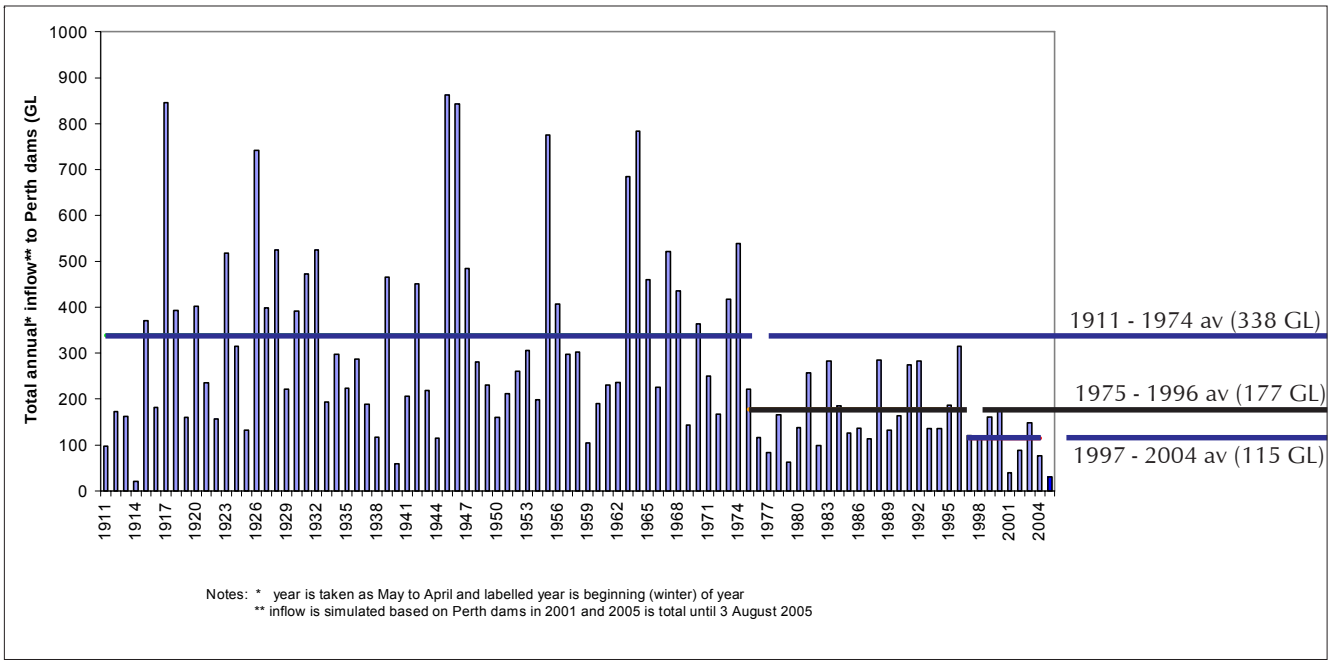
While Australia has always had a highly variable and unreliable rainfall, this unreliability in some parts of Australia has become more pronounced due to the potential impacts of global warming.

This point is exemplified by reviewing the inflows into Perth's Integrated Water Supply System over the period of 1911 to 2004. Figure 6 shows the dramatic impacts of climate change, with inflows for the last eight years reducing by 64 per cent on those up to 1974.

Climate change presents many challenges to the urban water industry, including:

- Current scientific understanding and models do not allow precise prediction of the impacts of climate change at regional or local scales. This creates new uncertainties for water resource planners who need local information to understand the impacts on hydrology and ecosystems.
- Increasing unreliability of rainfall, changing rainfall patterns and reduced run-off from catchments means that surface water storages cannot be solely relied on to provide secure sources of water for our growing population. Evidence from Perth indicates the impacts of climate change are here now. Inflows to the catchments providing water to Perth have noticeably decreased over the last 20 years, reducing the amount of available water for supply. The evidence of climate change induced reductions in run-off to other cities around Australia is not so clear.
- Hotter, drier summers mean increased demand for water to keep cool and maintain gardens, as well as an increased likelihood of bushfires which reduce catchment run-off over the long term.
- Higher temperatures mean an increase in water losses from surface water storages due to evaporation. The CSIRO estimates that evaporation could increase annually by an average of 8 per cent per degree of global warming.
- A recent study undertaken for Melbourne Water by the CSIRO[2] on climate change concluded that the major implications included:

Figure 6: Climate effect on run-off, Perth 1911–2004



[2] Howe, C., Jones, R.N, Maheepala, S., Rhodes, B. (2005) "Implication of Potential Climate Change for Melbourne's Water Resources", CSIRO and Melbourne Water, Melbourne.

- reduced water supply due to decreased stream flows,
- increased risk of bushfires,
- reduced environmental condition of streams,
- increased potential for corrosion and odours in the sewerage network,
- increased incident of sewer over flows,
- Increased risk of pipe failure and collapse in the sewerage system,
- increased flooding risks and property damage due to increased rainfall intensity,
- increased risk of damage to stormwater infrastructure and facilities, and
- reduced health of waterways due to changes in base flows.

Changes to rainfall patterns due to climate change may not be all negative for urban water systems. For example, if south-eastern Australia experiences wetter, more equatorial summer rainfall patterns, the result could be a reduction in water used for watering gardens. This example illustrates that close examination is required of the forecast impacts of climate change, both from the supply and demand sides.

It may be decades before we can accurately determine the long term impacts of climate change compared to the short term impacts of climate variability. In the meantime, it is likely that climate variability will influence the way urban water utilities plan for reliable supplies of water for our growing cities.

