

Integrated Resource Planning in the Australian Water Industry

Stuart White PhD
Senior Research Fellow
Institute for Sustainable Futures
University of Technology, Sydney
New South Wales AUSTRALIA

Australia has one of the most variable rainfall patterns in the world, and many growing cities and town. This means that there is a strong need to develop water efficiency programs, and for water supply agencies to undertake integrated resource planning. While there is no consistent movement in this direction as yet, there are some recent and significant examples of individual agencies pursuing cheaper demand side options in preference to augmenting supplies, or to meet regulatory objectives. This paper describes two of the most comprehensive water efficiency programs to be undertaken in Australia. These programs, designed by the author, are noteworthy because they encompass all the major water end-uses, and utilise a wide range of implementation mechanisms, including pricing, education, advisory services, auditing, loans, financial incentives, retrofitting and system management. They also incorporate significant monitoring efforts.

Kalgoorlie-Boulder Water Efficiency Program

In Western Australia, the then state Water Authority (now the Water Corporation) implemented a major water efficiency program in 1995 in Kalgoorlie-Boulder, an arid mining city. Water supplied to Kalgoorlie-Boulder is piped over 550 km from the coastal area at Perth, and the estimated marginal cost of water is about \$2.70/kL at the end of the pipeline.

This was a \$AUS3m program for a town of 30,000 people. The program included the following components:

- retrofitting 6/3 litre dual flush toilets - installed free of charge;
- AAA-rated water efficient shower heads - installed free of charge;
- fitting of flow restrictors/aerators to tap spouts in internal sinks and basins - free of charge;
- leaking taps repaired - free of charge;
- air-conditioner bleed valves - free of charge;
- garden reticulation systems checked and adjusted plus minor repairs - free of charge;
- tap timers discounted from \$20 to \$8;
- free WaterWise plants up to the value of \$80; garden mulch up to the value of \$200; and discounted brick pavers discounted by \$4 per square metre in exchange for lawn reduction and new garden establishment in the WaterWise theme;
- WaterWise garden assessment and information brochures - free of charge;
- free water audits for the premises of 150 commercial and institutional customers with annual demand greater than about 1,000 kL/a;
- two WaterWise demonstration gardens which incorporate information on low maintenance and low cost landscaping (Botica and White 1996).

Of the 8,200 domestic customers in Kalgoorlie/Boulder, around 5,200 accepted the free plumbing and retrofitting of toilets offer and approximately 3,200 houses accepted the external reticulation and gardens offer.

The projected savings are more than 700 ML/a, representing 16% of the demand for the targeted sectors.

A number of measures have been initiated to assess the program. Firstly, a customer satisfaction telephone survey of 200 customers was undertaken, particularly to assess the response to the water efficient toilets (dual flush models – 6 litres and 3 litres) and the water efficient shower head (9 litres per minute). This survey indicated that the rate of dissatisfaction with toilet and shower head performance was less than 3%. The second measure was to develop a climate correction demand model, which would enable an estimate of the impact of the program without the complicating factor of varying weather patterns. This model used multiple regression, with the weather related parameters: maximum daily temperature; rainfall and evaporation. Preliminary results indicate that the program has met targets.

Post hoc participant versus control assessment, using both water meter data and electricity data (for the shower head savings) shows that the indoor water efficiency measures have achieved the target reductions. Analysis of the outdoor measures is continuing.

Rous Regional Demand Management Strategy

In northern New South Wales, a bulk water supply authority, Rous County Council, has implemented a major water efficiency program designed to defer construction of a new dam in response to community demand and following a cost benefit analysis that placed the financial benefits associated with reducing demand by 1 ML/a at more than AUS\$3,500 (US\$2,500). The program included the following measures:

- pricing and billing reform, to ensure that prices are based on volume of water used and reflect costs, and that billing frequency is increased;
- leakage detection and repair;
- free water efficient shower heads, bundled as part of a low cost household assessment of water and energy efficiency;
- free audits for commercial, industrial and institutional customers and a loan offer for the implementation of the audit results;
- cash rebates (AUS\$150) at point of sale for purchase of front loading clothes washing machines;
- a demonstration water efficient house and garden.

