

**Investigation into Price Structures to Reduce the
Demand for Water in the Sydney Basin**

Final Report

**INDEPENDENT PRICING AND REGULATORY TRIBUNAL
OF NEW SOUTH WALES**

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Demand for Water in the Sydney Basin**

Final Report

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1 INTRODUCTION

In September 2003, the Premier of New South Wales asked the Independent Pricing and Regulatory Tribunal of New South Wales (the Tribunal) to investigate alternative structures for retail and wholesale water prices, to assess their potential to reduce demand for water in the Sydney Basin. The investigation was to inform the Government's broad water policy development process, and to provide input to the 2005 metropolitan water price review, when the Tribunal will make its final decisions on the structure and level of the prices the Sydney Water Corporation and the Sydney Catchment Authority can charge during the next determination period.

1.1 Key findings

The Tribunal has completed this investigation, following the process outlined in Box 1.1. In relation to retail water prices, it found that the most suitable price structure for Sydney is likely to be an 'inclining block' structure, which includes a two-tiered variable usage charge and a lower fixed access charge. The advantages of this price structure compared to the alternative options examined include that:

- it could potentially be used to send a strong signal about the need to conserve water that particularly targets high water users (who the Tribunal assumes use a higher proportion of their consumption for discretionary purposes and so will be able to respond to this signal)
- it could be set to minimise the number of customers who are required to pay the higher Tier 2 usage charge for efficient or non-discretionary water use
- it has considerable potential to reduce demand
- it is likely to have the least impact on vulnerable customers
- it is relatively easy to understand, implement and administer.

However, there are also disadvantages associated with an inclining block price structure, and limitations on its application. First, it would increase the volatility and uncertainty of Sydney Water's revenue, and expose the agency to increased forecast risk. The Tribunal will need to consider these impacts carefully before making final decisions on retail water prices as part of the 2005 price review.

Second, for practical reasons, an inclining block price structure could only be applied to residential customers whose water usage is individually metered. It would not be suitable for residential customers whose water usage is measured via a bulk meter (such as those living in home units), or non-residential customers.

Third, while the introduction of this price structure could help to encourage demand management, it is unlikely to solve Sydney's supply-demand imbalance on its own. It would need to be complemented by a range of non-price measures, including demand management initiatives and supply augmentation.

In relation to the wholesale price structure, the Tribunal is not convinced that introducing a step price structure is the most appropriate way to remove the financial incentive on Sydney Water to sell more water, enforce a cap on water extractions, or assist with the development of a secondary market in alternative water sources. While its analysis was hampered by

inadequate information and uncertainty about key policy parameters, it believes other available measures are likely to be more effective and less risky than a step price.

If the NSW Government decides to limit the amount of water that Sydney Water can take from the Sydney Catchment Authority, the Tribunal could consider whether a penalty should be introduced for breaching the cap as part of its current licensing review for Sydney Water. The use of any revenue generated by the penalty would be for the Government to decide.

The Tribunal considers that the appropriate next step towards wholesale water price reform is to review the balance between the fixed access charge and the variable usage charge and, if possible, set the usage charge with reference to the SCA's long run marginal cost. Long run marginal cost here refers to the additional costs of the measures that the SCA must incur to balance supply and demand, divided by the amount of additional water provided by those measures.

1.2 Structure of report

This report explains the Tribunal's investigation, findings and conclusions in detail:

- Chapter 2 sets important contextual information, including the Tribunal's key considerations and the limitations it faced in undertaking analysis and reaching conclusions
- Chapter 3 explains the Tribunal's approach and indicative findings on the alternative options for the retail price structure
- Chapter 4 explains the Tribunal's approach and indicative findings on the wholesale price structure
- Chapter 5 sets out the Tribunal's likely next steps in pursuing water price reform.

The Tribunal members who considered this review were Mr James Cox (Acting Chairman) and Ms Cristina Cifuentes (Member).

Box 1.1 Tribunal's review process

In undertaking this investigation, the Tribunal has consulted stakeholders, sought expert advice and undertaken its own analysis. As part of this process, it:

- released an Issues Paper in December 2003, which included theoretical analysis and a number of pricing scenarios for comment
- invited submissions from Sydney Water, Sydney Catchment Authority and other stakeholders and made these available to the public
- held a public hearing on 25th March 2004 to provide a further opportunity for stakeholders to express their positions
- engaged the Centre for International Economics to provide economic analysis and advice, and made its report available to the public
- sought additional information and advice from Sydney Water Corporation on aspects of retail price structure proposals
- undertook extensive analysis, including modelling the potential effects of various options for the structure of retail water prices on demand and on customers.

2 UNDERSTANDING THE CONTEXT, CONSIDERATIONS AND LIMITATIONS OF THIS INVESTIGATION

This investigation was not a straightforward or easy process, and it has not resulted in definitive answers about future water price structures for the Sydney area. To correctly interpret its findings and conclusions, the Tribunal believes it is important that all stakeholders fully understand the context of the investigation, and its considerations in assessing the various options, and the limitations it faced in undertaking its analysis and comparing the options. Each of these issues is discussed below.

2.1 The context

As noted in Chapter 1, this investigation was intended to fulfil two main purposes. The first was to inform or provide input to the Government's broad water policy development process—particularly, its overall response to the imbalance between the available supply of water in the Sydney Basin and the demand for this water. The second was to provide input to the 2005 metropolitan water price review, by considering alternative price structures to inform stakeholders' submissions to this review, as well as the Tribunal's future deliberations for this review. The Tribunal was *not* required to recommend specific water price structures, or to set water prices.

Although the investigation was instigated during an extended period of drought, Sydney's supply-demand imbalance is a longer term issue. Even when the current drought breaks and Sydney's water storages are filled to capacity, the longer term trends in demand and population growth indicate that the supply-demand imbalance will grow.¹ In addition, the likelihood that more water will need to be released as environmental flows to protect the health of the Hawkesbury Nepean river system will further exacerbate this imbalance.

One of many potential measures that could be used to address this problem is to increase the price of water, or alter the structure of water prices, to encourage a reduction in demand. In this context, the Tribunal was asked to investigate and report on the potential for changes in water price structures to reduce demand for water in the Sydney Basin. The Terms of Reference for the investigation asked it to assess alternative structures for:

- **retail tariffs**—that is, the tariffs Sydney Water charges its residential and non-residential customers, who are the end users of water
- **wholesale tariffs**—that is, the tariffs the Catchment Authority charges Sydney Water for bulk water (which Sydney Water treats then on-sells to end users).

In relation to retail tariffs, the Tribunal was asked to consider a range of alternative options for the tariff structure, including an inclining-block usage charge with a lower fixed charge. In relation to wholesale tariffs, it was asked to consider one specific option—a step price that would apply to water extracted in any year above the estimated safe yield of the catchment. (The full Terms of Reference are provided in Appendix 1.)

¹ IPART, *Investigation into Price Structures to Reduce Demand for Water in the Sydney Basin – Issues Paper*, December 2003.

2.2 Key considerations

In assessing each of the alternative price structure options and developing its conclusions, the Tribunal considered a range of competing pressures and interests, and tried to determine whether adopting the option would lead to an outcome that appropriately balances these interests. Its key considerations reflect the Terms of Reference for the investigation, the matters it is required to consider when setting water prices (see Box 2.1), and good regulatory practice. They include:

- the potential for the option to reduce water demand
- the potential impacts on customers and the water agencies
- how easy the option would be for customers to understand and for the water agencies to implement and administer
- whether the option is consistent with the principles of economic efficiency.

2.2.1 Potential to reduce water demand

According to basic economic theory, increasing the price of any product is likely to encourage consumers to use less of that product, either by changing their consumption patterns or by switching to an alternative product to avoid paying the higher price. So in theory, increasing the price of potable water should encourage consumers to use less of it—for example, by changing their behaviour so they use less water for discretionary purposes (such as gardening and car washing) and by creating an incentive to invest in water efficient appliances and switch to alternative forms of water (such as recycled or non-potable water).

Changing the structure of water prices—so that customers with higher consumption rates or particular consumption patterns pay more while those with lower consumption rates or other consumption patterns pay less—can also encourage lower water use. This approach can target the component of water consumption that is likely to be discretionary and so can be easily reduced or substituted with other forms of water.

The effectiveness of alternative price structures in reducing demand will depend on the strength and type of pricing signals they send to different customer segments, and on customers' reaction to those signals. The Tribunal believes that ideally, the water price structure should send a strong signal about the need to conserve water to all customers, and particularly those with high consumption levels, who use a large proportion of their consumption for discretionary purposes and so can respond to the price signal by reducing demand. However, this is only practical if customers pay water bills that are based on their own, individually metered consumption.

2.2.2 Potential impact on customers

Changing the structure of water prices would almost certainly mean that some customers pay more for the same level of consumption (relative to today) while others pay less. Indeed, to send strong signals about the need to conserve water, some customers may need to pay significantly more.

In relation to retail tariffs, the Tribunal considered the potential impacts of alternative price structures on residential customers, and particular ‘vulnerable’ customers who have a relatively low income per household member, and so are less able to afford an increase in their annual bills. It also took into account the results of its recent survey of household water use, which found that the primary driver of household water consumption is household size (that is, the number of people living in the house). This finding means that larger households are likely to use more water to meet basic, non-discretionary needs and so have less ability to respond to price signals by reducing their consumption. The Tribunal believes that ideally, the retail price structure should not expose a high number of vulnerable customers to higher water bills, should target discretionary water use, and should be set to minimise the extent to which larger households are required to pay higher charges for efficient or non-discretionary water use.

The Tribunal had limited ability to assess the potential impacts on non-residential customers. These customers use water for many different purposes—for example, to flush toilets in office buildings, to water market gardens, and in industrial processes. There are no data available to assess what portion of this use is discretionary, or analyse how the different price options will affect the affordability of water for these customers. However, the Tribunal considered the submissions it received from stakeholders.

2.2.3 Potential financial impact on water businesses

Changing the structure of water prices will also affect Sydney Water and the Sydney Catchment Authority (SCA). The Tribunal has assumed that if an alternative price structure were introduced, it would be intended to be revenue neutral. Nevertheless, some price structures would make it harder to ensure that the water agencies generate close to their required revenue in any year, and would increase the volatility of this revenue from year to year. This increased revenue uncertainty and volatility could affect their long-term profitability and viability.

For example, the Tribunal sets prices for Sydney Water based on an estimate of the agency’s revenue requirements and forecast demand over the determination period. If a new price structure were implemented, the degree to which customers will respond by reducing their water consumption cannot be known. This will make it difficult to forecast demand accurately, and so create a risk that the agency will not earn the revenue it needs. With some price structures, there is also a risk that the revenue it earns will vary significantly over the determination period. Any impact on Sydney Water’s revenue will flow through to the SCA, as Sydney Water is its main customer. The Tribunal considered the extent of this risk when assessing each price structure option, as well as the regulatory mechanisms that might be used to manage this risk.

In addition, changing the structure of water prices might change the incentives for the water agencies. For example, under the current regulatory arrangements, Sydney Water appears to have an incentive to maximise its water sales, as the more it sells, the more revenue it earns. (However, the extent to which this incentive actually drives and influences decision making within the agency is not clear.) The Tribunal considered how the alternative price structures might reduce or minimise this financial incentive, as well as other regulatory mechanisms that might achieve the same objective.

Although the Tribunal has undertaken its analysis for this investigation on the basis of revenue neutrality, it should be noted that the high level of capital expenditure undertaken by Sydney Water in recent years is placing upward pressure on prices.

2.2.4 Ease of understanding and implementation

The Tribunal considered how easy each price structure option would be for customers to understand, as this will affect its effectiveness in signalling the need to conserve water. If customers cannot clearly understand the price structure and its signals, they are unlikely to respond in the desired way.

It also considered how easy each option would be for the water agencies to implement and administer, and the costs that this would involve. The Tribunal took the view that introducing an option that is complex and costly to administer would be contrary to good regulatory practice. For some options, it considered that the complexity and costs involved made their introduction impracticable.

2.2.5 Consistency with the principles of economic efficiency

The Tribunal considered whether the alternative price structures were consistent with the principles of economic efficiency. This is necessary to ensure that water prices reflect the efficient costs of operating the water agencies. Efficient pricing is important to ensure that available water resources are not over-used and to discourage over- or under-investment.

