# Sydney Water Corporation submission to the Independent Pricing and Regulatory Tribunal on recycled water prices and sewer mining for Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council

**March 2006**

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# 1.0 Executive summary

In 2004, the NSW Government released its 25-year Metropolitan Water Plan.[1] The Metropolitan Water Plan identified demand reduction and supply augmentation options to ensure the people of the Greater Sydney area have enough water to meet their needs over the next 25 years. This suite of proposals included greater levels of recycled water for non-drinking purposes, such as watering gardens and flushing toilets.

In February 2006, the NSW Government released a Progress Report on the Metropolitan Water Plan.[2] The Report reaffirmed recycled water's importance in ensuring a sustainable water supply for Sydney. By 2015 the amount of wastewater recycled will grow fourfold to 70 billion litres a year

To meet these objectives, the NSW Government and Sydney Water Corporation (Sydney Water) are currently planning and implementing a series of recycled water projects for new growth areas, existing customers and for river flows.

Underpinning the planned growth in recycled water will be efficient, effective and sustainable pricing arrangements. In this submission Sydney Water sets out its views on the issues raised by the Independent Pricing and Regulatory Tribunal (the Tribunal) in its *Issues Paper* on pricing for recycled water.[3]

In particular, this submission addresses:

- the broad approach Sydney Water suggests the Tribunal should adopt to determine prices for recycled water;
- how the costs of recycled water projects should be estimated; and
- a methodology for calculating prices.

Unlike potable water, there are different qualities of recycled water, which are valued differently by different groups of customers. This suggests that prices should be set on a project by project basis. There would be significant administrative savings if the Tribunal specified a methodology for water agencies to apply when setting prices, rather than setting all prices itself.

Recycled water prices should reflect the costs of the project. The incremental, or additional, costs of a recycled water project to the community include:

- the water agency's capital and operating costs over the life of the project; less
- any direct costs that would be avoided if the project went ahead; less

[1] NSW Government, *Meeting the challenges – Securing Sydney's water future (Metropolitan Water Plan)*, October 2004.
[2] NSW Government, *Securing Sydney's Water Supply – Metropolitan Water Plan (February 2006 Progress Report)*, February 2006.
[3] Independent Pricing and Regulatory Tribunal, *Recycled water prices and sewer mining for Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council – Issues Paper*, February 2006.

- any external benefits, such as environmental benefits from the project (comprising such things as reduced nutrient loads in river systems).

To take account of environmental benefits arising from a recycling project, it may be necessary to provide a subsidy to the project. These subsidies could be funded by water consumers through charges for water services.

## 2.0 Recycling in Greater Sydney

Across Greater Sydney there are 14 recycled water schemes that recycle around 15 billion litres of wastewater a year. By 2015 the amount of wastewater recycled will grow fourfold to 70 billion litres a year.

- Australia's largest residential recycled water scheme is in northwest Sydney's Rouse Hill area. There, 15,500 homes already use 1.3 billion litres of recycled water a year. Eventually the scheme will serve 35,000 homes.
- Homes in Sydney Olympic Park and Newington use 886 million litres of recycled water a year.
- Recycled water irrigation schemes, including golf courses, sportsgrounds, parks, racecourses and farms, use over 1.5 billion litres a year.
- Sydney Water's sewage treatment plants use recycled water for 85 per cent of the water needed in their operations.
- A further 7.3 billion litres will soon be provided to BlueScope Steel in Port Kembla from a new recycled water plant at Wollongong. Recycled water plants and pipelines are also under construction in new suburbs in the Hoxton Park new release area and Ropes' Crossing near St Marys.

As part of the Metropolitan Water Plan, a major recycling scheme will provide recycled water via dual reticulation to 160,000 new homes in suburbs to be built in Sydney's northwest and southwest.

The Government has undertaken detailed planning into the construction and operation of a major Western Sydney Recycled Water Initiative. This is now in the final stages of development and an Expression of Interest will be issued to the market in June 2006. This is scheduled to be completed by 2009 and is expected to produce 21 billion litres of recycled water a year by 2011, rising to 27 billion litres a year by 2015.