Further investigation in this area indicates that, in addition to the financial benefits of deferring new water supplies, there are substantial benefits from deferring augmentation of wastewater treatment infrastructure, possible as much as \$AUS1,250 for a 1 ML/a reduction in discharge.

Sydney Water Corporation Least Cost Planning Study

In addition to these two water efficiency programs, Sydney Water Corporation, Australia's largest water supply agency, has recently embarked on a least cost planning study (see Beecher 1996) in order to determine the most cost effective means to achieve its Operating Licence conditions. These requirements have been made as part of the corporatisation process in 1995, and include a target of reducing the current draw from storages of 422 litres per capita per day (Lcd) to 379 Lcd in 2001 and 328 Lcd in 2011. This is complemented by a target of reducing unaccounted for water to 15% and an internal corporate target to increase effluent reuse to 58 ML/day.

Summary results of the least cost planning study are provided in Table 1 (from White and Howe 1998). The options shown are ranked in order of levelised cost which is the total resource cost divided by the 'yield' of the saving or supply option (present value). These options are cumulative in the sense that the effect of possible double counting has been removed. For example, the impact of restrictions has been reduced by the estimated savings that would be expected due to the increase in the price of water and the purchase of tap timer kits.

Option	Estimated demand reduction in 2001 (litres per person per day)	Levelised cost (£/kL)
Pricing	1.95	0.18
Restrictions	1.79	6.3
Smart Showerhead Program (\$10 rebates)	0.72	14
Residential indoor assessment and retrofit	3.41	19
Community residential assessment and retrofit	1.47	25
Active leakage control	7.18	30
Non Residential Efficiency Program	2.94	42
Hospitality Industry Efficiency Program (Olympics 2000)	1.26	42
Tap timer kit	0.22	49
Wollongong industrial reuse program	2.28	53
Kurnell industrial reuse program	1.82	65
Residential outdoor assessment	0.29	67
Washing machine rebate (with energy agencies)	0.44	70

TABLE 1 A proposed least cost program for reducing demand from Sydney Water Corporation storages by approximately 25 litres per capita per day in 2001. Note that the two industrial reuse schemes have a low cost due to their large scale and proximity to the reuse opportunity (from White and Howe 1998).

Appliance Water Efficiency

Nationally, there have been some advances in the area of water using plumbing fixtures, with the development of the 6/3 litre dual flush toilet, the installation of which was made mandatory in new buildings in most jurisdictions in 1993, and now has universal position in sales due to the market dominance of the manufacturer. This toilet has widespread acceptance, and reduces flushing volumes by two thirds from the older single flush 11 litre toilet suites.

Australian authorities have also developed a new performance standard for water efficient shower heads which specifies certain parameters relating to the user comfort, including spray temperature difference and mean spray spread angle. While minimum efficiency standards have not yet been established for sales of shower heads, many local authorities are now requiring their installation in new buildings. A water conservation rating and labelling scheme has been developed, which specifies three levels of water efficiency ('AAA', 'AA' and 'A') with 'AAA' shower heads having a flow rate at typical pressures of 9 litres per minute or less.

Conclusions

Despite these significant beginnings, there is great scope for increasing the extent of implementation of water efficiency programs in Australia. Responsibility for regulating urban water utilities is vested at the state level, and there is little understanding or commitment to the principle of integrated resource planning amongst regulatory agencies. Also, the movement towards microeconomic reform and increasing commercial objectives in the water industry means that many water service providers are operating on the assumption that reducing water sales through water efficiency programs is in conflict with these commercial objectives, despite the fact that all urban water service providers have a monopoly in their franchise area and can recover costs of water efficiency programs that are economically beneficial from a total resource cost perspective. These issues need further development in Australia. The recent establishment of a Water Conservation Task Force in New South Wales, the largest state, and a Water Conservation Working Group under the umbrella of a Federal government water resources committee may provide an avenue for improvement in this critical area.

REFERENCES

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