Economic theory suggests that the efficient price for any product is its marginal cost of supply—that is, the incremental cost to the supplier of producing an additional unit of the product. For a water agency, the marginal cost of supply represents the additional cost of supplying an additional kilolitre of water to a customer or taking action to reduce the customer's demand by one kilolitre. So in theory, setting water prices based on this marginal cost sends the appropriate signal to both consumers and the agency about the cost of both consuming an additional kL of water and also offering an additional kL for sale.²

As discussed in the introduction to this paper, Sydney is now facing difficulties in balancing the demand for water with the supply of water. Precisely what needs to be done will become clearer following Government announcements later in the year. Depending on the amount of water that the Government decides is available to Sydney Water from the SCA, Sydney Water will have to take measures either to obtain water from alternative sources or to limit further the demand of its customers through further demand management measures. Each of these measures involves capital and operating costs over a number of years. It is these costs (technically known as long run marginal costs (LRMC)) that need to be signalled to customers by setting the usage component of Sydney Water's water charges to equal Sydney Water's LRMC of providing water. The LRMC is calculated by dividing the costs of balancing the supply and demand for water in the Sydney area by the additional amount of water either purchased or saved through demand management measures.

² Marginal cost pricing encourages consumers to continue to consume water up until the point where the additional cost (marginal cost) of that water equals the additional benefit received from consuming that water (marginal benefit) whereas the water authority will, in theory, continue to offer water for sale up until the point where the additional revenue earned (marginal revenue) equals the additional cost of supply (marginal cost).

The least cost set of measures required to achieve a low cap (for example for Sydney Water to draw no more than 550GL per annum from SCA sources) will be very different from those required to reach a high cap of say 600GL per annum. The LRMC for Sydney Water will be much higher in the first instance than in the second. Because this target is not yet known, the Tribunal cannot at this stage estimate Sydney Water's LRMC.

A similar problem arises for the SCA. It too will be required to undertake a program of investment and operating expenditure to provide a given amount of water to Sydney Water. It is these costs (per unit of water) that need to be signalled to Sydney Water through the usage component of charges.

The Tribunal believes that in Sydney's current circumstances, water prices should be set with reference to a reasonably accurate estimate of the relevant water agency's LRMC. In addition, based on the advice it received from the CIE³, this LRMC needs to be calculated to include the costs associated with the sequence of measures the agency will undertake as part of an integrated government plan to achieve and maintain a supply-demand balance and comply with Hawkesbury-Nepean environmental flow requirements. (The critical role of the LRMC in setting water prices is discussed in more detail in Chapter 4.)

2.3 Key limitations

The Tribunal faced several important limitations that affected its ability to assess the alternative price structures and analyse their potential impacts. Some of these limitations have been discussed above—including the uncertainty about likely customer responses to the alternative retail price structures, and therefore the potential impact of these structures on demand and agency revenue, and the lack of information about non-residential retail customers' water use (discussed in section 2.2.2).

Other key limitations, which primarily affected the Tribunal's ability to analyse the impact of a wholesale step price, included:

- uncertainty about the future safe yield of Sydney's catchments
- the need to consider the potential impact of an overarching strategy to address the supply/demand imbalance, which the NSW Government is currently developing
- the absence of reliable estimates of each water agency's LRMC that is consistent with this broader strategy
- the multiple (and often conflicting) objectives that are required to be advanced through pricing policies.

2.3.1 Uncertainty about the safe yield of Sydney's catchments

As part of its end-of-term review of the SCA's operating licence, the Tribunal is currently considering the performance criteria specified in this licence, which largely relate to the frequency, duration and severity of water restrictions. One effect of the current criteria is to limit the amount of water that the Catchment Authority can release year after year from its storages without breaching the operating licence conditions. This amount is known as the

³ Centre for International Economics, *Water Price Restructuring and the Role of Sydney's Wholesale Water Price*, 2004.

safe yield. If the Tribunal decided to change these criteria, it could have implications for the level of the safe yield.

In addition, the Hawkesbury Nepean River Management Forum has delivered its final report to the Government and recommended that an increased allocation of Sydney's existing water supply be released as environmental flows to improve the health of the Hawkesbury-Nepean river system. However, final decisions on the volume of these flows and how they are to be achieved have yet to be announced. These decisions could also have significant implications for the safe yield.

2.3.2 Overarching strategy to address supply/demand imbalance

The Government has foreshadowed that it will develop a metropolitan water strategy to address Sydney's longer term supply-demand imbalance. To date, it has indicated that building another dam is not a preferred option, and introduced tougher water efficiency standards for new buildings. However, there are a wide range of other non-price measures that it could introduce—including undertaking a range of smaller supply augmentation works, increasing inter-basin transfers, investing in water recycling, desalination plants and demand management, and adjusting the conditions of the water agencies' operating and other licences.

Without this broader strategy in place, it is difficult for the Tribunal to assess the extent to which price signals need to play a role as part of an integrated plan to close the supply-demand gap. It is also impossible to develop reliable estimates of the water agencies' LRMC, as these estimates need to incorporate the costs each agency will need to incur to implement the metropolitan water strategy.

2.3.3 Absence of reliable estimates of the water agencies' LRMC

As discussed in section 2.2.5 above, the Tribunal believes that to be consistent with sound economic principles, water prices and price structures should be based on an understanding of the relevant water agency's LRMC. In the circumstances Sydney currently faces, where there is a long-term imbalance between supply and demand, water prices should be based on the LRMC that includes the costs the agency will incur in achieving and maintaining a supply-demand balance.

However, attempting to calculate this LRMC is inherently complex. It involves estimating accurately the costs and water savings associated with the many demand management and supply augmentation options that may be available in the future. The timing of implementation of these options significantly influences the calculation of present LRMC, so the options also need to be ordered into a sequenced timetable. Not only was this beyond the scope of this investigation, it cannot practically be done until the Government has developed its metropolitan water strategy, and made decisions on what supply augmentation and demand management options are available for implementation. It also cannot be done until final decisions have been made on the safe yield of the catchments, and the size of the gap between supply and demand has been determined.

The absence of reliable estimates of each agency's LRMC has made it difficult for the Tribunal to analyse and compare the different options, particularly for the wholesale water price.

2.3.4 Multiple Objectives

Much current discussion is focussed on the need to use Sydney Water's pricing structure to reduce the demand for water in the Sydney Basin. Although this is an important objective of pricing policy, it is not the only objective. In deciding on Sydney Water's pricing the Tribunal must also ensure that customers do not over pay and that Sydney Water and the SCA have sufficient revenue to fulfil their responsibilities. Pricing outcomes inevitably involve an element of compromise between competing objectives.

It is entirely possible, therefore, that what can be achieved through varying the price structure for Sydney Water may fall short of what might be considered desirable to reduce the demand for water. While a higher usage price will limit the demand for water it may not be desirable (on cost reflectivity grounds) to increase the usage price to such an extent that fixed charges for water are reduced to zero or very low levels.

The Government may wish to consider adding a levy on water use to Sydney Water's usage charges. Such a levy would recognise the environmental consequences of water use. The revenue from the levy would accrue to the Government rather than Sydney Water because the purpose of the levy is to recognise the environmental consequences of water use rather than to recover Sydney Water's costs. Some other States and territories have introduced such a levy.

Although the decision to introduce a levy is one for the Government, the Tribunal could facilitate the introduction of the levy in its pricing determination if the Government so decided.

Box 2.1 The Tribunal's approach to water pricing

When setting prices for Sydney Water and the SCA, the Tribunal takes a wide range of considerations into account, in line with the requirements of the *Independent Pricing and Regulatory Tribunal Act 1992* (the IPART Act). These considerations can be broadly grouped as follows:

- **consumer protection** – protecting consumers from abuses of monopoly power; standards of quality, reliability and safety of the services concerned; social impact of decisions; effect on inflation
- **economic efficiency** – greater efficiency in the supply of services; the need to promote competition; effect of functions being carried out by another body
- **financial viability** – rate of return on public sector assets including dividend requirements; impact on pricing of borrowing, capital and dividend requirements of agencies
- **environmental protection** – promotion of ecologically sustainable development via appropriate pricing policies; considerations of demand management and least cost planning.

3 RETAIL PRICE STRUCTURE

The Tribunal examined five alternative options for changing the structure of retail water tariffs, including:

1. introducing a two-tier or 'inclining block' usage charge, and reducing the fixed service charge
2. increasing the current usage charge and reducing or removing the fixed service charge
3. introducing a combined water and sewerage usage charge
4. introducing a seasonal pricing regime
5. introducing differential pricing for non-residential outdoor use.

Based on the considerations discussed in Chapter 2, and the analysis described in section 3.2 below, the Tribunal believes that the most suitable option for Sydney at the present time is Option 1, which includes a two-tier or inclining block usage charge. It believes that this price structure can potentially be used to send a strong signal about the need to reduce water consumption that particularly targets discretionary water consumption. In addition, it believes the potential adverse impacts of this price structure on vulnerable customers could be minimised by setting the consumption level at which the Tier 2 usage charge becomes applicable (the step quantity) high enough to ensure that the bulk of households can meet their basic, non-discretionary needs without incurring this charge.

However, an inclining block tariff would only be suitable for residential customers whose water usage is individually metered. This excludes most of those who live in flats and units, where water usage is usually measured via a bulk meter for the entire block. As these customers usually pay a pro-rated amount based on the total consumption and number of units in the block,⁴ the usage charge cannot practically be used as a signalling device for these consumers. It also excludes non-residential customers, as the highly varied nature of their water use makes it too difficult to set an equitable step quantity that primarily targets discretionary consumption for these customers.

While introducing an inclining-block tariff price structure may help to encourage reduced demand, it is unlikely that it would solve Sydney's supply/demand imbalance on its own. Rather, it should be considered as one of a range of options to encourage water conservation and must be complemented by other non-price demand management initiatives. (A more detailed discussion about the circumstances in which an inclining block tariff is appropriate is provided in Appendix 4.)

The Tribunal also believes it may be appropriate to increase the level of the Tier 1 usage charge under Option 1, to send a stronger signal about the scarcity value of all water. However, this level would need to be set with reference to a reliable estimate of the LRMC of achieving and maintaining a supply-demand balance, which is not available at present, and may not be available for the 2005 price review (see section 2.3.3).

⁴ Or the owners corporation pays the usage component from strata levies.

While the Tribunal has developed an indicative position on some of the components of an inclining block tariff structure, it will make its final decisions as part of its 2005 metropolitan water price review. If it decides to introduce two-tier usage charges, it will determine the level of the Tier 1 and Tier 2 usage prices, the step quantity, and the level of the fixed access charge as part of that review, based in part on its estimate of Sydney Water's revenue requirements.

This chapter discusses these findings and explains how the Tribunal reached them in more detail. It sets out:

- the current retail price structure
- the Tribunal's approach in assessing the alternative price structure options
- its analysis and conclusions on each option.

3.1 Current retail price structure

For the year ending 30 June 2004, Sydney Water charged its residential customers a two-part tariff consisting of a usage charge of \$0.98 per kL, and a fixed service charge of \$76.55 per annum. For sewerage services, it charged these customers a fixed service charge of \$338.54 per annum.⁵

The Tribunal phased in this structure between 1993 and 1995, to replace the existing price structure that was based in part on the value of the customer property being serviced. Its objectives in doing so were to encourage more efficient resource allocation, move towards cost reflective pricing, and send a stronger conservation signal to customers.

The variable usage component ensures that customers recognise the costs associated with water consumption—they can then decide how much water to use based on the extent to which they are prepared to bear these costs. The fixed component reduces the variability of Sydney Water's revenue, and can be used as a balancing item to ensure that it earns adequate revenue during long periods of excess capacity when the revenue from charges based on marginal cost would be insufficient.

However, the current price structure was introduced at a time when water scarcity was not as significant a concern as it is today. The Tribunal believes it is appropriate to review this price structure, to ensure it reflects current priorities.

3.2 Approach in assessing each option

The Tribunal assessed each option against the considerations discussed in Chapter 2, and subject to the limitations discussed in Chapter 2. This assessment identified that Options 1, 2 and 3 appeared to be the most appropriate and practicable options at this stage. It then analysed these three options in detail, by developing a price structure model and modelling their potential impact on Sydney Water's total annual water demand and on customers' annual bills. The price structure, modelling and assumptions used are discussed below.

⁵ For consistency with modelling undertaken for this review reference to existing charges relate to the prices set by the Tribunal for the period 1 July 2003 to 30 June 2004. The usage price for water from 1 July 2004 is \$1.01 per kL.

3.2.1 Developing a price structure model

The Tribunal developed a model of Options 1, 2 and 3 assuming they would be revenue neutral to Sydney Water. This means that the structure and the level of the price components under each option were designed to generate the same level of revenue as Sydney Water receives under the 2003 determination. The Tribunal used the revenue allowed under the 2003 determination because Sydney Water's revenue requirement for the 2005 determination is not yet known.

The revenue neutrality assumption meant that to determine indicative prices for each option the Tribunal had to rebalance the individual components within the price structure to generate a given level of revenue, rather than change the total price level. Any change in one component of the price structure (such as increasing the Tier 1 usage charge, or introducing a Tier 2 usage charge) had to be offset by a change in another component (such as reducing or removing the fixed charge). A more detailed discussion of the Tribunal's price model is provided in Appendix 2.

