

Final Report

Inquiry into Pricing of Recycled
Water in Western Australia

6 February 2009

Economic Regulation Authority



WESTERN AUSTRALIA

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Executive Summary

Recycled water has an important role to play in delivering cost-effective, fit for purpose water to customers who would otherwise use scheme water. The Authority is pleased to present its final recommendations of its Inquiry into Pricing of Recycled Water in Western Australia.

This inquiry was requested by the State Government of Western Australia on 8 July 2008. The Terms of Reference required the Authority to “undertake an inquiry into, and make recommendations on, pricing and other relevant factors affecting the adoption of recycled water and other alternative water supplies”.

The main recommendation is that recycled water customers should be able to gain access to wastewater on the same terms and conditions as the Water Corporation. Such neutral treatment would increase the potential for competition in the market for non-potable water. A set of pricing principles are required to facilitate neutral treatment.

The intent of any regulation of recycled water pricing is to promote conditions in which:

- there is active investigation by a range of potential providers of recycled water into commercially viable recycling projects;
- there is robust competition between alternative providers, with equal access to the resources required for recycling;
- there are strong incentives for the Water Corporation to achieve least-cost provision of contestable wastewater activities;
- there are the minimum necessary obstacles to the implementation of new recycling projects;
- the resources for recycled water go to those who value them most; and
- the benefits of regulation outweigh its costs.

In developing the pricing principles, the Authority has been guided by the need to ensure that there is a level playing field between all potential providers of recycled water services. A customer who is interested in using recycled water in their operations should have the opportunity to either:

- buy recycled water from the owner of a wastewater treatment plant;
- buy the wastewater resource from the owner of the wastewater treatment plant in accordance with the pricing principles and recycle it themselves; or
- buy the wastewater resource from households and businesses and use a third party access regime to transport the wastewater through the wastewater network and recycle it themselves.

The pricing principles would allow for three components to be included in the price of the wastewater resource:

- A charge associated with the costs of delivering the wastewater resource to the customer, including any incremental costs that might be incurred in treating the wastewater to be fit for purpose.

- A negative adjustment in price to take into account any costs that would be avoided as a result of selling the wastewater resource. For example, the operating costs of discharging the wastewater to the environment would be avoided. The negative adjustment should not exceed the direct costs associated with the project.
- If the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium should be added to the price to reflect its relative scarcity. The premium should be determined by a neutral tendering process.

There should be no constraints placed on the pricing of recycled water. The option of bypassing the vertically integrated service provider (through the use of the pricing principles) should provide sufficient check on the service provider's pricing practices.

The guiding principles would complement, and may be superseded by, pricing principles that would be established under a third party access regime. A third party access regime would allow other parties to transport wastewater through the natural monopoly infrastructure (in exchange for an appropriate access fee to the infrastructure owner), which would facilitate the provision of recycled water services.

The Water Corporation's submission implies that the Water Corporation generally seeks to recover a contribution from recycled water customers towards the joint costs of the wider wastewater network, if customers are willing to pay. Under the pricing principles, recycling projects would benefit retail wastewater customers (and/or government, through lower CSO payments) in two ways, which may be seen as contributing to joint costs on the network:

- any technical efficiency savings in contestable wastewater activities resulting from recycling would go to customers and/or government; and
- any scarcity revenue associated with scarce wastewater would go to customers/and or government.

The Authority does not consider that there should be any additional contributions by recycling customers towards joint costs associated with providing the wastewater network, as these costs have not been caused by the recycled water customers. Rather, recycled water customers would generally reduce costs to users of the network.

The pricing principles could be implemented through the water agencies charges bylaws. Implementation would involve the estimation of the avoidable costs of contestable wastewater activities, initially for the Perth metropolitan area, and for other regional systems on a case-by-case basis. The Authority supports the development of a dispute resolution mechanism, regulatory approval of avoidable costs, and the establishment of a transparent neutral tender process for the allocation of wastewater resources from wastewater treatment plants.

The Authority's recommendation that the price of recycled water activities from wastewater treatment plants should not be regulated also applies to the Kwinana Water Reclamation Plant. The pricing of recycled water from large recycling plants is a commercial issue between the service provider and its customers. However, the pricing principles should provide competitive pressures on the pricing policies of incumbent recycling plant owners. A State-based access regime, if introduced, would provide further competitive pressure.

In the case of third pipe schemes where services are provided by a monopoly provider and customers do not have an alternative supply option, some form of light-handed regulatory oversight is required to ensure that the rate of return is not unreasonably high.

The Authority was also requested to consider the pricing recommendations of the State Water Recycling Strategy, including the appropriateness of faster adoption of cost-reflective prices for major industry. By “faster adoption of cost-reflective prices for major industry”, the Terms of Reference refer to the current policy of transitioning metropolitan commercial water usage charges to charges based on long run marginal cost by 2014. The delay in transition towards cost-reflective water usage charges is primarily to address social issues, such as the impact of large price increases on tenants and low income households. However, there are no such social considerations in the case of commercial or industrial customers. The Authority’s view is that all metropolitan commercial customers should be treated equally and transitioned to cost-reflective water usage charges as soon as possible.

The Authority also examined other issues relevant to the adoption of recycling and alternative water supplies. The Authority:

- supports the use of voluntary targets for recycling, as these can provide incentives to service providers to seek out viable recycling opportunities;
- found that most rebate products are an expensive way to achieve water savings (more costly than producing more potable water). However, mandatory standards for new houses generally impose little additional cost to consumers while achieving water savings;
- does not support the reservation of water supplies for specific purposes and prefers a neutral tender process for the allocation of scarce wastewater resources.

The Authority wishes to thank those who provided the 15 submissions that were received in response to the Issues Paper and Draft Report. Those submissions have helped formulate these final recommendations.

Summary of Recommendations and Findings

- 1) A set of pricing principles for the pricing of wastewater from wastewater treatment plants should be introduced, to create a level playing field for all providers of recycled water.
- 2) The pricing principles and how they are applied should be subject to periodic independent regulatory review.
- 3) There should be an arbitration mechanism to assist parties in commercial negotiations with the Water Corporation in water recycling projects.
- 4) Wastewater from wastewater treatment plants should be priced to reflect the prices that would emerge under a competitive market. These prices would have three components:
 - **Direct Costs.** A charge associated with the costs of delivering the wastewater to the customer, including any incremental costs that might be incurred in treating the wastewater to be fit for purpose.
 - **(Minus) Avoidable Costs.** A negative adjustment in price to take into account any avoidable costs as a result of selling the wastewater resource. For example, the operating costs of discharging the wastewater to the environment would be part of the avoidable costs.
 - The price of the wastewater resource should be non-negative. Thus, if avoidable costs are greater than direct costs, the price of the wastewater should be zero.
 - **(Plus) Scarcity Premium.** Additionally, if the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium would be added to the price to reflect its relative scarcity. The premium should be determined by a neutral tendering process.

These guiding principles would complement, and may be superseded by, pricing principles that would be established under a third party access regime.
- 5) In implementing the pricing principles for the pricing of wastewater resources from wastewater treatment plants, the Authority recommends that:
 - the pricing principles be introduced into the water agencies charges bylaws;
 - the avoidable costs of contestable wastewater activities be estimated for the Perth metropolitan area, and for other systems on a case-by-case basis;
 - a dispute resolution mechanism be developed;
 - avoidable costs be subject to regulatory approval in the case of the Perth metropolitan area, and as needed for other systems;
 - a neutral tender process be developed for the allocation of wastewater resources from wastewater treatment plants.
- 6) The price of water from recycling plants is a commercial matter between the service provider and its recycled water customers.
- 7) The Kwinana Water Reclamation Plant should be treated as a commercial venture between the Water Corporation and its industrial customers, without any regulatory oversight of prices.
- 8) In the case of third pipe schemes, where services are provided by a monopoly provider and customers do not have an alternative supply option, some light-handed

- regulatory oversight is required to check that the rate of return is not unreasonably high.
- 9) Analysis of the Water Corporation's non-potable supply charges to residents of Brighton Estate indicates that the rate of return appears very high relative to the risks of the project.
 - 10) All industrial customers and metropolitan commercial customers should be transitioned to cost-reflective usage charges as soon as possible (rather than by 2014). (The Authority is considering the issue of usage charges for commercial customers in its inquiry into the tariffs of the Water Corporation, Aqwest and Busselton Water.)
 - 11) In the absence of a competitive market in the provision of recycled water projects, voluntary recycling targets can provide an incentive for service providers to seek out and invest in cost effective recycling options. However, there is a risk that recycling targets could artificially encourage projects that are not the most efficient options to balance supply and demand (or discourage others that are).
 - 12) The cost effectiveness of rebates will depend on the cost per kilolitre saved, where the cost is the full resource cost of offering and administering the rebate, plus the installation and operating costs to the customer.
 - 13) An assessment of costs per kilolitre of water saved indicates that most rebate products (with the exception of rain sensors, garden assessments and flow regulators) are more costly to society than the alternative of producing more potable water.
 - 14) The cost effectiveness of mandatory standards will depend on the cost per kilolitre of water saved.
 - 15) Mandatory standards involving water efficient technologies or new house design may generally involve little or no incremental cost to consumers, while achieving water savings. However, mandatory swimming pool covers are an expensive way to achieve water savings (i.e. more costly than producing more potable water).
 - 16) The reservation of water supplies for specific purposes involves second-guessing the value of water to users. Whenever wastewater is a scarce resource, it should be allocated using a neutral tendering process.
 - 17) A trial of a neutral allocation mechanism for allocating wastewater should be conducted, involving stakeholders (for example, for wastewater from the Beenyup wastewater treatment plant).
 - 18) A State-based third party access regime should be introduced. This would allow third parties access to the wastewater network for the purpose of providing recycled water.

1 Introduction

On 8 July 2008, the Treasurer of Western Australia gave written notice to the Economic Regulation Authority (the **Authority**) to “undertake an inquiry into, and make recommendations on pricing and other relevant factors affecting the adoption of recycled water and other alternative water supplies”.

1.1 Terms of Reference

The inquiry was referred to the Authority under Section 32(1) of the *Economic Regulation Authority Act 2003 (Act)*, which provides for the Treasurer to refer to the Authority inquiries on matters related to regulated industries (i.e. water, gas, electricity and rail industries).

A full text of the Terms of Reference is provided in Appendix 1.

In accordance with the Terms of Reference, the Authority was required to consider and develop findings on:

- 1) the circumstances in which recycled water prices should be regulated, and the recommended approach to any required regulation;
- 2) the pricing recommendations of the State Water Recycling Strategy, including the appropriateness of faster adoption of cost-reflective prices for major industry; and
- 3) other factors that the Authority considers relevant to the adoption of recycled water and other alternative water supplies.

In developing its recommendations the Authority was required to have regard to:

- the Government’s social, economic and environmental policy objectives;
- distributional issues, such as those between customers of recycled water services and other services in the same scheme; and
- any relevant pricing principles arising from the 1994 Council of Australian Governments water reform agreement and the National Water Initiative.

In undertaking the inquiry, the Authority has recognised section 26 of the Act which requires the Authority to have regard to:

- the need to promote regulatory outcomes that are in the public interest;
- the long-term interests of consumers in relation to price, quality and reliability of goods and services provided in the relevant markets;
- the need to encourage investments in relevant markets;
- the legitimate business interests of investors and service providers in relevant markets;
- the need to promote competitive and fair market conduct;
- the need to prevent abuse of monopoly or market power; and

- the need to promote transparent decision making processes that involve public consultation.

1.2 Review Process

The process for this review has been as follows.

- The Terms of Reference for the inquiry were received by the Authority from the then Treasurer on 8 July 2008.
- The Authority published an Issues Paper on 1 August 2008, providing background information on the issues to be investigated, and inviting public comment. Nine submissions were received in response to the Issues Paper. One submission and parts of another submission were accepted by the Authority as being confidential on the grounds of commercial sensitivity.
- The Authority published a Draft Report on 4 November 2008. Six submissions were received in response to the Draft Report.
- All submissions or parts of submissions that are not confidential are published on the Authority web site, www.era.wa.gov.au.
- The Authority gave a presentation on the Draft Report and its findings at an Australian Water Association (WA Branch) forum in November 2008.
- The Authority consulted with its Consumer Consultative Committee during the course of its inquiry.
- In accordance with the Terms of Reference, the Authority was required to present its Final Report to Government no later than seven months after receiving the Terms of Reference (by 6 February 2009).

In accordance with section 45 of the Act, the Authority acted through the Chairman and Members in conducting this inquiry.

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2 Water Recycling

Water recycling can take many forms, depending on the nature and source of the inputs, treatment processes, the scale of the scheme, the quality and end use of the final product, and the relationships between the providers of the recycled water and the end users. This section first defines what is meant by water recycling, and sets out a framework for categorising different approaches to water recycling. The experience with water recycling, in Western Australia and other States, and the potential for other schemes in the future, is discussed within this framework.

2.1 Definitions

The State Water Recycling Strategy defines recycled water as:

the multiple use of water, usually sourced from wastewater (also known as sewerage) or stormwater systems, after it has been treated to a standard appropriate for its intended use.¹

The National Water Commission refers to water recycling as:

water from a wastewater treatment plant or from collected stormwater that has been treated to an appropriate quality and is then used for some beneficial purpose.²

Recycled water can be produced on a commercial basis by a service provider, or on-site by a household or business.

Examples of commercially-generated recycled water include:

- large scale wastewater recycling plants, such as the plant at Kwinana;
- collection of household wastewater and treatment by the service provider for non-potable re-use (e.g. irrigation of parks);
- provision of non-potable water by the service provider to industry or households for non-potable use via a third pipe system.

On-site recycled water generally refers to greywater recycling. Greywater is household water that has not come into contact with toilet waste. Generally, this includes water from the laundry and bathroom (greywater from the kitchen is generally not used due to the high levels of organic materials such as oils and fats).

There are two broad categories of greywater:

- greywater diversion, whereby the water is diverted for use without any further treatment; and
- greywater treatment, where the water is treated to a quality that allows other uses for the water, such as flushing toilets or sprinkler irrigation.

Greywater recycling does, however, pose potential health risks and must either be treated accordingly or used for sub-surface irrigation if untreated.

¹ State Water Recycling Strategy, June 2008.

² National Water Commission, *Using Recycled Water for Drinking, An Introduction*, Waterlines Occasional Paper No 2, June 2007.

In addition, there are “other alternative water supplies” (referring to the term used in the Terms of Reference) which, under the definition above, cannot be considered recycling, because they do not involve multiple use. These substitutes for scheme water include:

- rainwater tanks;
- bores that tap into the superficial aquifer, such as garden bores and bores used by horticulturalists, local governments and industry; and
- stormwater (e.g. for recharging of aquifers, or irrigation of public open spaces).

2.2 What is the Current Extent of Recycling and Other Alternative Water Supplies?

This section provides an indication of the current extent of recycling and discusses the range of recycling activities that are currently underway in Western Australia.

The State Water Recycling Strategy identifies that currently 17 gigalitres (**GL**) or 12.5 per cent of wastewater is recycled in the State, an increase from 11.6 per cent in 2006 (see Box 1 for an explanation of the units of measurement for water volumes).

Box 1. Water and Wastewater Volumes – Units of Measurement

The units of measurement for water and wastewater volumes used throughout this report are as follows:

kL = kilolitre = 1,000 litres of water = one cubic metre of water

ML = megalitre = 1 million litres of water (or 1,000 kL)

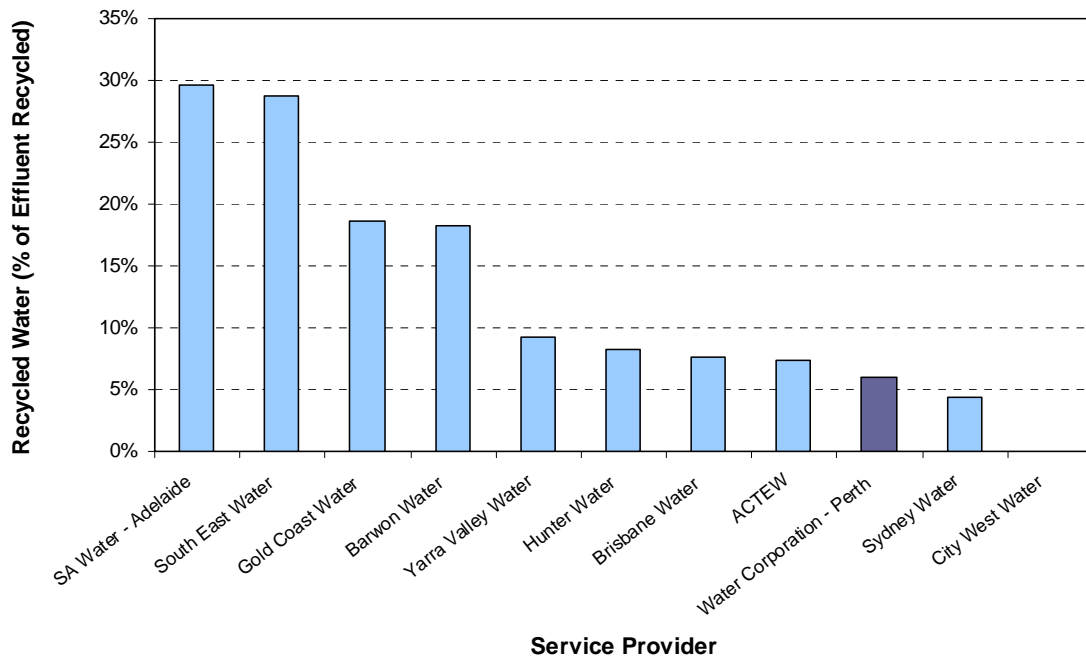
GL = gigalitre = 1 billion litres of water (or 1,000 ML)

An average household uses around 350 kL of water per year.

An Olympic-sized swimming pool holds around 2 ML of water.

Figure 2.1 shows the Water Corporation’s rate of recycling in the Perth metropolitan area compared to that of other large metropolitan service providers. The figure shows that the percentage of wastewater recycled in Perth is lower than for most other capital cities. However, it should be noted that other cities do not have the groundwater resources available in Perth, and are more reliant on surface water supplies and alternatives to groundwater, including recycled water.

Figure 2.1 Comparison of Percentage of Effluent Recycled for Largest Service Providers (More than 100,000 Customers)³



Source: National Water Commission and Water Services Association (2008), *National Performance Report 2006-07 – Urban Water Utilities*, p14.

Table 2.1 (overleaf) shows the extent of wastewater reuse by wastewater service providers in Western Australia. The table shows that recycling rates are higher in many regional areas than in Perth. Recycled water can be an economical source of water in areas where supplies of groundwater or other water supplies are limited, and where wastewater disposal costs are high.

It should also be noted that mining companies also recycle considerable volumes of water (for example, water from mine dewatering can be used on mine sites and in mining operations). The mining sector in WA uses around 600 GL of water per year, 95 per cent of which is from groundwater sources.⁴ Estimates from the mining industry are that up to 30 per cent of these water resources are recycled at least once, although this varies substantially between mine sites, from no recycling to almost full recycling on some mine sites. Water recycling by mines is an example of on-site recycling by private companies and is not regulated, so will not be considered in this inquiry.

³ These figures include only the volume recycled within the service provider's area of operation. Inland service providers often treat water before returning it to the environment for use downstream.

⁴ Source: *State Water Plan 2007*, pp38-40.

Table 2.1 Wastewater Reuse by Wastewater Service Providers in WA⁵

Service Provider	(A) Volume of wastewater receiving treatment (ML) ⁶	(B) Volume of wastewater reused (ML) ⁷	Percentage wastewater reused (%A/B)
WC – Australind/Eaton	989	989	100
WC – Manjimup	347	347	100
Shire of Dalwallinu	189	189	100
Shire of Morawa	65	65	100
Shire of Goomalling	32	32	100
Shire of Dowerin	12	12	100
Shire of Wickepin	6	6	100
Shire of Coolgardie	34	32	94
WC – Albany	2,135	1,900	89
WC – Broome	1,202	982	82
WC – Karratha	1,284	1,028	80
WC – Dunsborough	448	336	75
WC – Katanning	276	197	71
Shire of Moora	87	45	52
Shire of East Pilbara	326	156	48
City of Kalgoorlie/Boulder	2,865	1,219	43
WC – Merredin	204	88	43
WC – Narrogin	329	109	33
WC – Northam	365	118	32
Shire of Dumbleyung	34	10	29
WC – Esperance	669	132	20
WC – Geraldton	1,447	263	18
WC – Busselton	1,300	232	18
Shire of Lake Grace	14	3	18
WC – Perth	123,225	7,947	6
WC – South Hedland	965	57	6
Hamersley Iron	540	30	6
Rottneest Island Authority	82	4	5
WC - Bunbury	3,175	62	2
Shire of Yilgarn ⁸ – Southern Cross	198	1	1
Shire of Yilgarn – Marvel Loch	100	1	1
WC - Mandurah	3,788	4	0
WC - Collie	659	0	0
WC - Kununurra	569	0	0
Shire of Koorda	73	0	0
Shire of Brookton	45	0	0
WC - Jurien	40	0	0
Total	148,118	16,596	11

⁵ The Authority licenses all water and wastewater service providers in WA but only provides benchmarking and reporting information for Water Corporation towns with over 1,000 connections and all local shire water and wastewater schemes licensed by the Authority. There are also numerous smaller recycling schemes in regional areas (e.g. golf courses in Bridgetown, Derby, Dongara, Exmouth and Kalbarri have recycled water provided by the Water Corporation). The Shires of Gnowangerup and Jerramungup have been excluded from the table as data has not been provided. The Shire of Ravensthorpe has been excluded as data has not been verified. The Shires of Kent and Victoria Plains have been excluded as both reported no wastewater receiving treatment. WC refers to Water Corporation.

⁶ For Water Corporation towns this figure is the total sewerage collected (ML).

⁷ For Water Corporation towns this figure is the total recycled water supplied (ML).

⁸ The Shire of Yilgarn operates two sewerage schemes located at Southern Cross Town site and Marvel Loch Town site respectively. While they are owned by a single Shire they are considered separately for the purposes of this report.

Source: Economic Regulation Authority.

2.2.1 Current Recycling Schemes

This section provides examples of current recycling schemes in Western Australia.

Industrial applications

- The Kwinana Water Reclamation Plant (**KWRP**), which is owned by the Water Corporation, is the largest single recycler of wastewater in Western Australia, recycling approximately 6 GL annually. The KWRP adopts a process using microfiltration and reverse osmosis. The KWRP is located in the Kwinana industrial area and supplies recycled water to a number of companies for industrial purposes.⁹
- The Water Corporation is currently negotiating with industries in Kwinana to provide wastewater from the Water Corporation's Sepia Depression Ocean Outfall Line. The wastewater, which currently goes out to sea, would require no additional treatment and would be used for industrial purposes.
- All of the wastewater from the Water Corporation's wastewater treatment plant in Kambalda, in the eastern Goldfields, is supplied directly to a major customer for industrial use.
- All of the wastewater from the Pinjarra Wastewater Treatment Plant is treated through a process of pond treatment and re-used in Alcoa's Pinjarra Refinery.

Public open spaces

- Recycled water has been used in Western Australia for the last 50 years to irrigate public open spaces. This occurs primarily in regional WA, where about 40 per cent of treated wastewater is recycled.¹⁰ Recycling is often the least cost method of disposal. An estimated 70 GL of water, or three per cent of all water in WA, was used for public open spaces in 2005.¹¹ This includes the irrigation of golf courses, sporting ovals and parks.
- In the Perth metropolitan area there has been some limited examples of recycled water use on public open spaces. However, most have been demonstration projects. McGillivray Oval located at the University of Western Australia (**UWA**) was established as a demonstration project in 2004, using treated wastewater from the Subiaco Wastewater Treatment Plant. The project includes filtration and chlorination of secondary treated wastewater from the plant. This treated water is piped 800 metres in a new (300 mm diameter) pipeline under Brockway Road to the UWA Sports Park where it connects to the existing reticulation system in the Park.¹²

⁹ For more information, see www.watercorporation.com.au/files/PublicationsRegister/7/kwrp-brochure.pdf

¹⁰ Source: *State Water Recycling Strategy*, June 2008. Dale and Associates in their submission in response to the Draft Report calculate that the recycling rate across regional WA may be closer to 50 per cent.

¹¹ Source: Water Corporation, <http://www.thinking50.com.au/index.cfm?objectid=6363FA43-1708-51EB-A67C6EE570623C18>

¹² Water Corporation (2006), *Integrated Water Supply Scheme, Security through Diversity, 2005 – 2050, Water Recycling*.

Agroforestry

- The largest recycled water project for forestry use in Western Australia is the Albany Tree Farm. Treated wastewater from the Albany Wastewater Treatment Plant has been used to water over 300 hectares of gum trees in Albany for more than ten years. Some trees were harvested in 2003 with more harvested in 2006. Plans are underway to increase the size of the tree farm. The harvested trees are used for wood chips and making paper.¹³

Residential third pipe schemes

- United Utilities Australia has been nominated by LandCorp as the preferred water service provider to Gracetown. Used water (sewage) from homes will be treated to Class A+ standard and reclaimed water will be delivered back to homes for non-drinking uses (toilet flushing, washing machines, and subsurface garden irrigation) and also used in the town as a fire fighting supply. Drinking water will continue to be self-supply, utilising individual rainwater tanks. The proposed scheme aims to be operational by 2010 and will make use of a new renewable energy source (wind or solar) which will off-set the grid supply.¹⁴
- Moama Lifestyle Villages is currently seeking a licence from the Authority to construct a wastewater recycling scheme for a residential development in North Baldivis, comprising 415 park homes and other recreational facilities, which will recycle treated effluent via a specially designed irrigation system.¹⁵

Groundwater management

- The wastewater treatment plants in Mandurah (Halls Head, Gordon Road and Caddadup) are examples of using recycled water to manage groundwater. Treated wastewater from the plants is used to recharge the superficial aquifer through the use of infiltration basins on site. The wastewater is treated to a secondary level to reduce nitrates before passive sand filtration. The water is filtered through fractured limestone to the superficial aquifer which further reduces pathogens, nitrogen and phosphorous. The water is later extracted for use on parks and other open spaces. The City of Mandurah noted in its submission to the inquiry that the City is exploring additional use of the groundwater near the wastewater treatment plants for the irrigation of parks, ovals, golf courses and schools.

Reuse from coastal drainage

- In parts of the South West and South Coast regions of Western Australia, constructed drains convey water from farms, thus permitting agriculture by minimising inundation and waterlogging. For example, a turf farm on Dirk Brook benefits from storing first flush water¹⁶ in a separate basin and then uses it for irrigation.
- Nutrient-rich winter run-off from agricultural land in the Peel-Harvey catchment area is captured, piped and pumped by Alcoa for use in its Pinjarra refinery.

¹³ Ibid, p5.