Healthy waterways

Along with many Australians, the urban water industry is concerned about the poor health of our rivers. The urban water industry must play its part in ensuring that more water is available to improve the environmental health of our river systems. We must plan for the future, when environmental flow requirements will increase and water yields may decrease. This highlights the need for a diversified and precautionary approach to water supply planning as the potential impacts of climate change decades into the future creates a great deal of uncertainty.

Sustainability

Urban water resource issues must be managed in the context of ensuring sustainable outcomes. All policies and programs implemented in the urban water industry take account of the environmental, economic and social impacts. A single focus on water resource outcomes or a single solution could have negative impacts for the environment and the community. For instance, as all Australia capital cities (with the exception of Canberra) are coastal, sewerage systems have been designed to take advantage of gravity and major sewerage treatment plants tend to be close to the coast, which is the lowest point in the catchment. This means that to pump recycled water a considerable distance to areas where it can be used, such as the growth corridors on the outskirts of cities, requires a great deal of energy, which increases greenhouse gas emissions. This impediment to the greater use of recycled water may lead to localised treatment plants being constructed to ensure recycled water is produced close to where it can be used.

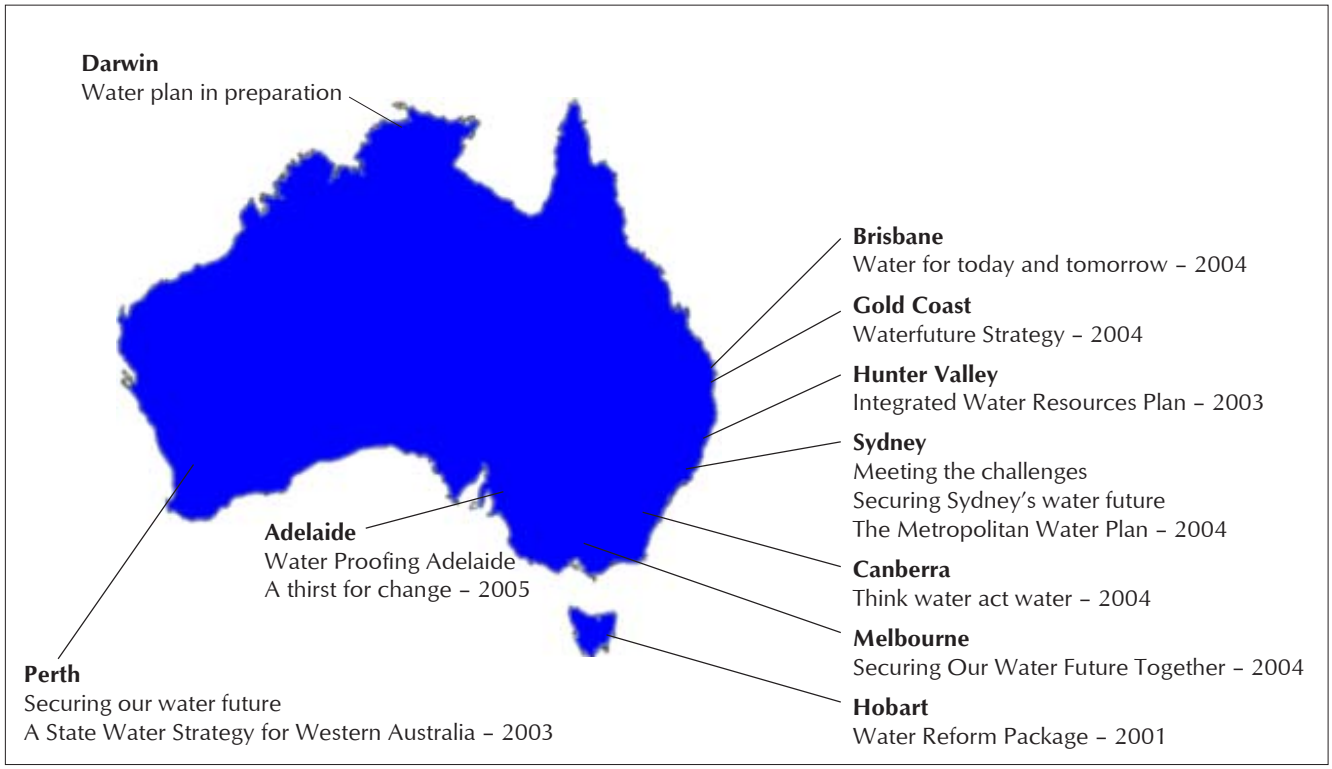
It is important that the urban water industry assesses alternative water sensitive urban designs from a holistic perspective, so that the most sustainable outcome is achieved.

Water conservation will always be a high priority for the industry as it generally delivers the best water resource and sustainability outcomes. For instance, water efficient appliances not only consume less water but also result in less wastewater to be treated and reduced greenhouse gas emissions through a reduction in water heating.

Planning for our water future

Despite the pressure on urban water resources, there is no urban water crisis. The urban water industry has used the nine-year drought as an opportunity to develop water resource strategies and introduce measures that may have been difficult to implement if dams supplying our cities had been spilling over. The water resource strategies recently developed for Australia's major urban centres are listed below.