3.2.2 Modelling potential to reduce demand

The Tribunal used the price model to assess the potential impact on *residential* demand of Options 1, 2 and 3. While it is impossible to know exactly how customers will react to a change in the water price structure, this modelling indicates the *potential* impact on demand if customers react in a predictable way. It also enables the options to be compared with each other.

To determine the most likely customer reaction, the Tribunal reviewed various estimates of the price elasticity of demand (PED) for water from Australia and other countries (see Box 3.1). Whilst there were a wide range of estimates, the most relevant of these indicated that a 10 per cent increase in the price of water in Sydney would cause a 1.3 per cent reduction in the total quantity of water used. Based on this finding, and an assumption that a residential customer's water use becomes more elastic as it becomes more discretionary, the Tribunal's modelling assumed that for a 10.0 per cent increase in the price of water:

- low water users will reduce their consumption by between 0.1 and 0.5 per cent
- medium water users will reduce their consumption by approximately 2.0 per cent
- high water users will reduce their consumption by 3.0 per cent.

As the Tribunal noted in its Issues Paper for this investigation, there is some uncertainty about whether customers respond to the marginal price or the average price when making decisions about how much water to consume. Economic theory suggests that a rational consumer would purchase water up to the point where the marginal cost of water was equal to the marginal benefit received through consuming that water. The decision to purchase more water would therefore be based on the marginal price (that is, the price for each additional unit of consumption). However, some studies have reported that consumers make decisions based the size of their periodic water bill—that is, the average price.

In the absence of information about whether Sydney Water's customers are likely to respond to the average or marginal price, the Tribunal modelled the potential demand reduction under each price structure option assuming both an average and a marginal price response.

Box 3.1 Understanding the price elasticity of demand for water

The price elasticity of demand (PED) measures the percentage change in the quantity of a product demanded that results from a change in price. Where a small change in price results in a large change in the quantity demanded, demand is said to be elastic. Where a small increase in price has little to no impact on the quantity demanded, demand is said to be inelastic.

The magnitude of PED is crucial to the question of how effective pricing policies are in achieving positive outcomes by changing consumer behaviour. Prices are signals to consumers, but these signals will only affect consumer behaviour to the extent that demand is elastic.

Estimates of the price elasticity of water from around the world (and the methodologies used to derive these estimates) vary considerably. However, most of the estimates the Tribunal examined were within the range -0.7 to zero.⁶ For Australia, the estimates of PED varied significantly between locations, due to differences in affluence, climate and other factors. However, the Tribunal was guided by the findings of Warner (1996) for the Sydney region. Warner used two alternative models and found that PED for water in Sydney was -0.1266 under the first model, and -0.1242 under the second. These results suggest that a 10 per cent increase in the price of water in Sydney would cause a 1.3 per cent reduction in the total quantity of water used.

The Tribunal's modelling assumes that water use becomes more elastic as it becomes more discretionary. Some empirical studies show that PED varies according to the purposes of water use.⁷ For example, outdoor water use has generally been found to be more elastic than indoor water use.⁷ A price structure that targets discretionary or outdoor water use may therefore be a useful tool in addressing the current demand/supply imbalance.

A more detailed discussion of the price elasticity of water can be found in the Tribunal's Issues Paper for this investigation (*Investigation into Price Structures to Reduce the Demand for Water in the Sydney Basin - Issues paper*, pp 15-18), which is available on www.ipart.nsw.gov.au

3.2.3 Modelling potential impacts on customers

The Tribunal also used the price model to assess the potential impact of the options on residential customers' annual water bills, using the indicative prices generated by the model and customers' 2003 consumption patterns. It then compared the findings to customers' annual bills for 2003, to determine the percentage change in these bills under each option.

The Tribunal also looked more closely at the potential impacts on vulnerable customers. It used the results of its recent household survey of water use to identify the proportion of households likely to be significantly and adversely affected by changing the structure of water prices. For the purposes of this investigation, these vulnerable customers were defined as those who:

- are least able to afford these increases because they already face financial hardship, and
- may not be able to reduce their water demand because of larger household size.

⁶ Elasticity is usually expressed as a negative number, because it is showing the percentage change in demand when price goes up by 1 per cent. For example, a PED of -0.06 means that a 1 per cent price rise will reduce demand by just 0.06 per cent. A PED of -2 would mean that a 1 per cent price rise would reduce demand by 2 per cent.

⁷ Gracia, Valinas and Martinez-Espineira, 2001.

Financial hardship was assessed using data published by the Melbourne Institute of Applied Economic and Social Research on poverty lines, which provides a poverty benchmark for different household sizes. It then assessed the likely bill impact on these customers. More detail on the Tribunal's approach to assessing impacts on vulnerable customers is provided in Appendix 3.

Finally, the Tribunal developed a number of case studies to further explore how its preferred option, the inclining block structure, would affect real customers under two hypothetical pricing scenarios, and asked Sydney Water to assess the potential for these customers to reduce their existing demand. These case studies can be found on pages 31 through 36.

3.3 Analysis and conclusions on each option

A more detailed description of each option, together with the Tribunal's overall assessment against the considerations discussed in Chapter 2, and the results of its analysis and modelling, is presented below.

3.3.1 Option 1: Introducing a two-tier or 'inclining block' usage charge, and reducing the fixed service charge

The first option, which is the Tribunal's preferred option, is to introduce a two-tier usage charge and reduce the fixed service charge for residential retail tariffs. Under this price structure:

- a Tier 1 usage charge would apply to each kL of water used up to a certain volume per annum
- a (higher) Tier 2 usage price would apply to each kL of water used in excess of that volume per annum
- a relatively low fixed service charge per annum would be used to collect the balance of Sydney Water's revenue requirement.

The aim of this structure (commonly called an inclining block tariff) is to send a strong conservation signal to customers who use a large amount of water. It can (and the Tribunal believes it should) be used to specifically target discretionary water use, by setting the level at which the Tier 2 price becomes applicable (the step quantity) high enough to cover most households' basic, non-discretionary water needs. Most discretionary water use is outdoor water use, such as watering gardens, washing cars, topping up swimming pools, and hosing paths and other outdoor surfaces.

To assess and illustrate the potential impacts of an inclining block tariff, the Tribunal developed two hypothetical pricing scenarios that would be revenue neutral for Sydney Water. These options are summarised in Table 3.1, and are referred to as Option 1a and Option 1b throughout this report. They incorporate some of the Tribunal's preferences about the way in which an inclining block tariff might be set in practice:

- The step quantity has been set at a relatively high level (400kL per annum), so the Tier 2 price would target discretionary water use and most households, including larger households, should be able to meet their non-discretionary consumption needs at the Tier 1 price. The 2004 household water use survey found that average consumption for households of between 1 and 5 persons is less than 400kL per annum (Table 3.1). Some 13.8 per cent of households use more than 400kL of water per annum, and the Tribunal

estimates that these households' combined consumption above this level is around 34GL per annum.

- The fixed service charge has been set at less than half the current charge, so that overall, variable usage charges would make up a higher proportion of customers' water bills than today. This would send a stronger signal about the need to conserve water to all customers, and create stronger incentives to invest in water efficient appliances for all customers.
- The Tier 1 price has also been set at a higher level than it is today, to send stronger signal to all customers about the need to conserve water.
- The Tier 1 and Tier 2 water usage charges have been set to create a simple relationship between these charges. The Tier 2 charge is 50 per cent higher than the Tier 1 charge in Option 1a, and 100 per cent higher in Option 1b. This makes the price structure much simpler for customers to understand, which enables it to send a stronger, clearer signal.

Table 3.1 Average water consumption by household size

Number of occupants	Average consumption (kL per annum)
1	142
2	228
3	267
4	305
5	370
6	408

Source: Residential water use in Sydney, the Blue Mountains and Illawarra – Results from the 2003 IPART household survey.

Table 3.2 Inclining block tariff pricing scenarios (Options 1a and 1b)

	Tier 1 (per kL)	Tier 2 (per kL)	Service (per annum)	Step quantity (per annum)
Option 1a	\$1.20	\$1.80	\$16.50	400 kL
Option 1b	\$1.10	\$2.20	\$32.65	400 kL

If the Tribunal were to introduce an inclining block tariff structure at the 2005 price review, the actual levels of the components could be quite different to those shown above, as they would be based on Sydney Water's 2005 revenue requirement, which is likely to be higher than the 2003 revenue requirement used in the Tribunal's modelling.

In addition, the Tribunal considers that the Tier 1 usage charge would need to be set with regard to a reliable estimate of Sydney Water's LRMC (including the costs it will occur to help achieve and maintain a supply-demand balance), which is not currently available (see section 2.3.3). However, the Tribunal would be reluctant to set this charge at a level lower than the current usage charge.

Potential to reduce demand

The Tribunal's modelling suggests that Option 1a and Option 1b have similar potential to reduce the residential demand for water. This potential is also similar to that under Option 2 (see section 3.3.2).

Table 3.3 Potential demand reduction under an inclining block tariff (Options 1a and 1b)

	GL ⁸	% of total residential consumption ⁹
Option 1a		
- Change in res. consumption assuming average price response	-6.77	1.8
- Change in res. consumption assuming marginal price response	-23.71	6.3
Option 1b		
- Change in res. consumption assuming average price response	-6.70	1.8
- Change in res. consumption assuming marginal price response	-24.35	6.4

Potential impact on customers

Of all the options the Tribunal considered, the inclining block tariff structure appears likely to have the lowest overall impact on customers. The Tribunal's modelling indicates under both Option 1a and Option 1b, more than half of all customers are likely to experience a bill change of plus or minus 10 per cent or less. Around 80 per cent are likely to experience a bill change of plus or minus 20 per cent or less (Figures 3.1 and 3.2).

⁸ The demand savings shown represent the potential reduction in total residential water demand only. No assumption has been made about the likely demand reductions from the non-residential sector with these price structures.

⁹ This figure was calculated using total residential consumption from the Tribunal's model in 2002/03 which was 378.5GL. This figure may not be indicative of consumption in a 'typical' year as there were voluntary water restrictions in place in the Sydney region for a large part of the 2003 financial year.

Figure 3.1 Residential bill impact analysis – Option 1a

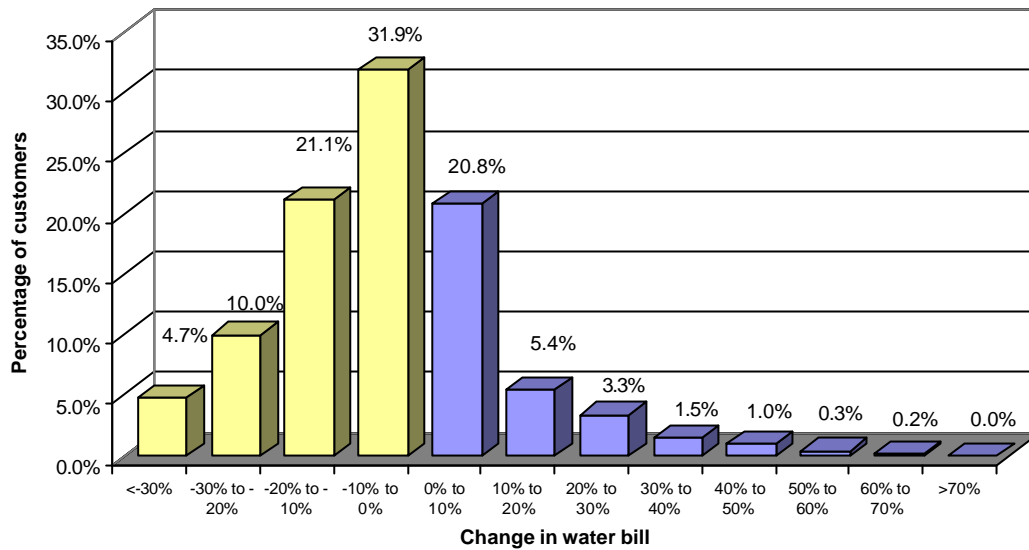
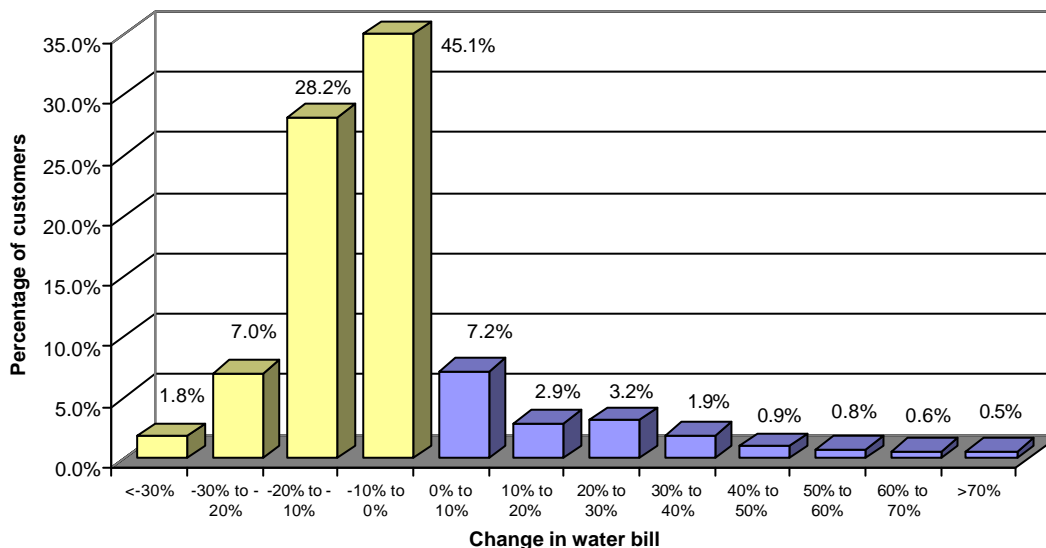