¹⁴ For further information, see <http://internet.landcorp.com.au/portal/page/portal/grace/sustain/water>

¹⁵ For further information, see the Authority's web site.

¹⁶ First flush water refers to the initial run-off from an area, which often contains higher levels of pollutants compared with later run-off following further rainfall. First flush storage systems are aimed at capturing and isolating the most polluted run-off.

Greywater reuse

- The Australian Bureau of Statistics estimated in 2006 that 26 per cent of Perth households re-used greywater on the garden. However, according to the Department of Water, only 123 households have obtained rebates for greywater systems. It is likely that most households that are using greywater are transferring it onto their gardens without using the type of greywater diversion systems that attract a rebate. The cost of the plumbing adjustments to separate greywater from toilet and kitchen waste may be limiting the uptake of greywater reuse systems.
- The Bridgewater residential village development in Mandurah will make use of on-site greywater recycling for private garden irrigation.

2.2.2 Current Use of Alternative Water Supplies

In addition to recycling schemes, there are a number of examples of customers making use of alternative water supplies.

Groundwater use by industry

- The Water Corporation indicated in its submission that there is considerable use of groundwater for self supply by industrial, mining and agricultural users; e.g. industrial customers in Kwinana, mining customers treating saline water in the eastern Goldfields to supplement potable scheme water from the Integrated Scheme, horticultural customers on the Gnangara mound. (Water Corporation submission on Issues Paper, p7)

Garden bores

- Around 25 per cent of Perth households have a domestic bore (155,000 bores out of approximately 600,000 connections).¹⁷
- According to the Department of Water, 20,000 rebates have been provided for domestic bores.

Rainwater tanks

- Around 5 per cent of Perth households have a rainwater tank (29,500 tanks out of approximately 600,000 connections).¹⁸
- According to the Department of Water, 14,000 rebates have been provided for rainwater tanks.

Stormwater use

- Several country golf courses make use of stormwater. An example is the Augusta Golf Club, which relies solely on stormwater harvested from its buildings and adjacent parking bays and roads. The stormwater is gravity fed into two reservoirs and is used to water the greens on the golf course. (See submission by Dale and Associates on the Draft Report, p5)

¹⁷ Source: Department of Water

¹⁸ Source: Department of Water

Third pipe schemes using groundwater

- The Brighton residential estate, developed by the Satterley Property Group in the northern suburb of Butler, provides a reticulated, non-potable water supply through a third pipe system. Community bores are used to supply water from a shallow groundwater aquifer for use on public open spaces and also private gardens. The Water Corporation provides both the non-potable water service and the potable water supply (through a different set of pipes). The Brighton estate scheme can be viewed as an alternative source scheme rather than a recycling scheme, as it makes use of groundwater rather than greywater.
- The Wungong Urban Water Project, by the Armadale Redevelopment Authority, will develop a third pipe system to deliver non-potable water, harvested from roof drainage, stormwater drainage and groundwater, to an urban development of up to 40,000 homes.

2.3 What is the Scope for Additional Recycling and Other Alternative Water Supplies?

The large volume of wastewater discharged every year provides an indication of the potential for additional recycling, if it is cost effective.

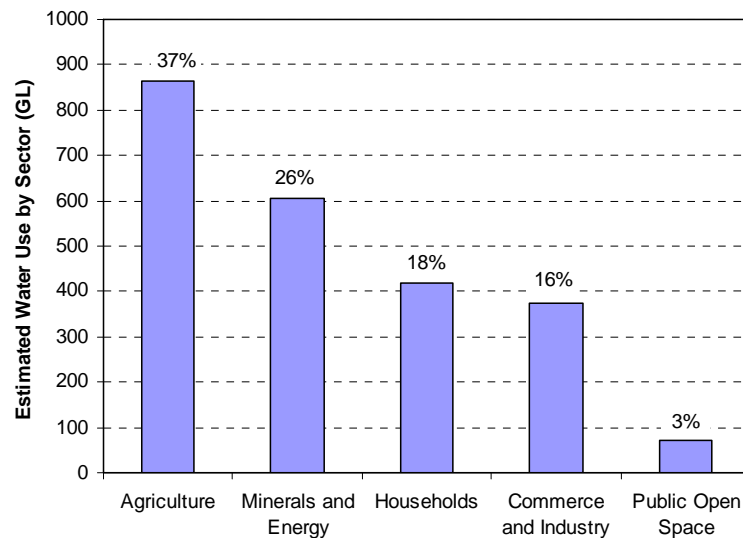
- Each year, the Water Corporation's wastewater treatment plants in Western Australia produce 150 gigalitres of treated wastewater, of which 12 per cent is recycled. The Water Corporation notes in its submission that the volume of wastewater flows is expected to double in the next 50 years.
- In the metropolitan area, 115 GL of wastewater is produced each year, largely concentrated at the Woodman Point (50 GL), Beenyup (43 GL) and Subiaco (22 GL) wastewater treatment plants.¹⁹ These plants generally treat the wastewater to a level suitable for discharge into the ocean. About 6 per cent of the wastewater is recycled.
- In Western Australia, the average person produces 200 litres of wastewater every day. Wastewater is 99.97 per cent water because by far the greatest volume comes from showers, baths and washing machines. The rest is dissolved and suspended matter.²⁰
- In 2005, an estimated 864 GL of water, or 37 per cent of all water usage in Western Australia, was used by the agricultural sector (see Figure 2.2 below).²¹ Almost all of this water was used for irrigation, including irrigated pasture, turf farms and horticulture. However, currently in Western Australia, there is very little use of recycled water for agricultural purposes.

¹⁹ Source: *State Water Recycling Strategy*, June 2008.

²⁰ http://www.watercorporation.com.au/W/water_recycling_faq.cfm

²¹ Source: *State Water Plan 2007*.

Figure 2.2 Estimated Water Use (GL) and Percentage of Total Water Used by Sector in 2005



Source: State Water Plan 2007

Studies currently being undertaken for the Department of Water estimate that the median annual discharge of stormwater from the Perth and Peel Metropolitan regions is 120 GL. It may be feasible to use some of this water without adverse impacts on waterways. However, the Water Corporation has estimated that less than 10 per cent of Perth's stormwater is transported by constructed drains to rivers, local waterways, wetlands and the ocean, which is significantly less than in other Australian cities.²²

2.3.1 Potential Recycling Schemes

The following discussion identifies the recycling projects that are either currently under consideration in Western Australia or are operating elsewhere.

Groundwater management

- One of the options being given further consideration by the Water Corporation is increased use of groundwater replenishment using recycled water. Groundwater replenishment is often also referred to as Managed Aquifer Recharge (**MAR**). MAR is a process where water from wastewater treatment plants is treated and then returned to local aquifers. Costs of MAR vary depending on the level of treatment (e.g. sedimentation, chemical, filtration or in some cases reverse osmosis) and the method of returning the water to the aquifer (e.g. passive filtration into shallow aquifers, or pumping into deeper aquifers).
- Because groundwater is very slow moving, the treated water would remain in the ground for decades (up to 50 years) before it reaches existing bores that are used for public water supply. During that time, the water would mix with existing groundwater as it travels through the underground aquifer, until the two are indistinguishable.

²² For more information on stormwater recycling, see the following information on the Corporation's web site <http://www.thinking50.com.au/index.cfm?objectid=087686A9-1708-51EB-A68F4DC10450094A>. See also the Department of Environment (2004), *Stormwater Management Manual for Western Australia*, which sets out best practices for stormwater management.

- Recycled water for groundwater replenishment is a source that does not rely on rainfall, and has the potential to increase as Perth's population increases.
- Recycled water for groundwater replenishment has the potential to contribute an additional 25-35 GL per year to drinking water supplies by 2015, which could supply up to 100,000 households. This volume and timeframe assumes that water can be extracted now in anticipation of sufficient recharge over coming decades.
- The Gnangara Groundwater Replenishment Trial, due to be completed in 2012, is currently under development with both the State and Federal Governments contributing \$15 million each to the cost of the trial.²³

Agriculture

- In South Australia, large scale recycling schemes supply recycled water to agricultural areas. The Virginia Plains Scheme²⁴ involves a network of pipelines of more than 100 kilometres supplying 15 GL per year (with a long-term capacity of 40 GL) of Class A reclaimed water from Adelaide's Bolivar WWTP to farms 35 kilometres north on the Northern Adelaide Plains. Approximately 250 growers covering an area of 200 square kilometres use the recycled water for horticulture irrigation.
- The Water Corporation indicated in its submission that one area of scope for increased recycling is in the Carabooda agricultural district, which is sited near the proposed Alkimos wastewater treatment plant and could potentially use treated wastewater from the plant for irrigation. This issue is further discussed in section 7.6.
- The Chamber of Commerce and Industry supported the use of recycled municipal wastewater for agriculture:

CCI believes that there is no reason why all the municipal wastewater that is currently discharged into the ocean could not be recycled for use in agriculture, given the rising cost of food and energy in Western Australia. (Chamber of Commerce and Industry WA submission on Issues Paper, p2)

Public Open Spaces

- The submission by Dale and Associates in response to the Draft Report incorporates a survey of recycled water use by golf courses in WA and indicates that there is significant scope for expanded use of recycled water for the reticulation of golf courses and other public open spaces.

Major on-site recycling

- The Sydney Olympic Park is an example of large scale recycling. The water reclamation and management system at the Park includes stormwater harvesting and treatment, sewage reclamation and treatment, and a dedicated supply system to utilise the treated stormwater and wastewater for toilet flushing, irrigation and operational wash-down activities. The system supplies around 500 ML of recycled water each year.

²³ For further information see, <http://www.thinking50.com.au/index.cfm?objectid=63630285-1708-51EB-A6841B0D43457275>

²⁴ The Virginia Plains Scheme cost \$55 million and was shared between the Commonwealth Government, which contributed \$10.8 million from the Building Better Cities Fund, \$574,000 from Landcare, \$7 million from private investors, \$7 million from the South Australian Government and the rest from SA Water.

Sewer mining

- The Council House 2 building in the Melbourne central business district takes water directly from a nearby sewer and treats it for non-potable use within the building.

Larger residential third pipe schemes

- Perhaps the largest example of recycled water for domestic use in Australia is the Rouse Hill development in Western Sydney. Approximately 17,000 households now use recycled water through the use of dual reticulation, commonly referred to as a “third pipe” system. The third pipe system supplies recycled water for flushing toilets, watering gardens, washing cars and other outdoor purposes via a separate purple water pipe.
- The South West Development Commission advocated the separation of water supply systems into potable and non-potable networks.

In building any water supply grid significant questions arise about achieving critical mass size. This issue is significantly compounded if the proposed grid is operated solely on the basis of being for treated wastewater.

Where mains supply has been constrained to treated wastewater alone it faces difficulty in that its supply growth can only occur in parallel to the growth of wastewater which in turn constrains the operation from being able to commit to larger supply contracts and achieve scales of efficient operation quickly.

To overcome this situation it is essential that any grid transporting treated wastewater should also be able to, at this time, access higher quality (though not treated to potable standard) water as an interim measure. The intent of this would be to create fit-for-purpose (non-potable) grids that long-term will supply increasing volumes of treated wastewater, although in the first instance this would involve the delivery of a mix of water qualities. This could be achieved through permitting a fit-for-purpose grid to access water that is reserved long-term (e.g. Yarragadee) for potable use as an interim measure while the total volume of wastewater grows with population increases.

Recommendation: That the ERA assesses the business case for fit-for-purpose water grids that will initially source a range of water supplies with the long-term goal of wastewater being the core source. (South West Development Commission submission on Issues Paper, p3)

Large scale water recycling for domestic consumption

- Queensland is currently constructing the Western Corridor Recycled Water Project, which will be Australia’s largest water recycling project and the first to use recycled water for drinking purposes. Recycled water will be supplied to power stations, industry, agriculture and the Wivenhoe public water supply dam, where it will be used to supplement the potable water supply. The project is expected to supply approximately 85 GL of recycled water per annum when the project is completed. The dam will act as an environmental buffer and the recycled water will be subject to further treatment such as ultra violet filtration and blending with existing non-recycled water.
- There are other large scale schemes in the world that recycle water for reuse as drinking water, including NEWater in Singapore, Water Factory 21 in California and the Goreangab Water Reclamation plant in Namibia. With the exception of Namibia, these schemes make use of an environmental buffer.

- The Water Corporation notes in its submission that the scope for the use of recycled water for drinking purposes will depend on community acceptance.

Industrial applications

- The Government indicated in the State Water Recycling Strategy that it supported the expansion of the Kwinana Water Reclamation Plant to 9.6 GL (from 6 GL at present).

2.3.2 Potential Schemes for Use of Alternative Water Supplies

Stormwater management

- The City [of Mandurah] is currently conducting a trial Stormwater Catchment Scheme at Egret Point to harvest and store stormwater for reuse on parks. The water is captured via runoff from the road drainage system and stored in underground reservoirs on site with a volume of 100 kL. (City of Mandurah, submission on Issues Paper, p3)
- A project by the Town of Cottesloe will filter stormwater that will then be used to replenish the Cottesloe groundwater aquifer. It will involve removing 10 stormwater ocean outfalls and installing underground stormwater treatment, storage and recharge tanks. Stormwater will also replenish the aquifer through 280 roadside soak pits.²⁵
- [T]he scope for stormwater recycling is much less as most is already recharged to local waterways and aquifers where it has environmental value. Stormwater is also rainfall dependent (less secure than wastewater recycling) and can be difficult and expensive to treat due to a wide range of contaminants including nutrients and petrocarbons. (Water Corporation, submission on Issues Paper, p8)
- Golf courses are usually good sites for the use of stormwater collected locally. They usually have sufficient space for the location of small dams, reservoirs and sumps. Furthermore, water quality can be improved, if necessary, through use of “reed-bed” systems. Water features add to the attractiveness of courses. (Dale and Associates, submission on Draft Report, p4)

²⁵ For more information see, <http://www.nwc.gov.au/agwf/wsa/project.cfm?projectID=47&ref=2>

3 Current Policy Settings and Directions

3.1 State Initiatives

Water recycling emerged as an important issue for Western Australia in 2001 in response to the drought. A water forum and symposium was held in 2002, partly to explore opportunities for water recycling in Western Australia. The outcome of these events informed the State Water Strategy released in Western Australia in February 2003. The State Water Strategy set a target to recycle 20 per cent of treated wastewater by 2012.

The most significant development since the State Water Strategy was released was the commissioning of the Kwinana Water Reclamation Plant in 2004, which uses wastewater from the Woodman Point wastewater treatment plant.

In addition, rebates for greywater reuse were introduced and a code of practice for reuse of greywater has been published by the Department of Health.²⁶

Further to the State Water Strategy, the State Water Plan 2007 increased the recycling target to 30 per cent of treated wastewater by 2030.

The State Water Recycling Strategy was published in June 2008. The following initiatives were included in the Strategy as ways to increase the level of water recycling in Western Australia in order to reach the 30 per cent target.

- Government supports the expansion of the existing Kwinana Water Reclamation Plant by 2010.
- Government will investigate the establishment of an industrial tariff to promote the efficient use of water and the use of recycled water by industry.
- Due to increasing pressure on our groundwater resources, the State Government is currently investigating the viability of horticultural precincts. Water from the new Alkimos Wastewater Treatment Plant has some potential for future use in horticulture and may be reserved for this purpose.
- A three-year trial of groundwater replenishment is being planned to commence in 2009....water from the Beenyup Wastewater Treatment Plant will be reserved for this purpose.
- ... an online Waterwise communities toolkit is being developed ... [which will provide information on] the availability of shallow groundwater, the availability of sources for recycled water, key land planning considerations, alternative water solutions including rainwater tanks, community bores, greywater and landscaping, streamlined application and approval processes. It is expected that the toolkit will be online by 2010.
- A review of Water Corporation charges for extending water infrastructure to new urban areas will be undertaken, with consideration given to reflecting the contribution of alternative water supplies.²⁷

²⁶ Department of Health (July 2002), *Draft Guidelines for the Reuse of Greywater in Western Australia*.

²⁷ *State Water Recycling Strategy*, June 2008.

3.2 National Initiatives

National agreements between the Federal and State Governments play a significant role in water policy in Australia. Recent reforms have placed increased importance on the development and use of recycled water as an alternative water source.

In 1994, in response to concern about the state of many of Australia's river systems, the Council of Australian Governments (**COAG**) developed a national policy for the efficient and sustainable reform of Australia's rural and urban water industries. The strategic framework agreed to by the Government embraced pricing reform based on the principles of consumption-based pricing and full-cost recovery, the reduction or elimination of cross-subsidies and making subsidies transparent. The framework also involved the clarification of property rights, the allocation of water to the environment, the adoption of trading arrangements in water, institutional reform and public consultation and participation.

Implementation of the strategic framework was expected to result in a restructuring of water tariffs and reduced or eliminated cross-subsidies for metropolitan and town water services with the impact on domestic consumers of water services being offset by cost reductions achieved by more efficient, customer-driven, service provision.

In the case of rural water services, the framework was intended to generate the financial resources to maintain supply systems, should users desire this, and through a system of tradeable entitlements to allow water to flow to higher value uses, subject to social, physical and environmental constraints. Where they have not already done so, States are to give priority to formally determining allocations or entitlements to water, including allocations for the environment.

Environmental requirements were to be determined on the best scientific information available and to have regard to the inter-temporal and inter-spatial water needs required to maintain the health and viability of river systems and groundwater basins. COAG also agreed where significant future irrigation activity or dam construction is contemplated, that in addition to economic evaluations, assessments will be undertaken to ensure that the environmental requirements of river systems can be adequately met.

The National Water Initiative (**NWI**) builds on the previous COAG framework for water reform.

The overall objective of the NWI is to achieve a nationally compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes. The multiple goals of the NWI are to:

- ensure healthy, safe and reliable water supplies;
- increase water use efficiency in domestic and commercial settings;
- encourage the re-use and recycling of wastewater;
- facilitate water trading between and within the urban and rural sectors;
- encourage innovation in water supply sourcing, treatment, storage and discharge; and
- achieve improved pricing for metropolitan water.

For metropolitan systems, the NWI (section 66(ii)) requires:

- 66(ii) development of pricing policies for recycled water and stormwater that are congruent with pricing policies for potable water, and stimulate efficient water use no matter what the source, by 2006.

The National Water Commission is in the process of developing pricing principles for recycled water and stormwater reuse to assist NWI parties to achieve their commitments under section 66(ii) of the NWI. The Commission has recently released its position on urban water pricing, with some reference to pricing for new water sources.²⁸

Urgent progress is required to improve pricing policies for recycled water and stormwater. Consistent with NWI commitments, pricing policies for recycled water and stormwater should be congruent with pricing policies for drinking water so as to stimulate efficient water use regardless of the source. Recycled water and stormwater re-use schemes need to be considered in a system-wide context and prices should reflect externalities and avoided or deferred costs. Prices for recycled water and stormwater should reflect underlying cost differences associated with providing products of different quality and fit for a range of different uses.

This inquiry is part of the State Government's implementation plan for the NWI in Western Australia, in which the Government committed to a review of pricing policies for recycled water and stormwater.²⁹

In addition, the National Water Quality Management Strategy has developed a set of Australian guidelines for water recycling. These guidelines are designed to:³⁰

provide an authoritative reference that can be used to support beneficial and sustainable recycling of waters generated from sewage, grey water and stormwater, which represent an underused resource...The guidelines describe and support a broad range of recycling options, without advocating particular choices. It is up to communities as a whole to make decisions on uses of recycled water at individual locations. The intent of these guidelines is simply to provide the scientific basis for implementing those decisions in a safe and sustainable manner.

The guidelines are being produced in two phases.

- Phase 1 was released in November 2006 and provides a framework for the provision of safe and reliable recycled water. Phase 1 focuses on the treatment of sewage effluent and greywater for non-drinking purposes.
- Phase 2 consists of three modules. Module I addresses the augmentation of drinking water supplies by recycled water and was published in May 2008. Modules II and III focus on stormwater harvesting and reuse and managed aquifer recharge and are currently open for public comment.

²⁸ National Water Commission (July 2008), "Urban Water Pricing: National Water Commission Position", in *Approaches to Urban Water Pricing*, Waterlines Occasional Paper No.7, by Frontier Economics on behalf of the National Water Commission.

²⁹ Government of Western Australia (April 2007), *Western Australia's Implementation Plan for the National Water Initiative*, p50.

³⁰ National Resource Management Ministerial Council, Environment Protection and Heritage Council, and Australian Health Ministers' Conference (May 2008), *National Water Quality Management Strategy: Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) - Augmentation of Drinking Water Supplies*, p1.

4 Recycled Water Pricing and Principles

4.1 Terms of Reference

The Terms of Reference require the Authority to:

consider and develop findings on the circumstances in which recycled water prices should be regulated; and the recommended approach to any required regulation.

4.2 Background

All service providers in WA that are currently licensed to provide wastewater services either currently do, or could potentially, provide water recycling services. Current licensed wastewater service providers include the Water Corporation, City of Kalgoorlie-Boulder, Rottnest Island Authority, Pilbara Iron and 19 Shires. However, other service providers could conceivably also provide recycling services in the future.

The Authority currently provides advice to the Government on the regulated tariffs of the Water Corporation. The tariffs of the other licensed wastewater service providers are not regulated.

This section examines whether recycled water prices should be regulated, and if so, what form this regulation should take, and what principles should be applied.

4.3 Current Approach by the Water Corporation

The only provider of recycled water that made a submission to the Inquiry was the Water Corporation. The Water Corporation has proposed that the price of recycled water from wastewater treatment plants be treated in the following way:

The Corporation does not believe that the efficient use of recycled water would be enhanced by a greater level of price regulation....The Corporation supports a “light-handed” approach to price regulation, where “regulation” requires adherence to specific principles that are approved by government, rather than regulation that sets prices for each scheme or sets a methodology or directly intervenes in commercial arrangements. The Corporation also supports the publication of the pricing principles. (Water Corporation, submission on Issues Paper, p1)

The Corporation prices for recycled water are based on the following guiding principles which are aligned to the principles outlined in the Water Services Association of Australia’s Occasional Paper No. 12 “Pricing for Recycled Water” (February 2005).

- Prices for recycled water should be set within a price band, with (whole of system) incremental cost as the floor and willingness to pay (as defined by the lesser of stand-alone cost or by-pass price of the alternative) as the ceiling.
- Commercial judgments should determine whether prices are set at the lower end of the efficient price band (i.e. just covering system incremental costs) or towards the higher end (where recycled water users make an increasing contribution towards joint/common costs).
- Prices for recycled water should be set in a way that broadly tracks the price of substitutes, but not locking in artificially low prices for an unnecessarily long time into the future.

- Prices for recycled water should be set as part of any longer term pricing reform strategy encompassing the suite of products provided by the industry (rather than a short-term position based on the current charges for potable and other services).
- In the case of mandated targets, any subsidies provided to recycled water products at the expense of the broader customer base should be fully and transparently costed. Preferably, these subsidies should be paid from general revenue since they constitute a CSO.
- In some cases, efficient prices may require different prices for different users, reflecting different qualities of recycled water and associated costs of supply – which may vary by user and/or location – and willingness to pay. Failure to price differentially may result in viable recycling projects not proceeding.

(Water Corporation, submission on Issues Paper, p14)

In addition, the Water Corporation made the following comments, which help to clarify its approach to pricing recycled water:

Where there is scarcity or potential scarcity, the resource should be managed and priced to achieve its greatest long-term value. (Water Corporation, submission on Issues Paper, p16)

The Corporation does not support a simple marginal cost pricing approach to reuse pricing. Such an approach does not take into account the value of the resource to the customer, their fair contribution to joint costs or the efficient allocation of the resource where the potential for recycling is limited and there are competing uses.

The Corporation's pricing policy for recycled water aims to achieve a positive contribution to the joint costs of a sewerage scheme where possible. The policy does not look at recycled water customers in isolation, and does not discriminate against other customers of the sewerage scheme in favour of recycled water customers. (Water Corporation, submission on Issues Paper, p3)

The Water Corporation indicated that there may be circumstances where consistent charging across customers is appropriate:

There will be circumstances where there are many customers receiving a similar service from a recycled water scheme. In these circumstances, a uniform service standard and price may be administratively efficient and an equitable means of recovering scheme costs....External oversight should be limited to any unresolved contractual dispute. (Water Corporation, submission on Issues Paper, p2)

The Water Corporation also commented that pricing should be cognisant of the best long term interests of communities.

As the value and the price of competing water sources continue to increase, the potential contribution to scheme costs of revenue from recycled water will increase. A potential distributional issue is who obtains the benefit of this increasing value. Care should be taken to retain the long-term resource rights with the scheme owner so that all customers benefit from increases in resource value. Passing control to customers with low value but short-term opportunities not only leads to potential windfall gains, but is more likely to lock in lower value uses (watering ovals and golf courses) as these customers are likely to resist change (e.g. the reluctance of communities to allow irrigation water to be traded to higher value use due to local impacts).

(Water Corporation, submission on Issues Paper, p12)

Information from the Water Corporation provides the following case studies on how the Corporation sets its charges (see Boxes 2, 3 and 4).

Box 2. Case Study – Industrial Customer

An industrial customer was exceeding its water entitlement which had been obtained under a commercial water supply agreement with the Water Corporation. Even with measures in place for reducing water usage, the customer recognised that it needed to increase its water entitlement.

As an alternative to using scheme water to meet the additional water requirement, the Corporation presented the customer with an option to use recycled water from a wastewater treatment plant which was in close proximity. This treatment plant has an approved disposal method in place.

The proposed charges comprise:

1. recovery of the Corporation's capital expenditure, i.e. the Corporation will be constructing the reuse scheme to enable delivery of recycled water specifically for the customer;
2. recovery of operating costs of the reuse scheme; and
3. a product charge reflecting the customer's ability to make a contribution to the joint costs of the sewerage scheme and the potential scarcity of the recycled water as a resource (another customer had expressed a potential interest in the resource).

Box 3. Case Study – Recycled Water for Irrigation

The following is a case study of a recent recycled water agreement that the Water Corporation has entered into.

- A review of disposal options for a wastewater treatment plant identified that water recycling represented the most efficient option.
- In order to be able take the recycled water for irrigation purposes, a customer had to upgrade its facilities to comply with Department of Health and occupational safety and health requirements. The Corporation also had to construct infrastructure to deliver the recycled water to the customer.
- The agreement included a contribution from the Corporation towards the customer's upgrades and a loan [provided by the Corporation].
- The recycled water will initially be provided free of charge, e.g. have a zero resource value and no contribution toward the existing wastewater system.
- To recognise that the customer's financial position may change in the future, the agreement provides for an annual review to determine the customer's capacity to pay for the recycled water.
- The agreement provides that if a third party requests use of the recycled water whilst the Corporation is providing the recycled water free of charge to the customer, the customer will be provided the opportunity to accept and agree to the commercial terms of the request by the third party but if the customer does not accept these terms, the customer's entitlement will be reduced by the amount requested by the third party.
- In the event the customer's entitlement is reduced and the reduction impacts its ability to adequately irrigate, the Corporation will reimburse the customer for any part of the customer's reticulation upgrade which is rendered redundant, or on a proportionate basis, to the extent of the redundancy is caused solely by the reduction in entitlement. Any reimbursement will be included in the charges to the third party. This provision does not apply for a specified number of years of the agreement so as to give the customer the opportunity to become more financially viable.