When the Western Sydney Recycled Water Initiative is complete, all of the treated wastewater currently being discharged by western Sydney sewage treatment plants will be fully allocated to productive uses. In addition, by removing nutrients currently being discharged by sewage treatment plants, the scheme will deliver water quality improvements in the Hawkesbury Nepean River and its tributaries.

## 3.0 Options for setting recycled water prices

The Tribunal has identified the objective of the review as establishing a consistent and transparent approach for efficient pricing of recycled water. The *Issues Paper* discusses three options for setting prices to meet these objectives:

1. the market decides the price of recycled water;
2. the Tribunal sets prices, either scheme by scheme or on a postage stamp basis; and
3. water agencies apply a methodology established by the Tribunal to set prices.

During a phase of rapid expansion of recycling in NSW the community are likely to desire more transparency in price setting than would be provided if recycled water prices were determined by the market alone. This is particularly the case given the regulation of water and wastewater charges.

In relation to options two and three, transparency can be achieved with significantly lower administrative costs to the Tribunal and to water agencies if the Tribunal established a methodology for water agencies to set prices (option 3), rather than if the Tribunal set all prices itself (option 2).

It is suggested that, in view of the key features of the recycled water market, project-specific pricing would best meet the Tribunal's objective of setting efficient recycled water prices. These features include that:

- recycled water will continue to be supplied through localised projects with discrete customer bases;
- the market for recycled water is still evolving, both for domestic and industrial users, and each market has different characteristics; and
- recycled water is not a homogenous product and different users may demand different qualities of water. There are a number of recycling technologies – including ultra violet treatment; micro filtration; and reverse osmosis – which can be used alone or in combination. Each technology has a different cost, produces water with different characteristics, and, importantly, with a different value in the market (particularly among industrial customers).

At a practical level, even if uniform prices were considered desirable as a matter of public policy, the above considerations suggest that there are too few projects on which to set an 'average' price.

## 4.0 The economic cost of supplying recycled water

An important input to the decision about whether to proceed with a recycling scheme is estimating the economic cost of the project. The economic cost of a recycling project represents the incremental resource costs to Sydney Water and to the community of the project. This approach is consistent with that specified by the NSW Government for appraisal of new capital works.[4]

The economic cost comprises:

- the water agency's capital and operating costs over the life of the project; less
- any costs that would be avoided if the project went ahead; less
- any external benefits, such as environmental benefits from the project (comprising such things as reduced nutrient loads in river systems).

The economic cost of recycling projects is usually calculated on a per kilolitre basis. This enables costs to be compared across recycling projects, and recycling projects to be compared with other sources of supply augmentation and demand management initiatives. In this way, the calculation of economic cost is fundamental to facilitating efficient investment in recycling infrastructure from the community's point of view. An expression for the economic cost is provided in Box 1. Measurement issues associated with each of the elements of the cost are discussed in Section 6.

Box 1: **The economic cost of a recycling project**

$$\text{Economic cost (\$/kL)} = \frac{\text{NPV}\{(\text{CAPEX} + \text{OPEX} + \text{JC}) - \text{AC} - \text{EB}\}}{\text{NPV expected RW demand}}$$

Where:
NPV = net present value
CAPEX = capital expenditure
OPEX = operating expenditure
RW = recycled water
JC = incremental joint and common costs
AC = avoided costs (water, wastewater and stormwater)
EB = external benefits/costs

[4] NSW Office of Financial Management, *Economic Appraisal, Principles and Procedures Simplified*, Treasury Policy paper TPP 99-1, 1999.

## 5.0 Willingness to pay and funding of recycled water projects

Recycled water schemes could be developed by Sydney Water or other enterprises. The principles developed below are designed to apply to any service provider, and could be consistent with the access pricing principles that are being separately developed.

The calculation of the economic costs of recycling options is an important input to decisions on which projects are necessary to augment supply or reduce demand. Sydney Water participates in the development of the Metropolitan Water Plan, including providing information on the economic cost of various project options. Sydney Water is also required to provide services efficiently at least cost, and recover the cost of its investments.

The price of potable water generally determines the amount that consumers are willing to pay for recycled water. In turn, this determines to a large extent the financial viability of recycling projects.

In a range of cases, projects that are justified on economic grounds may not be commercially viable. This could include instances where there are significant environmental benefits that cannot be recovered from users in prices, or significant future cost savings that are not built into a water agency's current prices. In other instances, the Government may consider projects with relatively high economic costs to be worthwhile on other public policy grounds.