Figure 3.2 Residential bill impact analysis – Option 1b



A comparison of the potential impact on the residential bills of all households shows that:

- more customers will experience a bill increase of between 0 and 10 per cent under Option 1a (20.8 per cent) than under Option 1b (7.2 per cent)
- more customers will receive a bill increase of between 10 and 20 per cent under Option 1a (5.4 per cent) than under Option 1b (2.9 per cent)
- less customers will receive a bill increase of greater than 20 per cent under Option 1a (6.3 per cent) than under Option 1b (7.9 per cent)
- less customers will receive a bill reduction under Option 1a (67.7 per cent) than under Option 1b (82.1 per cent).

Options 1a and 1b also appear likely to have the lowest impact on the water bills of vulnerable customers. The Tribunal’s modelling suggests that these options are likely to have either a small or moderate impact on these customers’ bills (Table 3.4).

Table 3.4 Potential impact on bills of vulnerable customers (very low income and unable to reduce consumption)—Options 1a and 1b¹⁰

	Option 1a (% of all households)	Option 1b (% of all households)
Small bill impact (>5% increase)	1.8 to 2.8	1.0 to 1.5
Moderate bill impact (>10% increase)	1.0 to 1.4	0.9 to 1.4
Large bill impact (>15% increase)	0	0

However, both inclining block tariff options may have an inequitable impact on large households. The results of the 2004 household survey of water use indicate that approximately 5.4 per cent of all households have five or more occupants and use more than 400kL of water per annum. The survey also indicates that these households have higher non-discretionary water needs than other households, primarily due to their household size. This means they may be less able to reduce their demand in response to the signal sent by an inclining block tariff structure.

If it decides to introduce an inclining block tariff structure at the 2005 price review, measures may need to be introduced to address any equity and affordability issues. For example, these measures might include direct financial support, or help in reducing consumption.

Ease of understanding, implementation and administration

Both inclining block tariff options are relatively simple, and would be easy for customers to understand. As noted above, in both options there is a clear relationship between the Tier 1 and Tier 2 usage charges, and a significant difference between these charges. This suggests they would send a clear, strong signal to customers. Both options would also be relatively simple to administer, and Sydney Water indicates that the necessary administrative changes to its billing system would not be too costly.

However, there are some administrative and implementation issues associated with an inclining block tariff that need to be considered. The first issue relates to applying the step quantity in the customer billing cycle. This could be done by either:

- treating the step quantity as an annual allowance of water, so that a Tier 2 price only applies when water usage has exceeded this annual allocation, or
- dividing the step quantity into four to suit Sydney Water’s quarterly billing cycle. With this approach each customer would effectively have a step quantity for each quarter, equal to one quarter of the annual allocation. If total water usage in any one

¹⁰ Rather than asking respondents to specify their actual household income, the Tribunal’s Household Survey uses a number of ‘income bands’. These income bands do not neatly match data on poverty lines published by the Melbourne Institute. To overcome this limitation when assessing vulnerable customer impacts the Tribunal was required to present a range of possible impacts for each option.

quarter exceeded the quarterly step point, then the Tier 2 price would apply for that quarter.¹¹

Although there are disadvantages with both approaches, the Tribunal favours the second approach because it would have two important benefits for customers. First, a quarterly step quantity would send a more frequent price signal about the cost of water use. Customers whose trend water use is above the step quantity would be aware of any Tier 2 costs after a single quarter. If they can then respond by reducing water consumption, they will see the results of their efforts in each quarter. An annual step quantity would not send a price signal to high-volume water users until the year is finished, so their only chance to respond is in the following year.

Customers would also be protected from unexpected variations in their water bills over the course of a year. If an annual step quantity is applied, some customers could receive three quarterly bills with usage charged at the Tier 1 price, but have unknowingly reached the annual step quantity. If so, their final quarterly bill for the year will be much higher because the Tier 2 charge will apply to their water use in that quarter. A quarterly step point avoids this problem.

A quarterly step quantity has further benefits. It is the easier of the two options to apply to the current water billing cycle. Sydney Water suggests that major changes to its billing system may be needed to facilitate an annual step point. It may also help to discourage extra discretionary water use during summer, because customers cannot avoid the Tier 2 price in one quarter just because they tend to use less water for discretionary purposes at other times of the year.

The major disadvantage of this approach is that some customers may pay for a portion of their water usage at the Tier 2 price even though their annual consumption is less than the equivalent annual step quantity. However, the Tribunal considers that the advantages of quarterly billing are sufficient to make it the preferred option on balance.

A second issue relates to the practicality and appropriateness of implementing this price structure consistently across all customers. The Tribunal considers that an inclining-block tariff is only suitable for residential consumers living in houses that are individually metered. As Sydney Water pointed out in its submission to this investigation, it is not suitable for residential properties connected to a shared meter, such as home units, because the consumption of individual households cannot be isolated, and the costs of installing individual meters for all properties are uneconomic at this time. However, this is not likely to be a major problem, as the results of the 2003 household water use survey suggest that, given the consumption patterns of households living in flats and units, most households with shared meters are unlikely to reach the step quantity.

An inclining block tariff is also not suitable for non-residential customers because the nature of these customers' water use is very varied, and there are no data to help the Tribunal assess how much of their water use is for discretionary purposes. In its Issues Paper, the Tribunal proposed a form of inclining block tariff for non-residential customers under which the step

¹¹ For example, if the step quantity is set at 400kL per annum, a household would be entitled to 100kL of water per quarter at the Tier 1 price. This means that a household using in excess of 100kL in any one quarter would pay the Tier 2 water usage charge for some consumption even if their annual water use was less than 400kL.

quantity depends on meter size. Many stakeholders argued that this was not appropriate, due to the lack of information about discretionary water consumption in the non-residential sector. For example, Australian Business Limited noted that:

ABL does not favour the use of inclining block tariffs because of the complexities involved in identifying appropriate targets for consumption and hence positioning of the step quantity for non-residential customers. The use of meter size does not provide a suitable indicator for setting the step quantity across non-residential customers.¹²

Potential impact on Sydney Water

If an inclining block tariff structure were introduced, an increased proportion of Sydney Water's revenue would depend on the volume of water sold because the fixed charge would need to be reduced to maintain revenue neutrality. This would increase the volatility and uncertainty of Sydney Water's revenue.

Revenue uncertainty would be further exacerbated by the difficulties associated with forecasting demand accurately when consumers' response to the price signals inherent in the inclining block tariff is not known. In addition, the need to forecast the volumes of water sold at the Tier 1 price and at the Tier 2 price would increase the forecast risk. If the Tribunal decides to implement this price structure at the 2005 price determination, it will need to consider these potential impacts carefully.

Consistency with economic efficiency principles

Economic theory suggests that an efficient price structure is one that encourages an efficient allocation of resources in the economy via the signals that it sends to consumers and producers. Given the current supply-demand imbalance, it may be efficient to set retail water prices based on a reliable estimate of Sydney Water's LRMC that includes the least-cost sequence of measures it needs to undertake under an integrated government plan to achieve and maintain a water supply-demand balance in the Sydney Basin. This would signal the scarcity value of water (or the costs of augmenting supply and managing demand to achieve a balance) without encouraging inefficient investment in demand management, and also allow for these costs to be recovered over time.

However, if an inclining-block tariff price structure is implemented it would not be possible to set both the Tier 1 and Tier 2 usage prices to reflect this cost. The Tribunal considers that it would be more appropriate for the Tier 1 price to be set with reference to the LRMC, as this would send an appropriate signal to all customers about the scarcity value of water, and allow them to make purchasing decisions accordingly.

The Tier 2 usage charge would not be chosen for economic efficiency reasons. However, the Tribunal believes there could be merit in using it to send an additional signal to those residential customers who use a high volume of water, to encourage them to reduce their discretionary use of water.

¹² Australian Business Limited submission to IPART, 2004, p 3.

Conclusions

Even though an inclining block tariff structure would only be practical for residential customers living in individually metered houses, the Tribunal believes it is the most appropriate retail price structure for Sydney at this time because:

- it sends a stronger conservation signal to very large water users than the current price structure
- it is relatively simple and easy for customers to understand and for Sydney Water to administer
- it targets water used for discretionary purposes in the residential sector with higher prices
- it allows the step quantity to be set high enough to avoid capturing very much efficient or non-discretionary water usage by larger households
- it minimises the number of vulnerable customers who are exposed to higher prices and therefore partly addresses the affordability issues that exist in other price structures.

3.3.2 Option 2: Increasing the current usage charge and reducing or removing the fixed service charge

This option would involve a general increase in the water usage charge, and a reduction in (or the removal of) the fixed access charge to maintain revenue neutrality. Thus, customers would be charged the same (higher) usage charge for each kL of water, regardless of the total volume they use. This would send a strong pricing signal about the need to minimise water use in general, rather than targeting discretionary use. This signal would be stronger than the one sent by the current retail price structure, because the removal or reduction of the fixed charge would more closely link the size of customers' water bills to the amount of water that they use.

To assess the potential impacts of this price structure, the Tribunal developed a hypothetical price scenario that is revenue neutral for Sydney Water. This scenario is summarised in Table 3.5, and is referred to as Option 2 throughout this report.

Table 3.5 General increase in usage price scenario (Option 2)

	\$2003/04
- Fixed charge (per annum)	\$0.00
- Water usage price (per kL)	\$1.30

Potential to reduce demand

The Tribunal's modelling suggests that this price structure would have slightly less potential to reduce demand than Options 1a and 1b (Table 3.6). Compared to these options, it could result in a slightly lower reduction, assuming both an average price response and a marginal price response.

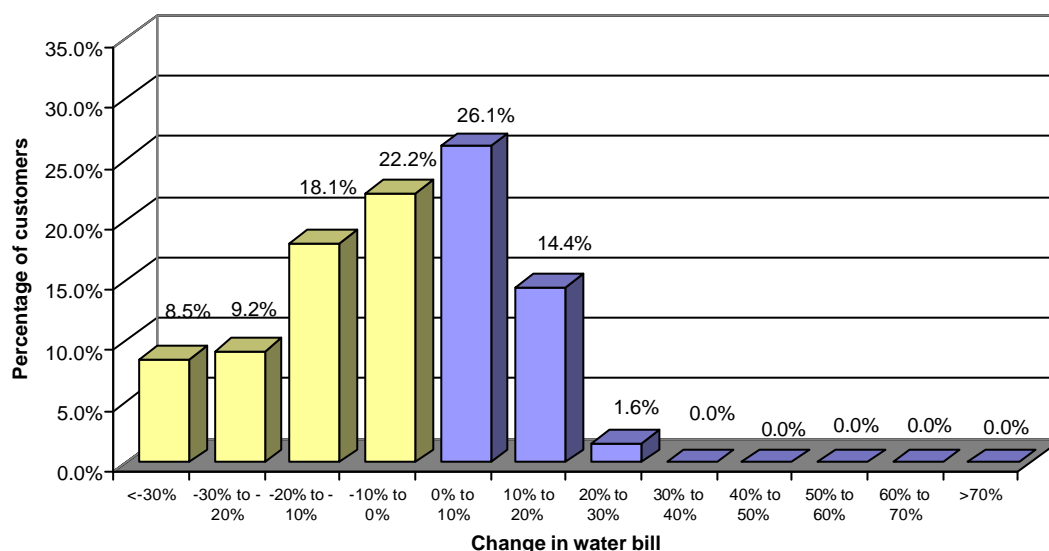
Table 3.6 Potential demand reduction under a general increase in usage price (Option 2)¹³

Residential demand savings	GL ¹⁴	% of total residential consumption ¹⁵
- Change in res. consumption assuming average price response	-5.82	1.5
- Change in res. consumption assuming marginal price response	-19.31	5.1

Potential impact on customers

The Tribunal’s modelling suggests that under this pricing scenario, almost half of all customers would experience a relatively minor change in their water bills of plus or minus 10 per cent or less. Almost 60 per cent of customers would experience some price reduction (Figure 3.3).