Source: Water Corporation, submission on Issues Paper, p16-17

The submission from the City of Mandurah provides another illustration of how the Water Corporation currently sets recycled water charges.

[A]ny review should consider the extent of control over water infiltrated by Water Corporation (through a Managed Aquifer Recharge process) into an aquifer, but accessed by another party some distance from the infiltration point (how far from infiltration point does water cease to become 'owned' or controlled by Water Corporation and therefore not subject to competition and pricing inconsistencies). (City of Mandurah, submission on Issues Paper, p5)

Box 4. Case Study – City of Mandurah

Water Corporation owns and operates the Gordon Road wastewater treatment plant (WWTP) in Mandurah. Wastewater from the WWTP is treated and filtered through fractured limestone to recharge the aquifer. This is a form of managed aquifer recharge.

The City of Mandurah approached the Department of Water for a licence to construct a bore and abstract groundwater for the purposes of reticulation of public open spaces. However, the Leederville aquifer in this area is fully allocated and there are restrictions on use from the superficial aquifer, which would not be sufficient to meet the City of Mandurah's irrigation needs.

The City of Mandurah wanted a guarantee that there would be sufficient water being infiltrated in the long term to meet their needs, which is not something that the Department of Water could provide. The Department of Water recommended that the City of Mandurah enter into an agreement with the Water Corporation to ensure that the quantity of groundwater being drawn by the City each year continued to be infiltrated by the Gordon Road WWTP to ensure the aquifer was not impacted by the abstraction.

The wastewater agreement between the City of Mandurah and the Water Corporation is for the supply of 110 ML per year (abstracted from the groundwater bores by the City), at a cost of 18c/kL to the City (around \$20,000 per year). This price was based on the price which another major potential customer at the time was willing to pay for infiltrated wastewater from the plant.

The agreement is conditional on the infiltration of sufficient treated wastewater from the plant. Currently, the infiltration rate from the plant is around 2,700 ML per year (7,500 kL per day). The Department of Water estimates that 80 per cent of local aquifer recharge is from the infiltration from the plant.

Under current legislation, the Department of Water can only license groundwater abstractions, and not injections into aquifers. Thus, the requirement for City of Mandurah to enter into an agreement with the Water Corporation is the only mechanism available to the Department of Water to ensure that groundwater abstractions and injections are balanced. New legislation currently being drafted is expected to address this matter.

4.4 Form of Regulation

A first consideration is what form of regulation (if any) is appropriate in the case of recycled water prices.

Submissions

The Department of Water provided a range of alternative approaches to the regulation of recycled water prices, without indicating a preference:

If regulation is necessary, this could take a range of forms. The simplest option is minimal regulation: to allow utilities to sell recycled water by commercial contract with a negotiated price that reflects supply and demand, and the availability of alternative sources of water at competitive prices.

Under a commercial contract price regulation can be light handed if there is no indication of market failure caused by misuse of market power. If there is indication or evidence that market failure is hindering the development of recycled water, then further regulation may be warranted.

Alternatively, recycled water tariffs could be set individually using a building block approach (operating cost plus fixed return on investment). However this could be administratively burdensome and inefficient, especially for smaller recycling schemes.

In between these two options, the Department of Water sees a number of potential measures that could be examined:

- public reporting of costs and prices to allow scrutiny
- establishment of principles for pricing of recycled water
- dispute resolution or appeal mechanisms
- regulated methodology for the calculation of charges (as opposed to the setting of specific charges)
- regulation of designated high value or high demand schemes.

These measures could be applied individually or in combination.

(Department of Water submission on Issues Paper, p6)

The Water Corporation does not support a greater level of price regulation but accepts that adherence to a set of pricing principles would be appropriate.

The Corporation does not believe that the efficient use of recycled water would be enhanced by a greater level of price regulation....The Corporation supports a “light-handed” approach to price regulation, where “regulation” requires adherence to specific principles that are approved by government, rather than regulation that sets prices for each scheme or sets a methodology or directly intervenes in commercial arrangements. The Corporation also supports the publication of the pricing principles. (Water Corporation submission on Issues Paper, p1)

In addition, the Water Corporation proposed an external review mechanism.

In a manner similar to the application of the Corporation’s framework for negotiating water supply agreements with major consumers, the Corporation is comfortable with an external review of its pricing policy for recycled water and how it is applied. (Water Corporation submission on Issues Paper, p2)

The Department of Treasury and Finance also supported an approach based primarily on pricing principles or guidelines.

The introduction of a set of pricing principles or guidelines is preferred rather than any formal regulation of recycled water prices except where there is a monopoly provider or a provider with a degree of monopoly power, which is misusing its market power. If guidelines were to be introduced it is recommended that they are in accordance with the principles of the NWI and the 1194 COAG Water Reform Framework. More specifically guidelines should include the following:

- prices for recycled water should be set to recover the full cost of the implementation of the recycled water scheme to send the appropriate signals to customers, and they should also be adjusted for avoidable costs and externalities where possible;
- any regulation or guidelines should promote economic efficiency and not be restrictive. Guidelines should also allow for flexibility in pricing arrangements, catering for different pricing arrangements for different types of recycled water projects;
- prices should be set within the bounds of other water prices and also not allow for any cross-subsidisation between recycled water customers and other water customers; and
- guidelines should also ensure that price setting is transparent and administratively simple where possible.

(Department of Treasury and Finance submission on Issues Paper, p5-6)

The ERA may also wish to consider the development of pricing guidelines, which translate the pricing principles of the NWI and COAG Water Reform Framework into practical assistance for local councils in the valuation and costing of its recycled water services to ensure ongoing financial viability. This would include an appropriate calculation of avoidable cost of ocean discharge and a reduction in the volume of water being treated at wastewater treatment plants.

...

If through [the monitoring of recycled water prices] it is discovered that monopoly rents are being achieved, then service providers could then be subject to price regulation or at least pricing inquiries, which report to the Government.

(Department of Treasury and Finance submission on Issues Paper, p2)

A further issue noted by the Water Corporation is that, due to its budget constraints, which are set by government, there is a limit to the number of recycling projects that it can undertake.

The Corporation is financially constrained due to the State Government's budget priorities. Funding is not available to undertake all the projects required to improve services to customers and projects have to be prioritised. (Water Corporation, submission on Draft Report, p1)

Some submissions reported difficulties that some parties have experienced in negotiating arrangements with the Water Corporation for recycled water use.

A number of other major country golf clubs are interested in using recycled water on their golf courses. However, their operators have not been successful in obtaining supplies from the Water Corporation, several after more than 10 years of trying. They include the golf courses at Binningup, Collie, Donnybrook, Gingin, Jurien Bay, Margaret River and Northam. (Dale and Associates, submission on Draft Report, p2)

The Authority also received two submissions in which confidentiality was claimed by the parties on the grounds of commercial sensitivity (for all of one submission and parts of another submission). These confidentiality claims were accepted by the Authority. One of the submissions provided the details of negotiations where the submitter claimed the

Water Corporation was using market power to influence negotiations. The Authority has investigated these claims and has used this analysis to inform its recommendations.

The Department of Treasury and Finance suggested that an arbitration mechanism could be useful to assist parties in negotiations with the Water Corporation.

[T]he ERA is encouraged to undertake additional discussion of the shortcomings of the current process, where parties undertake commercial negotiations with the Water Corporation, but with no recourse to an adequate arbitration mechanism (such as those which exist in access regimes more generally), should negotiations break down. Arbitration may be justified given the market power of the Water Corporation. It is believed that a wider discussion of the benefits of such a mechanism to potential investors in recycling options would be of benefit to the Final Report. (Department of Treasury and Finance, submission on Draft Report, p2)

The Australian Water Association submitted that the low rate of recycling in Western Australia was in part due to the complexity of the approvals processes for recycling projects, and recommended that a more transparent regulatory framework be introduced, supplemented by case studies of recycling projects around the world:

There is a broad view that the regulation of recycled water use in Western Australia is complex and lacks transparency and that this works against the development and extension of recycling schemes. In particular, many AWA members are of the opinion the regulatory approvals process needs to be clarified and applied with more consistency. To this end, the AWA would make the following suggestions:

- A framework for assessing the risks associated with recycled water use should be developed. The point of such a framework would be to determine, objectively, the risks associated with the use of recycled water in particular applications. These would range from replacement of environmental flows to, potentially, direct potable reuse.
- The framework would require rigorous consideration of:
 - The likely concentrations of contaminants
 - Human and ecological health effects
 - Likely exposure pathways
 - The availability and practicality of risk mitigation techniques, and
 - Other factors which would affect the risk faced by consumers in accessing recycled water.....
- Case-studies of successful recycling schemes in Australia and internationally should be compiled. These would be an adjunct to the framework discussed above, in that they would provide examples of the way in which risks have been assessed and mitigated, provide actual field-verified results of particular schemes and provide insight into the effectiveness of various technologies and the relations between suppliers and users.

(Australian Water Association, submission on Draft Report, p1-2)

Assessment

The current industry structure and pricing approach governing the provision of recycled water services in Western Australia creates some problems for potential proponents of new recycling projects.

First, Water Corporation has some advantages over other recycled water providers by virtue of its status as a vertically integrated provider of wastewater services (the collection, treatment and disposal of wastewater).

- The Water Corporation has control over the resource used to produce recycled water (e.g. wastewater in wastewater treatment plants).
- The Water Corporation has the ability to offset recycled water project costs against its avoided costs – costs that it would otherwise incur in the provision of wastewater services.

Secondly, there is no readily available third party access regime in Western Australia that would give other parties access to wastewater in wastewater treatment plants, or wastewater on the sewerage network, on an equal basis to the Water Corporation. A third party access regime would enable alternative service providers to bypass the Water Corporation's recycled water services in a number of ways:

- alternative providers of wastewater recycling services would be able to purchase wastewater (e.g. from businesses, industry or households), transport it through the wastewater network, by paying the network owner a charge for transportation services, take out the wastewater, treat it and sell it on to recycled water customers;
- by allowing sewer mining, in which third parties could extract wastewater from the wastewater network, treat it and sell the recycled water on to customers; or
- by allowing third parties direct access to wastewater in wastewater treatment plants.

To support third party access, and access to the wastewater resource, instruments may be required to circumvent issues relating to the ownership of the wastewater resource. For example, in New South Wales, the water or wastewater in a network is owned by the network owner. However, in NSW, the process for parties seeking to take wastewater from a wastewater network (known as "sewer mining") is facilitated by the requirement for service providers to publish policies on sewer mining, as well as the provision for any disputes on sewer mining agreements to be arbitrated by the regulator, IPART.

The point raised by Water Corporation regarding its budget constraints limiting the recycling projects it can undertake suggests that there are potential opportunities for third parties to develop viable recycling schemes which are currently not being developed. This underscores the need for a pricing regime which promotes equal access for potential providers of recycled water.

A third problem is that there is insufficient pressure on the Water Corporation to minimise the costs of its contestable wastewater activities. Currently, regulatory reviews of capital expenditure efficiency are limited to the periodic reviews of the Water Corporation's tariffs, in which the Authority makes recommendations to government regarding the Water Corporation's tariffs. By contrast, in the electricity and gas sectors, the network access codes provide processes for the regulatory pre-approval of capital investments, on the basis of their prudence and efficiency, as well as assessments of any new capital expenditure as part of the regulatory reviews of access arrangements.³¹

³¹ In electricity, under the *Electricity Networks Access Code*, proposed major augmentations are required to pass a Regulatory Test, administered by the Authority, to assess whether the augmentation maximises the net benefit after considering alternative options. In addition, new facilities are required to pass a New Facilities Investment Test (NFIT), to assess, among other things, whether costs are being efficiently minimised. Only new facilities that pass the NFIT can be added to the regulatory asset base and the costs recovered through tariffs. The NFIT test also applies to new facilities in gas networks, under the *National Third Party Access Code for Natural Gas Pipeline Systems*.

However, it is difficult for regulators to determine whether investments are efficient, due to the complexity of investment decisions and the informational asymmetry that exists between the service provider and the regulator. It is preferable for such incentives to be provided by effective competition in the supply of recycled water services. Alternative providers of recycled water could potentially provide lower cost solutions for the disposal of wastewater, which would provide competitive pressure on the Corporation to seek cost efficient solutions in its contestable wastewater services.

The submissions to the Authority also highlighted that:

- There is some indication that the Water Corporation is able to use its market power in negotiations with some parties on its recycling projects.
- There is no arbitration mechanism to assist parties negotiating contracts with the Water Corporation on its recycling projects.
- Other than through inquiries such as this, there is no regular independent review of recycled water pricing policies where these have been used.
- The current processes for approving new recycling projects (such as the assessment of environmental and health risks) are complex and not transparent, and could create a barrier to entry into the industry.

These factors indicate that there is a need for some regulation in the market for recycled water, to ensure a level playing field between the Water Corporation and other alternative providers of recycled water. The provision of recycled water services is potentially a competitive activity. The intent of any regulation of these activities, if required, would be to promote conditions in which:

- there is active investigation by a range of potential providers of recycled water into recycling projects that are commercially viable;
- there is robust competition between alternative providers, with equal access to the resources required for recycling;
- there are strong incentives for the Water Corporation to achieve least-cost provision of its contestable wastewater services;
- the pricing and regulatory framework places the minimum necessary obstacles to the implementation of new recycling projects;
- the resources for recycled water go to those who value them most; and
- the benefits of regulation outweigh its costs.

These conditions, taken together, are consistent with economic efficiency, which has several dimensions:

- ensuring optimal investment in recycling technology (dynamic efficiency);
- minimising the costs of disposing of wastewater (technical efficiency); and
- allocating resources (in this case, recycled water) to where they are most highly valued (allocative efficiency).

Price regulation, as noted by the Department of Water, can take varying forms, including the setting of individual tariffs by Government to recover the costs of each recycling scheme, the establishment of pricing principles to guide contract negotiations, and the establishment of appeals and review mechanisms. The choice of the appropriate

regulatory instruments will depend upon the balance between the costs of regulation and the benefits that can be achieved.

There are a number of practical difficulties associated with the Government setting recycled water prices. Such difficulties include:

- the wide range of water recycling services (typically, prices are regulated for services that are relatively homogenous within a scheme); and
- the cost of the water recycling service will vary depending on the particular circumstances that arise during the negotiation (typically, prices are regulated for services that have costs that can be established in advance).

In considering the issue of pricing recycled water, the Authority has been guided by the need to ensure consistency across the different ways in which recycling projects could proceed. For instance, a customer who is interested in using recycled water in their operations should have the opportunity to:

- buy recycled water from the owner of a wastewater treatment plant;
- buy the wastewater resource from the owner of the wastewater treatment plant in accordance with the pricing principles and recycle it themselves; or
- buy the wastewater resource from households and businesses and use a third party access regime to transport the wastewater through the wastewater network and recycle it themselves.

Irrespective of how the wastewater resource is procured, it would be expected that under a competitive market the price of recycled water would converge. The Authority considers that this consistency could best be achieved by establishing a set of pricing principles to guide the pricing of the wastewater resources used for recycling.

- Ensuring that customers are able to purchase wastewater at a competitive price (a price similar to that which would emerge under third party access) would create a level playing field between existing and potential providers of recycled water.
- It would also mean that there would be no need to regulate the prices charged by the Water Corporation for recycled water services, since recycled water customers would have the option of bypassing these services, by using the pricing principles to purchase the wastewater resource at a competitive price.
- The use of pricing principles in this way would be simpler, more transparent, more light-handed and less costly than setting individual prices for recycled water schemes.

The Authority considers that any such pricing principles and how they are applied should be subject to periodic independent regulatory review. In the case of the Water Corporation, such a review could form part of the periodic reviews by the Authority of the Water Corporation's tariffs. In the case of other providers of recycled water, some light-handed regulatory oversight of prices may be warranted in cases where customers of recycled water have no other options for their water supply. (This issue is examined further in the discussion on third pipe schemes in section 5.2.)

It would also be appropriate for parties negotiating with the Water Corporation, in the purchase of the wastewater resource, to have access to a mechanism for the independent arbitration of commercial disputes.

Final Recommendations

- 1) A set of pricing principles for the pricing of wastewater from wastewater treatment plants should be introduced, to create a level playing field for all providers of recycled water.
- 2) The pricing principles and how they are applied should be subject to periodic independent regulatory review.
- 3) There should be an arbitration mechanism to assist parties in commercial negotiations with the Water Corporation in water recycling projects.

4.5 Pricing Principles

In considering the issue of pricing of wastewater from wastewater treatment plants, the Authority has taken the Water Corporation's current approach to pricing its recycled water services and analysed whether this approach is appropriate, in light of information provided in submissions and other analysis conducted by the Authority.

The Water Corporation's approach to the pricing of its recycled water services uses the buyer's willingness to pay as the upper bound to prices. The buyer's willingness to pay is generally determined by the price of the least-cost alternative to the recycled water service (which may be the cost of an alternative water source, or the stand-alone cost of providing the recycled water service).

The Authority accepts that willingness to pay is an appropriate basis for setting recycled water prices – as long as there is a level playing field in the provision of recycled water services. However, as discussed in the previous section, this is not the case, as other operators in the non-potable water market do not have ready access to the wastewater collected from customers on the wastewater network, and, further, are not able to offset the direct costs of their recycling projects against the avoided costs of wider wastewater services.

The following section discusses in more detail what would happen to prices under a competitive market. In addition, there may be a need to further adjust the prices that evolve in a competitive market to reflect any externalities (see section 4.5.5), or social objectives (see section 4.5.6).

4.5.1 Pricing in a Competitive Market

A competitive market would be expected to result in recycled water prices with three components:

- a charge associated with the costs of delivering the wastewater resource to the customer, including any incremental costs that might be incurred in treating the wastewater to be fit for purpose;
- a negative adjustment in price to take into account any costs that would be avoided as a result of selling the recycled water or wastewater resource. For example, the operating costs of disposing of the wastewater; and

- if the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium would be added to the price to reflect its relative scarcity.

The approach of taking into account avoidable costs and direct costs is consistent with accepted principles for access charging in the water and wastewater sector.³² Previous advice by the Authority on third party access pricing indicated that a “retail minus” approach would be appropriate.³³ Under such an approach, prices for parties accessing the wastewater network would take as their starting point the retail price of the wastewater network owner, and subtract from that the costs that are (or could be) avoided by the wastewater network owner in no longer having to provide some services.³⁴

The objective of access pricing is to ensure efficient entry into the market – access prices are set so that only entrants that can provide the same service at a lower cost than the existing provider would find it profitable to enter the market.

The example presented in Box 5 shows how a retail-minus approach would be applied in the case where a new entrant proposes to replace an incumbent’s method of wastewater disposal (ocean outfall) by gaining access to the incumbent’s network and recycling the water themselves.

³² These principles have been confirmed in the ACCC Arbitration Report (19 July 2007) in the case of Services Sydney.

³³ Economic Regulation Authority (2008), *Final Report: Inquiry on Competition in the Water and Wastewater Services Sector*, Chapter 4, Third Party Access.

³⁴ Any activity which has costs that can be avoided by a vertically integrated monopoly is probably contestable if another party can replace that activity by a lower cost activity.

Box 5. Example of the Retail-Minus Approach to Access Pricing for a Recycling Project Involving Third Party Access

A new entrant with a recycling project pays an access charge to the incumbent network owner for access to the network to provide two contestable services – a retail service and a wastewater disposal service – to a group of the incumbent’s retail customers. In this example, retail prices are regulated, and the market is fully competitive, so that service providers earn efficient returns on and of capital.

	Incumbent	Entrant
Costs (including efficient return on and of capital):		
Retail costs	C1 (avoidable)	C5
Wastewater collection and transport	C2	
Wastewater treatment at plant	C3	
Wastewater disposal – ocean outfall	C4 (avoidable)	
Wastewater disposal – recycling		C6
Total Costs	$C1 + C2 + C3 + C4$	$C5 + C6 + \text{access charge}$
Retail price (P) – before access	$P = C1 + C2 + C3 + C4$	
Access charge		Retail price – avoidable costs $= P - C1 - C4$ $= C2 + C3$
Retail price – after access		$C2 + C3 + C5 + C6$
Cost saving to retail customers		Savings in retail costs + savings in disposal costs $= (C1 - C5) + (C4 - C6)$

The example in Box 5 highlights some key points about the outcomes of the retail-minus approach as applied to third party access:

- The access charge is based on the incumbent’s retail price – which, if set efficiently, will reflect all the costs incurred by the incumbent, including an efficient return on and of capital – less the avoidable costs of the incumbent not having to dispose of the wastewater.
- This means that the access charge to the new entrant covers only the incumbent’s non-avoidable costs of servicing the contestable customers (the costs of wastewater collection, transport and treatment, $C2 + C3$).
- A new entrant will only find it profitable to enter the market if its costs of providing the contestable services are lower than the incumbent’s costs of providing that service. Thus, efficient entry is encouraged.
- The access charge operates so that the incumbent’s returns under either method of wastewater disposal are the same. Either way, the incumbent will recover the costs that they incur, including an efficient return on and of capital.

- The new entrant could set its retail price at the incumbent's retail price (minus an incentive payment sufficient to encourage customers to switch to the new entrant), and could thereby capture the full cost savings between it and the incumbent. The ability to capture this cost saving and earn a return that is higher than normal would provide an incentive for companies to innovate and improve technical efficiency.
- However, in the long run, contestability in the market should ensure that new entrants set their retail prices efficiently (to recover their costs, including an efficient return on and of capital). In the event that a new service has monopoly characteristics (e.g. where customers have no choice about the supplier), regulation may be required to ensure that retail prices are efficient.
- In order for the retail-minus approach to work efficiently, regulation must be effective in ensuring that service providers make efficient returns on and of capital.
- If the incumbent's retail prices are too high, the access price can lock in monopoly rents to the incumbent. Another risk is that of inefficient entry – a new entrant with costs higher than the incumbent's avoidable costs could find it profitable to enter the market.
- Assuming retail prices are set efficiently, customers will see their retail prices reduced by the amount of the cost reduction offered by the recycling project (i.e. any savings in retail costs (C1 – C5) plus any savings in wastewater disposal costs (C3 – C4)).

It is important to note that many recycling projects are not examples of third party access, because they are not serving retail customers. For example, a golf course which provides a cheaper option of disposing of treated wastewater from a wastewater treatment plant (compared with an expansion to a wastewater treatment plant) is not a new entrant seeking to compete with the Water Corporation to provide services to a group of its retail customers. In this example, there is no retail price that could be recovered by the golf course ($P = 0$). Thus, the relevant charge, consistent with access pricing, includes just a negative adjustment to reflect avoidable costs (as well as the direct costs of the project).

The Water Corporation submission highlighted that some anomalous situations could arise under access pricing. For example, the Corporation suggests that if the avoidable costs to the Corporation are higher than the direct costs of the project, this would result in a negative charge (e.g. the Corporation having to pay the recycled water customer).

The standard inclusion of a negative adjustment to account for any costs that would be avoided as a result of selling recycled water would not be practical. It would result in:

- sewerage customers paying higher charges and the Government paying greater subsidies than under the Corporation's current pricing principles;
- the removal of the financial incentive for the Corporation to seek alternative reused options in place of standard effluent disposal methods, eliminating one of the motivations to undertake reuse schemes;
- depending how the term "avoidable costs" is interpreted, it could lead to the Corporation being forced to undertake unnecessary non-core activities in competition with local organisations.

(Water Corporation, submission on Draft Report, p4)

Responding to these concerns, the Authority notes that a key outcome of an efficient third party access regime is that the contestable retail customers should see their retail prices reduced to reflect the lower (more efficient) costs of the new entrant. That is, in a

competitive market, retail customers would benefit from the gains associated with improved technical efficiency or resource scarcity.

- For example, if the Water Corporation was able to reduce the costs of wastewater treatment and disposal, through a recycling project, or by technical improvements in its wastewater services, this would benefit the Corporation's retail customers by reducing their wastewater costs.
- If wastewater is a scarce resource, the producers of that resource (households and businesses) should benefit from any scarcity premium associated with that resource.

This implies that in order to encourage technical efficiency, as under a competitive market, the charge for the wastewater resource should be non-negative. Thus, in cases where the avoidable costs to the Corporation exceed the direct costs of the recycled water scheme, the Corporation would pay for the direct costs of the scheme. Since these would be less than the avoided costs to the Corporation, this would represent a more efficient disposal method and a cost saving to the Corporation's retail customers (or government, through lower CSO payments).

- The Corporation provided in its submission an example where a golf course, which provides a lower cost method of disposing of treated wastewater from a wastewater treatment plant, would need to be paid a substantial amount of money, reflecting the Corporation's avoided disposal costs, and resulting in higher charges to wastewater customers on the network.
- This example is one in which the Corporation's costs exceed the direct costs of the recycling project. Applying the guideline that charges for the treated wastewater should be non-negative, the Water Corporation should in this case pay for the direct costs of the scheme. These are lower than the costs of expanding the treatment plant, and would result in a cost saving to retail customers (or government).

Summary: Pricing in a Competitive Market

A customer who is interested in using recycled water should be able to buy recycled water from the owner of a wastewater treatment plant; buy wastewater from wastewater treatment plants and recycle it themselves; or buy wastewater from households and businesses under a third party access regime, transport it across the network and recycle it themselves.

The pricing principles proposed by the Authority apply to the pricing of the wastewater resource from the owner of a wastewater treatment plant. The pricing of wastewater should be consistent with access pricing more generally, including:

- a charge associated with the costs of delivering the wastewater to the customer;
- a negative adjustment in the price to take into account any costs that would be avoided as a result of selling the wastewater resource; and
- if the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium would be added to the price to reflect its relative scarcity.

In a competitive market, households and businesses would benefit from the gains associated with improved technical efficiency in contestable wastewater activities, or wastewater resource scarcity. Customers should see their retail prices reduced to reflect

the lower costs of a more efficient entrant. This implies that the price for the wastewater resource should be non-negative, so that if avoidable costs exceed the direct costs of a recycling project, the price should be zero.

The following sections set out the Authority's assessment of the avoidable cost and scarcity premium components of recycled water prices, the treatment of joint costs, and the adjustment of prices for externalities and social issues.

4.5.2 Avoidable Costs

Retail-minus approaches may differ with regard to the definition of the costs that are subtracted from the retail price (the costs associated with the contestable activity).

- One approach is to use the costs that are actually avoided by the network owner if recycled water services were to be provided by another party (known as "avoided costs").
- A broader approach is to use the costs that the network owner could avoid in the long-run ("avoidable costs").