In each of these cases, in order to undertake the project, service providers need to be funded for any shortfall. Subsidies could come either directly from the Government, or through the Government directing the Tribunal to allow recovery of any shortfall through other charges.

Increasingly, providers other than Sydney Water may seek to supply recycled water. Ensuring that decisions to subsidise projects are made by a government process, rather than water agencies, will facilitate competitive neutrality between water agencies and other potential service providers.

## 6.0 A methodology to set prices

This section discusses the method Sydney Water suggests the Tribunal should develop for agencies to calculate prices; and discusses the appropriate structure of prices for new and existing customers.

## 6.1 Calculating prices

The *Issues Paper* recognises that there is a distinction between economic costs and the amount that should be recovered in prices. As discussed, the role of the calculation of economic cost is to promote efficient investment in recycled water infrastructure. Once investment decisions are taken, the key role for prices is to promote efficient use of that infrastructure, subject to recovering all relevant costs.

A key pricing principle is that recycled water prices should recover the water agencies' incremental costs.

The incremental cost of a project comprises the direct capital and operating costs over the life of the project less any subsidies provided. A key issue for the review will be determining how avoided costs should be included in prices.

### *6.1.1 Direct costs*

Direct costs include the capital cost of the plant and associated infrastructure plus ongoing operating and maintenance costs. Operating costs encompass both the operation of the plant and any additional staff or resources associated with retailing, such as customer billing and education on the use of recycled water.

In particular, the direct costs of a recycled water project include:

- the capital cost of planning and constructing treatment facilities, new recycled water trunk delivery systems, pumping stations and storage facilities;
- the operating and maintenance cost of treatment facilities, recycled delivery systems, pumping stations and storage facilities;
- the operating cost of potable water top-up to match seasonal variations in demand and production. In growth areas this cost can include the provision of potable water through recycled water pipes to the home until developments generate enough wastewater to produce recycled water;
- the administration costs of conducting community education/information programs, reading meters, billing customers and other ancillary services; and
- the costs of complying with regulatory requirements and risk management measures. This includes the cost of the cross connection inspection program and on-going water quality sampling and analysis.

A project's direct cost may also include the capital cost of converting from potable water to recycled water. Conversion costs broadly include plumbing costs, on-site treatment and risk and health management measures. In most

circumstances these costs will be met by the end-user. If, on occasion, Sydney Water undertakes the conversion and meets the capital cost then it should be included in the direct cost of the project.

### *6.1.2 Joint and indirect costs*

Sydney Water provides a range of products and services such as potable water, wastewater, stormwater and recycled water. Consequently, there are some joint and indirect costs across all services.

Joint costs relate to costs that do not vary with the type of service being provided. For example, customer services and billing infrastructure is necessary for all services. Indirect costs are those cost that cannot be directly attributable to a particular service or product. This includes general corporate overheads, financial services, human resources, and other management functions.

Only directly attributable increases in cost should be included when estimating the economic cost of a recycled water project. However, in setting prices, it is necessary for firms to recover all overhead costs across its suite of services. While recycling revenue is a small proportion of total revenue, it is acceptable on efficiency and equity grounds to recover only incremental overheads in prices.

### *6.1.3 Identification and valuation of externalities*

Externalities are costs or benefits to the community arising from the production of recycled water that are not, in the absence of action by governments, taken into account in prices.

*External benefits*

Possible external benefits of a recycled water project can include:

- improved water quality due to a reduction in nutrient levels. This reduces the level of algae and exotic weeds and reduces the decline in aquatic life such as native fish and waterbird populations;
- reduced environmental impacts associated with water extraction for potable use; and
- reduced health risks including cleaner water for swimming, boating and fishing (this may include commercial fishing).

*External costs*

Possible external costs of a recycled water project include:

- a decrease in land values because of aesthetic costs from the building and operation of a recycled water plant in the community; and
- an increase in carbon emissions from recycled water production.