Figure 7: Water Resource Strategies prepared for our cities

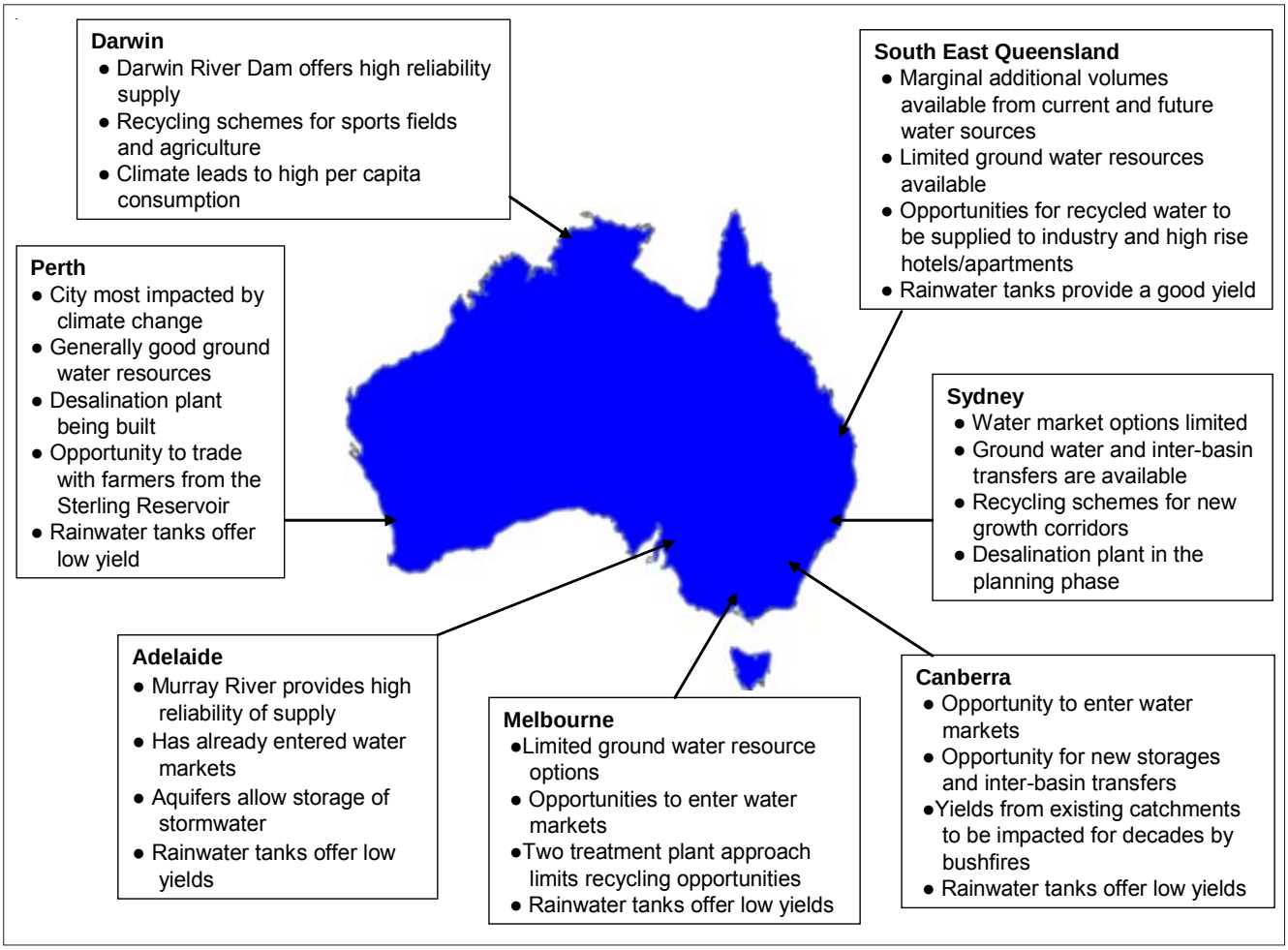


Currently, the urban water industry relies almost entirely on surface water sources (with the exception of Perth). This is a high risk approach when rainfall is becoming more unreliable and there is uncertainty about the impacts of climate change. To mitigate this risk, the industry is adopting a diversification approach. Each of the water resource strategies being adopted for our major cities takes a diversification approach that includes developing new and alternative sources of water.

No one option will provide the total solution to the water needs of our growing cities – a combination of actions is required. Strategies will vary from state to state, city to city, depending on a range of factors as outlined in Figure 8.

Planning for our water future
continued

Figure 8: Snapshot of diversification of supply strategies across Australia



Water conservation will always remain a core component of the overall package of measures adopted by the urban water industry to enable it to supply water to our growing cities.

The strategies proposed by the urban water industry are consistent with the objectives of the National Water Initiative.

Planning for our water future
continued

New sources of water

Table 4 outlines the new sources of water to be developed for cities over the next 25 years. These proposals are included in the water resources strategies prepared recently for our cities. A summary of the measures contained in each strategy is included in Appendix 1.

Table 4: New sources of water for our cities (from water resource strategies)

City	Year		Additional supplies (ML)	
	Short term	Long term	Short term	Long term
Brisbane	2010		20,560	
		2026		38,182
Adelaide		2025		7,000
Sydney	2010		116,500 to 146,500	
		2020		176,500
Canberra		2013 2023		20,000
Melbourne	2010		28,000	
		2030		28,000
Perth		2025		358,000
Gold Coast		2030		28,800
Lower Hunter		2025	No additional supplies planned	
Hobart			No additional supplies planned	
Darwin		2030		28,000
Total				**684,482** [3]

Note: Short term Additional supplies are included in Long term figures

As shown in Table 4, nearly 700 GL of additional water will be supplied to meet the future needs of our growing cities. This figure is more than the amount of water that Sydney and Canberra consumes annually. Consistent with the approach of diversifying sources of water, the 680 GL will come from a range of sources including:

- transferring water during high flow periods from catchments adjoining existing water supply catchments,
- using water markets to access water from agriculture,
- improving catchment management practices to limit farm dams and other land management practices that reduce run-off,
- exploring the opportunity of constructing desalination plants to provide additional supplies, recognising that this is not the only or complete solution,
- establishing and expanding groundwater sources, where possible,
- bringing existing dams that are currently not used for potable purposes back on line following the construction of water treatment facilities,
- extracting additional water from rivers, and
- leakage and water loss management.