Avoidable costs are determined on the basis of long run equilibrium. They are an estimate of the cost of providing contestable services in the long-run that encompasses both avoidable operating costs and avoidable capital costs.

The ACCC used the avoidable cost approach in its determination of access charges in the case of Services Sydney and Sydney Water.³⁵ In this case, the ACCC:

- identified all the assets involved in the provision of the contestable services and specified the valuation methodology for those assets;
- specified the cost elements to be included as part of the avoidable costs of Sydney Water's services;
- determined that Sydney Water's avoidable costs of sewerage treatment and disposal should be allocated across customers based on dry weather flows or volume discharge, to calculate a standard per kilolitre charge; and
- determined that the avoidable costs associated with retail activities should be allocated on a per customer basis.

In principle, the approach to determining avoidable costs is the same as the "building block" approach used by the Authority and other regulators to determine regulated prices: costs reflective of efficient operations, allowing for prudent capital investment over time, including an appropriate rate of return and, particularly relevant for treated water, compliance with environmental requirements.

Applying the ACCC approach in the case of the pricing principles would involve a number of steps.

- 1) Identify the contestable activities of wastewater activities and the assets associated with those activities.
 - Wastewater disposal is the main contestable activity, for which recycling can provide an alternative. Collection and transportation via the wastewater

³⁵ ACCC (1997), *Access Dispute Between Services Sydney Pty Ltd and Sydney Water Corporation: Arbitration Report*, 19 July 1997.

network, and wastewater treatment by means of large-scale wastewater treatment plants, are likely to be natural monopoly activities and not contestable.

- The contestable activities would also need to be defined in terms of the range of the service (e.g. the Perth metropolitan area, or a regional town). This will depend on the existing wastewater infrastructure and the extent to which recycled water projects replace the contestable activities in each case.
- 2) Calculate the avoidable costs associated with each contestable activity, on the basis of the building blocks of operating costs, depreciation and an appropriate return on assets required to provide the contestable services over the long term.
 - 3) Allocate the avoidable costs (e.g. per customer and/or per volume) to derive a standard long run avoidable cost for each contestable service.

A first step in the implementation of the pricing principles in Western Australia would be to determine the avoidable costs of contestable wastewater activities in the Perth metropolitan area, probably on the basis of a cost per ML of wastewater. For other regional systems, avoidable costs could be determined on a case-by-case basis, such as when potential recycled water providers seek to apply the pricing principles.

4.5.3 Scarcity Pricing

In the Draft Report, the Authority recommended that the price of wastewater from wastewater treatment plants should include a component to reflect the scarcity of the wastewater resource: if the amount of wastewater available was less than the demand for it, the premium would be positive, but if there was no scarcity, the premium should be zero. The Authority also recommended that the scarcity premium would best be determined by a neutral tendering process.

Submissions

The Department of Treasury and Finance disagreed with the view that, in the absence of scarcity, the scarcity premium should be zero, since there may be the possibility of scarcity in the future. The Department recommends a mechanism, administered by the Authority, to allow for flexibility in the setting of the scarcity premium in the event that a secondary market is ineffective.

[I]t should be recognised there is value to the treatment plant operator to wait for scarcity to arise through competition for the resource and this could provide a disincentive to agree to a long-term contract (a means through which the efficient allocation of resources can be achieved over time).

Consequently, it is suggested that the expected net present value of the scarcity component may not be zero, given the probability that scarcity will arise within the contractual period. This implies that a non-zero scarcity value would be appropriate, as a function of the probability and volume of excess demand.

The justification for the inclusion of such a mechanism is the argument...that high sunk costs may prevent the development of a secondary market. It is therefore necessary for a price mechanism to be developed which will ensure a more efficient allocation within the market. This problem may be solved via shorter term contracts, or with clauses allowing the treatment plant to revisit the scarcity component under certain circumstances.

It would be appropriate for this mechanism to be administered directly by the ERA.

In making this suggestion, it is acknowledged that any possible solution to this problem may introduce secondary, unintended consequences, which would ameliorate the potential

gains. The optimal solution which both the DTF and ERA are intending to approximate may always be elusive under a regulated system, and hence any further complexity both unnecessary and counterproductive. (Department of Treasury and Finance, submission on Draft Report, p2-3)

The Department of Treasury and Finance, while supportive of a neutral auction mechanism, noted some concerns.

While a neutral auctioning mechanism for wastewater would achieve a degree of allocative efficiency, there are some criticisms of this approach. Specifically, it has been suggested that a neutral auctioning mechanism may result in an inefficient allocation because:

- the high sunk costs associated with many production processes, and the low marginal value of water in these processes will prevent an active secondary market for water; and
- not all potential users of the resource will be present at the time of the auction.

In responding to this issue, it is suggested that the ERA could undertake an examination of:

- the practicality and benefits of an alternative method for the assignment of property rights in the auction, wherein the rights are sold subject to the obligation to renegotiate prices should a higher bidder enter at a later time;
- the applicability of a tender process, as opposed to an auction; and
- whether the benefits of the auction mechanism, in regards to allocative efficiency, on balance, will outweigh the efficiency gain that could be achieved through an alternate mechanism (such as intertemporal reassignment or reservation for public supply).

However, the DTF would take this opportunity to reassert a preference for a neutral auction mechanism without public reservation in the first instance, subject to revision should the ERA develop a more effective process.

(Department of Treasury and Finance, submission on Draft Report, p4-5)

The Water Corporation submitted that it can achieve a better allocation of recycled water than could be achieved by a neutral auctioning process.

In the absence of the Corporation taking the role, there is no other entity that is willing and able to balance the interests of all customers.

(Water Corporation, submission on Draft Report, p1)

Allocation of resources using an auctioning process can be inefficient. It is a misplaced faith to believe in the efficiency of market mechanisms where all the potential customers cannot be present for the initial auction and secondary markets are likely to be inefficient.

The nature of water is that it is a relatively low cost input that supports significant (sunk) investments, which means that secondary markets cannot be relied on to subsequently reallocate resources to higher value uses. Once committed to a low value use with significant sunk costs, the value required to cause the resource to be transferred in a secondary market has to be higher than the existing use plus the sunk costs.

Additionally, where the water is used by service orientated organisations (e.g. local authorities) rather than profit orientated organisations, even a clear financial gain may not be enough to encourage transfer to a higher value use.

In the absence of a functioning secondary market, optimising the use of recycled water can only be achieved by long-term planning. In these circumstances, planning is not a process of “second guessing” that would be better performed by a market.

(Water Corporation, submission on Draft Report, p4)

The Department of Water also suggested a number of considerations regarding a neutral auctioning process:

A neutral auction process should consider these factors:

- Competition between bidders at the time of neutral release may not reflect future demand, and the potential scarcity value of the resource may not be captured. In this instance the department notes the existence of an incentive to withhold supply.
- The sunk cost investments made by early users could create a path dependency that prevents secondary markets from reallocating water to a use that would have otherwise had a higher value use, producing a dynamically inefficient outcome.

In assessing whether a neutral auction process or a commercial negotiation process would result in an optimal outcome, the department identifies the following issues:

- It is unclear how a commercial negotiation process limited to the parties who have approached a utility can determine the true value of current or future scarcity more effectively than a neutral auction process.
- A commercial negotiation process that is not transparent gives the wastewater utility greater knowledge of the value of the water than the current potential buyers. Such knowledge can influence the 'commercial judgement' of the utility in determining 'willingness to pay' and result in a distorted price signal which would influence future investment decisions.

(Department of Water, submission on Draft Report, p5)

Assessment

The best way to determine a scarcity price would be to tender the rights to the wastewater resource. If there is no scarcity (if supply of wastewater exceeds demand), then the scarcity component of the price would be zero. If there is a scarcity, then the scarcity component of the price would reflect the value of the wastewater in its highest value use. A tender process could involve two stages:

- 1) Establish whether there is scarcity. For example, in the case of infiltrated wastewater from a wastewater treatment plant, the plant owner could seek registrations of interest for the use of groundwater up to the amount of infiltration from the plant.
- 2) If the registrations of interest indicate scarcity, the plant owner could conduct a tender and set the price of the wastewater resource at the price set by the highest bidder.

If all of the resource has been allocated, there is the potential for a secondary market, whereby other users could buy the rights to the wastewater resource from existing users.

In a competitive market, it would be expected that any premium arising from the scarcity of wastewater available for recycling would be largely captured by the households and businesses discharging their wastewater into the sewer. This could be seen in the case of multiple access seekers who could enter into a bidding war to encourage retail customers to sell wastewater to their particular project.

- The scarcity premium would not be retained by the wastewater network owner, as it would only be entitled to recover the efficiently incurred costs associated with the transportation and treatment of wastewater. The regulatory treatment of recycled water revenue would account for any scarcity revenue by netting off the recycled water revenue against the costs of providing the regulated service (to ensure retail

customers are the beneficiaries, or alternatively to reduce Community Service Obligation (**CSO**) payments).

- On this point, it is important to note that the wastewater treatment plant and network are treated by the Authority in its pricing advice to government as regulated assets, and the costs are fully reflected in the Authority's tariff recommendations. An important regulatory principle is that, in general, where service providers receive revenue that exceeds the costs of providing regulated services, and the additional revenue was generated using those regulated assets, then the tariffs are reduced (or CSOs reduced) to equate revenue and costs.
- While there may be an argument for allowing some of the scarcity premium to be retained by the service provider, to provide an incentive to the service provider to seek out recycling projects, service providers already have an incentive to consider recycling projects when trying to determine the least-cost options for the disposal of wastewater.

The Authority considers that markets, where possible, are the best means to determine the highest and best use of resources. If a person or firm chooses to hold to a treated water allocation acquired at market prices via a bidding system it is presumed to be because the firm derives net benefits from doing so that is the net benefit from using the water exceeds the opportunity cost as reflected in its market value.

The Authority does not consider that it is an appropriate role for the Water Corporation to anticipate the value that future users may place on wastewater, or to remove the rights of those allocated the resource in order to redirect the resource at a later date. Once a right has been allocated, it is for the holder of that right to make the decision to continue to hold that right, or to sell it to a purchaser willing to cover the costs and benefits associated with that right. There is a risk that other allocation mechanisms (such as intertemporal reassignment, or reservation for public supply, or negotiations with a small set of potential users) could underestimate – or overestimate – the benefits derived by different recycled water users. The Authority maintains the view that the value to users of a resource is best determined by the users themselves, and those values are best elicited by neutral market mechanisms.

Several of the submissions raised concerns regarding how a secondary market would work in the case where a wastewater resource is fully allocated and new potential users emerge at a later date. In particular, there may be cases where the wastewater resource is allocated at a low value to a user who then invests in infrastructure to use the wastewater, and a user with a higher value for the wastewater emerges at a later date.

- In this case, future users who wanted access to a fully allocated wastewater resource would need to purchase the rights from existing users. It would be expected that the current holder of the rights would only sell their rights if the value they get from selling the rights are greater than the value they get from holding them. The value of the rights depends only on future costs and benefits and not on past costs, which are sunk.
- Participation in the allocation process by future users can be encouraged through the design of the allocation mechanism. As demand grows and excess demand is forecast, early advance warning can be given, sufficient to allow firms that anticipate a future need for recycled water to participate in the allocation in advance (for example, by purchasing a right and leasing it).

Finally, the Department of Treasury and Finance suggested that the Water Corporation may have a conflict of interest in allocating wastewater from its wastewater treatment

plants, if it anticipates future scarcity (and a scarcity premium). The Authority's view is that the key issue is that wastewater resources be allocated through a neutral and transparent tendering process, including the publication of information on the amount of wastewater resource available. However, it is possible for a neutral process, once established, to be administered by the Water Corporation.

Summary: Scarcity Pricing

The price of wastewater from wastewater treatment plants should include a component to reflect the scarcity of the wastewater resource: if the amount of wastewater available was less than the demand for it, the premium would be positive, but if there was no scarcity, the premium should be zero. The Authority's view is that the scarcity premium would best be determined by a neutral tendering process.

4.5.4 Joint Costs

A key question in the consideration of pricing principles for wastewater from wastewater treatment plants is the extent to which recycled water projects should contribute to costs on the wider wastewater network (referred to as "joint costs"). The view of the Authority in the Draft Report was that recycled water customers should not contribute to joint costs, as they were not responsible for these costs – rather, recycled water projects would generally reduce costs on the wastewater network.

Submissions

The Water Corporation's view, encapsulated by the pricing principles it uses in negotiating prices to recycled water customers, is that commercial judgements should determine whether recycled water prices should be set towards the higher end of the price band (between incremental cost and willingness to pay), with recycled water customers making an increasing contribution towards joint costs. (The Corporation's pricing principles are shown in section 4.3.)

The Water Corporation's objective in obtaining a contribution towards joint costs from recycled water customers is that such contributions reduce the charges to other (Water Corporation wastewater) customers, and reduce subsidies from Government.

The Corporation is not a "rent seeking" private monopolist using all means to protect that monopoly position...Key points to recognise are:

- The Corporation's revenue is regulated so there is no opportunity for the Corporation to benefit from overcharging some customers. Revenue from recycling that contributes to shared scheme costs results in lower charges for other customers and lower subsidies from Government.

(Water Corporation, submission on Draft Report, p1)

The Water Corporation submitted that setting prices above direct costs did not discourage recycling projects, since prices were negotiated to reflect the recycled water customers' willingness to pay.

Recycled water customers value the product and will proceed with projects at prices above the incremental cost. Where prices are negotiated on a project by project basis, pricing recycled water above incremental cost based on a customer's willingness to pay will not result in "recycling projects not proceeding". Prices would be negotiated down to as low as the avoidable cost if this was all the customer was willing to pay and therefore all viable projects would proceed and all potential cost savings would be realised. (Water Corporation, submission on Draft Report, p7)

The Water Corporation maintained that recycled water was a joint product of the sewerage system, and that recycled water customers should therefore contribute to the joint costs.

Recycled water is a joint product of a sewerage scheme. The idea that recycled water customers should not make a contribution to joint costs is not supported by what would happen in a competitive market.

In the theoretical world of a perfectly competitive market, producers have to maximise their revenue from one joint product to remain competitive in the market for the other joint product. For example, a company failing to maximise recycled water net revenue (revenue + avoided costs) and therefore maximising the contribution to joint costs would be uncompetitive in the provision of their sewerage services.

(Water Corporation, submission on Draft Report, p7)

The Water Corporation also submitted that under the Authority's proposed approach all of the benefits from recycled water would go to the recycled water proponent, and that this was inequitable, since households provided the wastewater resource for recycling and should receive a share of the benefits.

As currently drafted, the financial benefits from a recycled water project would only go to the user of that recycled water. The proposed pricing principles remove all rights of the providers of that water (that is, the households producing the wastewater) to share in any benefit. This is akin to forcing all producers to give away any by-product resulting from the production of their primary good. (Water Corporation submission on Draft Report, p1)

In applying [the Authority's draft] principles, it is assumed that no one has any rights to the wastewater, and the Corporation simply provides a conveyance service. However, this proposal is inconsistent with the result that would occur with a competitive market under an access regime, which would include competition for sewerage customers (the resource). This would result in some of the value of the recycled water being passed on sewerage customers. A competitive market price would be between lower bound and upper bound prices, consistent with the outcome negotiated under the Corporation's pricing principles. (Water Corporation, submission on Draft Report, p3)

The Department of Treasury and Finance submitted that there may be some justification for allocating some shared costs to recycling customers, since recycling customers benefit from some of the services provided by wastewater treatment plants (e.g. pre-treatment of wastewater).

There is a broader question of the treatment of shared costs and the need to recognise that traditionally, a wastewater service involves collection, transport, treatment and disposal. Furthermore, the charging regime is centred around recovering the costs of these services from wastewater customers. With the advent of recycling, the treatment and disposal aspects of traditional wastewater services may no longer be the final stage of the process, but rather act as a 'pre-treatment' for the recycling process.

Consequently, the point at which the process ceases to be a wastewater service and becomes a recycling service is of importance to the development of an appropriate cost recovery regime. Without the wastewater treatment plant, effluent could not be treated directly by the recycling plant, and therefore additional treatment costs would be incurred by the recycling business.

It is understood that the ERA's preferred approach is to charge recycling customers only the direct costs, and continue to have the wastewater customers bear the full cost of the treatment and disposal. This is comparable to the situation where no recycling takes place. While this approach is one way of allocating the economic surplus, there is also a case for some surplus to be returned to the operator of the treatment plant, and possibly to customers of the wastewater service.

There may be good policy reasons for the Government to charge recycling customers part of the costs of the 'pre-treatment'. For example, if the scheme is in a country area and the costs of the wastewater service are subsidised by a community service obligation payment (CSO). If the recycling customer were to contribute to the cost of the 'pre-treatment', this would reduce the size of the CSO. In effect, the payment of the pre-treatment costs could be shared between beneficiaries, and benefits not all go to the recycling customer or the Water Corporation.

In addressing this issue more broadly, the ERA's final recommendation should balance the interests of the service providers and those wishing to purchase the treated waste, giving the 'pre-treatment' provider and the recycling business a financial incentive to participate in the transaction.

Consequently, a pricing mechanism, similar to those employed in third party access regimes may be an appropriate solution. This approach would allocate a share of the costs of the treatment plant (based on proportionality) to the recycling plant operator, and consequently reduce the negative adjustment charge under the retail-minus methodology.

(Department of Treasury and Finance, submission on Draft Report, p1-2)

The Department of Water supported the view that there are no efficiency arguments for recovering joint network costs from recycled water customers.

It is not possible to gain an efficiency benefit by charging a premium on recycled water to recover broader wastewater scheme costs from recycled water customers. A price signal that is inflated to include costs not caused by the potential investor's decision will distort their decision. This approach could artificially limit the uptake of cost-effective recycling innovations and create a bias towards the use of surface and groundwater. (Department of Water, submission on Draft Report, p3)

The Department of Water also submitted that there were no equity grounds for recovering joint costs from recycled water customers to offset costs incurred by customers on the network.

Apart from economic efficiency, the other possible justification for requiring a contribution to broader scheme costs is equity. However, there is no equity improvement that results from requiring recycled water customers to contribute towards the cost of a scheme already established for other customers, in the absence of scarcity.

It could be argued on a 'beneficiary pays' approach which says that a cross-payment to the broader scheme is appropriate because the recycled water customers receive a benefit. However, the department views the 'impactor pays' approach of the ERA's proposed principles as more appropriate because it is aligned with the broader objective of increasing the use of recycled water.

There is no overriding principle to guide the choice between 'beneficiary pays' and 'impactor pays' approaches. Government natural resources charges (such as pollution charges, water resource charges) are often based on an 'impactor pays' approach because this provides signals to encourage positive behaviour. However, the choice between 'impactor pays' and 'beneficiary pays' should be based on achieving the best overall policy outcome, in accordance with the concepts of economic efficiency and equity.

Water recycling has strong popular support in the community and many people would see the use of market power to extract scheme costs that have already been paid for as inequitable. Some people would probably even believe that recycled water users should be subsidised by other users. Furthermore, using 'willingness to pay' (i.e. the maximum that the utility can negotiate) in the absence of competition offers a utility substantial discretionary power and could be considered unfair. There is no reason why extracting broader scheme costs should be considered more equitable than the draft report's pricing principles.

Even if a 'beneficiary pays' approach were adopted, the use of 'willingness to pay' to define the share of 'benefit' that recycled water customers should pay for would be biased against

these customers. The benefit that retail sewerage customers receive from their service and their 'willingness to pay' are likely to be substantially more than their regulated charges. Defining the benefit share of one group of users according to 'willingness to pay' and the other's share according to regulated charges is not an equitable 'beneficiary pays' approach.

There is also unlikely to be any social equity achieved from shifting costs between retail waste water customers and recycled water customers.

Attempting to recover broader scheme costs should not be an objective of pricing practices for wastewater sold from pre-existing treatment plants and wastewater networks. (Department of Water, submission on Draft Report, p3-4)

The Department of Water submitted that:

The recovery of broader scheme costs from customers purchasing treated wastewater from existing treatment plants represents a shifting of costs to these customers. In effect, this can be regarded as a hidden cross-subsidy with no clear policy objective.

(Department of Water, submission on Draft Report, p5)

Another point raised by the Corporation was that disallowing a contribution to joint costs by recycling projects would reduce the incentive for Water Corporation to seek out recycling projects.

The implementation of the proposals in the Draft Report would result in...viable recycling projects not proceeding due to a reduction in the incentive for the Corporation to seek out and promote new reuse opportunities (the Corporation identifies, initiates and develops most reuse opportunities)... (Water Corporation, submission on Draft Report, p1)

Assessment

In summary, the submissions make several points.

- The Water Corporation should be free to elicit a contribution towards joint costs from recycling customers as long as recycling customers are willing to pay.
- The recovery of joint costs from recycling customers reduces the costs to the Corporation's wastewater customers, and reduces subsidies from Government.
- It is fair for the benefits from recycled water to go to households, since households provided the wastewater resource for recycling and should receive a share of the benefits.
- The allocation of some shared costs to recycling customers is justified, since recycling customers benefit from some of the services provided by wastewater treatment plants (e.g. pre-treatment of wastewater).
- Disallowing a contribution to joint costs by recycling projects would reduce the incentive for Water Corporation to seek out recycling projects.
- There are no efficiency or equity grounds for recovering joint costs from recycled water customers to offset costs incurred by retail customers.

In addressing these points, it should first be noted that, if conditions existed such that proponents of recycling projects had access to the wastewater resource on the same basis as the Water Corporation, then the Corporation should be able to set the price of its recycled water as it wishes. This includes the eliciting of a contribution towards joint costs, if recycled water customers are willing to pay this. Alternatively, recycled water customers could bypass the Water Corporation, by applying the pricing principles in negotiating the price for the wastewater resource.

Setting recycling prices consistent with the pricing principles would mean that wastewater customers on the network (or government, through low CSO payments) would benefit from recycling projects in several ways:

- If the downward adjustment for the Water Corporation's avoidable costs is capped at the value of the direct costs to the recycling proponent, so that the charges for the wastewater resource are non-negative, then the Corporation's retail wastewater customers will receive the full benefits of any savings due to improved technical efficiency. In other words, the costs to wastewater customers would be reduced down to the (lower) direct costs of the recycling project.
- Encouraging competition in the provision of recycled water services, by creating a level playing field for all providers, would improve the incentives for the Water Corporation to reduce the costs of its recycled water and wastewater disposal, which would effectively be in competition with private sector recycling projects.
- If there is a scarcity in the wastewater resource, the scarcity premium would go to wastewater customers on the network (households and businesses), or to government through lower CSO payments.

These benefits from recycling projects (from technical efficiency improvements, or from scarcity) can be viewed as contributions towards joint costs.

The case against allocating joint costs to recycled water customers is based on the principle of "user pays", or "impactor pays", as noted in the submission by the Department of Water. Prices should, as far as possible, reflect costs to those that cause the costs to be incurred. If there was no recycling, retail customers would bear all of the costs of wastewater collection, treatment and disposal, since they cause these costs to be incurred. If recycling projects then arise, they do not create any additional network costs in wastewater collection, treatment or disposal. Instead, recycling projects would generally reduce costs on the network, by removing wastewater from the network which would otherwise need to be disposed of. If there are additional direct costs, these would be paid for by the recycling project proponents. If recycled water projects are charged a share of joint costs, not only would these projects be paying more than the costs that they incur, but users on the network would also be paying less than the costs of their sewerage services.

In the case of third party access, in which a third party buys wastewater from retail customers, transports it on the network and recycles it, the access price does cover the joint costs associated with the contestable customers (i.e. C2 and C3 in the example in Box 5, the costs of wastewater collection, transport and treatment). This is because the third party makes use of the network to convey and treat the wastewater on behalf of the retail customers. However, recycling projects which simply replace the method of disposal of wastewater are not examples of third party access and do not impose additional costs on the network.

In the absence of a third party access regime (or pricing principles that simulate such a regime), recycled water customers do not have access to the wastewater resource on the same basis as the Water Corporation. The Water Corporation is able to use the market power that it has, as a vertically integrated monopoly with control over the wastewater in its wastewater treatment plants, to negotiate recycled water prices that in some cases are above the direct costs of the recycling project, and contain a contribution towards costs on the system that have not been caused by the recycling project.

Summary: Joint Costs

The Water Corporation's view is that recycled water customers should contribute to the joint network costs, based on their willingness to pay.

Under the pricing principles, customers on the network would benefit in two ways from recycling projects, both of which may be seen as contributing to joint costs on the network:

- any technical efficiency savings resulting from recycling should be passed through to wastewater customers or the Government through lower CSO payments; and
- where any scarcity revenue is received by the service provider, it should be used to offset either customer tariffs or CSO payments.

However, the Authority considers that recycled water customers should not make any further contributions to the costs of non-contestable activities on the network, as it is retail customers, and not recycled water customers, that are responsible for these costs. Rather, recycled water projects would generally reduce costs on the wastewater network.

4.5.5 Adjusting the Price for Externalities

Externalities are present when the well-being of third parties (those not involved in an economic decision) is impacted by the amount of a good or service that is produced. In the case of recycling, an example of an externality may be an environmental impact associated with the treatment or disposal of wastewater that has not already been factored in to the costs of treating or disposing of the wastewater. In this case, the wastewater customers would not pay the full costs of their wastewater service. The question is whether there are externalities which would warrant an adjustment of recycled water prices.

Submissions

The Water Corporation provided a range of potential externalities, both positive and negative:

There are a number of positive externalities associated with recycled water:

- Avoidance / deferral of need to build a new potable water source such as a dam where potable water prices don't capture the added cost;
- Reduce pressure on natural systems;
- Community preference;
- Reduction in the release of effluent to oceans.

There are also negative externalities:

- Increased public health risk associated with incorrect use and management;
- The application of recycled water can impact the environment, particularly due to nutrients and other contaminants;
- Where carbon costs are not included, recycling can be more energy intensive than other water sources.

(Water Corporation, submission on Issues Paper, p11)

The Water Corporation did not support incorporating externalities into recycled water prices:

The Corporation does not support the regulation of water recycling prices to account for externalities. Negative externalities are normally best managed through specific regulation (e.g. health, environment) and are then directly incorporated into the cost of the project. The Corporation's preference is for positive externalities to be identified and dealt with through specific project subsidies (e.g. CSO payments), but concedes that an alternative is for the cost to be passed on to the entire customer base. It should be noted that specific price regulation for positive externalities would require similar subsidies or cross-subsidies. (Water Corporation, submission on Issues Paper, p3)

The Department of Treasury and Finance also noted that some externalities have already been, or could potentially be, 'internalised' into charges, which means that no additional adjustment to prices is required.