Figure 3.3 Residential bill impact analysis – Option 2



This price structure could be seen as the most equitable, as all customers would be charged the same price for a kL of water consumed, regardless of their total consumption. It also gives all customers an opportunity to better manage the size of their water bill by choosing to reduce consumption in response to a price increase.

¹³ This option was previously outlined in the Tribunal’s Issues Paper under the heading scenario 1. While the model used to estimate potential demand savings used in the Issues Paper relied upon data provided by Sydney Water, the model used in this report incorporates data from the Tribunal’s household survey. This means that the estimated demand savings presented in Table 3.6 are slightly different to those presented in the Issues Paper.

¹⁴ The demand savings shown represent the potential reduction in total residential water demand only. No assumption has been made about the likely demand reductions from the non-residential sector with these price structures.

¹⁵ This figure was calculated using total residential consumption from the Tribunal’s model in 2002/03 which was 378.5GL. This figure may not be indicative of consumption in a 'typical' year as there were voluntary water restrictions in place in the Sydney region for a large part of the 2003 financial year.

However, it does not attempt to make a distinction between discretionary and non-discretionary consumption. Customers would pay a higher usage price for all water, including the proportion used for non-discretionary purposes, such as drinking, cooking and bathing. Thus, it could have an inequitable impact on larger households, who are less able to reduce their water consumption in response to price signals. For example, a large household that takes all possible measures to minimise its water consumption could pay more under this price structure, simply because there are more people living in the house.

The Tribunal’s modelling suggests that under Option 2, between 2.9 and 4.5 per cent of all households are vulnerable and will receive an increase in their bill of at least 5 per cent, and between 1.8 and 2.7 per cent of all households are vulnerable and will receive a bill increase of at least 10 per cent.

Table 3.7 Potential impact on bills of vulnerable customers (very low income and unable to reduce consumption)—Option 2

	Option 2 (% of all households)
Small bill impact (>5% increase)	2.9 to 4.5
Moderate bill impact (>10% increase)	1.8 to 2.7
Large bill impact (>15% increase)	0

Ease of understanding, implementation and administration

Option 2 is a simple price structure that would be easy for customers to understand. This makes it likely that it would send a strong conservation signal to customers. In addition, unlike an inclining block tariff structure, it could be easily applied to all customers, both residential and non-residential.

This price structure would also be relatively simple for Sydney Water to administer, and could be implemented without significant changes to Sydney Water’s current billing system.

Potential impact on Sydney Water

Like an inclining block tariff, Option 2 would increase the volatility and uncertainty of Sydney Water’s revenue. If this option were implemented, an increased proportion of Sydney Water’s revenue would depend on the volume of water sold, because the fixed charge would need to be significantly reduced—or removed altogether—to maintain revenue neutrality. Revenue uncertainty would be further exacerbated, at least initially, by the difficulty of forecasting demand accurately when consumers’ response to a higher usage charge is unknown.

Consistency with principles of economic efficiency

If a reliable estimate of Sydney Water’s LRMC were available, it should be possible to set the level of the usage charge within this price structure with reference to this cost, to encourage an optimal allocation of resources. This suggests this would be an efficient price structure.

Summary

Although increasing the usage charge and reducing or removing the fixed charge has several advantages—including that it is simple for customers to understand and for Sydney Water to administer, and would be economically efficient—it is not the Tribunal’s preferred option at this time because:

- it would result in a higher proportion of vulnerable customers facing a significant increase in their water bill than under Options 1a and 1b
- it would send a weaker conservation signal to large water users than an inclining block tariff structure, because the top marginal price for usage charges would be lower than is possible under an inclining block tariff
- it does not attempt to distinguish between discretionary and non-discretionary consumption.

3.3.3 Option 3: Introducing a combined water and sewerage usage charge

This option, which was raised by Sydney Water in its submission to this investigation, would involve introducing:

- one variable usage charge for both water and sewerage
- one fixed service charge for both water and sewerage.

These new, combined charges would replace the current variable and fixed water charges and the current fixed sewerage charge. Because the current sewerage charge is quite high, introducing combined water and sewerage charges would provide much more scope to increase the level of the variable component than under Options 1 and 2 while still being revenue neutral for Sydney Water.

Although the different components could be set at a wide range of levels, the Tribunal has used a pricing scenario similar¹⁶ to the one outlined by Sydney Water to assess the potential impacts of this option (Table 3.8). This scenario represents a significant increase in the level of the variable usage component compared with the current retail tariff, which means that it would send a much stronger signal to customers about the scarcity of water.

Table 3.8 Combined water and sewerage usage charge pricing scenario (Option 3)

	Usage (per kL)	Combined access (per annum)
Current Price Structure	\$0.98	\$415.09
Combined water/sewer	\$2.00	\$177.90

Potential to reduce demand

The Tribunal’s modelling suggests that this option would have a much greater potential to reduce demand than Options 1 and 2 (Table 3.9).

¹⁶ This option differs from the option presented in Sydney Water’s submission in that it is assumed to apply only to residential customers and uses 2003/04 prices. This essentially results in a lower fixed access charge than was proposed by Sydney Water in its submission.

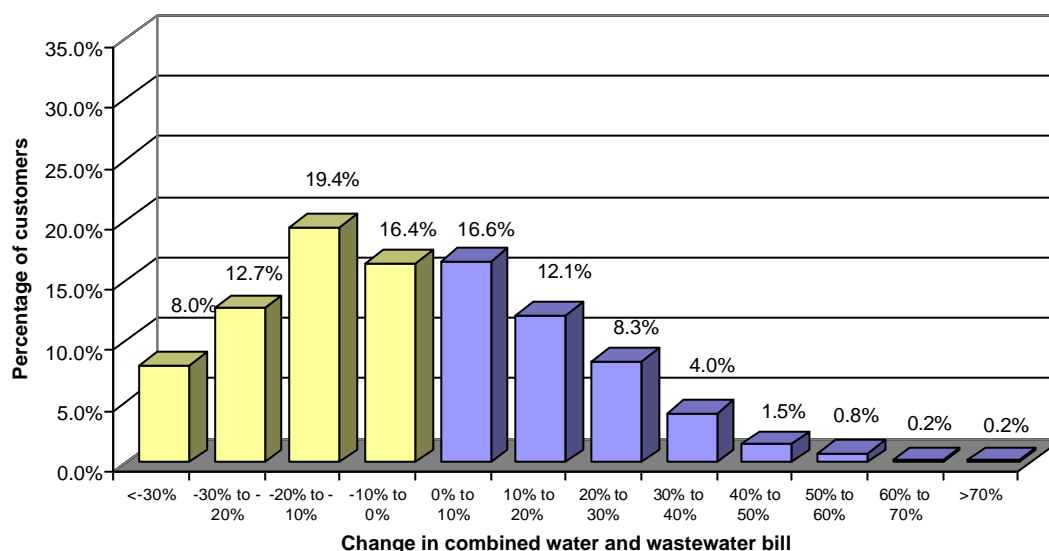
Table 3.9 Potential demand reduction under a combined water and sewerage charge (Option 3)

Residential demand savings	GL ¹⁷	% of total residential consumption ¹⁸
- Change in res. consumption assuming average price response	-12.40	3.3
- Change in res. consumption assuming marginal price response	-46.44	12.3

Potential impact on customers

The Tribunal’s modelling suggests that many more customers would face significant changes in their water bills, both positive and negative, than under Options 1a, 1b and 2 (Table 3.10). This makes it more difficult to predict customers’ likely response to the price changes than under other options. In addition, significantly more customers would face increases of 10 per cent or more than under the other options.

Figure 3.4 Residential bill impact analysis—Option 3



This modelling also suggests that under Option 3, between 3.7 and 6.0 per cent of all households are vulnerable and will receive an increase in their bill of at least 5 per cent, and between 2.8 and 4.3 per cent of all households are vulnerable and will receive a bill increase of at least 10 per cent. In addition, under Option 3, between 2.2 and 3.5 per cent of all households are vulnerable and will receive a large increase in their bill (at least 15 per cent), and between 1.3 and 1.9 per cent of all households are vulnerable and will receive a very large bill increase of at least 20 per cent.

¹⁷ The demand savings shown represent the potential reduction in total residential water demand only. No assumption has been made about the likely demand reductions from the non-residential sector with these price structures.

¹⁸ This figure was calculated using total residential consumption from the Tribunal’s model in 2002/03 which was 378.5GL. This figure may not be indicative of consumption in a 'typical' year as there were voluntary water restrictions in place in the Sydney region for a large part of the 2003 financial year.

Table 3.10 Potential impact on bills of vulnerable customers (very low income and unable to reduce consumption)—Option 3

	Option 3 (% of all households)
Small bill impact (>5% increase)	3.7 to 6.0
Moderate bill impact (>10% increase)	2.8 to 4.3
Large bill impact (>15% increase)	2.2 to 3.5
Very large bill impact (>20% increase)	1.3 to 1.9

There are also likely to be equity issues with this structure. For example, because of the practical limitations in measuring wastewater discharged to the sewer, Sydney Water would need to base a combined water/sewerage usage charge on metered water usage. This means that customers who do not discharge to the sewerage system but who consume water would subsidise the cost of treating and transporting other consumers' waste.

Ease of understanding, implementation and administration

While this price structure option appears relatively simple to understand, customers may have difficulty at least initially. For example, as discussed above, it is likely to result in significant changes in many customers bills compared to today, which may distort the signal they receive about the need to reduce demand.

In addition, under this option, a significant proportion of waste water costs would be recovered through a charge based on the volume of water used. To do this, an assumption would need to be made about what proportion of water usage is discharged as wastewater by a typical customer (the discharge factor). This assumption will be incorrect for many customers—such as those who use an above-average proportion of their water consumption for outdoor purposes—which will further distort the signal they receive. Moreover, many customers are likely to think that this arrangement is unfair.

Potential impact on Sydney Water

As for Options 1 and 2, introducing a combined water/sewerage charge would mean that a much higher proportion of Sydney Water's revenue depends on the volume of water sold. However, under the pricing scenario proposed by Sydney Water the impact on the volatility and uncertainty of revenue would be much greater than under the other options, because the level of the fixed component for both water and wastewater is significantly lower. This uncertainty would be further exacerbated, at least initially, by the difficulty of forecasting demand accurately when consumers' response to the new price structure is unknown.

This option would also result in additional risk to Sydney Water, because a high proportion of the costs associated with its wastewater system are fixed. The combined water/sewerage usage charge may not generate sufficient revenue to recover these fixed costs in years when water usage is lower than expected.

Consistency with principles of economic efficiency

The Tribunal's approach to date has been to ensure cost reflective pricing. Under this approach, revenue earned from prices charged for water services and revenue earned from prices charged for sewerage services have typically been treated separately. This approach is in line with CoAG's¹⁹ water pricing principles, which requires that prices reflect the costs of service delivery.

Moving to a combined water and sewerage usage charge would be inconsistent with cost reflective pricing. As noted above, this may lead to inequitable impacts for customers who are not connected to the sewerage system, as they will be required to pay for some of the costs of sewerage infrastructure. In addition, because the usage charge would need to recover both water and sewerage costs, it could introduce undesirable cross subsidies between the water and sewerage businesses.

Summary

The introduction of combined water/sewerage pricing is not, on the basis of information presently available to it, the Tribunal's preferred option:

- while it may deliver significant water savings, it is unclear that this benefit would outweigh the significant customer impacts that would result
- it would result in a much higher proportion of vulnerable customers facing a significant increase in their water bill than under Options 1a, 1b or 2
- it would result in inequities between customers
- it could result in some customers subsidising the cost of treating and transporting other customers' waste
- it substantially reduces revenue stability for Sydney Water
- it may introduce undesirable cross subsidies between the water and sewerage businesses.

Having said this, Option 3 results in larger reductions in water usage than the other options considered in this paper. Despite the difficulties it may merit further consideration if a large reduction in water use is needed in Sydney and other options are unavailable or impractical.²⁰

3.3.4 Option 4: Introducing a seasonal pricing regime

If the objective of price structure reform is to encourage consumers to conserve water in the summer months (when usage is normally at its peak), then a seasonal pricing regime may be appropriate. Seasonal pricing is a form of 'peak pricing' that involves charging higher prices in periods characterised by peaks in demand. For Sydney Water, it would mean charging higher prices in summer to discourage discretionary outdoor uses such as watering gardens and filling swimming pools.