[3] With the exception of Sydney, the water savings obtained from water loss and leakage reduction are included here. Sydney Water includes its water savings from water loss and leakage programs in the Water Efficiency category.

Water trading

Allowing water markets to work to enable and encourage trading between rural, environmental and urban uses represents a win/win outcome as it often results in the most environmentally friendly and inexpensive option for the community. In particular, trading with the agricultural sector gives urban users access to volumes of water that are currently applied to low economic value uses.

Secure tradeable entitlements will allow agricultural users to better plan water use and sell water as a product. Environmental entitlements can also be planned to ensure that increased amounts are allocated to sustain the health of our rivers. With the exception of Sydney, all Australian capital cities have the opportunity to access water from agriculture through water markets without the need to build substantial infrastructure. Many regional cities are also in a good position to trade with agricultural users as urban and irrigation systems are often interconnected.

Water Corporation and Harvey Water have recently established a temporary water trade that has resulted in 3 GL of water being made available for Perth. The parties have signed another temporary arrangement for a further additional 3 GL of water. Water Corporation and Harvey Water are working towards the development of a Water Trade Agreement involving the permanent trade of 17 GL of water from Harvey Water's irrigation districts. Water trading has been made possible by Water Corporation investing funds in upgrading irrigation infrastructure to decrease leakage and losses.

SA Water recently used the water market to purchase 16 GL from irrigators, mostly from the lower Murray swamps to meet increased demands resulting from economic and population growth and environmental obligations. This represented a valuable addition to SA Water's supply and allowed dairy farmers to retire from their farms when faced with significant industry restructuring.

Water trading both with the agricultural sector and between urban areas will be an increasingly important component of the urban water industry's approach to ensuring reliable water supplies for our cities.

Managing leakage and overflows

Based on an internationally recognised index, the Australian urban water utilities are among the world leaders in leakage management. Despite this, the industry is not complacent and continues to pursue opportunities for improvement. New technology for detecting leaks, reducing system pressure and responding faster to repair burst mains and leaking pipes are just some of the measures being adopted to reduce water loss from urban water systems. The industry is acutely aware that in times of drought there is significant community focus on water loss through leakage from water utility infrastructure. The results of the leakage index are published annually in WSAA*facts*.

Alternative sources of water

As yields from surface water storages become less reliable and water demand increases, new and alternative sources become critical. Again, a combination of actions is needed to deliver the volumes required to meet future urban demand. Table 5 indicates the quantity of water that will be supplied from alternative sources over the next 25 years, outlined in recently developed water resource strategies for our growing cities.

Table 5: Alternative supplies of water (from water resource strategies)

City	Year		Substitution sources of water	
	Short term	Long term	Short term	Long term
Brisbane	2010		14,200	
		2026		18,000
Adelaide		2025		33,000
Sydney	2010		22,000	
		2020		60,000
Canberra		2013 2023	Measures included in water conservation	
Melbourne	2010		4,300	
		2030		9,031
Perth		2025		39,000
Gold Coast		2030		12,800
Lower Hunter		2007		6,500
Hobart			No figures supplied	
Darwin		2030		17,000
Total				**195,331**