It is noted that positive externalities exist through a reduction in ocean discharge and a lower volume of water being processed at major wastewater treatment plants, where a private provider uses the Water Corporation's wastewater. However, if this benefit is reflected in the cost of wastewater then it is internalised. In contrast, there are negative externalities such as greenhouse gas emissions from pumping and reverse osmosis among other processes. The cost of greenhouse gas emissions is soon to be included in the cost of energy, which could translate into an increase in the cost of recycled water. However, it is difficult to quantify the magnitude of these externalities. With carbon emissions trading, this cost will be explicit. (Department of Treasury and Finance, submission on Issues Paper, p3)

Other submissions were in favour of price regulation to reflect environmental externalities.

Pricing needs to recognise the significant environmental benefits that arise from use of recycled water that avoids discharges into the environment.

(Kwinana Industries Council submission on Issues Paper, p1-2)

It is acknowledged that some positive externalities ... exist from an increase in the use of recycled water and this supports recycled water prices being adjusted to reflect these externalities (i.e. internalise the externality). However, it is difficult to isolate an efficient method of determining the cost impact of some environmental externalities or for other externalities to ensure an appropriate monitoring arrangement to determine whether they are reflected in the price. The ERA is encouraged to further investigate a methodology of quantifying the value of externalities and how they can be included in recycled water pricing.

...

Within the context of regulation for externalities of recycled water, the costs associated with the implementation of health and environmental regulation should also be accounted for within the pricing structure. For example, as mentioned in the issues paper, the Health Department has published a code of practice for reuse of greywater which includes both health and environmental requirements for household greywater recycling.

It is also important to note that a requirement of the NWI is to recover the cost of environmental externalities, although no State has successfully included this in the cost of water. Perhaps in the interim, a proxy could be applied to recover some of the costs of externalities, until a method of quantifying these externalities is developed.

(Department of Treasury and Finance, submission on Issues Paper, p3)

The Department of Water submitted that there were almost certainly positive externalities to the use of recycled water, but that these were difficult to quantify. The Department therefore recommended the setting of a tax at an approximate but conservative level to reflect these externalities.

The Department of Water believes that there are positive externalities associated with the use of recycled water. It is not yet possible to assign a value to these positive externalities,

but they include reduced stress on groundwater and surface water and reduced pollution to waterways and oceans.

The Department of Water notes the complexities associated with quantifying and assigning a value to externalities. However to completely exclude externalities from prices effectively deems their value to be zero. While water use and wastewater discharge are regulated, it would be optimistic to claim that regulation avoids all environmental costs.

An approach that requires less quantification was considered by the Productivity Commission in their work on irrigation externalities:

Determining the optimal rate of a tax for irrigation externalities would be difficult. In Australia there appear to be few studies that would provide policy makers with estimates of the likely marginal costs of externalities to set a tax. An ideal tax (a Pigouvian tax) would need differing rates across different locations and times, to reflect the varying costs of externalities over location and time. Such an approach would be costly to design and implement. Nonetheless, introducing a quasi Pigouvian tax set below the optimum level will likely improve efficiency, with the marginal improvements in efficiency decreasing as the tax rate approaches the optimum level. Thus, one strategy might be to implement such a tax at an approximate, but conservative, level. In the future, as information improves on the likely marginal costs of externalities, the tax rate could be revised.

(Department of Water, submission on Draft Report, p11)

The Department of Water submitted that this approach would encourage the efficient uptake of recycling schemes, until such time as environmental costs are fully captured, such as through the efficient pricing of effluent discharge, the reduction of water allocations to reflect sustainable levels of abstraction, and the inclusion of the costs of water resource management.

However, it is also arguable that including environmental externalities in the price of recycled water would only be a substitute for more effective direct charges on effluent discharge (for example, load-based licensing) or on the use of surface water and groundwater.

The department believes that there are several artificial constraints to the uptake for recycling and efficient water use. These include:

- The price of water does not always reflect true scarcity. Markets are established in some areas of full allocation. Scarcity values greatly increase in areas of over-allocation when mechanisms to reduce allocation to a sustainable level are commenced. The department is in the process of developing the 'pathways' to resolve over-allocation (with Gngangara as a focus) and this may increase the scarcity value considerably.
- Charges for surface water and groundwater are currently negligible. If the cost of regulation to avoid externalities (i.e. water management) was passed on to the users, both the price of scheme water (in schemes where prices are not driven by manufactured sources) and self supply water could increase.

As decreased rainfall begins to impact on water levels and flows, there will be future reductions in allocation limits, and existing licences. Currently this is anticipated to occur in some areas, however, investigation and planning may sometimes lag behind climate change. A risk based approach to planning is being followed to ensure that priority is given to planning of sources.

In this period where water reforms are being implemented, the net externalities of water recycling are almost certainly positive, even if they cannot be readily quantified.

(Department of Water, submission on Draft Report, p11-12)

The Australian Water Association also supported the downward adjustment of recycled water prices to reflect environmental externalities:

The ERA's recommendations should explicitly call for efforts to be directed to the inclusion of externalities in the price of recycled water. The 1994 COAG water reform principles referred to the need to consider externalities in water prices. Subsequent reviews of progress have noted that internalisation of externalities remains largely unaddressed, although it has frequently been noted that quantifying externalities is complex. AWA believes, however, that effort should still be directed to this issue.

...

[I]t is likely that the environmental externalities associated with recycled water will be fewer and of lower magnitude than those associated with water from traditional sources. Thus, at least in this regard, the cost of recycled water should be comparatively cheaper, boosting the attractiveness of recycled supplies to those able to utilise them.

(Australian Water Association, submission on Draft Report, p2)

However, the Department of Agriculture and Food was against the application of a proxy downward adjustment for environmental externalities, preferring the formal quantification of externalities in determining the costs of water services.

The Department of Agriculture and Food does not support the application of a proxy in the interim while an appropriate methodology is designed. Rigorous evaluation should be applied to determine the effect of positive and negative externalities. Compliance with paragraph 65(ii) of the NWI requires full cost recovery of water services including environmental externalities, therefore further analysis into this issue is recommended.

Intervention to internalise externalities may be required to correct recognised market failure. However, this should not be implemented until externalities are analysed and quantified, through an open community and industry engagement process.

(Department of Agriculture and Food, submission on Draft Report, p3)

Assessment

As indicated in submissions, the environmental impacts associated with recycling may be positive, such as a reduction in ocean outfalls and the reduced pressure on natural systems if recycled water displaces groundwater abstraction. For example, a reduction in the discharge of treated wastewater into the ocean could have an overall positive impact on the well-being of recreational users of the ocean, residents surrounding wastewater treatment plants, or other members of society who value the environmental improvement. Environmental impacts may also be negative; for example, if the recycled water is not treated to appropriate standards, or if the carbon emissions associated with recycling are not accounted for and are higher than providing the water in a less energy intensive way.

If it were possible to determine that there was a net environmental benefit from recycling, that is not captured through the costs of meeting environmental standards, then there could be a case for adjusting recycled water prices for this marginal environmental benefit, as suggested by the Department of Water.

However, for many wastewater treatment or recycling schemes, the costs associated with environmental impacts can be directly quantified and will often be internalised either as part of the direct cost of a project, or avoidable costs. If the environmental standards that underpin licences are set in a way that is socially optimal, then the costs of meeting those standards will be part of a project's costs, and there will be no other environmental costs to take into account.

- For example, the costs associated with discharging treated wastewater into the ocean will be internalised through the costs of treatment and wastewater management that are needed in order to produce wastewater of suitable quality for discharge, in accordance with environmental permits. These costs would be

avoided in the event of a recycling project which removed the need to discharge into the ocean, and would therefore be counted as an avoidable cost.

- Another example is any additional project costs required by a recycling project to avoid or mitigate environmental impacts. In setting the prices of recycling schemes, many such costs would therefore be treated as part of the direct costs of the recycling project.

It is difficult to determine the nature of, or to quantify, any true environmental externalities associated with recycling generally. The considerable variation in recycling projects, and in the local environmental impacts of the projects and the wastewater treatment processes that they would replace, makes this even more difficult. Such costs are best identified on a case-by-case basis and estimated as part of the direct or avoidable costs of meeting environmental standards that are set to achieve a socially optimal balance between the benefits of those standards and the costs of meeting them.

A further issue is that of any positive externalities which may arise if recycling alleviates pressure on other water sources. However, the appropriate use of different water sources is best achieved through the correct pricing of alternative sources, based on their sustainable yields, rather than by subsidising recycled water projects.

Summary: Adjusting the Price for Externalities

The Authority considers that any adjustments to the price for wastewater from wastewater treatment plants to reflect environmental costs and benefits should be done on a case-by-case basis, rather than through a general adjustment as part of the pricing principles. Most environmental costs can be internalised as a component of the direct costs or avoidable costs of recycling projects, through the need to meet appropriately set environmental standards. The appropriate use of water from recycling as opposed to other water sources is best determined through the correct pricing of each source option.

4.5.6 Adjusting the Price to Achieve Social Objectives

Another consideration is whether the price for recycled water, set efficiently, should be further adjusted to meet particular social objectives.

Submissions

A number of submissions commented on whether recycled water prices should be adjusted to achieve social objectives. The Department of Treasury and Finance submitted that social objectives are better achieved through mechanisms other than subsidising recycled water prices.

In general, it is recommended that social objectives are best not delivered through water pricing. It is important that voluntary recycled water customers pay the full costs of their water sourcing decisions and the social objective achieved through different means. (Department of Treasury and Finance submission on Issues Paper, p4)

It is considered that there are better, more targeted approaches to achieve social objectives set by Government than using price subsidies. For example a rebate system would achieve the social objective and not distort price signals. Price subsidisation should be avoided, as it does not send appropriate price signals to the subsidised customers, which in turn, promotes inefficiency and can also result in customers undeserving of subsidisation receiving discounts.

(Department of Treasury and Finance, submission on Issues Paper, p5)

The Department of Treasury and Finance also commented that if recycled water were the only water available then the Uniform Tariff Policy could be applied:

The applicability of the UPP to recycled water depends on the chosen use of recycled water. If it is a component of the IWSS or a substitute for potable water then, the same policies applied to other potable water supplies should be applicable. On the other hand, if recycled water is used for non-potable use such as for industry, then the UPP should not apply. (Department of Treasury and Finance, submission on Issues Paper, p4)

The City of Mandurah argued for subsidies to encourage recycling:

Any pricing policy should provide incentives to take up recycled water options that use water effectively and efficiently measured against community benefit. Some suggestions are to use a Reverse Sliding Scale, offer subsidies if you 'sign up' in the next 10 years or subsidies to reflect the community benefit (as opposed to private sector, profit generating usage). Policy should also encourage partnering between all levels of Government that increases the availability of infrastructure, the use of current and future technology and community capacity building. (City of Mandurah, submission on Issues Paper, p4-5)

The City of Mandurah also argued for greater subsidies to go to community projects rather than businesses.

The City submits that the purpose of water usage should be factored into pricing policy and structure (community based outcome vs private business).

Policy considerations should include the distinction between community and business use, purpose of water usage, externality benefits that [Local Government Authorities] provide – with tariffs / pricing to reflect these benefits.

Commercial users may be able to demonstrate an offset with regards to providing a benefit to community by way of investing in / contributing to infrastructure and / or water sensitive urban design...

Provision may be considered for commercial organisations to receive lower tariff if they can demonstrate a contribution to the community. This would involve a reporting function. (e.g. Alcoa may contribute to ongoing irrigation or other costs involved in the installation or continued provision of an active reserve).

(City of Mandurah submission on Issues Paper, p5-6)

Assessment

The submission by the City of Mandurah identified the benefits to local communities from the use of recycled water for purposes such as irrigation of parks, ovals and public open spaces. Further, the City submitted that it can not afford to pay the higher water prices that can be paid by industry, and that some recycled water should be set aside for community purposes.

In response to the issues raised by the City of Mandurah, a key point to note is that if there is no scarcity in the wastewater resource, then the charge for the wastewater would only be the direct incremental costs of accessing the wastewater, net of any avoided costs.

However, if wastewater is a scarce resource, there are several reasons why it should not be provided at subsidised prices for community use.

- First, it is important that all options for water supply or demand reduction are assessed on a level playing field. Setting an artificially low price for access to wastewater would favour this option relative to other approaches (for example,

- grey water recycling, or water sensitive urban design) that may be more cost effective.
- Second, pricing wastewater at less than what it costs to produce would encourage over-use of an artificially “cheap” water source.
 - Further, communities derive a private benefit from the greening of public open spaces and should be prepared to pay an amount up to the value of that private benefit. If the private benefit derived is less than the cost, then a case would need to be made to fund this difference through a CSO. However, as these benefits are largely private, it would be difficult to justify that they should be funded by other tax payers rather than the local government authority.

4.5.7 Conclusion - Pricing Principles

The Authority has recommended a set of principles (provided in the following recommendation box) to guide the pricing of wastewater from wastewater treatment plants. The objective of the principles is to create a level playing field in the provision of recycling services. Recycling customers should be able to either:

- buy recycled water from the owner of a wastewater treatment plant;
- use the pricing principles buy the wastewater resource from wastewater treatment plants; or
- use third party access to buy wastewater from households and businesses, transport it along the network and recycle it.

The pricing principles are therefore consistent with access pricing in general, and would be superseded by the principles under an access regime, if this were to be introduced.

The price of wastewater from wastewater treatment plants should not be adjusted to reflect environmental externalities or to achieve social objectives. Environmental costs and benefits are best internalised in the direct or avoidable costs of individual recycling projects. Recycled water should not be subsidised for community use, since this would distort the use of recycled water relative to other water source or demand management options that may be more cost effective.

The Water Corporation should be free to set the price of its recycled water services as it wishes, as the pricing principles would allow recycled water customers to bypass the Corporation’s recycled water service, and thereby create a more level playing field in the provision of recycled water services.

Recommendation

Principles for Pricing Wastewater from Wastewater Treatment Plants

- 4) Wastewater from wastewater treatment plants should be priced to reflect the prices that would emerge under a competitive market. These prices would have three components:
- **Direct Costs.** A charge associated with the costs of delivering the wastewater to the customer, including any incremental costs that might be incurred in treating the wastewater to be fit for purpose.
 - **(Minus) Avoidable Costs.** A negative adjustment in price to take into account any avoidable costs as a result of selling the wastewater resource. For example, the operating costs of discharging the wastewater to the environment would be part of the avoidable costs.
 - The price of the wastewater resource should be non-negative. Thus, if avoidable costs are greater than direct costs, the price of the wastewater should be zero.
 - **(Plus) Scarcity Premium.** Additionally, if the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium would be added to the price to reflect its relative scarcity. The premium should be determined by a neutral tendering process.

These guiding principles would complement, and may be superseded by, pricing principles that would be established under a third party access regime.

4.6 Implementation of Pricing Principles

The Authority has considered how the principles for pricing wastewater from wastewater treatment plants could be implemented in practice.

- The pricing principles could be set out in the water agencies charges bylaws. This would require water agencies to follow the pricing principles when selling wastewater to customers.³⁶
- As a first step, the Authority recommends that the avoidable costs for contestable wastewater activities (primarily wastewater disposal) in the Perth metropolitan area be determined.

³⁶ The Water Corporation's charges are regulated through bylaws made by the Minister under section 41 of the *Water Agencies (Powers) Act 1987*. The bylaws can also be made to apply to other licensed service providers, by using section 45 of the *Water Services Licensing Act* to extend the application of section 41 of the *Water Agencies (Powers) Act 1987*.

- For other regional systems, the avoidable costs of contestable wastewater services could be determined on a case-by-case basis, when customers seek to make use of the pricing principles.
- Parties entering into agreements based on the pricing principles should have access to an independent dispute resolution mechanism.
- Calculated avoidable costs for the Perth metropolitan area should be subject to regulatory approval. The Authority is best placed to provide regulatory scrutiny and approval for such cost calculations. One possibility would be to set up a standing reference for the Authority to review and approve avoidable costs as needed. In addition, the Authority could review these costs as part of its periodic review of Water Corporation's tariffs.
- For other systems, avoidable costs could be reviewed by the Authority on an as-needed basis (such as in the case of a dispute about the calculation of avoidable costs).
- A neutral tender process for the allocation of wastewater from wastewater treatment plants should be established, including:
 - public information on the current and future availability of wastewater from wastewater treatment plants;
 - a register for potential users of recycled water to express their interest in purchasing the wastewater resource;
 - if the supply of wastewater exceeds demand, an allocation of the rights to the wastewater to those who have expressed their interest, at no cost;
 - if the demand for the wastewater exceeds supply, an allocation of the rights to the wastewater by competitive tender.

The following box presents an example of how the pricing principles could be implemented in practice.

Box 6. Example – Implementation of Pricing Principles

A large industrial customer wishes to use recycled water for its industrial processes. In the absence of a third party access regime, the company could either:

- continue to use scheme water;
- buy recycled water from the owner of the WWTP; or
- use the pricing principles to purchase the wastewater resource from the WWTP owner.

The WWTP owner establishes that the supply of wastewater is less than the demand for it. A public tender process is held for the rights to the wastewater and the wastewater is allocated to successful customers on the basis of their bids.

The large industrial customer takes part in the tender and is successful. The company would pay the owner of the WWTP the net amount of:

- the cost associated with delivering the wastewater resource from the WWTP, including any additional treatment costs incurred by the owner of the WWTP;
- a scarcity premium, determined from the public tender process; and
- a discount based on the avoidable cost of wastewater discharge for the Perth metropolitan area, multiplied by the volume of wastewater that the customer purchases.

The customer would need to have a licence from the Authority for non-potable water supply services, environmental approvals from the Department of Environment and Conservation, and technical approvals from the Health Department with regards to public health and safety standards.

Recommendation

- 5) In implementing the pricing principles for the pricing of wastewater resources from wastewater treatment plants, the Authority recommends that:
 - the pricing principles be introduced into the water agencies charges bylaws;
 - the avoidable costs of contestable wastewater activities be estimated for the Perth metropolitan area, and for other systems on a case-by-case basis;
 - a dispute resolution mechanism be developed;
 - avoidable costs be subject to regulatory approval in the case of the Perth metropolitan area, and as needed for other systems;
 - a neutral tender process be developed for the allocation of wastewater resources from wastewater treatment plants.

5 Recycled Water Pricing for Large Recycling Plants, Third Pipe Schemes and New Developments

This section examines the pricing of recycled water for three specific situations:

- large recycling plants, to industrial customers (specifically, the Kwinana Water Reclamation Plant, or **KWRP**);
- third pipe schemes (with case studies of Brighton Estate and Gracetown); and
- new developments.

The Authority has examined each case to determine what form of price regulation, if any, is required.

5.1 Price of Recycled Water from Large Recycling Plants to Industrial Customers

This section considers whether the price of recycled water from large recycling plants should be regulated, with the primary example being the Kwinana Water Reclamation Plant (KWRP).

In its Draft Report, the Authority assessed whether there were any grounds, on the basis of market power, externality issues or social concerns, for regulating the prices of the KWRP, and concluded that there were not. The Authority's draft recommendation was that the KWRP should be treated as a commercial venture between the Water Corporation and its customers, and as such should not be subject to price regulation.

5.1.1 Submissions

The Water Corporation argued for maintaining pricing flexibility in its commercial negotiations with major customers, including customers of the Kwinana Water Reclamation Plant.

The Corporation has been supplying water from its monopoly infrastructure in country areas to major customers under commercially negotiated arrangements, i.e. non by-law charges, in accordance with its Major Consumers Framework, for almost half a century. This Framework entails guidelines approved by government which has not required independent regulation.

From a public policy criteria, the pricing principles contained in the Framework:

- are clear in its rationale and objectives;
- send efficient price signals which reflect variations in the costs of servicing different locations;
- maintain equity between similarly situated customers;
- ensure fair, cost reflective charges from monopoly infrastructure; and
- are applied consistently to all major customers in country areas.

In a manner similar to the application of the Corporation's framework for negotiating water supply agreements with major consumers, the Corporation is comfortable with an external review of its pricing policy for recycled water and how it is applied.

The Corporation does not support regulation that sets a methodology or directly intervenes in commercial arrangements. Our experience in negotiating with major water customers and for recycling schemes such as the Kwinana Water Reclamation Plant (KWRP) is that the outcome of negotiations for both parties would be compromised if the Corporation was not free to negotiate to the specific circumstances of each customer.

(Water Corporation, submission on Issues Paper, p9)

The Water Corporation supported the Authority's draft recommendation:

The Kwinana Water Reclamation Plant should be treated as a commercial venture between the Water Corporation and industrial customers, without any regulatory oversight of prices. (Water Corporation, submission on Draft Report, p6)

Kwinana Industries Council indicated that the Water Corporation's approach to pricing the Reclamation Plant is of concern.

The applicability of a base charge to gain access to recycle water in the absence of real competition for its use needs to be examined. Such a charge has the potential to adversely influence the development of recycle water use.

(Kwinana Industries Council, submission on Issues Paper, p2)

The Department of Treasury and Finance, however, noted that the higher price of water from the plant reflects the higher water quality and treatment costs of the recycled water produced.

Industry may require higher quality water than that which is available through mainstream water supplies. The high treatment costs of this better quality water should be reflected in the cost of the water to industry. The advantage to industry of purchasing water from the Kwinana Reclamation Plant and the higher costs of this water for example would necessitate a different level of prices for this higher quality water. Flexibility for the Water Corporation to negotiate commercial arrangements for large customers in these circumstances is supported, so long as it is consistent with [recycled water] pricing principles.

(Department of Treasury and Finance, submission on Issues Paper, p7)

Kwinana Industries Council also raised concerns about the Water Corporation's incentive to expand the Reclamation Plant rather than consider other options.

Water Corporation is in a dominant market position to determine the expansion of recycle water use in the Kwinana Industrial Area. They have a vested interest in securing contracts for supplies of Kwinana Water Reclamation Plant water and may use their position to influence the development of other options such as [Managed Aquifer Recharge]. (Kwinana Industries Council submission on Issues Paper, p2)

The Kwinana Industries Council provided an example of the impact of recycling projects on the costs of wastewater disposal.

Pricing should reflect the value to the primary wastewater infrastructure owner of third parties using recycled water as it leads to deferment of major capital expenditure on duplicating or upgrading the infrastructure for wastewater disposal. For example the Kwinana Water Reclamation Plant takes its source water from the SDOOL [Sepia Depression Ocean Outfall Line] and this creates space (additional volume capacity) in the SDOOL for additional sewage connections and defers major cost of duplicating the SDOOL when it reaches capacity.

Pricing needs to recognise the significant environmental benefits that arise from use of recycled water that avoids discharges into the environment. (Kwinana Industries Council, submission on Issues Paper, p1)

5.1.2 Assessment

The main issue in this section is whether the price of recycled water from large recycling plants owned by a vertically integrated service provider, such as the Water Corporation's Kwinana Water Reclamation Plant (KWRP) should be regulated.

In general, price regulation may be considered in situations where there is/are:

- market power by a service provider, which can lead to prices being higher than would be achieved in a competitive market;
- externalities, which are present when the well-being of third parties are impacted by the amount of a good or service that is produced; or
- social objectives, which cannot be achieved through non-price measures (such as welfare payments).

Market Power

Market power generally exists where there are few, if any, substitutes for the good or service that is being produced and where it is not feasible for alternative businesses to enter the market (for example, due to the scale of the investment required).

In relation to whether there are any substitutes for KWRP water, it is clear that the industrial customers have the option of using scheme water.

In relation to whether alternative businesses could enter the market, large recycling plants are assets that could potentially be constructed by the private sector. However, it is important that the pricing principles for wastewater, as well as a State-based access regime, be introduced to provide competitive pressures on the pricing policies of incumbent recycling plant owners. (Third party access is considered further in section 7.7.)

There is no indication from the Authority's analysis that the Water Corporation is receiving a rate of return that is above what is warranted given the riskiness of the investment (the risks are associated with signing up customers who could otherwise use alternative water supplies, such as scheme water). Indeed, analysis by the Authority indicates that Water Corporation will make a lower rate of return on its KWRP investment than it receives on its investments in regulated assets. This analysis assumes that the plant continues to be fully utilised, operating expenditure is constant in real terms, and revenue continues at levels similar to the existing take or pay contracts.

Overall, the Authority has concluded that there is little justification for regulating prices for the KWRP on the grounds of market power.

Externalities

Recycling schemes in coastal areas will generally reduce the amount of treated wastewater that is discharged into the ocean. If this reduction in discharge has a positive impact on the well-being of others, such as recreational users of the ocean, residents surrounding wastewater treatment plants, or members of society who value the

environmental improvement, there may be a case for reducing the price of recycled water to reflect this positive impact.

However, in order to discharge into the Cockburn Sound, industries require a licence from the Department of the Environment, based on environmental standards that are set to ensure that treated wastewater discharged into the Sound causes no harm to the environment. According to the Water Corporation, the KWRP has resulted in one major customer reducing its discharge into Cockburn Sound. Given that the company had approval from the Department of Environment to discharge into Cockburn Sound, there would not appear to be any grounds for subsidising the price of water from KWRP to reflect the reduction in the externality.

Another type of externality from the KWRP is the benefit to Perth households from the reduced risk of higher-level watering restrictions as a result of KWRP reducing the demand for scheme water. However, any new source would provide this benefit to Perth households. It is unlikely that Perth households would be willing to contribute to the cost of the KWRP (as opposed to other options) to receive this benefit. Rather, Perth households would expect the risk of higher-level watering restrictions to be addressed by the Water Corporation in the most cost-effective way.

Overall, the Authority concludes that there are no grounds to regulate prices for large recycling plants on the basis of externalities.

Social Objectives

The Authority invited interested parties to present their views about whether there are any social objectives that are achieved by large recycling plants, such as the KWRP, that justify the payment of a Community Service Obligation payment to the provider of recycled water, and did not receive any comments on this issue.

However, the Authority is aware that the Federal Government has awarded the Water Corporation a \$5 million grant to support the expansion of the KWRP. The media release by the Minister for Climate Change and Water, which announced the receivers of the grants, indicated:

“The National Water Security Plan for Cities and Towns will help communities improve water efficiency and develop new sources of water.

“The plan is designed to help smaller communities make their existing water infrastructure more efficient or find new sources of water supply.

“The Government will also work with local water authorities to minimise the loss of valuable water resources by providing funding for practical projects that save water.”³⁷

The Water Corporation has advised that the \$5 million grant will be used to reduce prices to the KWRP customers.

The Authority does not consider that any social objectives would be met by providing a CSO payment for the KWRP.

³⁷ Senator the Hon Penny Wong, Minister for Climate Change and Water (13 May 2008), *Media Release*.

Recommendations

- 6) The price of water from recycling plants is a commercial matter between the service provider and its recycled water customers.
- 7) The Kwinana Water Reclamation Plant should be treated as a commercial venture between the Water Corporation and its industrial customers, without any regulatory oversight of prices.

5.2 Price of Recycled Water Delivered Through Third Pipe Schemes

The key issue in the pricing of recycled water services through third pipe schemes is that where customers have no alternative water supply, some form of pricing oversight may be required to ensure that prices are cost reflective. For this reason, regulators in New South Wales and Victoria have limited their direct involvement in recycled water regulation to the regulation of developer charges and to setting prices for large third pipe schemes.