¹⁹ Council of Australian Governments

²⁰ Then Hunter Water Corporation does not have integrated water and sewerage pricing but does base a component of its sewerage pricing on water usage. A discharge factor is applied to water usage to calculate the assumed discharge to sewers. Although this option provides strong incentives to save water it has not proved popular among all Hunter residents.

Based on the considerations discussed in Chapter 2, the Tribunal believes a seasonal price regime is not the most appropriate price structure for reducing demand in the Sydney basin. The primary purpose of such a structure is to target very large peaks in demand and associated peak flow problems, which are not a major problem for Sydney Water. In addition, if all meters were not read exactly when the peak period begins and ends, some consumers would be charged the wrong price.

In addition, the Tribunal considers that introducing this option would:

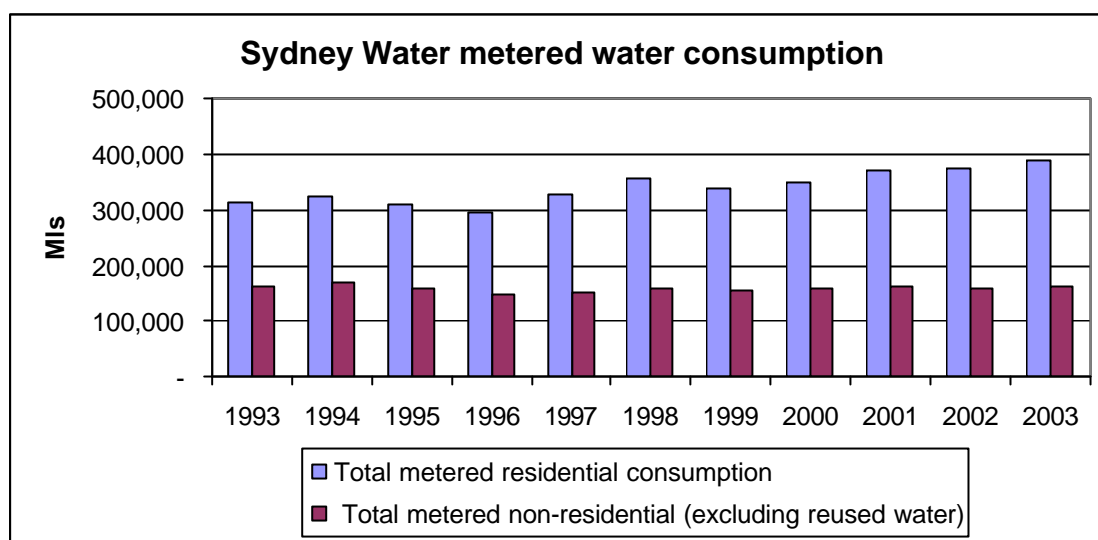
- be unlikely to deliver the volume of water savings that could be generated under an inclining block tariff price structure
- be significantly more complex than a simple inclining block tariff and may result customers being unaware of the marginal price they face
- make it impossible to set prices based on Sydney Water's LRMC, as it would require that consumers be charged a different per kL price for water consumed than the rest of the year
- reduce revenue stability for Sydney Water.

The Tribunal considers that an inclining block tariff applied on a quarterly basis is a more appropriate way to discourage large discretionary water use in summer than a seasonal price regime.

3.3.5 Option 5: Introducing differential pricing for non-residential outdoor water use

It may be appropriate to introduce differential pricing for different customer classes and different end uses of water – such as industrial, commercial, residential and non-residential outdoor use.

Currently the non-residential sector (which includes commercial, industrial and government customers) uses approximately 30 per cent of Sydney's potable water. This sector's total *level* of water consumption has been stable for the last decade, but because total residential demand has grown, its consumption as a *proportion* of total water sold has declined (Figure 3.5).

Figure 3.5 Metered water consumption by residential and non-residential customers

Note: Information is sourced from Sydney Water's Annual Information Return 2002/03.

Generally, Sydney Water supplies a single class of water to non residential customers, although it is currently finalising a scheme to supply recycled water to the BlueScope Steel mill at Port Kembla. It is anticipated that further recycling supply schemes will be developed over time, as opportunities for the substitution of potable water are identified.

To date, all potable water supplied to Sydney Water customers has been provided at a common usage price regardless of its end use. The introduction of an inclining block tariff structure for some residential customers would change this. The Tribunal also considered whether price structure could be used to similarly target discretionary water consumption in the non residential sector. The objective of such targeted pricing would be to encourage efficiency of use in this sector and/or to make substitution with an alternate supply such as recycled water more attractive.

Customers in the non residential sector use water for many different purposes, including grass watering, industrial processing (such as steel making and petroleum refining), industrial cleaning and as an input to consumer products. Water efficiencies could probably be made to varying degrees in some or all of these uses. In addition, different grades of water could probably be substituted for some uses. However, the economics of efficiency savings and the practicality of substitution will vary from business to business and from site to site. The Tribunal does not have sufficient information or understanding about these issues to attempt to use differential pricing to target particular uses of potable water in this sector. Little evidence on these points was presented to this investigation. The extent to which the use of water in various industries would respond to increases in price is also uncertain. Non-price measures may be more effective in some instances. Finally, considerable complexity would be added to the billing structure if different end users and customer classes were billed separately. Anomalies and inconsistencies are likely to arise. The Tribunal would need considerably more detailed information before it considered this proposal further.

3.4 Customer case studies

To show how the Tribunal's preferred price structure option might affect customers, a series of customer case studies has been developed. These case studies are real households in Sydney (names were changed for privacy reasons) who have granted permission for the Tribunal to access and present details of their water use in this paper.

Using information on household characteristics and current water use trends, the Tribunal compared each household's water bill under the current price structure with their bills under Options 1a and 1b, assuming that the household does not alter its consumption in the future.

Only the water component of Sydney Water bills is compared in these case studies. The annual bills referred to do not include wastewater and stormwater charges.

While the case studies indicate the direct impact of price structure changes on customers, they also demonstrate that customers may be able to avoid paying more for water by taking steps to reduce their consumption. To assess the extent to which each of these households may be able to reduce their consumption to avoid higher bills, the Tribunal asked Sydney Water to conduct a water use audit for each household based upon their household characteristics. The results of these audits are also presented below.

While an inclining-block tariff, if implemented, would only apply to single dwelling houses, the Tier 1 usage price and access price would still apply to all residential customers regardless of the type of dwelling. Therefore, a change in the Tier 1 usage charge and fixed charge is likely to result in a change in the size of the overall water bill for all residential customers.

Case study: The Smith family – a small household in a unit²¹

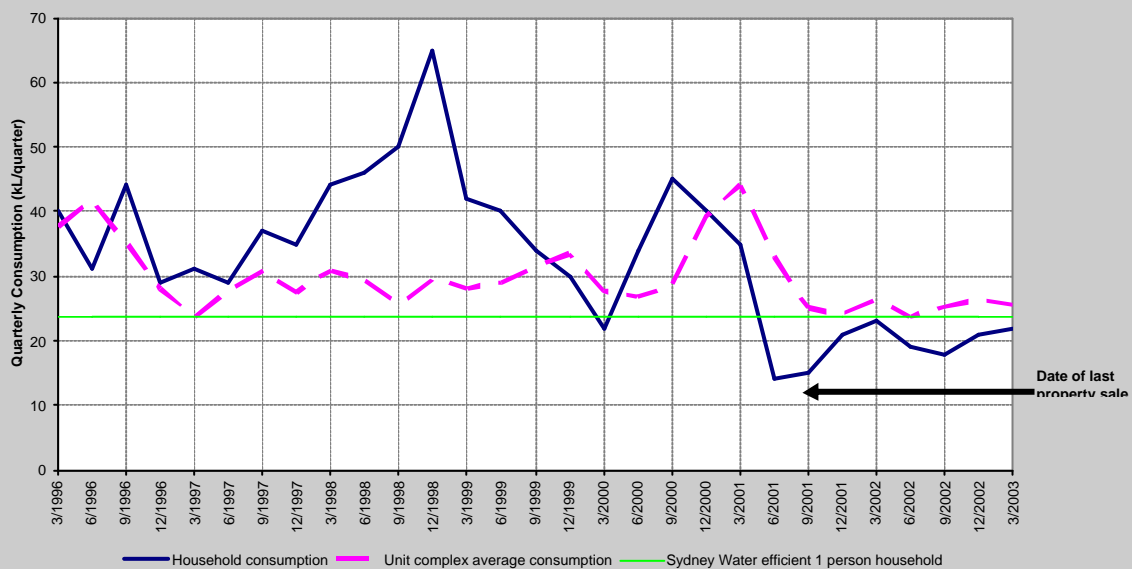
The Smiths live in a reasonably modern two bedroom, two bathroom unit in Sydney's Inner West. A single parent household, there are usually 1 or 2 adults staying in the unit. The unit includes a dishwasher, a medium-sized top loading washing machine and a small balcony garden. Two of the bathroom taps drip constantly.

The Smiths have yearly water consumption of 78kL when water restrictions aren't in place. This means their annual water bill would be **\$152.99 at current prices**. Under the inclining-block scenarios used in this review their household water bill would fall by 28% to **\$110.10 with Option 1a** or fall by 23% to **\$118.45 with Option 1b**. Given that the Smiths live in a unit, they would not be subject to the Tier 2 usage price even if their water usage was in excess of 400kL per annum. Only changes in the Tier 1 usage price and the fixed access charge affect the size of their water bill.

An audit of the Smith's water uses conducted by Sydney Water indicates that it would only require a few easy changes to this unit to reduce water consumption. The unit already has three dual flush toilets and an aerator on the kitchen tap. Around half of the household water use is for showering so by replacing the two conventional showerheads with water saving showerheads, swapping to a AAAA rated front loading washing machine and fixing leaking taps, they could save around 28kL of water each year.²²

With these water saving changes the Smiths could reduce their water consumption by 36% to 50kL per year. If they did this then their water bill would fall to **\$76.50 with Option 1a** or **\$87.65 with Option 1b**.

Quarterly household water consumption (1996 to 2003)



²¹ Case studies are actual households in Sydney Water's area of operations. These households have agreed for details of their use of water to be presented in this paper and for Sydney Water to undertake an audit of their water use. Permission to publish this data was obtained from each household and names were changed for privacy reasons.

²² Estimates of household water savings from Sydney Water modelling.

Case study: The Miller family – a large household in a free standing house²³

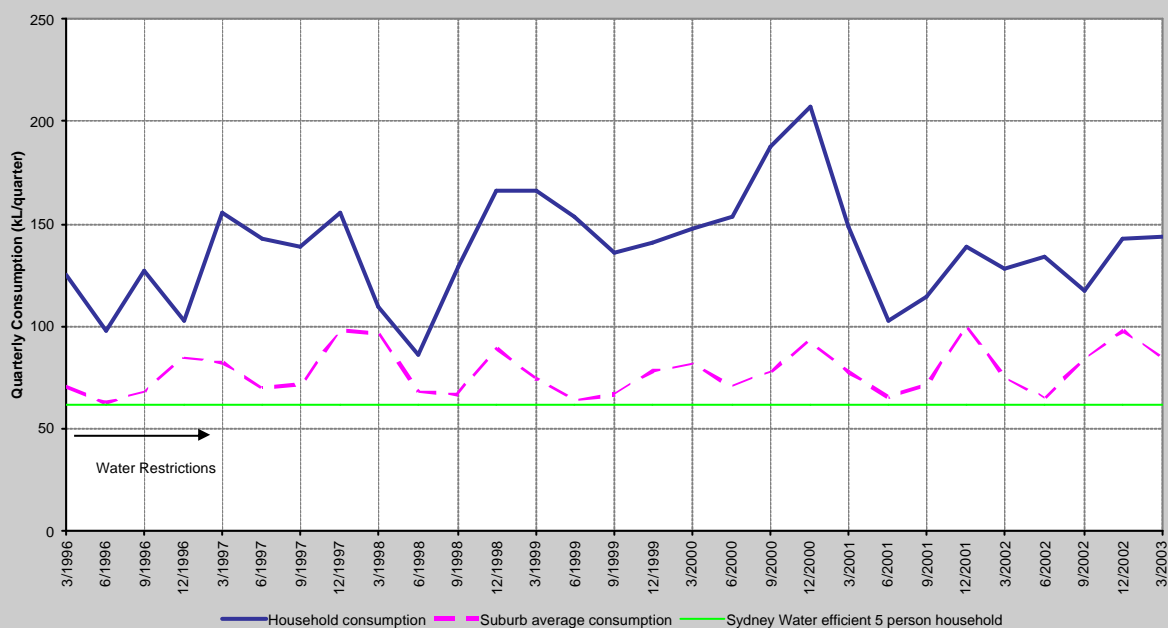
Mr and Mrs Miller live with their four grown children in a six bedroom, two storey brick home in Sydney’s North West. The house has three bathrooms and a swimming pool that they top up weekly. With such a large family, the Millers use their dishwasher daily and run around 10 loads of washing in a large top-loading washing machine each week. When there are no water restrictions they water the garden for around 7 hours a week with a hand held hose or automatic sprinkler and wash the car about once every three months.