Note: Short term alternative sources of water are included in Long term figures

Planning for our water future
continued

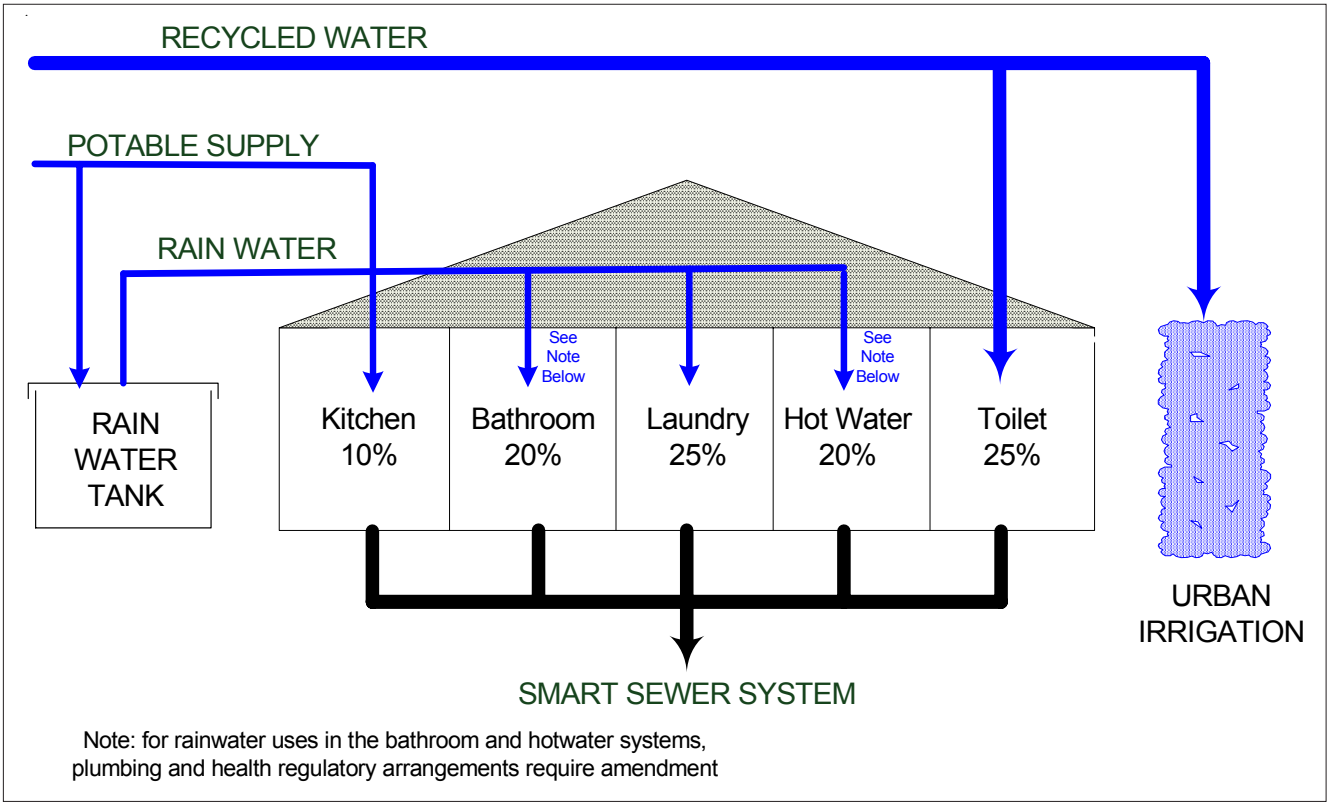
Alternative supplies of water will mostly be recycled water that is used as a substitute for potable water. Examples of this approach outlined in the water resource strategies for our cities include:

- supply of highly treated (micro filtration and reverse osmosis) recycled water to supply high value add industries. Examples to date include supplying water to oil refineries, fertiliser plants and steel manufacturers. Industry is attracted by the consistent, reliable and high standard of water supplied and they are prepared to pay for it,
- supply of recycled water to irrigate sports fields and public open space in urban areas. Open space irrigation can be a major consumer of water in an urban environment and does not require water of drinking water quality, and
- introduction of water sensitive urban development in growth areas and major redevelopments in established areas to provide recycled water and water from other sources, such as rainwater tanks, for garden watering and toilet flushing. Traditionally, water supply systems in Australia are based on a 'use once' approach, where water, once used, is diverted to the sewerage system for treatment and discharge. Water sensitive urban development takes a different approach. Water use is optimised by looking at fitness for end use. That is, other available supply sources, such as stormwater and recycled water, are substituted for potable water to reduce overall water consumption. This approach, which can only be cost-effectively introduced into new developments, provides opportunities for water utilities to work with the community and developers to adapt to the impacts of climate change and population growth. These developments must systematically and effectively consider the public health and environmental aspects of urban recycling.

The NSW Government is proposing that Sydney's two major new growth corridors will be supplied with recycled water to reduce demand from Sydney's supply system.

The Pimpama Coomera development on the Gold Coast is an example of cutting edge water sensitive urban development. Through the use of recycled water, rainwater tanks and demand management measures, the demand from the drinking water supply system is expected to be reduced by 80 per cent.

Figure 9: Pimpana Coomera Water sensitive urban development



After appropriate research and investigation, recycled water has the potential to be used to provide environmental flows to improve the health of our rivers. Water is released from most storages that supply urban Australia to ensure downstream aquatic ecosystems are maintained. If this water could be substituted with recycled water, it would increase significantly the yield from the water supply catchments that supply our cities. There are a number of environmental issues associated with this approach that would need to be investigated on a case by case basis.

On a practical note, often the source of recycled water in our coastal cities is quite some distance from the water supply storages, where the environmental flow water is required. Pumping water large distances is an energy intensive and expensive process.

Ongoing water efficiency measures

Throughout Australia, urban water utilities have been implementing water efficiency strategies to raise community awareness of the need to conserve water to deliver reductions in per capita consumption. Education campaigns, subsidies for retro-fitting with water saving appliances (such as low volume shower roses), permanent low level water restrictions and the introduction of the Commonwealth's Water Efficiency Labelling Scheme (which will make it mandatory for all water using appliances to display water efficiency labels), will all contribute to achieving more efficient use of water in Australian households.

Table 6 outlines the water savings from water efficiency measures to be implemented by urban water utilities across Australia over the next 25 years. It is worth noting that these savings are in addition to the significant reductions in per capita consumption achieved in Australian capital cities over the last decade.

Table 6: Water savings through water efficiency measures (from urban water resource strategies)

	Year		Water efficiency savings	
City	Short term	Long term	Short term	Long term
Brisbane	2010		20,600	
		2026		23,000
Adelaide		2025		37,000
Sydney	2010		70,000	
		2020		140,000 [4]
Canberra	2013		3596	
		2023		8,050
Melbourne	2010		29,700	
		2030		34,550
Perth		2025		60,000
Gold Coast		2030		13,500
Lower Hunter		2025		1,000
Hobart			No target stated	
Darwin		2030		8,786
Total				**325,886**

Note: Short term conservation of savings are included in Long term figures

[4] This includes water savings obtained from Sydney Water's leakage and overflow programs.