In the Draft Report, the Authority's draft recommendation was that, in the case of third pipe schemes, where services are provided by a monopoly provider and customers do not have an alternative supply option, some form of light-handed regulatory oversight may be required to check that the rate of return is not unreasonably high. The Authority's analysis of the Water Corporation's non-potable supply charges to residents of Brighton Estate indicated that the rate of return appeared very high relative to the risks of the project.

5.2.1 Submissions

The Department of Treasury and Finance highlighted the potential for market power when third pipe schemes have been installed.

A particular example where the Water Corporation has monopoly power in recycled water is Brighton residential estate. The Water Corporation is the sole provider of recycled water services to this area, where recycled water is provided to landowners for non-potable use. While landowners choose to live in this area, the use of recycled water as an alternative source is not entirely optional. Other factors may have more weight in the decision to live in this location, including the geographical location and affordability. This gives some pricing power to the Water Corporation (who provides the water services to this area) as landowners have no choice but to utilise the recycled water infrastructure when they purchase land in the area. (Department of Treasury and Finance, submission on Issues Paper, p1)

The Water Corporation disagreed with the Authority's draft recommendation that light-handed regulation should be applied to prices in third pipe schemes.

These recommendations suggest regulation of the rate of return on commercially negotiated contracts that do not arise from any monopoly power. The provision of third pipe schemes is negotiated with developers on a commercial basis. The service provider, whether it is the Corporation or a private company, is a voluntary participant and imposing an additional regulation risk on the project would either result in higher charges or the project not proceeding.

Light handed regulation should be limited to ensuring the utility does not change the terms of the agreement to exploit a monopoly position once the developer is no longer present. An alternative would be for the proponents to seek the ERA's endorsement of the terms of the agreements before they decided whether to proceed with a project. (Water Corporation, submission on Draft Report, p4)

The Department of Water, on the other hand, submitted that more formal regulation of third pipe schemes may be required if recycled water is used for essential services.

The department asks that the final report explain why light-handed regulation may be appropriate for third-pipe schemes, while fuller regulation is required for traditional water and wastewater monopolies. While the Brighton third-pipe scheme is for garden use only, it is conceivable that future third-pipe schemes could be regarded as essential services: for example some schemes in other states are used for toilet flushing. (Department of Water, submission on Draft Report, p7)

5.2.2 Assessment

In assessing the comments made in submissions, the Authority has examined some examples of third pipe schemes and reviewed the issues raised in each case.

Case Study: Gracetown

An example of a third pipe scheme which is being developed in Western Australia is that of Gracetown (see Box 7).

Box 7. Gracetown

Gracetown is a coastal town 15km from Margaret River in the south west of WA. It does not have a licensed water provider, reticulated water or a sewerage system. Local residents rely on rainwater tanks and septic tanks.

LandCorp is planning and funding a new development with 140 residential lots in Gracetown (almost doubling the current town's size), as well as a 50-key tourist accommodation site.

Following expressions of interest, LandCorp nominated United Utilities Australia (UUA) as the preferred water service provider to design, build and operate a reclamation water system that will provide used water (sewage) collection and treatment, and a non-drinking reclaimed water supply to Gracetown. The reclaimed water service will supplement the potable supplies from each dwelling's rainwater tank.

The water supply options were selected on the basis of community consultation and investigations into a range of alternative supply options. Problems with groundwater contamination from septic tanks have meant that these are not a viable option for future sewerage management.

Under the new scheme, used water from homes will be collected and treated to Class A+ standard at a new water reclamation plant. The treated water will be delivered back to the town through a reticulated pipe network for non-drinking use in homes (e.g. laundry, toilets, and gardens) and for fire fighting. It is anticipated that during winter months surplus reclaimed water will be used for aquifer recharge and flushing. Drinking water will continue to be self-supply through the use of rainwater tanks. Water efficient appliances and a 45,000 litre tank will be required for each new household constructed.

The new scheme will apply to both new homes and existing homes. While all new homes will be designed and fitted for both services, existing homes would need to be retrofitted. Connection of existing homes to the new scheme will be on a voluntary basis.

The costs of the scheme are being developed but it is anticipated that the rates will be comparable to those of similar locations. As the services would be provided by a private service provider, there is currently no CSO funding available to subsidise costs to customers.

Source: LandCorp

In the case of Gracetown, households in the new development will not have a choice of service provider, although existing households would have the option of continuing with their current sewerage and water supply systems (i.e. septic tanks and rainwater tanks). Regulatory oversight of prices for connected households would appear warranted.

Case Study: Brighton Estate

In the case of Brighton Estate, the Water Corporation provides drinking water for use inside homes and non-drinking water, sourced from groundwater bores, through a separate pipe system for use on gardens.

- Residents of the estate pay an annual service charge for the non-potable water, regardless of whether or not they are connected to the non-potable system (currently \$65.15 for lots smaller than 400m² and \$130.30 for lots larger than 400m²). This charge is in addition to the annual service charge for potable supply (\$180.50).
- Customers are only metered for their potable water usage and pay the standard metropolitan usage charges. There are no usage charges on the non-potable water.

The Authority agrees with the Department of Treasury and Finance that the use of the third pipe scheme in Brighton is not entirely optional, particularly given that Brighton Estate residents cannot disconnect from the scheme or switch to scheme water for outdoor use. Also, unlike major industrial customers, new customers who buy existing homes in the estate are unable to negotiate the terms and conditions of their recycled water supply.

The Authority reviewed the Water Corporation's charges for Brighton Estate and established that the Water Corporation would be generating a rate of return of 28 per cent (real pre-tax) on their project.³⁸ The Authority considers that this rate of return is very high for the risks associated with the project.

The reason for the high rate of return is that the Water Corporation has required customers to pay for the tax implications of the transaction that was entered into with the developer. The developer gifted the assets to the Water Corporation and the Water Corporation was then obliged to treat the gifted assets as revenue and pay tax on the revenue.

The Water Corporation submitted that it should be able to recover from customers the tax costs of transactions with developers:

Companies are motivated to achieve after tax returns and any assessment of these agreements should be on an after tax basis. Presenting before tax returns for individual projects involving developer contributions can grossly distort the actual returns achieved...Regulating prices and returns on a before tax basis would mean that some viable projects would not be undertaken, either by the Corporation or by private companies.

As an example, the Corporation's charges for Brighton Estate are as low as possible to recover costs, including our minimum after tax return target. These prices were negotiated to facilitate a demonstration project that both parties wanted to proceed. To suggest that the rate of return appears very high is a reflection of the distortion created by focussing on

³⁸ It appears that the Water Corporation had incorrectly required customers to pay for the tax implications of the transaction that was entered into with the developer.

before tax returns. Any lower price would mean that the project could not proceed. (Water Corporation, submission on Draft Report, p4)

The Water Corporation indicates that the Authority is mistaken in undertaking the financial analysis on a pre-tax rather than post-tax basis. However, as shown in Box 8, pre-tax and post-tax financial modelling in fact produces very similar tariffs.

Box 8. Pre-Tax Versus Post-Tax Regulation of Returns

Regulators generally calculate the revenue requirement for a natural monopoly service provider by adding up the cost components associated with providing the regulated service. Some regulators, such as the Authority, adopt a pre-tax approach, while others adopt a post-tax approach.

Under a pre-tax approach, the relevant costs are:

- the pre-tax return on assets, based on a pre-tax rate of return;
- depreciation; and
- operating costs.

Under a post-tax approach, the relevant costs are:

- the post-tax return on assets, based on a post-tax rate of return;
- depreciation;
- operating costs;
- tax; and
- the value of imputation credits.

The rate of return under either approach is generally calculated by making use of a Weighted Average Cost of Capital (WACC) formula. The WACC is a weighted average of the return on equity and the return on debt.

Under the pre-tax approach, the rate of return is calculated by grossing-up the post-tax return on equity to a pre-tax return on equity (because the market information upon which the calculation is made is in the post-tax form). This adjustment requires assumptions about the tax rate and the value of imputation credits (generally it is assumed that the tax rate is the statutory tax rate).

Under the post-tax approach, the rate of return is lower because it excludes the tax and value of imputation credits. However, these costs are explicitly added as separate cost components. This approach provides for a more accurate estimation of tax but is more complicated.

Overall, both the pre-tax and post-tax approaches account for the same cost components (albeit in different ways) and in general therefore result in similar revenue requirements for the service provider.

In the particular case of Brighton Estate, the Water Corporation may make a financial loss on the project if it is not able to recoup the tax associated with the gifted assets. However, the following issues need to be recognised:

- When the property developer gifted the assets to the Water Corporation, it would have received a tax benefit from doing so. If the market for developments were competitive, the amount that the developer would have recovered from purchasers of the developed land would have been the cost of the investment less the tax benefit.

- When the Water Corporation received the gifted assets, it was required to make an upfront tax payment (due to the gifted asset having to be treated as revenue) which is then consequently recovered in depreciation over the life of the asset. However, there is an overall tax cost to the Water Corporation in present value terms.

If it were not for the tax implications, customers would pay the cost of the investment to the developer and pay the operating costs to the Water Corporation. With the tax implications, customers would pay the cost of the investment less the tax benefit to the developer and pay the operating costs plus the tax cost to Water Corporation.

However, if the market for developments is not competitive, the developer may choose to not pass through the tax benefit it receives to customers. In that situation, if the Water Corporation were to pass on the tax costs of the transaction to its customers, customers could end up paying more than is appropriate.

An alternative approach would be to not pass on to customers the tax costs of any transactions involving gifted assets but instead leave the Water Corporation to negotiate with the developer to recover its tax costs. It is understood that this is the arrangement the Water Corporation uses with major customers who provide gifted assets.

The Authority prefers a process where the rate of return of a project is assessed on the basis of the capital and operating costs incurred by the service provider and no allowance is provided for the recovery of the tax implications of a transaction involving gifted assets.

On the issue of charging residents who are not connected to the non-potable supply system the annual service charge for non-potable supply, it is difficult to see how this can be justified. If the non-potable supply network were provided by a third party, the third party would not be able to charge residents who are not connected. For example, existing households in Gracetown who choose not to connect to the proposed recycling scheme would not be charged for the service.³⁹

The Water Corporation maintains that residents of an estate with a third pipe system who are not connected to the non-potable scheme should be charged:

Making participation in a third-pipe scheme (and payment of charges) optional would result in the need for a higher return on investment to compensate for the additional risk, increasing the overall revenue requirement. As a result, charges for customers using the service would have to be more than proportionally higher than simply paying for the costs of the non-participants and project viability would be harder to achieve. (Water Corporation, submission on Draft Report, p5)

The Authority's view, however, is that this is a commercial project, not a social project, and that the risks associated with the project should be reflected in its rate of return.

Pricing oversight of the Water Corporation's charges for the Brighton Estate third pipe scheme would also be warranted and could be included as part of the periodic review by the Authority of the Water Corporation's tariffs.

³⁹ However, projects where customers can choose whether or not to connect to a service would require higher rates of return to reflect the higher level of risk.

Case Study: Rouse Hill

The Independent Pricing and Regulatory Tribunal (**IPART**) sets the recycled water price for the third pipe scheme at Rouse Hill in Sydney. Sydney Water provides 1.8 GL per annum of recycled water to over 17,000 customers in Rouse Hill. IPART determines the prices for the Rouse Hill because it is a mandated scheme (customers have no choice as to whether or not they connect to the recycling scheme), and there is sufficient information to allow IPART to set prices.⁴⁰

The Water Corporation submitted that it is not in favour of applying the particular approach adopted by IPART in the case of the Rouse Hill Development in Sydney:

Very large schemes in the Eastern States have adopted a pricing approach of taking a percentage of the by-law potable water price, with any shortfall in costs being met by the utilities general customer base, e.g. IPART determined price of recycled water for the Rouse Hill Development Area to be 80% of potable water price. The Corporation does not support this approach, and it should only ever be considered by Government on a project basis, not as a general pricing principle. (Water Corporation, submission on Issues Paper, p2)

The recycled water price for Rouse Hill is set to fully recover the costs of the scheme, based on forecasts of recycled water sales, operating costs and capital expenditure related to the scheme. IPART's decision in 2006 to set the recycled water usage charges at 80 per cent of the potable water price represented a significant increase in recycled water prices, which had been set low to encourage the use of recycled water and did not fully recover the costs of providing recycled water service.⁴¹ IPART's 2008 pricing determination for Rouse Hill, which upholds its 2006 approach, states that:⁴²

The key reason for setting prices at this level [i.e. 80 per cent of the potable water price] was that during peak usage periods, recycled water supplies cannot always meet demand and have to be topped up with potable water. In the past, around 20 per cent of total recycled water demand has been met by potable water.

The pricing decision for Rouse Hill reflects IPART's pricing guidelines for mandated recycled water schemes, which state that the maximum price that can be charged for recycled water is the potable water price, unless higher recycled water prices can be justified by the water agency.⁴³ For schemes where the demand for recycled water exceeds supply by more than 10 per cent, recycled water is set at a proportion of the potable water price. IPART's concern was that, if recycled water prices are too low relative to potable water prices, this could encourage over-use of recycled water, resulting in a need to supplement with potable supplies. An associated risk is that high (relative) prices for potable water could cause customers to use non-potable water inappropriately (e.g. to top up swimming pools), with potential health implications.

The Authority agrees with the Water Corporation that the prices for recycled water schemes in general should not be linked to potable water prices. Each scheme will have different issues specific to that scheme, and these need to be considered on a case-by-

⁴⁰ For mandated schemes in which there is insufficient information for IPART to set prices, IPART has established pricing guidelines to assist water agencies to calculate prices. Voluntary recycling schemes (where customers can choose to connect) are not regulated.

⁴¹ IPART (September 2006), *Pricing Arrangements for Recycled Water and Sewer Mining: Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council. Determinations and Report.*

⁴² IPART (June 2008), *Review of Prices for Sydney Water Corporation's Water, Sewerage, Stormwater and Other Services: Determination and Final Report*, p118.

⁴³ IPART (September 2006), *op.cit.*, p58.

case basis. If there are health risks (for example, such as those associated with people switching between potable and non-potable supplies), these are best dealt with through infrastructure design, customer information and health regulations, rather than through the pricing of recycled water.

Summary: Third Pipe Schemes

In situations where customers do not have an alternative supply option, light-handed regulatory oversight of prices is required to ensure that the rate of return is not unreasonably high. Conversely, third pipe recycling projects which are not a monopoly service would not require regulatory oversight.

Recommendations

- 8) In the case of third pipe schemes, where services are provided by a monopoly provider and customers do not have an alternative supply option, some light-handed regulatory oversight is required to check that the rate of return is not unreasonably high.
- 9) Analysis of the Water Corporation's non-potable supply charges to residents of Brighton Estate indicates that the rate of return appears very high relative to the risks of the project.

5.3 Price of Recycled Water in Developer Charges

Service providers may be able to use market power in the case of new developments that are designed to be water sensitive through their use of recycling schemes (for example, third pipe systems). The market power could theoretically be represented in a service provider not providing a discount to developers even though the recycling scheme lowers the cost of the water infrastructure required to service the development.

Other jurisdictions, such as in Victoria and New South Wales, have developer charges that are regulated in a way that provides for discounts where recycled water systems are installed in new developments.

The Authority has recently undertaken an inquiry into the Water Corporation's developer charges, and considered the issue of discounts off developer charges for water sensitive urban design (**WSUD**). This report has been tabled in Parliament and is available on the Authority's web site. WSUD covers a wide range of practices, for example, maximising localised retention and re-use of stormwater, re-use of treated effluent, minimising wastewater generation, and collection, treatment and/or re-use of run-off. The Authority concluded that, where WSUD principles result in permanent savings to the Water Corporation in distribution costs for new developments, these savings should be reflected in the developer charges to those new developments.

6 Cost-Reflective Water Prices for Major Industry

6.1 Terms of Reference

The Terms of Reference require the Authority to:

consider and develop findings on the pricing recommendations of the State Water Recycling Strategy, including the appropriateness of faster adoption of cost-reflective prices for major industry.

6.2 Background

By “faster adoption of cost-reflective prices for major industry”, the Terms of Reference is referring to the current Government policy of transitioning metropolitan commercial water usage charges to charges based on long run marginal cost by 2013/14.

Currently, the metropolitan commercial usage charge has three tiers:

- Usage from 1 to 600 kL is charged at \$0.983 per kilolitre (kL).
- Usage from 601 to 1,100,000 kL is charged at \$1.043 per kL.
- Usage above 1,100,000 kL is charged at \$1.028 per kL.

Under current government policy, these three usage charges are to gradually converge to a single usage charge of \$1.714 per kL (in real dollar values of 2009) by 2013/14. (The Authority is currently reviewing these charges as part of its inquiry into the Water Corporation’s tariffs.) In addition to water usage charges, there are also fixed charges which are required to ensure total cost recovery. Any relative increase in the usage charge would be offset by a decrease in the fixed charge for a given levels of costs.

The only pricing recommendation in the State Water Recycling Strategy was:

A review of Water Corporation charges for extending water infrastructure to new urban areas will be undertaken, with consideration given to reflecting the contribution of alternative water supplies.

Government will also investigate the establishment through the Economic Regulation Authority of an industrial tariff to promote the efficient use of water and the use of recycled water by industry.

The first recommendation was addressed by the inquiry into the Water Corporation’s developer charges (see section 5.3).

On the basis of the Terms of Reference and the recommendation of the State Water Recycling Strategy, the issue for this inquiry is whether major industry should be treated in a different way to other metropolitan commercial customers, by either:

- creating a separate tariff for major industry that has a faster transition to long run marginal cost; or

- having a faster transition in the existing tier 2 and tier 3 usage charges (tier 3 does not represent major industry as only two customers currently pay the tier 3 charge); or
- changing the thresholds for metropolitan commercial usage charges to better reflect the split between major industrial customers and other commercial customers, and having a faster transition for industrial customers.

In the event that industrial (or all commercial) customers are transitioned more quickly to water usage charges that are set in relation to long run marginal cost, the competitiveness of recycled water from projects such as the Kwinana Water Reclamation Plant is increased.

Usage charges for commercial customers are also currently under review by the Authority as part of the Inquiry on the Tariffs of the Water Corporation, Aqwest and Busselton Water. Information on this inquiry is available on the Authority's web site.

In the Draft Report, the Authority's recommendation was that all metropolitan commercial customers and industrial customers should be treated equally, with a transition to cost-reflective charges by 2010 rather than by 2014.

6.3 Submissions

The Water Corporation, in response to the Draft Report, supported the Authority's recommendation that all metropolitan commercial customers be transitioned to cost-reflective prices by 2010 (see Water Corporation's submission on the Draft Report, p6).

The Department of Water supported a faster transition to cost reflective prices more generally, and noted that under-pricing potable water could make some potentially viable recycling schemes unviable:

The Department of Water supports consideration of this issue, but notes that faster phase-in of cost reflective prices more generally may also be worthy of examination in the context of its possible impact on recycled water pricing.

(Department of Water, submission on Issues Paper, p8)

The department notes that until the long run marginal costs of scheme water are implemented, cost-effective wastewater recycling initiatives may not be considered financially viable due to competition with under-priced scheme water.

(Department of Water, submission on Draft Report, p3)

Similarly, the Department of Treasury and Finance did not support distinguishing between major industry and other commercial customers:

Major industry should not be treated differently to other commercial customers, and a full cost pricing system should be applied to all transactions. However, in practice major industry may have more countervailing market power and the capacity to develop water sources themselves. This may not warrant the same regulation and monitoring of water charges as other commercial customers. (Department of Treasury and Finance, submission on Issues Paper, p6)

However, the Chamber of Commerce and Industry, while also recommending the equal treatment of all water users, supported a transition for all customers by 2014, with no acceleration for industrial or commercial customers.

CCI does not agree to the singling out of heavy industry for accelerated transition, despite the political attractiveness of this. CCI believes that if pricing reform can be accelerated for heavy industry, it can also be hastened for all potentially all water users.

CCI understands that the issues paper into the pricing of recycled water indicates an intention to move to full-cost recovery, using a single tariff based on long run marginal cost by the year 2013/14. CCI supports this and recommends that it should ensure efficient use of the resource and encourage the introduction of additional recycling schemes. CCI recommends that the full environmental cost should be included in the calculation of long run marginal cost, as current potable water prices are too low to encourage increased recycling.

(Chamber of Commerce and Industry WA, submission on Issues Paper, p3)

6.4 Assessment

There are a number of reasons to support a faster transition (as soon as possible) to cost-reflective water usage charges for all metropolitan commercial and industrial customers.

- Efficient prices, which signal to buyers and sellers the costs of producing goods and services, maximise welfare by directing resources towards their highest value use. Any delay in the move to cost-reflective usage charges therefore involves a cost, in the sense that welfare is not being maximised.
- The delay in transition towards cost-reflective water usage charges (to 2014) is primarily to address social issues, such as the impact of large price increases on tenants and low income households. However, there are no such social considerations in the case of commercial or industrial customers.
- A faster transition towards cost-reflective usage charges by commercial and industrial customers would encourage the development of recycled water projects that would be economically viable in a regime of cost-reflective commercial and industrial tariffs.

While the Authority supports the faster transition of commercial customers in principle, usage charges to industrial and commercial customers will be considered in detail as part of the inquiry into the tariffs of the Water Corporation, Aqwest and Busselton Water. This will include specific analysis of the Water Corporation's proposal in that inquiry to have cost reflective usage charges of up to \$2 per kL.

Recommendation

- 10) All industrial customers and metropolitan commercial customers should be transitioned to cost-reflective usage charges as soon as possible (rather than by 2014). (The Authority is considering the issue of usage charges for commercial customers in its inquiry into the tariffs of the Water Corporation, Aqwest and Busselton Water.)

7 Other Factors Relevant to the Adoption of Water Recycling and Other Alternative Water Supplies

7.1 Terms of Reference

The Terms of Reference require the Authority to:

consider and develop findings on other factors that the Authority considers relevant to the adoption of recycled water and other alternative water supplies.

7.2 Background

The State Water Recycling Strategy highlighted a wide range of factors that are important to the adoption of water recycling and other alternative supplies.

The factors that the Authority investigated as part of this inquiry included:

- the appropriateness and effectiveness of the current recycling target;
- the role of rebates;
- the appropriateness of reserving water from wastewater treatment plants for specific purposes;
- the appropriateness of standards or regulations that mandate the installation of recycling systems; and
- the regulatory arrangements for third party access to wastewater and stormwater (which was considered in detail as part of the Inquiry into Competition in the Water and Wastewater Services Sector).

7.3 Recycling Targets

The State Water Recycling Strategy includes the target of 30 per cent water recycling by 2030. The target appears to be motivated by the premise that recycled water can be cost effective when compared to traditional water sources and that there needs to be a more intensive 'push' for recycling opportunities.

One of the major initiatives that will contribute to the 30 per cent recycling target is the expansion of the Kwinana Water Reclamation Plant, which will increase the rate of water recycling to 17.3 per cent. The other major initiative is the Gnangara Groundwater Replenishment Trial. By 2030, an additional 50 GL of recycled water will be required to meet the target.

Many regional centres already exceed the 30 per cent recycling target. Across regional WA, more than 40 per cent of wastewater is recycled, with recycling rates in some schemes higher than this.

7.3.1 Submissions

Submissions to the Authority showed general support for the role of recycling targets in the adoption of recycled water in Western Australia, and the level of 30 per cent wastewater recycling by 2030 set by the State Water Plan.

Water Corporation

The Corporation supports...the State Government's target to recycle 30% of wastewater by 2030. The target provides a focus for innovation, supports fit-for-purpose water use, assists in the timely development of supporting regulation and builds technical capacity. (Water Corporation, submission on Issues Paper, p4)

....

The policy to set the target to recycle 30% of wastewater was developed through an extensive, state wide consultation process during the development of the State Water Plan (not Recycling Strategy as per Issues Paper). The target was endorsed by Government and announced by the Minister for Water Resources in May 2007.

The Corporation notes the extensive community consultation process undertaken to develop the plan and the Government's authority to set water policy objectives. (Water Corporation, submission on Issues Paper, p18)

Department of Water

Clear and achievable targets are an effective way of focusing effort on performance improvement. The Department of Water believes that the State water recycling strategy target to recycle 30 per cent of wastewater by 2030 is achievable. (Department of Water, submission on Issues Paper, p10)

The Water Corporation submitted that recycling targets have not led to inefficient investment in recycled water.

Water Corporation

The target is aspirational and no penalties are associated with any failure to meet it. It has not resulted in the inefficient investment in recycled water in Western Australia. (Water Corporation, submission on Issues Paper, p18)

Other submissions focussed on how to ensure that the targets can best be achieved.

Water Corporation

[Re-use] targets should be achieved in the most efficient manner available. Ideally, any short-fall between revenue and costs in meeting reuse targets should be met by an explicit CSO payment. Alternatively, the cost could be met by the Corporation's general customer base as a "cost of doing business". This cost should be explicitly recognised and endorsed by Government so that it is recognised by the ERA in their price recommendations. (Water Corporation, submission on Issues Paper, p6)

City of Mandurah

State targets need to be broken down into more meaningful and specific targets for regions. (e.g. Peel Region to use 30 per cent recycled water by 2020). Regional targets would be more relevant and will ensure that communities (business and government) work together. Targets need to be continually reviewed to ensure continued take up of recycled water even if state targets are achieved.

The City of Mandurah may look to develop its own targets and implementation plan to achieve these. Recognition via funding and rebates should be provided to companies that develop their own Water Recycling Strategy, acknowledging that each area is location specific with regards to appropriate methods of reuse. (City of Mandurah submission on Issues Paper, p6)

Kwinana Industries Council

Positive economic incentives such as water charge rebates should be considered to help achieve the State Government's target of 30% reuse by 2030. (Kwinana Industries Council, submission on Issues Paper, p2)

Several submissions noted that it was important to consider the cost of recycling relative to other water supply options, and that recycling targets could in some circumstances promote inefficient recycling projects.

Department of Treasury and Finance

[T]he use of recycling targets is only useful if economically efficient recycled water projects are put in place to reach these targets.

The use of recycling targets is supported, but these targets should be flexible. It is imperative that the cost of recycling is competitive to avoid the introduction of recycling projects, which meet recycling targets, but cost more than other means of supplying water.

(Department of Treasury and Finance submission on Issues Paper, p6)

While it is recognised that mandatory recycling targets will provide an incentive for service providers to invest in recycling infrastructure, it is important to acknowledge the potential for such government intervention to result in a misallocation of resources.

Firstly, it is agreed that in the absence of a competitive market for the provision of the service, and furthermore the downside risk on demand that new suppliers may face, recycling targets will encourage investment by artificially stimulating demand. Furthermore, it is agreed that "targets need to be complemented by policy settings that support the most cost effective water supply options".