Without water restrictions the Millers consume 515kL of water per year. This represents an annual water bill of **\$581.25 at current prices**. As high water users consuming above 400kL a year, under the step price scenarios in this review their new water bill would increase by 21% to **\$703.50 with Option 1a** or increase by 25% to **\$725.65 with Option 1b**.

An audit by Sydney Water of the Miller’s water use indicates that some changes to their home could potentially reduce their water use below the 400kL step quantity. They could save an estimated 172kL per annum on their indoor water use by replacing the three conventional showerheads with water saving showerheads, installing three dual flush toilets instead of the existing single flush units and upgrading to a AAAA rated front loading washing machine. Outdoor water use accounts for around 20% of their total use, so by using a pool cover they could save around 16kL per annum and by installing a rainwater tank they could possibly save a further 30kL of water each year.²⁴

If the Millers made these water saving changes, excluding the rainwater tank, they could potentially reduce their water consumption by 37% to 327kL per annum. This brings their consumption below the step quantity of 400kL. Their water bill would be reduced to **\$408.90 with Option 1a** or **\$392.35 with Option 1b**. Installing a rainwater tank would reduce their consumption by a further 6% to 297kL per annum, resulting in annual water bills of **\$372.90 with Option 1a** or **\$359.35 with Option 1b**.

Quarterly household water consumption (1996 to 2003)



²³ Case studies are actual households in Sydney Water’s area of operations. Names have been changed for privacy reasons.
²⁴ Estimates of household water savings from Sydney Water modelling.

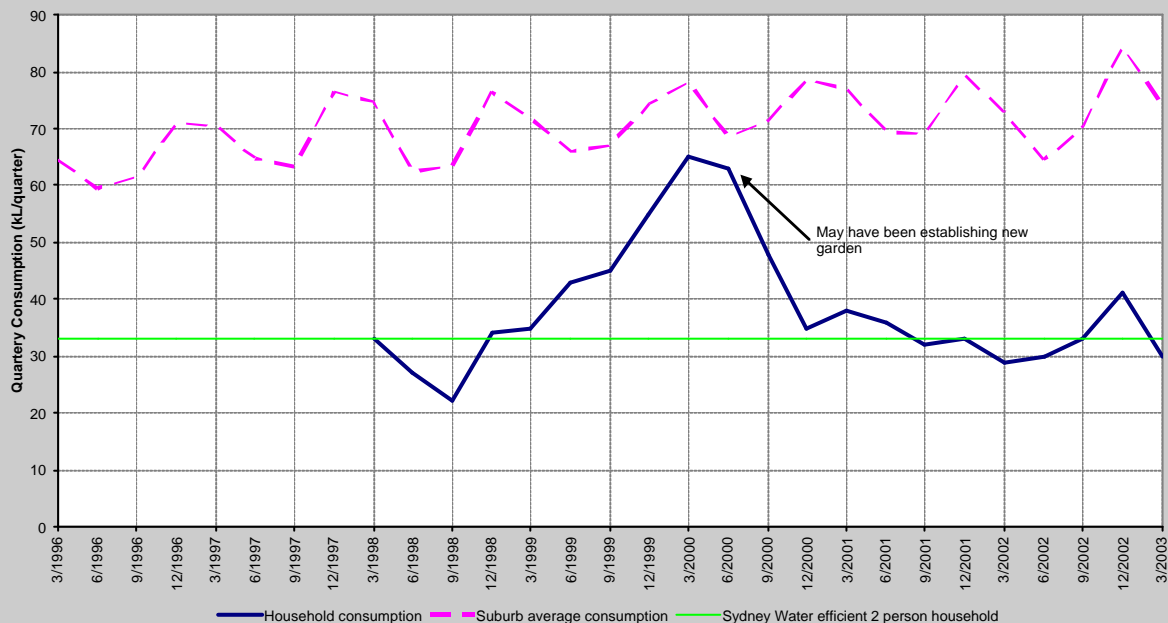
Case study: The Gibson family – a small household in a free standing house²⁵

Mr and Mrs Gibson live in a single storey, three bedroom brick house in Sydney’s mid-west. The Gibson’s house contains a spa bath, but they have installed aerators on their taps, a water efficient showerhead, a high water efficiency dishwasher and a medium-sized front loading washing machine. Without water restrictions, their outdoor water use includes washing a car every three weeks, hosing down external hard surfaces once a month and watering a medium sized garden of mostly native plants every couple of days in the warmer months.

The graph below shows the Gibson’s quarterly water consumption from 1996 to 2003. Their water consumption peaked in early 2000 when they undertook renovations to establish a new courtyard garden area. The Gibsons currently consume 124kL of water per year. This means they receive an annual water bill of **\$198.07 at current prices**.

An audit of the Gibson’s water uses by Sydney Water revealed the Gibsons are already a fairly water efficient household and there are limited additional changes they could make to the house to reduce their consumption. Without reducing consumption, using the inclining-block price structure scenarios in this report their water bill would fall by 17% to **\$165.30 with Option 1a** or by 15% to **\$169.05 with Option 1b**.

Quarterly household water consumption (1996 to 2003)



²⁵ Case studies are actual households in Sydney Water’s area of operations. Names have been changed for privacy reasons.

Case study: The Sheppard family – a middle size household in a free standing house²⁶

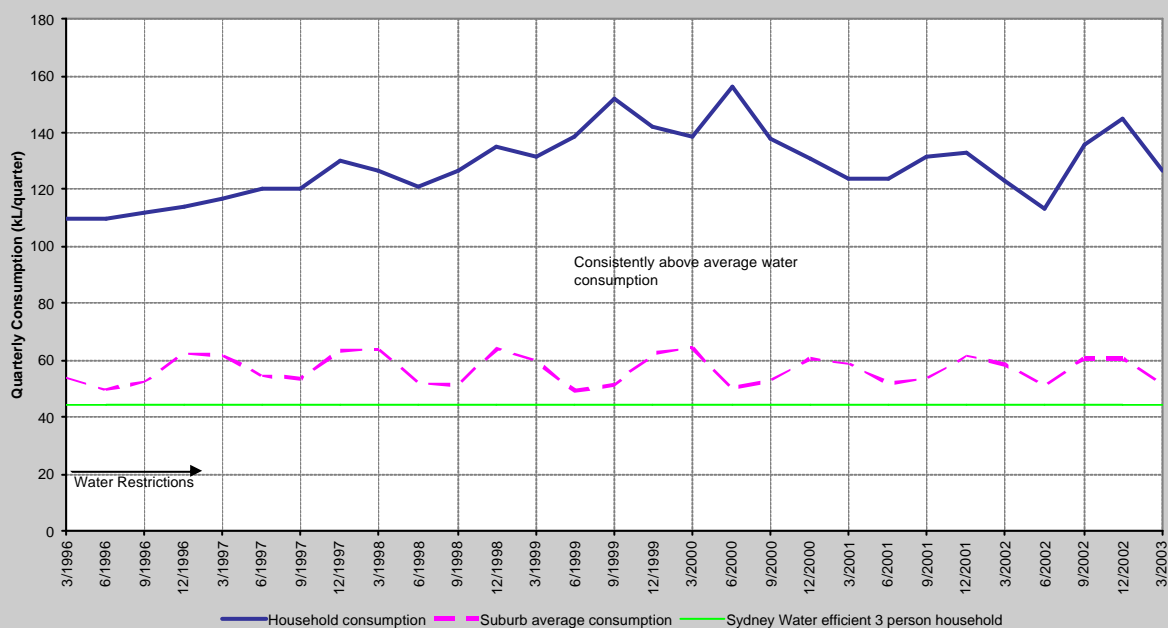
The Sheppard family consists of three adults living in a three bedroom brick house in the Illawarra district. The family uses their dishwasher almost every day and runs their large top-loading washing machine around twice a day. The bathrooms contain two single flush toilets and three very frequently used showers with conventional showerheads. Additionally, when water restrictions aren't in place the Sheppards water their medium sized lawn and garden for about an hour a day and wash an average of two cars every week.

The Sheppards use 501kL of water per year, representing an annual water bill of **\$567.53 at current prices**. Since they consume above the step quantity of 400kL per year, using the step price scenarios from this review their new water bill would increase by 20% to **\$678.30 under Option 1a** or increase by 22% to **\$694.85 under Option 1b**.

An audit of the Sheppard's water use by Sydney Water revealed they could significantly reduce their water use without changing any of their water using habits. If they installed three water saving showerheads, upgraded to two dual flush toilets instead of two single flush toilets and converted to a AAAA rated front loading washing machine they could save approximately 137kL of water each year. On top of this, since around 34% of their water is used outdoors, by installing a rainwater tank for outdoor use they could possibly save a further 42kL per year.²⁷

If the Sheppards made these water saving changes to their house, excluding installing a rainwater tank, they could potentially reduce their water consumption by 27% to 364kL. This would bring their annual consumption below the 400kL per annum step quantity. Their water bill would be reduced to **\$453.30 with Option 1a** or **\$433.05 with Option 1b**. Installing a rainwater tank could reduce the Sheppard's water consumption by a further 8% to 322kL per year, reducing their annual water bill to **\$402.90 with Option 1a** or to **\$386.85 with Option 1b**.

Quarterly household water consumption (1996 to 2003)



²⁶ Case studies are actual households in Sydney Water's area of operations. Names have been changed for privacy reasons.

²⁷ Estimates of household water savings from Sydney Water modelling.

Case study: The Donnelly family – a large household in a free standing house²⁸

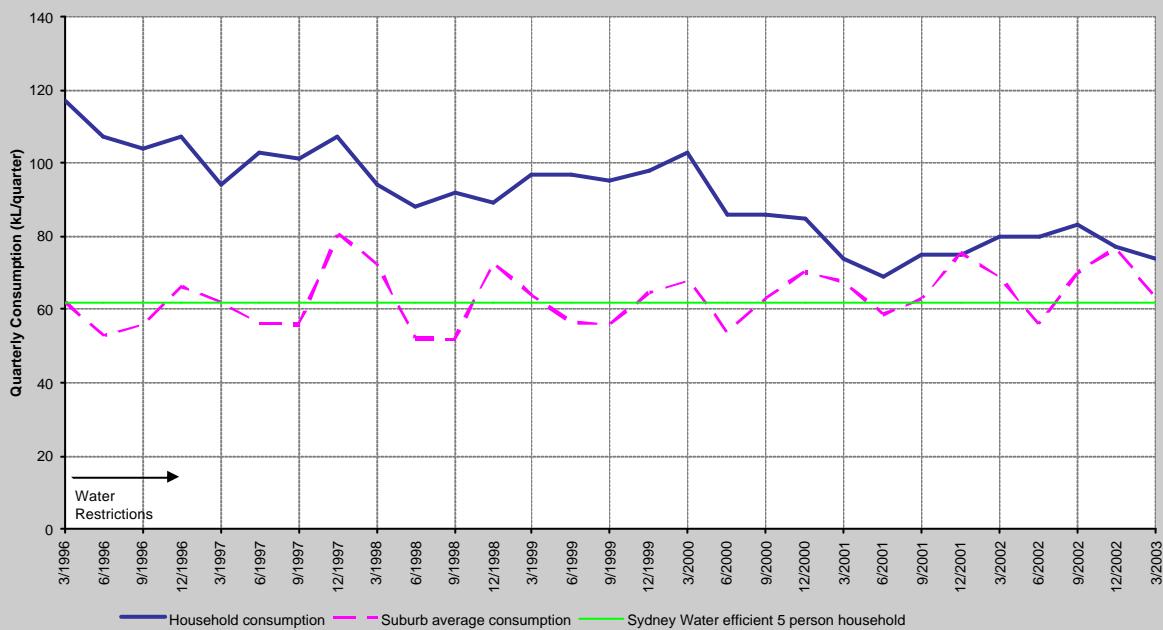
Mr and Mrs Donnelly live with their three teenage children in a two storey, four bedroom brick house in south-western Sydney. They use their dishwasher nearly twice a day on average and run around two loads of washing each day in a large top-loading washing machine. Their bathroom is fitted with tap aerators, a dual flush toilet and a water efficient showerhead. They also have a swimming pool with a splashguard, which is topped up monthly, and because they spend half of their weekends away, they only wash the car every couple of months and rarely water their garden or lawn.