Planning for our water future
continued

The urban water balance sheet

The urban water industry has developed water resources strategies for each of the cities that have a strong supply-side focus. Supply-side measures include inter-basin transfers, accessing groundwater, desalination, accessing water from water markets, and increasing use of recycled water[5]. Demand-side programs focus on reducing per capita demand through water efficiency measures.

The urban water balance sheet balances the additional and alternative sources of supply identified with increases in demand for water due to population growth in Australia's major urban centres, and potential reductions in yield from existing water sources due to the potential effects of climate change.

The balance sheet shows that even with ongoing aggressive water demand management measures and continued community education, the growing population in our cities cannot be serviced without access to new and alternative sources of water. Without the supply-side measures contained in water strategies for our cities, a water deficit of 854 GL would result in 2030 (this is greater than the combined consumption by Sydney and Perth in 2003–04). It is worth noting that the 326 GL of water conservation savings identified in water strategies is in addition to the substantial reductions in per capita demand already achieved.

The limitations of relying on ongoing water efficiency programs to close gaps between demand and supply highlights the importance of supply-side measures—both new sources of water and alternative sources of water—in enabling our cities to grow and prosper into the future.

Development of the urban water balance sheet has taken into account the potential climate change impacts of greater losses from surface water storages through evaporation and reduced run-off from catchments, which will result in reductions in water catchment yield. Reductions in yield from existing water storage catchments, which could be as much as 25 per cent, will require the industry to find approximately 550 GL of water.[6]

The precise extent to which potential climate change will reduce yield is impossible to predict decades into the future, nevertheless, for long term planning purposes, plausible changes in climate should be taken into account.

[5] Note that the additional water identified in these strategies does not necessarily increase yield by the exact amount of additional water supplied as yield calculations take into account the probability of this amount of water being available for a given period. For instance, recycled water as a substitute for potable purposes is a secure source of water as recycled water is being generated and treated regardless of season and rainfall. Therefore, yield would increase by the amount of recycled water being supplied. On the other hand, inter-basin transfers that rely on high flows in rivers will not increase yield by the amount of water supplied as these high flows are dependent on rainfall events that have a particular probability of occurring and, hence, this risk needs to be factored into yield calculations.

[6] The reduction in run-off into surface water storages experienced in Perth is such that the streamflows for the last eight years (including 2004) have been 64 per cent down on those up to 1974.

Planning for our water future
continued

Table 7: The urban water balance sheet

	Population	Available Water	Consumption	Total
Current				
Population of Australian capital cities (plus Gold Coast and Lower Hunter region)	12.8 million			
Yield		2175 GL		
Unrestricted Consumption			2063 (GL)	
Existing surplus				**111 (GL)**
Future – 2030				
Population	17.3 million			
Yield (25% reduction to account for potential climate change impacts)		1631 GL		
Consumption based on 2004 per capita			2811 (GL)	
Water Deficit				**1180 GL**
Measures identified in urban water resource strategies				
New sources of water		684 GL		496 GL deficit
Alternative sources of water		195 GL		301 GL deficit
Water efficiency measures			- 326 GL	
Total		**2510 GL**	**2485 GL**	**25 GL**

Based on WSAA*facts* 2004

Understanding the risks

Although, the urban water balance sheet outlined above could imply that there are no challenges facing the urban water industry, there is always uncertainty in long term planning which relies on assumptions about the future. All of the strategies in the water resource plans for our cities are based on assumptions that could easily change.

As the supply of safe and reliable sources of water for our cities is a 'given', it is essential that we understand the risks associated with the measures that are proposed to be introduced by the urban water utilities so that we can monitor progress and identify contingency measures.

The key overall risks to urban water utilities achieving the supply and demand side measures stated in their water resource strategies are as follows:

1 Population growth exceeds forecasts

For many of our major cities, past population growth forecasts have always been exceeded, quite often by significant numbers of people. Population growth in our cities is influenced by natural birth rates, the degree to which people move from rural and regional areas to the cities, and Commonwealth Government immigration programs. Any changes are likely to impact on the future population of our cities.

2 Yields from catchments decline significantly and/or droughts become longer and more frequent

In preparing the urban water balance sheet, it has been assumed that yield from catchments will decline by up to 25 per cent; therefore, the urban water industry should be planning for less water coming into its storages. The impacts of rainfall variability and the potential impacts of climate change are difficult to predict into the future and are likely to vary from city to city. Therefore, as distinct patterns emerge, the urban water utilities will need to factor new run-off scenarios into yield calculations.

3 Increases in environmental flows

The poor environmental health of many of our rivers is of great concern. It is difficult to predict precisely how much water from urban water supply systems will need to be released from storages to provide environmental flows down stream. The 25 per cent reduction in yield assumed when preparing the urban water balance sheet includes some water for additional environmental releases. If the amount of water required to refresh our rivers increases significantly, there will be less water available from storages to supply customers and water resource plans will need to be modified accordingly.

4 Environmental concerns over additional sources of water

All plans to supply additional water through inter-basin transfers, greater use of groundwater and the construction of new dams will be subject to detailed environmental assessment impact studies. Given the focus on over-allocation of water from many of our catchments, it is expected that proposals for additional water supply will come under close scrutiny and environmental approvals cannot be taken for granted.

5 Making water markets work

Accessing water markets to purchase water for our cities from agricultural users is expected to become an increasingly attractive option. The National Water Initiative states that one of the objectives for urban water is to ensure that water trading occurs between all sectors. Despite this, there are a number of social and political impediments to the water markets functioning properly and urban water utilities are likely to face difficulties in the short term in using water markets as a source of new water.