However, wastewater recycling will already take place if its costs are competitive and it is priced competitively, with or without the imposition of mandatory targets. Furthermore, the ERA has not presented evidence that a significant market failure presently exists which would need to be 'corrected' via the introduction of mandatory recycling targets.

Wastewater recycling will take place if and when it is efficient to do so. Consequently (in the absence of market failure), the only difference mandatory targets will make is to sanction inefficient investment.

(Department of Treasury and Finance, submission on Draft Report, p3-4)

Water Corporation

It is acknowledged that there are some circumstances where the target makes no sense. For example, in the East Kimberley where significant water resources can be developed at a far lower cost with less environment impact. (Water Corporation, submission on Issues Paper, p18)

The City of Mandurah note that there is insufficient funding for meeting targets, and that approvals processes make it difficult to implement recycled water projects:

[I]n practical terms we believe there is a lack of 'on ground' support to implement recycling schemes highlighted in the following areas:

Lack of Funding for initiatives

The City recommends the State Government commits a high level of funding to support Local Government, business and industry to contribute to achieving the targets set by the State Water Plan 2007, in particular the State Water Recycling Strategy. We also urge the Federal government to recommit funds to the Australian Community Water Grants program.

Barriers to Approval Processes

City officers have found that the approval processes and number of government departments involved in the approvals to use recycled waste water is prohibitive with regards to time, process, approval requirements, strategic alignment and inter / intradepartmental inconsistencies.

Very little assistance is provided to guide [Local Government Authorities] to assist with or expedite processes.

(City of Mandurah, submission on Issues Paper, p3-4)

7.3.2 Assessment

Recycling targets can be an effective means of encouraging water service providers to actively seek out cost effective recycling options and alternative water sources. This can be especially important in the absence of a competitive market in the provision of recycled water.

However, setting targets for recycling involves some risk that such policies may artificially encourage projects that are not the most efficient options to balance supply and demand (and, conversely, discourage some that are). It would generally be inefficient to develop recycling options that have a per kL cost that is higher than traditional sources, unless they were able to provide high degrees of flexibility, avoid investment in options for which utilisation would be uncertain, and/or provide external benefits to third parties.

Responding to the concerns raised by the Department of Treasury and Finance, it is important that any recycling targets be aspirational only, and not mandatory. Voluntary recycling targets can encourage innovation and the exploration of other options, without distorting investment decisions.

Targets need to be complemented by policy settings that support the most cost effective water supply options, including recycling options. This would require:

- the efficient pricing of water and wastewater services, so that recycling and other options can compete on a level playing field;
- a competitive environment in the provision of bulk water supplies, to encourage innovation and participation by third parties. (For more information on how to develop a more competitive market, see the Authority's final report for the Inquiry into Competition in the Water and Wastewater Services Sector.); and
- potentially, third party access to infrastructure, to facilitate the recycling of wastewater by third parties where they can do so more cost-effectively than the infrastructure owner.

Finding

- 11) In the absence of a competitive market in the provision of recycled water projects, voluntary recycling targets can provide an incentive for service providers to seek out and invest in cost effective recycling options. However, there is a risk that recycling targets could artificially encourage projects that are not the most efficient options to balance supply and demand (or discourage others that are).

7.4 Rebates

The Authority has considered the appropriateness of rebates as an instrument to encourage the cost effective adoption of recycling and other sources.

The only rebate that is currently available for water recycling is the rebate for greywater reuse systems. This rebate provides up to \$500 or 50 per cent of the purchase/installation cost (whichever is the lesser amount) for an approved system.

In addition, rebates are available for other alternative water supplies, such as:

- Domestic rainwater tanks – tanks with a capacity greater than 600 litres that are not plumbed-in are eligible for a rebate of \$50. Tanks with a capacity greater than 2,000 litres are eligible for a rebate of up to \$600 or 50 per cent of the purchase and plumbing in cost (whichever is the lesser amount), if they are plumbed-in by a licensed plumber for use in a toilet and/or washing machine when installed.
- Garden bores – for sites that are eligible, a rebate of \$300, or 50 per cent of the installation cost for a new bore (whichever is the lesser amount), is available per residential property.

Rebates are also available for other demand management measures, such as for washing machines, irrigation systems, rain sensors, swimming pool covers and flow regulators. Appendix 2 (Table A2.2) presents a list of the different types of rebates.

The effectiveness of rebates depends on the cost per kL of the resource cost of the water source (inclusive of the rebate) in comparison to the resource cost of scheme water.

7.4.1 Submissions

The Water Corporation noted that the examination in this inquiry of rebates not related to the recycling of water may be outside the scope of the Terms of Reference:

None of the rebates in question relate to recycled water (as they do not involve the further treatment of water). They are perhaps out of the scope of this inquiry. (Water Corporation, submission on Issues Paper, p18)

However, the Terms of Reference require the Authority to also consider other factors relevant to “alternative water supplies”, so the issue of rebates is relevant in this context.

The Water Corporation is strongly supportive of the rebates program, which it maintains has cost effectively helped to achieve considerable reductions in scheme water use:

The rebate program was established by the State Government in 2003 further to the State Water Symposium and Strategy. Rebates have assisted in reduced reliance on scheme water by the community who have adjusted to reduced watering regimes.

There has been a reduction in residential consumption of about 20% since 2001 in Perth, without the need for severe water restrictions. Overall savings of 50 GL pa have been achieved that represents the avoided cost of more new sources such as desalination plants. The Corporation has undertaken costing on all of the rebates that show the cost to be less than \$1 a kilolitre for all rebates. Demand management represents a very low cost demand / supply alternative. (Water Corporation, submission on Issues Paper, p18)

....

The Corporation supports...the use of rebates as part of broader water policy that positively influences changes in behaviour and ultimately encourages more efficient water use. (Water Corporation, submission on Issues Paper, p4)

The Department of Treasury and Finance submitted that the cost effectiveness of rebates, on a per kL basis, should be examined by the Authority.

The use of rebates to compensate consumers for the higher cost of recycled water is not encouraged as this discourages the recycled water industry from lowering costs. The ERA is encouraged to assess the economic efficiency and cost effectiveness of a rebate scheme to promote the use of recycled water. Any such investigation to manage demand in this way must include the calculation of cost per kilolitre of water and the avoided cost of water saving technology potentially delaying future water sources. A rebate scheme should only be proposed if the cost per kilolitre of recycled water is comparable with the benchmark LRMC. (Department of Treasury and Finance, submission on Issues Paper, p7)

The Department of Water supported the use of rebates and mandatory standards, if cost-effective, particularly where potable water prices did not fully reflect costs, such as environmental costs.

The Department of Water believes that rebates and minimum standards have an important role in improving management of water resources.

Encouraging the adoption of water efficient technologies is a key part of the urban water management approach of governments and water utilities across Australia. Rebates and mandatory standards can assist this process, and they underpin the voluntary efforts that many customers have made to conserve water. In turn, increased uptake of water efficient technology drives further innovation.

Cost-effectiveness is an important consideration in rebates and standards, as there may be cheaper, alternative ways of taking less water from the environment and providing water security, for example, desalination or recycling.

An essential component of ensuring the efficient uptake of water saving technology is to ensure that all domestic customers face water prices that accurately reflect the value of water, including environmental costs. Where some customers are insulated from these price signals, the case for rebates and standards is strengthened. A rebate of the correct value would result in net avoided costs for the utility or the government.

...

The Department of Water supports the development of a robust methodology for calculating the value of rebates and standards to water utilities and to the government.

(Department of Water, submission on Draft Report, p8)

The City of Mandurah and the Chamber of Commerce and Industry WA both submitted that a priority is the introduction of pricing structures that fully reflect costs, with rebates following from this.

City of Mandurah

The first priority should be to introduce sustainable pricing that reflects identified outcomes and benefits.

The pricing structures (and the statutory process for permits) need to ensure the use of recycled water is a realistic option. To this end rebates should be secondary and...an option to businesses for contributing to a community benefit. (City of Mandurah submission on Issues Paper, p6-7)

Chamber of Commerce and Industry WA

CCI believes that rebates could be used to overcome public perception issues surrounding the use of recycled water and to encourage greater recycling activity. This however should only take place after pricing reform. (Chamber of Commerce and Industry WA submission on Issues Paper, p3)

7.4.2 Assessment

Any examination of the cost-effectiveness of rebates should take into account all of the costs associated with water saving technologies; i.e. the total cost per kilolitre of water saved, including the cost of the rebates and their administration, plus the costs to the customer of installing and operating the new technologies.

It should also be recognised that not all rebate products purchased will be bought because of the rebates. The number of purchases that can be attributed to the presence of a rebate will depend on how sensitive customers are to the price of the product (with and without the rebate).⁴⁴ It is important, therefore, in assessing the rebate policy, that the water savings achieved by the rebate program only be attributed to those purchases that are specifically due to the rebates.

Analysis provided to the Authority by the Department of Treasury and Finance indicates that there are very few rebate products that are cost effective when compared with the cost of securing new potable water supplies. The Department's analysis has been reviewed by the Authority and its consultants, Economic Research Associates, and some of the assumptions amended to reflect recent findings on water efficiency savings. The assumptions and results of the analysis are presented in Appendix 2.

A key assumption is the estimated water savings for each product, which are highly dependent on how the products are used. Maximum savings would be achieved if a product is used in accordance with the manufacturer's guidelines and garden watering guidelines. However, user behaviour will have a considerable impact on the water savings actually achieved, so that the cost effectiveness of rebate products will vary between users. For example, rain sensors can be ineffective in reducing potable water demand if they are not coupled with effective sprinkler control systems.

For most products, therefore, average water savings will be lower than manufacturers' estimates, and for some products, average water consumption may even increase. For example, the Authority's consultants indicate that the Water Corporation has conducted a recent study of actual water use by households in Perth, which suggests that:

- sub-surface irrigation increases water use on average, as users tend to run their systems more frequently and for longer periods than above-ground watering systems;
- upgrading existing swimming pool covers (from ones not eligible for rebates to ones that are) increases water consumption on average, as pool temperatures are raised and pools are used more often;
- greywater re-use systems appear to increase water consumption. The reasons for this are unclear, but may be due to a reduced incentive to achieve in-house water savings.⁴⁵

⁴⁴ The sensitivity to price is known as the demand elasticity (i.e. the percentage change in the demand for a product given the percentage change in price).

⁴⁵ These water use estimates are based on the small number greywater re-use systems installed in Perth, so may not be statistically significant.

For products such as these, where the behavioural response may result in increased water use, offering rebates could actually be counter-productive in terms of the objective of saving water.

The analysis finds that for stand-alone water saving products, only rain sensors, garden assessments and flow regulators involved costs per unit of water saved that were less than the benefits as measured by the opportunity value of producing potable water.

The analysis indicates that domestic garden bores, rainwater tanks and new swimming pool covers cost between \$3 per kL and \$6 per kL of water saved, compared with the cost of the most expensive source of potable water (desalination) of approximately \$2 per kL. However, a recent National Water Commission (NWC) study on rainwater tanks suggests that the water savings for large tanks could be less than half of the savings assumed in this analysis.⁴⁶ If the NWC estimates are used, the costs for large rainwater tanks would be over \$8 per kL of water saved.

Other products involve embedded water-saving technology (e.g. water efficient washing machines).

- In the past, when many washing machines were not very water efficient, the use of rebates to encourage customers to switch to washing machines that were much more water-efficient would have produced substantial water savings. However, as the water efficiency of washing machines in the market (and households) in general improves, the additional water savings – from customers switching from a water efficient machine to an even more water efficient machine – become smaller.
- The analysis assumes that rebates encourage customers to switch from a 4-star rated washing machine to a 4.5-star rated washing machine, and finds this to be an expensive way to achieve water savings (an estimated cost per kL of water saved of around \$128 per kL). The value of the rebate is also further diminished if the water saving technology does not add to the cost of manufacture, or if customers would choose the water efficient machines anyway.

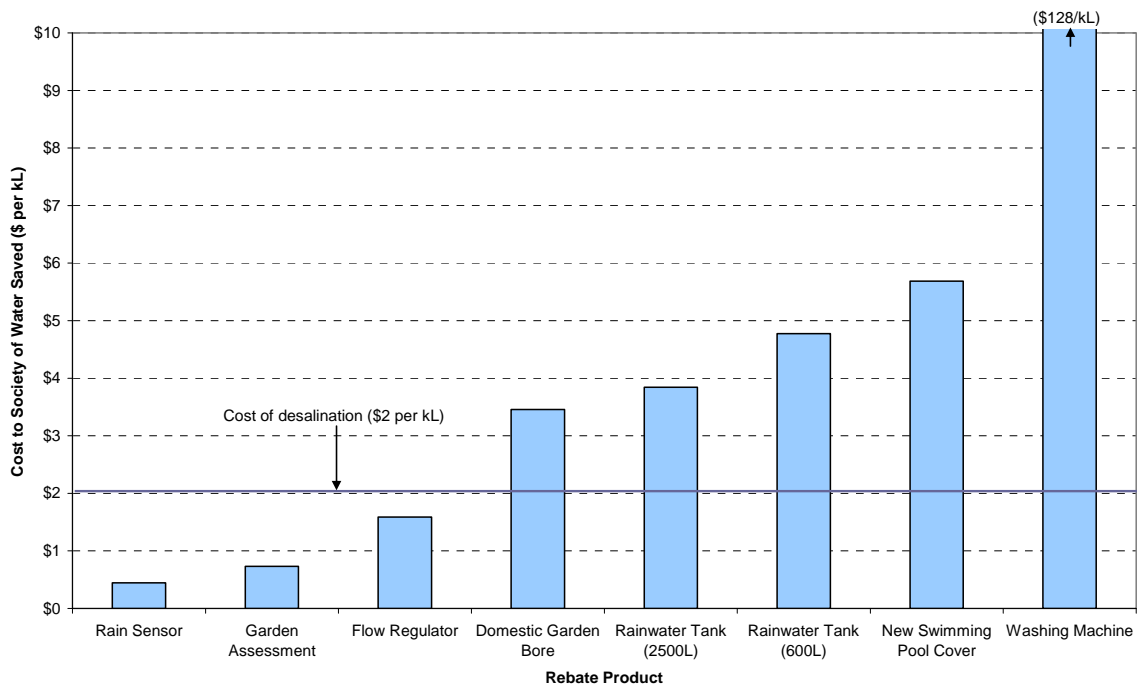
The analysis is based on some simplifying assumptions.⁴⁷ However, further refinement of the assumptions would be unlikely to alter the broad conclusions of the analysis.

The submission by the Water Corporation that rebates are highly cost effective could be explained if the costs considered are only those incurred by the Corporation or the government, and not the consumer, or if all rebate product purchases are assumed to be solely due to the presence of the rebate. In some cases, rebates may be more attractive from the perspective of a water supplier or consumer than when viewed from a societal efficiency perspective .

Figure 7.1 summarises the estimated costs to society per kilolitre of water saved for different rebate products.

⁴⁶ Marsden Jacob Associates (March 2007), *The Cost-Effectiveness of Rainwater Tanks in Urban Australia*, a study carried out for the National Water Commission. This study estimated the water savings for a 2,500 litre tank at 28 litres per year, compared with 61 litres assumed in the analysis in this inquiry.

⁴⁷ The elasticity of demand is assumed constant and the same for all products, as there is little information on the sales of the products before and after the rebates. See Appendix 2 for a full description of assumptions.

Figure 7.1 Costs to Society per kL of Water Saved for Rebate Products, 2003-2008

Source: From Department of Treasury and Finance and Economic Regulation Authority analysis

***Notes:**

- Greywater re-use systems, upgrading existing swimming pool covers (to water-wise ones endorsed by the Smart Approved Watermark Scheme) and sub-surface irrigation are not shown, as these products have been assumed to *increase* water consumption, based on a recent survey of household water consumption (i.e. there are no water savings).
- Rainwater tank (2,500L) assumes 61 kL of water saved per year.
- New swimming pool cover assumes the purchase of a new water-wise pool cover rather than an upgrade from an existing (non-water-wise) pool cover.
- Costs per kL for washing machines reflect incremental water savings that would be achieved by customers switching from 4-star rated washing machines to 4.5-star rated washing machines.

Recommendation

- 12) The cost effectiveness of rebates will depend on the cost per kilolitre saved, where the cost is the full resource cost of offering and administering the rebate, plus the installation and operating costs to the customer.

Finding

- 13) An assessment of costs per kilolitre of water saved indicates that most rebate products (with the exception of rain sensors, garden assessments and flow regulators) are more costly to society than the alternative of producing more potable water.

7.5 Mandatory Standards

The State Water Recycling Strategy states:

- The revision of building codes through 5 Star Plus will support the inclusion of complimentary water supplies to meet demand for external garden use, toilet flushing and clothes washing.
- In the future, new heavy and general industrial areas will be required to investigate the installation of a third pipe to distribute recycled water. Where feasible and cost effective, existing heavy industrial areas should be retrofitted to facilitate the use of recycled water.

Under the 5 Star Plus program, implemented on 1 September 2007, new houses are required to meet minimum standards for energy and water efficiency. Under this program, the *Water Use in Houses Code* specifies that all new houses must have 3 or 4 Star rated water efficient fittings and fixtures, hot water outlets located near the hot water system, and covers on swimming pools.

Existing homeowners are not required to comply with the 5 Star Plus standards.

The State Government has decided not to proceed with Stage 2 of the 5 Star Plus program, which would have prescribed additional standards.

There has been no formal implementation into building or land development codes of mandatory standards for heavy and general industry.

7.5.1 Submissions

Submissions were generally supportive of the use of mandatory standards in the adoption of recycled water.

Department of Water

Mandatory standards such as the water efficiency measures referred to in the issues paper are intended to ensure that cost-effective water-sensitive urban design measures are installed in buildings and developments at the time of construction, when the cost of installation is minimised.

The issues paper (page 28) states that “the risk... is that the water savings may not be cost effective in comparison with other source options.”

In considering the benefit of water sensitive urban design measures, any relevant savings in avoided wastewater augmentation or drainage costs should also be considered as well as any improved environmental outcomes. (Department of Water submission on Issues Paper, p11)

Water Corporation

The Corporation supports...the appropriate use of mandatory building standards, including standards that promote water efficiency and consumer choice. (Water Corporation submission on Issues Paper, p4)

....

Mandatory standards, such as Building Codes, play an important role in ensuring appropriate standards that reflect the needs of the community. These standards may pertain to public safety, public health, durability, liveability and sustainability. Cost effectiveness is one consideration in the setting of building codes.

There is a long history of association with water standards in building codes including plumbing standards and water efficiency. The mandating of dual flush toilets is one example.

The changes to the Building Codes announced by Government that ensure homes are “alternative water source ready” reflect community support for increased access to alternative water sources. While the additional cost of the standard is minimal, the cost of retrofitting for these changes is prohibitive. Mandating standards for homes protects consumers from inappropriate and poor design and construction, excessive future costs and promotes future flexibility and choice.

(Water Corporation submission on Issues Paper, p20)

City of Mandurah

Mandatory standards would play an important role in regard to:

- Security / guarantee of supply
- Certainty of access to recycled water and sustainability of water
- Secondary sales market – potential on-sale / passing off needs to be regulated / controlled.

(City of Mandurah submission on Issues Paper, p7)

As noted in the discussion on rebates, the Department of Water supports the use of mandatory standards, if cost-effective, as a useful tool for encouraging efficient water use in the absence of cost-reflective water prices. In addition, the Department noted that home buyers may not have full information on the water efficiency of the property that they are buying.

The case for mandatory standards is strengthened where customers may purchase or lease properties with imperfect information about the property’s water efficiency.

(Department of Water submission on Draft Report, p8)

The Chamber of Commerce and Industry also supported mandatory standards for new buildings, but submitted that these should not be applied retrospectively.

Chamber of Commerce and Industry WA

CCI believes that mandatory standards should be applied to all new domestic and commercial building construction, requiring the installation of infrastructure for grey water reuse, rainwater collection and other water use efficiency devices. The additional costs could be offset by increases in property values for ‘green’ buildings. Standards should also be applied when there are planned building refurbishments, but should not be applied retrospectively to unimproved buildings. (Chamber of Commerce and Industry WA submission on Issues Paper, p3)

The Department of Treasury and Finance noted the importance of determining the cost effectiveness of mandatory standards.

It is noted that the setting of mandatory standards such as the 5 Star Plus scheme introduced by Government, can be a useful approach to reach recycled water targets. It should be noted however, that there is concern about the introduction of further regulatory burden on both the housing industry and existing homeowners for schemes such as this.

The benefits of setting mandatory standards must be weighed against the costs. Retrofitting of existing properties may bring benefits of reduced consumption of scheme water, potentially delaying future water sources. However, there is a risk that the cost of imposing such water saving measures exceeds the long run marginal cost of new water supplies.

The ERA is encouraged to look closely at the costs and benefits of the setting of these standards. In particular, a full assessment should include an analysis of the cost of mandatory standards, including the cost of compliance and any negative impact on customers. If regulation were to be introduced to enforce mandatory recycled water use, there would be merit in also conducting a Regulatory Impact Statement (RIS). An RIS monitors and assesses the costs and benefits of a proposal to determine the burden a particular regulation has on the State and increases transparency in Government decisions.

(Department of Treasury and Finance submission on Issues Paper, p7-8)

7.5.2 Assessment

The key issue regarding mandatory standards is whether the cost per kilolitre of water saved is more or less than other water sources.

Mandatory standards are likely to be more cost effective for new houses, where implementation costs can be minimised in the design process of new homes and developments, than for retrofitting of existing properties. However, the 5 Star Plus program only applies to new homes and is not mandatory for existing homes.

The current standards relate to tap fittings (other than bath outlets and gardening taps), showerheads, and sanitary flushing systems. These standards complement the current rebate system. In many cases (e.g. shower heads, taps or toilets) there would be little or no incremental cost to the consumer between buying a water efficient technology as opposed to a high water use technology. This is particularly the case once new mandatory standards have been incorporated into the general design and technology of new homes. In this case, mandatory standards may impose minimal additional costs on consumers, while producing savings in potable water.

However, the mandatory requirement for swimming pool covers for new houses is an expensive way to secure additional water savings. The Department of Treasury and Finance's analysis of rebate products (see previous section) indicates that the cost to society of new swimming pool covers is more than \$5 per kL, compared with the cost of desalination of approximately \$2 per kL.

While the cost effectiveness of mandatory standards is an efficiency issue, the question of who bears the cost of mandatory standards is an equity issue. The costs of mandatory standards for new homes would be incurred mainly by the purchasers of the homes. To the extent that there are savings in development costs arising from the reduced water demand by new developments, due to the mandatory standards, these should be reflected in lower developer charges. New home owners would also benefit from lower water bills.

Recommendation

- 14) The cost effectiveness of mandatory standards will depend on the cost per kilolitre of water saved.

Finding

- 15) Mandatory standards involving water efficient technologies or new house design may generally involve little or no incremental cost to consumers, while achieving water savings. However, mandatory swimming pool covers are an expensive way to achieve water savings (i.e. more costly than producing more potable water).

7.6 Reservation of Water From Wastewater Treatment Plants

The State Water Recycling Strategy states:

- Due to increasing pressure on our groundwater resources, the State Government is currently investigating the viability of horticultural precincts. Water from the new Alkimos Wastewater Treatment Plant has some potential for future use in horticulture, and may be reserved for this purpose.
- In recognition of the potential for water to be recycled for drinking purposes, water from the Beenyup Wastewater Treatment Plant will be reserved for this purpose. This will ensure that there is a source available should groundwater replenishment become an acceptable drinking water supply option in the future.

The Authority considered the appropriateness of using reservation policies for resources that may have significant alternative uses.

7.6.1 Submissions

The Water Corporation was supportive of policies to reserve wastewater for specified purposes.

Water Corporation

The Corporation supports...the reservation of recycled water for public water supply and other high value uses. (Water Corporation submission on Issues Paper, p4)

.....

The State Water Plan, developed through an extensive process of community consultation was released by the Minister for Water Resources in May 2007.

Objective 5 “Enhance the security of water for the environment and use” recognises that environmental water provisions have security to ensure sustainable ecosystems.

The next principle states that “Water may be reserved for future public water supply and other high value uses”.

These principles reflect water policy nationally, and more broadly, internationally. The provision of water to safeguard ecosystems and provide essential water to communities is a high priority for Governments’ and communities around the world and in Australia.

(Water Corporation, submission on Issues Paper, p20)

The City of Mandurah also supported the reservation of some quantities of recycled water for community purposes.

A portion of available recycled water should be reserved for community public benefit (e.g. 5 GL allowance out of a 12 GL capacity WWTP). The State should undertake forward planning taking population growth for specific areas into account. This would also link into regional Water Recycling Strategies. (City of Mandurah submission on Issues Paper, p7)

The Department of Water wanted to ensure that water from the Beenyup WWTP is available for groundwater replenishment, and recommends that the allocation of recycled water resources by means of a neutral auctioning process be trialled:

The State water recycling strategy notes that water from the Beenyup Wastewater Treatment Plant will be reserved for potential groundwater replenishment for future drinking water.

Groundwater replenishment is a potentially large and valuable future use. Reservation is intended to ensure that the potential for groundwater replenishment is not lost during the period of the trial. This could happen if water were gradually sold off to other uses in a way that could stop the water being used for a future groundwater replenishment project if its value is demonstrated.

Reservation does not necessarily preclude the Water Corporation using or selling recycled water temporarily, or from other more valuable recycling innovations being considered if these were identified.

(Department of Water, submission on Issues Paper, p11)

The trialling of neutral release mechanisms could demonstrate the potential of this approach as a measure for ensuring that the value of recycled water use is maximised and avoid second-guessing the value of water.

Given the potential for MAR at Beenyup, other recycled water sources could offer opportunities to experiment with the effective design and implementation of neutral release processes.

The Department of Water supports the continued reservation of water from the Beenyup wastewater treatment plant for potential MAR.

(Department of Water, submission on Draft Report, p9)

The Department of Treasury and Finance also supported an allocation mechanism that ensures that wastewater resources are directed to their highest value use, but did not support wastewater reservation policies:

Water allocation management plans where water from wastewater treatment plants is reserved for a particular use are not supported. A reservation policy does not ensure that water is allocated to its highest value use, which is necessary for the efficient allocation of water supplies.

The ERA's suggestion of auctioning water instead of a reservation policy is supported. This will provide a mechanism whereby water suppliers are able to compete for water supplies based on the value they attribute to their use. It promotes competitiveness and market efficiency. It will also assist the Water Corporation in the planning of its operations and resourcing.

(Department of Treasury and Finance, submission on Issues Paper, p7)

The Department of Agriculture and Food supported an open, public process for determining the allocation of recycled water different purposes.

The Department recommends a process for deciding what portion of recycled water should be allocated for groundwater replenishment, rather than assume that all recycled

wastewater should be used for this purpose. The process should engage community and industry in identifying relevant social, economic and environmental issues and potential uses for the recycled water. The process should also take into account how the use of recycled water for groundwater replenishment may affect current and future allocations.