The valuation of externalities is not a straightforward exercise. In the first instance, Sydney Water can play a role in providing information about the physical impacts of a project, such as the net change in flows of treated sewage into waterways or oceans, and the level of greenhouse gas emissions from recycled water plants. It can also draw on existing information and its own resources to provide a broad indication of the significance of external costs and benefits for a particular project. However, other agencies are likely to have a role in the assessment of external benefits and costs, and a role in assessing the case for providing subsidies for these benefits where they are significant.

### *6.1.4 Avoided costs*

In measuring the net change to total costs it is also necessary to consider any cost savings that could be achieved in Sydney Water's water, wastewater or stormwater networks. Potential cost savings from a recycled water project in existing networks can be broadly classified as either:

- current system operation and maintenance savings; or
- future system capacity savings.

Current system operation and maintenance savings largely relate to reductions in pumping and disposal costs associated with the sewage that would have otherwise been processed by the existing system. These cost savings are project specific and are influenced by factors including:

- the point of extraction;
- the amount extracted; and
- the amount of, and point where, wastewater effluent is discharged back into the wastewater network.

If wastewater is sourced from Sydney Water's network prior to the sewage treatment plant then system operation and maintenance savings may be realised from the point of extraction to the point where effluent is discharged back into the system. However, if the wastewater is sourced after the sewage treatment plant then there are unlikely to be any current system operation and maintenance savings.

Current system operation and maintenance system savings could also be reflected in 'licence compliance' savings. These refer to possible reductions to Sydney Water's load based licence costs due to reduced wastewater effluent being discharged into receiving waterways. If the recycled water project reduces load based licence costs then these savings can be an input into the calculation of Sydney Water's incremental cost.

Future system capacity savings refer to possible deferment of capital infrastructure upgrades or system augmentations in the water and/or wastewater networks. There are four types of avoided costs in relation to upgrades and augmentation:

- deferral of water distribution capacity;
- deferral of wastewater distribution capacity;
- deferral of construction of sewage treatment plants or upgrades to existing plants; and
- deferral of potable water headworks expenditure.

A summary of possible current system operation and maintenance and future system capacity savings for a recycled water project are shown in Table 1.

*Table 1: Examples of possible avoided costs*

| **Network** | **Current system operation and maintenance savings** | **Future system capacity savings** |
|---|---|---|
| Water | - local pumping costs<br>- local reservoir maintenance and operation | - deferment of measures to augment supply, eg raise a dam wall<br>- deferment of water distribution capacity, eg trunk mains and pumping stations |
| Wastewater and stormwater | - sewage pumping costs<br>- treatment costs at STPs<br>- licence compliance savings | - deferment of treatment plant upgrades<br>- deferment of system amplifications, eg trunk mains and pumping station upgrades |

*Incorporating avoided costs in prices*

An important area for consideration by the Tribunal is the extent to which avoided costs should be included in prices, and possible mechanisms to achieve this.

If a recycling project resulted in savings in water, wastewater treatment or stormwater operating costs (such as treatment and pumping costs), a water agency will realise these savings since the prices for its other services are set to recover operating costs. This provides water agencies with the capacity to deduct avoided costs from the cost of supply thereby reducing recycled water charges. It is noted, however, that these savings are generally quite modest.

In contrast, the treatment of deferred capital costs is more complex, particularly in relation to avoided potable water headworks. As prices of potable water are generally set to cover the long run marginal cost (LRMC) of water, the Tribunal is well placed to provide guidance on the extent to which existing water prices reflect the economic cost of providing water. To the extent existing water prices do not recover the full economic costs (including externalities) of providing water, then the case for subsidising recycling schemes is increased.

In Greater Sydney, the LRMC of water is increasing as it is necessary to seek more expensive sources of supply. By reducing the demand for potable water, a recycling project can reduce future increases in the LRMC of water. This generates a saving for water consumers. Future rises in the per kilolitre charge for water would not be as large as they otherwise would be. In addition, to the extent developer charges fund future expansions in supply, developer charges would also be lower than they otherwise would be.

For water agencies, however, it is important to note that the future savings arising from deferment of capital expenditure are not necessarily reflected in its prices for potable water. As a consequence, automatically reducing recycled water prices by the future savings would leave water agencies facing future losses.[5]

In developing a pricing methodology, the Tribunal should consider mechanisms to enable future savings to be reflected in recycled water prices. It would appear that as the beneficiaries of future savings, potable water users should contribute to the recycling projects that will generate these savings.