6 Community concerns about the energy intensive nature of desalination

Desalination is recognised as a potential new source of water in three cities; in fact, a major desalination plant is currently being constructed in Perth and the NSW Government has recently announced its intention to build a desalination plant for Sydney. While desalination plants provide a new and reliable water source, they have a potentially negative impact on greenhouse gas emissions due to the energy intensive nature of the process and the safe disposal of the brine discharge. Despite new technology allowing energy requirements of desalination to be reduced significantly, growing community concern about greenhouse gas induced climate change and the introduction of measures by governments to discourage additional greenhouse gas emissions could make the approval process for desalination plants problematic in the future.

Despite the costs of desalination plants reducing in recent years, there are concerns about the cost of this source of water if we return to a cycle of reliable and consistent rainfall.

7 A public health incident associated with recycled water

While there is a high degree of community acceptance of the use of recycled water for non-potable purposes, particularly in times of drought, social research indicates that the closer the use of recycled water comes to personal use, the less people support it.

It would only take a small public health incident for community confidence in the safety of recycled water for potable purposes to be diminished. For example, an incident in The Netherlands several years ago, which involved the cross connection of a water supply from a river with a potable supply, caused sickness and resulted in the banning of third pipe systems in that country.

This example provides a salutary lesson to the Australian urban water industry as it seeks to maximise the use of recycled water in third pipe systems and in public open space where contact with people is inevitable. It emphasises the need for strict guidelines and standards that protect public health.

8 Uncertainty in water consumption forecasts

a. Increasing affluence

With the emergence of the 'aspirational' class, and increasing affluence in Australia, there is a risk that per capita water consumption could rise again as people adopt an attitude that if they 'can pay for it, they should be able to use it'. As disposable income rises, it becomes increasingly difficult to send meaningful price signals to wealthy households through the volumetric water charge. As more people install spas in bathrooms, swimming pools in backyards and automatic watering systems in their gardens, per capita water use is likely to creep up.

b. Community resistance to further water efficiency measures

As outlined, significant advances have been made in the past in reducing per capita water consumption. There is little doubt that the water efficiency 'low hanging fruit' has been picked and the next water efficiency measures are more likely to encounter customer resistance and will be more difficult to achieve. We must not assume that what people will tolerate during a drought will continue into the future. As we still lack basic data on the social thinking that influences individual water consumption behaviour, there must be an element of risk over the ability of the utilities to achieve the water efficiency targets outlined in their water resource strategies. Careful monitoring of the success of water efficiency programs is required, but the results are often difficult to interpret due to the many variables, such as climatic conditions.

c. The Australian love affair with the traditional house and land package

Most State Governments have prepared planning strategies for cities that outline a trend towards a great proportion of new development in the future being in established areas as opposed to greenfield developments on the outskirts of our cities. This trend towards urban consolidation and apartment/unit living is important for water resource planning as this kind of housing generally results in little water being used outdoors. Some planners suggest that forecasts for the rate of urban consolidation compared to greenfield developments are overly optimistic and, if this is the case, more water will be consumed as a result of a greater number of gardens needing to be watered in new greenfield subdivisions.

d. Increases in lone person dwellings

Recent studies[7] have indicated that household numbers are growing faster than population and that this trend will place greater demands on urban water resources than anticipated. This is because as average household size decreases, average per capita water use within households increases. If the trend towards a higher proportion of lone resident dwellings continues at a greater rate than predicted, this is likely to lead to increases in per capita consumption.

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[7] Impact on Demographic Change and Urban Consolidation on Domestic Water Use, WSAA Occasional Paper No. 15 – June 2005

Conclusion

The growth in urban populations and the potential effects of climate change over the next 30 years will have a significant impact on Australia's urban water industry.

The Australian urban water industry is responding to this by adapting its operating environment and leading innovation and research to develop additional and substitute sources of water for our growing cities.

The ability of the urban water industry to continue to provide water supplies for our growing cities will depend on the Commonwealth, the States and the water utilities working together cooperatively and involving all sectors and communities. This is particularly so in relation to developing water markets that will allow trading between rural and urban users.

Appropriate water policy at the national level is required to support the efforts of the urban water industry in meeting the challenges of the future. The provision of adequate water for our cities is vital for the future prosperity of Australia.

Although the water resource strategies prepared for our cities contain significant measures both on the supply and demand sides, these measures are all based on assumptions projected out 25 years into the future. By virtue of the rapidly changing world we live in, and the vast number of variables involved (most of which are outside the control or influence of the urban water industry), there are significant risks associated with each of the measures, that is, will they deliver water savings and additional water supply?

The urban water balance outlined in this paper could leave some readers with the feeling that there are no challenges for the industry. Nothing could be further from the truth. Although there is no urban water crisis, the industry must remain alert and ready to adapt and change as circumstances dictate.

Long term planning in some industries is now considered to be an oxymoron due to the dynamic and rapidly changing world we live in and, as such, long term plans are not prepared in some industries. Unfortunately, we do not have this luxury in the urban water industry due to the long term nature of our assets and the imperative of ensuring safe and reliable supplies for our cities. We must accept that once you prepare a plan for the future you became 'a hostage to fortune'. The urban water industry must accept this and we must continually monitor the assumptions that underpin our strategies and make amendments as required.