...

This process should address similar values to those considered by the process undertaken by the Department of Water Statewide Policy No.5.⁴⁸

(Department of Agriculture and Food, submission on Draft Report, p1-2)

7.6.2 Assessment

Policies that reserve water for a specific purpose involve second-guessing that the use of the water for that purpose has a higher value than alternative uses. It would generally be appropriate to use a neutral tendering process rather than a reservation policy to ensure that, where water from a wastewater treatment plant has significant value, that water is allocated on a commercial basis to customers who value it most.

In its final report on the Inquiry into Competition in the Water and Wastewater Services Sector, the Authority expressed concern regarding the reservation of water supplies for public suppliers, and recommended that an effective trading regime for water allocations would be a better mechanism for ensuring that water supplies are directed to their highest value use. The same conclusions would apply in the case of any reservation of treated wastewater supplies from wastewater treatment plants.

It should be noted that the State Water Recycling Strategy does not prescribe the reservation of water from the Alkimos plant for horticultural use, but simply raises this possibility subject to a viability assessment. However, reservation of water from the Beenyup plant for the purpose of groundwater replenishment assumes that this is the highest value use for the treated wastewater.

A neutral tendering process would not only identify the value of the water for horticulture and groundwater recharge, but would also identify any other potentially higher uses. In terms of auctioning water from the Alkimos and Beenyup plants, the value placed on the water by horticulturalists and the Water Corporation itself (in the case of future public drinking supplies made available through aquifer recharge) may be more or less than the value placed on the water by other potential users, such as a private service provider wanting to supply commercial users, third pipe schemes to new residential developments or other innovative applications. This is not just an issue for the treated wastewater from the Alkimos and Beenyup plants, but for all situations where wastewater is a scarce resource.

A trial of a neutral allocation mechanism (for example, for wastewater from the Beenyup wastewater treatment plant), as suggested by the Department of Water, involving all stakeholders, would be a useful starting point in the development and implementation of such a mechanism.

⁴⁸ Department of Water (2000), *Statewide Policy No.5: Environmental Water Provisions for Western Australia*.

Recommendations

- 16) The reservation of water supplies for specific purposes involves second-guessing the value of water to users. Whenever wastewater is a scarce resource, it should be allocated using a neutral tendering process.
- 17) A trial of a neutral allocation mechanism for allocating wastewater should be conducted, involving stakeholders (for example, for wastewater from the Beenup wastewater treatment plant).

7.7 Third Party Access

Third party access regimes allow entities other than an infrastructure owner to use infrastructure to deliver services to customers. Third party access regimes:

- set out the terms and conditions of use; and
- outline prices (or how prices are to be determined) that may be charged by the infrastructure owner for access.

An effective access regime would allow businesses to access wastewater or stormwater from the service provider and recycle it for either their own purpose or for sale to customers.

Third party access regimes are common in the gas, electricity and telecommunications industries. However, they are less common in the water and wastewater industry.

There are no current institutional or legislative restrictions on seeking third party access to water and wastewater networks in Western Australia. Under current arrangements the process is as follows:

- A potential entrant seeking access to infrastructure of national significance can approach the infrastructure owner and attempt to negotiate access.
- If this fails, they can apply to the National Competition Council (**NCC**) to have the infrastructure declared under Part IIIA of the *Trade Practices Act 1974*.
- Should the approach to the NCC be unsuccessful or the findings of the NCC be rejected by the relevant Minister, who has the discretion to set aside the NCC findings, the access seeker can apply to the Australian Competition Tribunal for review of the decision not to grant access to the infrastructure.

However, this may be a long and expensive process. As an alternative to the national access regime under the Trade Practices Act 1974, the Competition Principles Agreement also provides for State-based regimes for third party access to infrastructure.

As part of the Inquiry on Competition in the Water and Wastewater Services Sector, the Authority recommended that a simple State-based third party access regime be developed. The Final Report for that inquiry has been tabled in Parliament and is available on the Authority's web site. The Authority also noted in that inquiry that the third party access regime being introduced in New South Wales could provide a model upon which to base a Western Australian regime. The NSW Government has introduced the

Water Industry Competition Act 2006, which makes it possible for third parties to enter into the market to supply water, sewerage and recycled water services.

It is uncertain to what extent private sector participants may seek to provide such services, because it is not possible to predict the range of ideas that the private sector may generate. The underlying principle of third party access regimes is to remove the barriers to entry, and allow the market to come up with proposals. Early indications in NSW are that several proponents are already actively considering a number of schemes for recycling wastewater.

Respondents to the Issues Paper and Draft Report were highly supportive of the introduction of a State-based third party access regime in Western Australia, on the grounds that this would allow for innovation by the private sector in the provision of alternative recycling initiatives (see submissions by the Chamber of Commerce and Industry WA, Department of Water, Department of Treasury and Industry, Water Corporation and the Australian Water Association). The City of Mandurah noted the existing bureaucratic difficulties of implementing recycled water schemes and supported a simplified model to encourage third party participation, subject to public consultation.

There were no particular issues raised in this inquiry that warrant the Authority refining its advice to the Government in relation to the introduction of a State-based third party access regime.

Recommendation

- 18) A State-based third party access regime should be introduced. This would allow third parties access to the wastewater network for the purpose of providing recycled water.

Appendix 1 Terms of Reference

INQUIRY INTO PRICING OF RECYCLED WATER IN WESTERN AUSTRALIA

TERMS OF REFERENCE

I, ERIC RIPPER, Treasurer, pursuant to Section 32(1) of the *Economic Regulation Authority Act 2003* request that the Economic Regulation Authority (the Authority) undertake an inquiry into, and make recommendations on pricing and other relevant factors affecting the adoption of recycled water and other alternative water supplies.

In doing so, the Authority is expected to consider and develop findings on:

- the circumstances in which recycled water prices should be regulated, and the recommended approach to any required regulation;
- the pricing recommendations of the State Water Recycling Strategy, including the appropriateness of faster adoption of cost-reflective prices for major industry;
- other factors that the Authority considers relevant to the adoption of recycled water and other alternative water supplies.

In developing its recommendations the Authority will have regard to:

- the Government's social, economic and environmental policy objectives;
- distributional issues, such as those between customers of recycled water services and other services in the same scheme; and
- any relevant pricing principles arising from the 1994 Council of Australian Governments water reform agreement and the National Water Initiative.

The Authority will release an issues paper as soon as possible after receiving the reference. The paper is to facilitate public consultation on the basis of invitations for written submissions from industry, government and all other stakeholder groups, including the general community.

A draft report is to be available for further public consultation on the basis of invitations for written submissions.

The Authority will complete a final report no later than seven months after receiving the Terms of Reference.

**ERIC RIPPER MLA
DEPUTY PREMIER; TREASURER;
MINISTER FOR STATE DEVELOPMENT**

Appendix 2 Cost-Effectiveness of Rebates

The following table summarises the different types of rebate products and maximum rebates.

Table A2.1 Rebate Products and Maximum Rebates

Rebate Products	Maximum Rebate
Water Recycling Products	
Greywater re-use systems	\$500 or 50 per cent of purchase/installation cost of approved system, whichever is the lesser (one per household)
Alternative Water Sources	
Domestic rainwater tanks	
- 600 litres or more unplumbed	\$50 per tank (one per household)
- 2,000 litres or more plumbed for toilet and/or washing machine use	\$600 or 50 per cent of purchase and installation costs, whichever is the lesser (one per household)
Domestic garden bores	
- New garden bore	\$300 or 50 per cent of installation cost, whichever is the lesser (one per household)
- Shared bore	\$300 or 50 per cent of installation cost shared equally between households sharing the bore, whichever is the lesser (one per household)
- Rebores	\$300 or 50 per cent of refurbishment cost, whichever is the lesser (one per household)
Water Efficiency Products	
Waterwise garden irrigation systems	\$300 or 50 per cent of installation cost, whichever is the lesser (one per household)
Rain sensors	\$20 per rain sensor (one per household)
Subsurface irrigation systems	\$10 per 30m roll of subsurface irrigation pipework (up to 10 rolls per household)
Waterwise garden assessments	\$30 per assessment (one per household)
Swimming pool covers	\$200 or 50 per cent of total cost, whichever is the lesser (one per household)
Flow regulators	\$2 per flow regulator rated 3 Stars or above, up to \$20 per household
Washing machines	\$150 rebate on washing machines rated 4.5 Stars or above (one per household)

Assessment

The Department of Treasury and Finance (DTF) has provided to the Authority a preliminary assessment of the effectiveness of WaterWise rebates. This analysis has been reviewed and adapted by the Authority's consultants, Economic Research Associates. The assumptions and results of the analysis are shown in the tables at the end of this appendix.

The structure of the analysis is as follows. For each water saving mechanism or unit an estimate is made of:

- the market price with and without the rebate;
- sales, with and without the rebate;
- the water saving per unit and aggregate saving based on units sold because of the rebate;
- the resource benefit to society of this water saving, based on the cost of increasing potable water supplies (up to \$2 per kL, for desalination) as a measure of the opportunity value of water saved; and
- the full cost to society of achieving the water savings based on acquisition, installation and operation of the water saving device and rebate program administration costs.

The cost effectiveness of each mechanism is based on comparing the estimated value of water saving benefits per kL with the estimated costs per kL of water saved. The ranking of each mechanism is based on the cost per kL of water saved.

Assumptions on Water Savings

The amount of water actually saved by rebate products will vary between users and will depend on how the products are used. The assumptions on the amount of water savings used in the DTF analysis have been based on information from the Department of Water and the Water Corporation, including a recent study of household water consumption in Perth that compared households with rebate products to those without rebate products.

- **Sub-surface irrigation systems.** Sub-surface irrigation systems *increase* the amount of water used, on average, as these systems are probably used more frequently and for longer periods than above-ground irrigation systems. The analysis therefore assumes an increase in water consumption of 52 kL per year for sub-surface irrigation systems. However, if used in accordance with the watering schedules and guidelines sub-surface irrigation can result in water savings.
- **Greywater re-use systems.** Households with greywater re-use systems also have a higher consumption of potable water than households without greywater systems (by an average of 62 kL per unit per annum). The reasons for this are unclear. One possibility may be behavioural: users with greywater systems may feel less compelled to save water in the house as the water is being re-used. Another possibility is that users buy greywater systems because they have specific high water needs (e.g. high water demand gardens). However, greywater systems could result in water savings if they are used to directly replace potable water usage. Retrofitting versus fitting at the time of building may also have an influence. In the latter case, for example, the garden can be designed to be water efficient with the use of greywater. It should also be noted that water use

estimates are based on the small number of greywater re-use systems installed in Perth, and may not be statistically significant.

- **Swimming pool cover upgrades.** Upgrading swimming pool covers, from non-water-wise covers to water-wise covers that are endorsed for rebates, also appears to *increase* water consumption (by around 27 kL a year).⁴⁹ This could be due to the higher grade pool covers raising pool temperatures, resulting in the pools being used more often. However, households that have no pool cover and purchase a new pool cover will save around 29 kL per year.
- **Washing machines.** The Water Corporation estimates that switching from a AAA-rated washing machine to a 4.5-Star rated washing machine can result in an annual water saving of around 23 kL. However, the majority of washing machines in the market today are already 4-Star rated (which is more water efficient than AAA-rated), so if rebates encourage customers to switch from a 4-Star machine to a 4.5-Star machine, the water saving will be less (around 2.4 kL per annum).
- **Rainwater tanks.** The Water Corporation estimates that a 2,500 litre rainwater tank can result in an annual water saving of 61 kL. However, a recent National Water Commission study on the cost effectiveness of rainwater tanks indicated average savings of 28 kL per annum for a 2,500L tank.⁵⁰ The Authority has used the higher figure for water savings (61 kL), while noting that the water savings could be less than this.

The Consumer's Perspective

From the consumer's perspective, whether a water saving device is effective depends on:

- the cost of owning and operating the device;
- the benefits from saving water which are comprised of:
 - water expenditure savings, and
 - any increase in utility associated with making a positive contribution to the environment.

The utility gains are difficult to measure. The expenditure savings depend on the volume of water saved and the price paid for water. The latter is a function of the tiered regulatory tariff and how the bill is affected by a change in demand by the consumer. The 2008/09 consumption charges are 82.8 c/kL and 99.7 c/kL for tiers 3 and 4 (see Table A2.2). Therefore, a consumer saving one kL in tier 2 needs the cost per kL of water saving to be less the 82.8 c/kL. A consumer saving one kL in tier 3 needs the cost per kL of water saving to be less the 99.7 c/kL.

⁴⁹ Swimming pool covers eligible for rebates are those that are endorsed under the Smart Approved Watermark Scheme and with a minimum warranty of 8 years.

⁵⁰ Marsden Jacob Associates (March 2007), *The Cost-Effectiveness of Rainwater Tanks in Urban Australia*, a study carried out for the National Water Commission.

Table A2.2 Water Corporation Metropolitan Residential Consumption Charges

Metropolitan Residential Consumption per Annum (kL)	Consumption Charges, 2008/09 (c/kL)
0-150	64.3
151-350	82.8
351-550	99.7
551-950	142.3
over 950	171.4

Source: Water Corporation

The Societal Perspective

From society's perspective, whether a water saving device is effective depends on:

- the benefits from saving water;
- the cost of owning and operating the device; and
- where rebates are in operation, the costs of the rebate scheme.⁵¹

The issue here relates to the fact that the cost of sourcing new potable supply water is estimated to be as high as \$2 per kL (for desalination). However, the price paid by the consumer is less than this. Hence, a kL of water saved is more valuable from society's perspective than from the consumer's perspective. The opportunity value of water saved from society's perspective is up to \$2 per kL. The direct benefit to the consumer is between \$0.82 to around \$1 per kL.

Therefore where a consumer saving a kL in tier 2 needs the cost per kL of water saving to be less than 82.8 c/kL, the societal perspective indicates that it is worth doing if the cost per kL of water saving is less than, say, \$2 per kL.

Hence, the assessment of water saving devices will differ depending on whether it is taken from a consumer's perspective or society perspective. Water saving devices that appear uneconomic to the consumer may be economic from society's perspective.

General Caveats

Before considering the implications of the analysis, two general issues with the analysis need to be noted.

Data was difficult to collect. Water use and water savings estimates are not widely available and estimates will vary across jurisdictions reflecting the actual circumstances in the water system. The estimates used by DTF were derived largely from information provided by the Department of Water and the Water Corporation. Indicative prices, installation costs and operating costs were derived from simple price "ring arounds" of suppliers and from the Department of Water. Administration costs came from the Water Corporation. Data on the number of rebates came from the Water Corporation. Data on water savings in kL per annum was based on information provided by Water Corporation.

Without a specific study it appears that no better indicative data would be available.

⁵¹ The cost of rebates is included in the cost to society, on the assumption that government is budget constrained, so that the money spent on rebates has an opportunity cost. If government is not budget constrained, the cost of the rebate could be viewed as a transfer from tax payers to rebate customers.

The first general issue relates to assessing the demand for devices. Rebates data indicates the number of rebates. Rebates reduce the price to the consumer from the “without rebate” price to the “with rebate” price. “Without rebate” sales figures are needed to approximate the demand curve. A price elasticity of -1 was assumed for all devices to estimate “without rebate” sales (that is, a one per cent increase in the price result in a one per cent decrease in demand). Given the “with rebate” sales, the price reduction due to the rebate and the price elasticity of demand allows an estimate of the effect of the price reduction on sales. This is the number of units due to the rebate, and will be less than the number of units receiving rebates. Almost certainly this price elasticity would vary between devices. If it does, then the demand response may be under or overestimated based on an assumed price elasticity of -1. This affects the estimate of the number of units attributable to the rebate and the estimate of the consequent water savings. However, no meaningful price elasticity data appears to be available. Hence, an assumption was required and the DTF assumption was intended to be neutral.

If the demand curve is downward sloping then there is a consumer surplus gain based on the price fall and quantity increase. That is, some consumers are acquiring water saving devices at a price below the price that they would be prepared to pay. This benefit to consumers of water saving devices has been ignored in the analysis. If it was included, it would increase the estimated benefits. However, without a reliable price elasticity estimate the calculation would be largely spurious. A preliminary assessment outlined below indicates that this does not appear to be a material issue.

The devices attracting rebates need to be considered in two broad groups:

- 1) specially acquired and operated devices such as rainwater tanks and pool covers (“stand-alone devices”); and
- 2) compulsory devices built into appliances, such as water saving dishwashers and washing machines (“embedded water saving devices”).

Specific Water Savings Expenditures for Stand-Alone Devices

Stand-alone devices include pool covers, rainwater tanks, greywater re-use systems, rain sensors and flow regulators. The following analysis looks at the estimated social and consumer benefits for these devices, based on the data in the DTF analysis.

Consumer Perspective

The consumer bears the acquisition cost (net of rebate), the installation and operation costs. From the consumer’s perspective, several devices have a cost per kL of less than \$1 per kL. These are:

- rain sensors;
- garden assessments; and
- flow regulators.

The remaining devices (pool covers, rainwater tanks, greywater re-use systems) all have a cost per kL greater than \$1. Hence, based on DTF’s costings, consumers could justify the purchase of rain sensors, garden assessments and flow regulators based on the value of water saved, but not swimming pool covers, bores or rainwater tanks.

Societal Perspective

The DTF estimated that only rain sensors, garden assessments and flow regulators have estimated costs less than \$2 per kL (the cost of desalination) indicating that they are cost effective. The others all have estimated costs greater than \$2 per kL, indicating that they are cost ineffective. Rebates for rainwater tanks are an expensive source of water (around \$4 to \$5 per kL).

For products that may not produce water savings (e.g. greywater re-use systems, sub-surface irrigation systems and swimming pool upgrades), rebates may actually be counter-productive.

These devices are entirely directed at water savings. Therefore, it can be assumed that the only reason they are bought is to save water. In this case, the whole purchase price, installation cost, and operating cost can be attributed to water saving objectives.

The rebate lowers the purchase price. The rebate splits the resource cost as reflected in the purchase price between the Government (rebate) and consumer (price less rebate). The consumer bears the installation and operating costs.

Consumers will derive some consumer surplus benefits from the increased consumption. However, a preliminary assessment indicates that adding these benefits would do little to the analysis. The consumer surplus gains add between 6 per cent and 25 per cent to the estimated societal benefit but this does not change the assessment of any devices. Rain sensors and garden assessments are still the only ones with positive net benefits.

Summary

Even allowing for the caveats on price elasticity and consumer surplus, the conclusion from the analysis appears robust. Apart from rain sensors, garden assessments and flow regulators, devices acquired to specifically save water are inefficient in that the resource cost to achieve the savings exceeds the value of the benefits as measured by the opportunity value of producing potable water. However, from the perspective of the individual consumer, as opposed to society, more devices appear cost effective. If looked at from the perspective of a water provider like the Water Corporation, devices are cost effective if the combined rebate and administration cost per kL of water saved is less than \$2.

Embedded Water Saving Devices

Some water saving devices are embedded in other products and are not separable from them. In the DTF analysis, the device that falls into this category is the water saving washing machine. The conclusion here is the same as for the other devices – the resource cost per kL of water saving achieved exceeds the opportunity value of the water saved.

The analysis assumes that, embedded in a washing machine price of \$1,754, is a water saving device costing \$372 (\$150 rebate and \$222 paid by the consumer). Given this assumption, the key is then the amount of water saved for the expenditure of the \$372 plus rebate administration costs. The analysis suggests that relatively little water is saved, with the result that the cost of water saved may be as high as \$128 per kL, well above the estimated cost of producing more potable water (up to \$2 per kL).

However, there are two further points worth considering.

It is arguable that where water saving technology is built into a product as the market norm, it effectively adds nothing to the product price. The water saving requirement is embedded at the design and manufacturing stages and is not an “add on”. This may particularly apply to products like washing machines, which are imported and have high level water saving capacities set in other jurisdictions.

In these circumstances it could be argued that the extra cost to the consumer of acquiring a water saving washing machine is minimal. It could also be argued that consumers would choose water saving machines anyway, all other things being equal. The argument for the rebate is therefore reduced, because as new machines are brought to market and bought by consumers they would be more water efficient as a normal market outcome.

The argument for the rebate in this case may not be eliminated entirely because the rebate may bring forward new purchases and encourage early replacement of existing machines, thereby expediting greater water saving. However, considerably more information would be needed to assess this proposition thoroughly, although given the available evidence, it would be unlikely to be a cost effective way of saving water.

Summary

For embedded water saving devices, the analysis ascribes part of the product price as the “price” for the embedded water saving technology. Under this scenario, embedded devices in washing machines still have a resource cost greater than the opportunity value of water saved. However, if the market is moving to embed water saving technologies into new machines because of regulation or because of market demand, then the case for these rebates is reduced still further.

Analysis Assumptions and Results – Rebate Products, 2003-2008

Table A2.3 Rebate Products (2003-2008) – Assumptions for Analysis *

Products - 2003-2008	Product Details			Price of Product	Running Cost (Annual)	Costs					Total Cost	Volume of Water Saved over Product Life (kL per Unit)	Quantities			Elasticity		
	Lifespan of Product	Annual Water Saved (per Unit, kL)	Number of Rebates			Rebate	Consumer Premium	Installation Cost	Program Cost	Running Cost (PV over Lifespan)			Units Without Rebate	Units With Rebate	Units Due to Rebate	% Change in Demand	% Change in Price	Elasticity
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Swimming Pool Cover (Upgrade)	8	-27.2	23,320	\$574	-	\$200	\$374		\$16.00		\$590	-218	17,986	23,320	5,334	30%	-30%	-1
Swimming Pool Cover (New)	8	29.0	23,320	\$574	-	\$200	\$374		\$16.00		\$590	232	17,986	23,320	5,334	30%	-30%	-1
Rain Sensor	10	20.0	8,956	\$35	-	\$20	\$15		\$2.56		\$38	200	6,210	8,956	2,746	44%	-44%	-1
Subsurface Irrigation System	10	-51.8	6,520	\$42	-	\$10	\$32		\$1.17		\$43	-518	5,381	6,520	1,139	21%	-21%	-1
Garden Assessment	10	23.0	51	\$70	-	\$30	\$40		\$3.50		\$74	230	38	51	13	35%	-35%	-1
Flow Regulator	15	3.0	59	\$30	-	\$20	\$10		\$0.49		\$30	45	39	59	20	50%	-50%	-1
Domestic Garden Bore	15	105.4	22,723	\$2,233	\$50	\$300	\$1,933		\$35.39	\$536	\$2,804	1,581	20,182	22,723	2,541	13%	-13%	-1
Greywater Re-use System	10	-62.3	184	\$3,050	\$150	\$500	\$2,550	\$300	\$56.90	\$1,254	\$4,661	-623	160	184	24	15%	-15%	-1
Washing Machine	8	2.4	54,253	\$1,754	-	\$150	\$222		\$17.68		\$390	19	50,140	54,253	4,113	8%	-8%	-1
Rainwater Tank (600L)	20	21.2	14,386	\$767	\$20	\$50	\$717		\$12.78	\$249	\$1,030	424	13,532	14,386	854	6%	-6%	-1
Rainwater Tank (2500L)	20	61.0	14,386	\$1,889	\$20	\$600	\$1,289	\$300	\$12.78	\$249	\$2,451	1,220	11,291	14,386	3,095	27%	-27%	-1

Table A2.4 Rebate Products (2003-2008) – Costs per Kilolitre of Water Saved **

Products - 2003-2008	Volume of Water Saved over Product Life (kL per Unit)	Number of Rebates	Units Due to Rebate	Consumer		Government		Society	
				Cost of Water Saved	Cost per kL	Cost of Water Saved	Cost per kL	Cost of Water Saved	Cost per kL
				$V = (G+H+J)*T$	$V/(S*T)$	$W=(F+I)*T$	$W/(S*U)$	$X = W + (G+H+J)*U$	$X/(S*U)$
Swimming Pool Cover (Upgrade)	-218	23,320	5,334	\$8,732,654	n/a	\$5,037,120	n/a	\$7,034,364	n/a
Swimming Pool Cover (New)	232	23,320	5,334	\$8,732,654	\$1.61	\$5,037,120	\$4.07	\$7,034,364	\$5.68
Rain Sensor	200	8,956	2,746	\$136,310	\$0.08	\$202,047	\$0.37	\$243,848	\$0.44
Subsurface Irrigation System	-518	6,520	1,139	\$210,066	n/a	\$72,828	n/a	\$109,541	n/a
Garden Assessment	230	51	13	\$2,040	\$0.17	\$1,709	\$0.56	\$2,241	\$0.73
Flow Regulator	45	59	20	\$590	\$0.22	\$1,209	\$1.37	\$1,406	\$1.59
Domestic Garden Bore	1,581	22,723	2,541	\$56,094,281	\$1.56	\$7,621,067	\$1.90	\$13,893,256	\$3.46
Greywater Re-use System	-623	184	24	\$755,138	n/a	\$102,470	n/a	\$201,830	n/a
Washing Machine	19	54,253	4,113	\$12,038,613	\$11.65	\$9,097,143	\$116.17	\$10,009,788	\$127.82
Rainwater Tank (600L)	424	14,386	854	\$13,907,403	\$2.28	\$903,153	\$2.49	\$1,728,682	\$4.77
Rainwater Tank (2500L)	1,220	14,386	3,095	\$26,445,761	\$1.51	\$8,815,453	\$2.33	\$14,504,957	\$3.84

■ = products less than \$2/kL

Notes: * Annual water savings are based on most recent Water Corporation or Department of Water information. Swimming pool cover upgrades, sub-surface irrigation systems and greywater re-use systems appear to increase water consumption. Water savings for washing machines are based on the difference between 4-star and 4.5-star washing machines. See text for discussion.

** Costs per kL water saved for swimming pool cover upgrades, sub-surface irrigation systems and greywater re-use systems not applicable as these products appear to increase water use, rather than producing water savings. Costs to society include rebate costs on the assumption that government is budget constrained (i.e. rebates have an opportunity cost).

Source: Department of Treasury and Finance and Economic Regulation Authority

Appendix 3 Glossary

Term	Definition
ACCC	Australian Competition and Consumer Council
Act	<i>Economic Regulation Authority Act 2003</i>
Authority	Economic Regulation Authority
COAG	Council of Australian Governments
Corporation	Water Corporation
CSO	Community Service Obligation
ESC	Essential Services Commission (Victoria)
GL	Gigalitre (one billion litres)
IPART	Independent Pricing and Review Tribunal
kL	kilolitre (one thousand litres)
KWRP	Kwinana Water Reclamation Plant
MAR	Managed Aquifer Recharge
ML	Megalitre (one million litres)
NCC	National Competition Council
NWI	National Water Initiative
SDOOL	Sepia Depression Ocean Outfall Line
UWA	University of Western Australia
WSUD	Water Sensitive Urban Design
WWTP	Wastewater Treatment Plant