One option to manage such a contribution would be for the pricing methodology to include a mechanism whereby the Tribunal approves an increase in cost recovery for other water and wastewater services linked to reducing recycled water prices by avoided costs.

### *6.2 Structure of prices for new and existing customers*

Different arrangements are likely to be appropriate for structuring prices for growth (mainly residential) customers and for existing (mainly industrial) customers.

#### *6.2.1 Growth customers*

Sydney Water proposes that capital costs should be recovered through developer charges and operating costs through volumetric charges.

Recovering capital costs through developer charges is consistent with the Tribunal's Determination, in 20006, on a developer charges methodology. The Determination states that these charges should be calculated on a project-specific basis using a present value method. The present value formula for the developer charge per lot for a recycling project is provided in Box 2.

[5] In cases where a project results in savings in capital expenditure that was approved as part of the current determination, the water agency will realise these savings. In these cases the savings would be treated in the same way as operating cost savings.

[6] Independent Pricing and Regulatory Tribunal, *Determination number 9: Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council – Developer charges from 1 October 2000*, 2000.

Box 2: **Expression for the developer charge**

$$\text{Developer charge(\$/lot)} = \frac{\text{NPV (CAPEX – AC – Subsidy)}}{\text{NPV expected RW demand}}$$

As noted in Box 2, the developer charge should be reduced to reflect any subsidy provided. It could be argued that subsidies for external benefits are related to how much recycled water is used, and should be included in a volumetric charge. However, for recycling projects the avoided costs and external benefits are more closely related to whether a project proceeds rather than the volume of recycled water used at the margin. For example, a project may be economic only when environmental benefits are included. Assuming these were funded as a community service obligation, reducing the development charge may make the project financially attractive to a developer. By contrast, offsetting environmental benefits against the volumetric charge would be irrelevant if the developer refused to undertake the project.

The principal advantage of recovering capital costs up-front through a developer charge is that the volumetric charge then reflects the additional costs of producing a unit of water – in this case Sydney Water's direct operating costs and incremental joint costs. Setting the volume charge to cover these costs sends the right price signal to consumers to efficiently use recycled water. An expression for the volumetric charge to consumers is provided in Box 3.

Box 3: **Expression for the volumetric charge for growth customers**

$$\text{Volumetric charge (\$/kL)} = \frac{\text{NPV(OPEX + incremental JC)}}{\text{NPV expected RW demand}}$$

With respect to operating costs, recycling infrastructure is optimised by balancing demand with the scale of the plant. It would not be economic to build a plant with capacity to meet all peak loads. During large peaks in demand it is more cost effective to top up the system with potable water. Thus one component of the operating cost is the value of the potable water provided as an input to the scheme.

### *6.2.2 Existing customers*

For existing customers (where capital costs cannot be recovered via developer charges), different charging regimes may be appropriate for different customer types.

Where there are many small customers and the cost of servicing each customer is similar, an annual access fee to recover capital costs and a volumetric charge to cover operating costs could be appropriate. This could capture the same efficiency benefits as using developer charges.

However, where there are a few large customers and the cost of servicing each customer varies, direct negotiations with the customers on the form of the price is likely to be more appropriate. For example, some industrial customers with fixed demand for water may prefer a single volumetric charge (that includes capital and operating costs). In other circumstances, a take or pay contract may be negotiated to recover Sydney Water's costs.

Whatever structure of prices is adopted, the key principle is that prices cover all relevant costs (as described in Box 2). While market conditions will influence the form of the recycled water price, the administrative costs to Sydney Water of implementing various pricing options will also be an important consideration.

## 7.0 Sewer mining

The *Issues Paper* seeks water agencies' views on the appropriate level of price regulation for sewer mining, and approaches for determining prices for sewer mining projects.

Sewer mining differs from other forms of recycling schemes in that the water produced is used exclusively by the recycler for its own purposes rather than sold to customers.

Nevertheless, the broad pricing principle should be consistent across the two forms of recycling. Thus, the prices for sewer mining should recover the incremental costs of Sydney Water providing the service. The suggested approach in relation to the treatment of avoided costs for recycling applies equally to sewer mining, and it will be important to resolve these issues on a consistent basis.