Our approach will be based on the principles of adaptive management. All options will undergo a risk assessment before being implemented and emerging technologies will be investigated. We need not fear if we do not have all the answers immediately to our water supply needs stretching decades into the future. New technologies and approaches will evolve that will enable us to use water in smarter ways.

Appendix – Summary of measures contained in water resource strategies prepared for our cities

The following tables only include those recycled water projects that will add supplies of water to our cities.

ADELAIDE

Water Proofing Adelaide – A thirst for change

Strategy	Potential benefits from strategies by 2025 (ML/annum in drought years)
Total stormwater use projects - Large scale stormwater use projects (11,000) - Rainwater tanks in new home (4,000) - Water sensitive urban development in new land divisions (2,000)	17,000
Recycled water reuse	16,000
Reduce indoor household water use – (e.g. low-flow shower heads and washing machines, continued uptake of dual flush toilets etc)	12,000
Permanent water conservation measures	12,000
Prescription of Western Mt Lofty Ranges (subject to the outcome of community consultation on a notice of intention to prescribe)	7,000*
Reduce outdoor household water use (additional to permanent water conservation measures)	7,000
Reduce community purposes water use (additional to permanent water conservation measures)	3,000
Reduce commercial and industrial water use	2,000
Reduce losses from mains system	1,000
Total potential impact on water supplies	**77,000**

* Reduced growth in diversion to farm dams and from groundwater resources – not additional water.

BRISBANE

Water for today and tomorrow – an integrated water strategy for Brisbane City Council

	2004 (ML/a)	2010 (ML/a)	2026 (ML/a)
Additional water from SEQ Water Dams		20,560	38,182
Water Efficiency (Residential)	NA	20,600	23,000
Recycled Water Substitution (Industrial/Residential)	3,200	12,400	15,000
Other Substitution (Residential)	0	1,800	3,000
Total impact on water supplies			**79,182**

Appendix
continued

SYDNEY

Meeting the Challenge Securing Sydney's Water Future - The Metropolitan Plan 2004
New supply-side

Measures	2006	2010	2020
Increased Shoalhaven transfers		50-80 GL	Up to 110 GL*
Deep water	30 GL	30 GL	30 GL
Recycling	20 GL	22 GL	60 GL**
Desalination		36.5 GL***	36.5 GL

* Assuming that Stage 2 infrastructure is constructed
** Assuming a significant initiative capable of recycling for new developments, agriculture and the environment is constructed in western Sydney
*** Assuming a 100 megalitre per day desalination plant is constructed

HUNTER

Integrated Water Resource Plan – Hunter Water

New sources	No new sources proposed within 20 years planning horizon
Alternative sources	13% reuse target by 2007 (6,500 ML based on 2003 wastewater flows)
Water conservation	1,000 ML of water to be saved per annum by 2013

GOLD COAST

Gold Coast Waterfuture Strategy

Water Source	2021	2030	2056
Additional Bulk Water Supplies	28.8 GL	28.8 GL	40 GL
(Assumes regional pipeline (20 GL/a) and Hinze 3 (8.8 GL/a) within 25 years)			
Quantity Rainwater (GL/a)	3.3 GL	4.4 GL	7.3 GL
Quantity of Recycled Water (above 2001 baseline level) (GL/a)	6.2 GL	8.4 GL	14.6 GL
Water saved through conservation and leakage control (above 2001 baseline level) (GL/a)	9.5 GL	13.5 GL	25 GL

Appendix
continued

WESTERN AUSTRALIA

Securing our water future – A water strategy for Western Australia 2004

New sources of water	2004/05	By 2025
Ground water		165 GL
Surface water, water trading and catchment management	105 GL	148 GL
Desalination		45 GL
Total		**358 GL**
Alternative sources of water		
Water recycling	3 GL	9 GL
Aquifer storage and recharge		30 GL
Total		**39 GL**
Water conservation	45 GL	60 GL

DARWIN

Water Efficiency Plan (in preparation)

New sources of water	By 2030
Groundwater	14,000 ML
Surface water	14,000 ML
Water conservation	
25% reduction on current consumption	8,786 ML
Substitute sources of water	
Assumes all treated effluent is recycled	17,000 ML

HOBART

Hobart City Council - Water Reform Package 2001

A range of initiatives is canvassed
but no specific targets included

Appendix
continued

MELBOURNE

Securing our water future together 2004 - Melbourne

Water recycling	**2010**	**2030**
Kooringal Golf Club	500 ML	500 ML
Aurora Estate	335 ML	1,070 ML
Sandhurst Golf Club	380 ML	380 ML
Inkerman Delux Development	6 ML	6 ML
Sandbelt Scheme	1,000 ML	2,000 ML
Wyndam Residential Development	655 ML	1,560 ML
Princess Park Water Mining	1,000 ML	1,100 ML
Cranbourne East Residential Development	315 ML	1,365 ML
Cranbourne West Residential Development	105 ML	1,050 ML
Total	**4300 ML**	**9031 ML**
New sources		
Tarago Reservoir to be brought back online – date not specified		21,000 ML
Leakage management	7,000 ML	
Water conservation		
15% reduction from 1990s average – 423 l/p/d to 360 l/p/d by 2010	29,700 ML	34,550 ML

ACT

Future water options – For the ACT in the 21st Century

New sources	
Pump from Murrumbidgee River to Googong Reservoir	20,000 ML
Water conservation	
12% per capita reduction by 2013	3,600 ML
25% per capita consumption by 2023	8,050 ML
Substitute sources	
Recycling and substitute sources are included in the water conservation targets above	

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