Without water restrictions in place, the Donnellys consume 310kL of water each year and would receive an annual water bill of **\$380.35 at current prices**. Under the inclining-block scenarios discussed in this review, their water bill would increase by 2% to **\$388.50 with Option 1a** or decrease by 2% to **\$373.65 with Option 1b**.

An audit of the Donnelly’s water use by Sydney Water showed there is limited scope for the Donnellys to easily reduce their water consumption. However, by installing a AAAA rate front loading washing machine and a pool cover, they could still potentially save around 61kL per annum.²⁹

If the Donnellys implemented these water saving changes their water consumption could fall by around 20% to 249kL per annum. Under the Tribunal’s proposed price structure scenarios, the Donnelly’s annual water bill would fall to **\$240.90 with Option 1a** or to **\$238.35 with Option 1b**.

Quarterly household water consumption (1996 to 2003)



²⁸ Case studies are actual households in Sydney Water’s area of operations. Names have been changed for privacy reasons.
²⁹ Estimates of household water savings from Sydney Water modelling.

Case study: Ms Anderson – a single person household in a unit³⁰

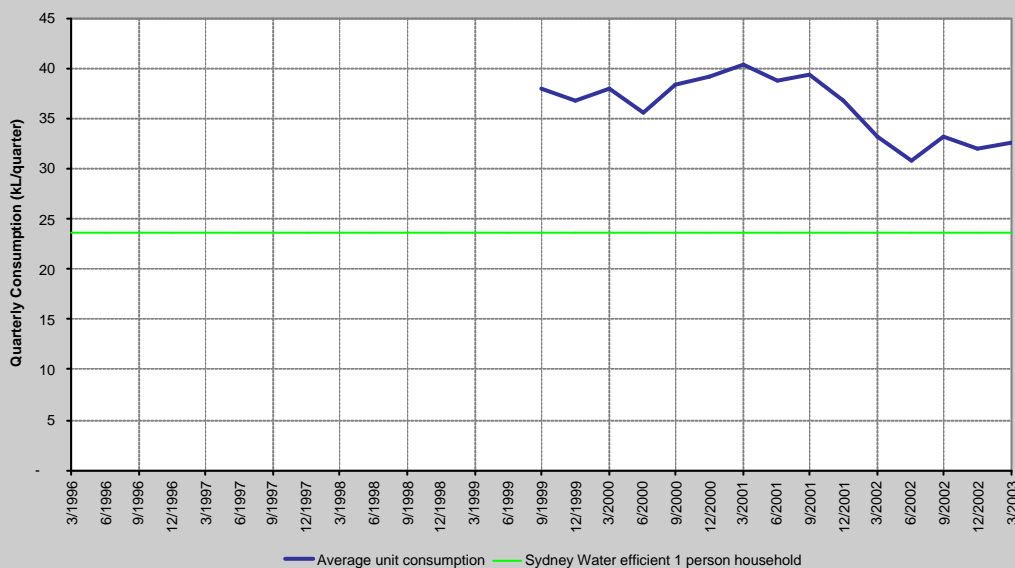
Ms Anderson is a single person living in a two bedroom, one bathroom unit in Sydney’s Inner West. Even though she’s the only occupant of the house, she still uses water to run a dishwasher, a medium-sized top-loading washing machine, water her small balcony garden and wash her car about once a month.

Ms Anderson consumes only 86kL of water in a year, giving her an annual water bill of **\$160.83 at current prices**. Under the inclining-block scenarios presented in this review, her water bill would fall by 26% to **\$119.70 with Option 1a** or by 21% to **\$127.25 with Option 1b**. Given that the Ms Anderson lives in a unit, she would not be subject to the Tier 2 usage price even if her water usage was in excess of 400kL per annum. Only changes in the Tier 1 usage price and the fixed access charge affect the size of her water bill.

According to a water audit of Ms Anderson’s unit by Sydney Water, there is still scope for Ms Anderson to reduce her annual water consumption. By changing to a AAAA rated front loading washing machine and installing a water efficient showerhead, she could save an estimated 29kL per annum.³¹

If she makes these water saving changes, she could reduce her current water consumption by 34% to 57kL per annum. This would reduce her water bill to **\$84.90 with Option 1a** or to **\$95.35 with Option 1b**.

Quarterly household water consumption (1996 to 2003)



³⁰ Case studies are actual households in Sydney Water’s area of operations. Names have been changed for privacy reasons.

³¹ Estimates of household water savings from Sydney Water modelling.

4 WHOLESALE PRICE STRUCTURE

The Tribunal examined the use of a step price for the bulk water purchased by Sydney Water from the SCA for extractions above the estimated safe yield of the catchment. This price structure is similar to the inclining block tariff structure for retail tariffs discussed in Chapter 3. Under the option specified in the Terms of Reference, it would involve:

- a Tier 1 price for each ML of water purchased up to a volume equivalent to the estimated safe yield per annum (the step quantity)
- a (higher) Tier 2 for each ML of water purchased above that volume per annum
- a fixed access charge per annum.

Based on the considerations discussed in Chapter 2 and the analysis described below, the Tribunal is not convinced that a wholesale step price is the best way to meet the objectives stakeholders appear to expect it to meet. It is likely that other measures available would be both more effective and less risky than introducing a step price at this time.

The Tribunal considers that the appropriate next step for it to take in relation to wholesale water price reform is to review the balance between the fixed (access) and variable (usage) prices and, if possible, set the usage price with reference to the SCA's LRMC. It will not be in a position to consider further reform, including introducing a step price, until key decisions have been made and more information is available. Its major information requirements include:

- a reliable estimate of SCA's long run marginal costs (LRMC) that takes into account the sequence of initiatives the agency needs to undertake as part of an integrated plan to close the gap between supply and demand in Sydney and allow it to release the required environmental flows
- firm positions on:
 - what the safe yield of the existing drinking water catchments is, taking into account decisions on environmental flows
 - whether a cap on extractions from the catchments will be established, either under the *Water Management Act 2000* or Sydney Water's operating licence
 - whether penalties will be imposed on Sydney Water when its demand exceeds this cap.

The Tribunal recognises that some stakeholders see wholesale price reform as a matter of urgency. However, we should be wary of expecting too much from price reform—the wholesale water price is just one of many measures that could influence the future demand for water in the Sydney Basin. The Tribunal believes the structure and level of this price must be considered in the context of a whole-of-Government strategy for achieving and maintaining a supply-demand balance. In addition, it is concerned that aggressive price reform options in the current dynamic but uncertain environment could do more harm than good. Inappropriate wholesale price changes could distort the market for demand management and supply augmentation in a way that conflicts with broader conservation strategies.

This chapter discusses these findings and explains how the Tribunal reached them in more detail. It sets out:

- the current wholesale water price structure
- the Tribunal's approach in assessing the appropriateness of introducing a step price at this stage
- its analysis and conclusions.

4.1 The current wholesale water price structure

The SCA currently charges Sydney Water a two-part tariff that consists of:

- a variable usage charge of \$113.53 per megalitre
- a fixed access charge of \$5.24 million per annum.³²

The Tribunal established this price structure when the SCA was created in 1998, in line with CoAG's framework for the reform of water prices. Its initial decisions on the balance between the fixed and variable components of this price structure aimed to allow the SCA to earn approximately equal revenue from each component.

4.2 Approach in assessing a step price structure

While the aim of an inclining block tariff structure for retail water prices is fairly clear—to send a strong message to end users about the need to reduce water consumption, particularly for discretionary purposes—the objectives of a similar structure for the wholesale water price are not so obvious. Because Sydney Water is not the end user of the water it purchases, the introduction of a higher Tier 2 wholesale price would not send the same signal to it as a Tier 2 retail price would send to its customers. In addition, it has limited ability to respond to this signal as it does not directly control most of its demand.

Nevertheless, Sydney Water can play an important role in demand management. As the manager of Sydney's water distribution infrastructure, it has the best knowledge of this infrastructure's performance (for example, leakage rates), and the costs of maintaining and improving that performance. As the retailer, it has a relationship with and knowledge of the end users, including how they are likely to respond to demand management initiatives. This means it is likely to be in a better position than end users to respond to price signals by, for example:

- targeting and reducing water delivery leakage
- reducing water usage in sewerage treatment processes
- conducting customer education campaigns
- undertaking other initiatives to encourage or support customers in reducing their water consumption, and
- implementing water restrictions.

³² For consistency with modelling undertaken for this review, reference to existing charges relate to the prices set by the Tribunal in June 2003 which applied until June 2004. These were adjusted on 1 July 2004.

In addition, several stakeholders argued that using a wholesale price signal to influence a single commercial entity such as Sydney Water is simpler than trying to influence the general population via retail price signal, and therefore may be more effective.³³

For these reasons, the Tribunal considers that, in principle, using the wholesale water price to signal the scarcity value of water and encourage Sydney Water to actively manage demand has some merit. However, there are a number of ways in which a step price structure might be used to help achieve this overall goal. In addition, other price structures and non-price measures might be better ways to achieve this goal.

For these reasons, the Tribunal's first step in assessing the appropriateness of a step price structure was to understand what the potential objectives for introducing such a structure might be. It then considered how effectively a step price structure would meet each of these objectives, and whether alternative measures (including Sydney Water's proposed D-factor) might be more appropriate or effective. Finally, it considered, if step price structures were to be introduced, whether there should be a link between the level of the Tier 2 usage charges for retail and wholesale prices.

For each step, the Tribunal took into account the considerations discussed in Chapter 2. It also considered the findings of the review it commissioned from the Centre for International Economics (CIE) on the role of wholesale water prices in reducing Sydney's water demand, and the submissions it received from stakeholders in response to its own Issues Paper and the CIE's review³⁴.

4.2.1 Understanding the possible objectives for a step price

Based on its own analysis and the general themes and messages that emerged from stakeholder submissions on the wholesale price structure, the Tribunal identified four possible objectives for introducing a step price to contribute to the overall goal of reducing Sydney's demand for water. These objectives are:

- **Removing the financial incentive for Sydney Water to sell more water than is sustainable.** Under the current price structure, Sydney Water has a theoretical incentive to sell as much water as possible, as the more it sells, the more profit it earns. Given the current supply/demand imbalance, this incentive is incompatible with basic social and environmental objectives. Setting a higher Tier 2 usage charge for wholesale water over the safe yield for the SCA's catchments could neutralise this incentive by making sales over this volume unprofitable.
- **Creating a market for efficient demand management and supply augmentation options.** Setting a higher Tier 2 usage charge for wholesale water over the safe yield could also make alternative options to buying this water more economic. For example, these options might include obtaining water from alternative providers (such as recycling plant operators) or undertaking cost effective demand management. Thus, to

³³ DEC's submission (p 9) asserts that Sydney Water is often better placed than end users to invest in demand management and alternative supply measures. PIAC's submission broadly supports the use of a wholesale step price on the assumption that Sydney Water is in a better position than individual households to respond to economic signals provided by price reform (p 8).

³⁴ CIE's report *Water price restructuring and the role of Sydney's wholesale water price* and the Tribunal's Issues Paper *Investigation into Price Structures to Reduce the Demand for Water in the Sydney Basin* are available on the Tribunal's website www.ipart.nsw.gov.au

the extent that these cheaper options are available, the step price may create a competitive market for them.

- **Giving meaning to a ‘cap’ that may be placed on extractions from the Sydney catchment.** One of the issues the Government is currently considering is whether a cap should be placed on extractions from Sydney catchments. However, the SCA could not ‘turn off the tap’ when Sydney Water’s demand reaches the level of this cap. Setting a higher Tier 2 usage charge for wholesale water over the cap could help to make a cap more meaningful, by imposing a financial penalty on Sydney Water when its demand exceeds the cap.
- **Creating a pool of funds to be used for demand management and supply augmentation.** Several stakeholders suggested that a higher Tier 2 usage charge could generate additional revenue that could be set aside in a fund to be administered by an agency other than the SCA or Sydney Water. This fund could be used to subsidise water saving initiatives, or remediate damage to river systems caused by over extraction.

4.2.2 Assessing how effectively a step price and alternative measures would meet these objectives

The Tribunal was not able to undertake detailed analysis to assess and compare the potential effectiveness of a step price structure and alternative measures for meeting these objectives. For the first three objectives, the absence of a reliable estimate of the SCA’s LRMC consistent with a broader, integrated plan for water conservation in NSW was the major barrier. (An explanation of the critical role of the LRMC in setting wholesale water prices is provided in Box 4.1.) Uncertainty about requirements for enhanced environmental flows and the impact these will have on the likely safe yield of the existing catchments presented further difficulties, as did the lack of a firm decision on whether extractions from the catchment will be capped, and what penalties will be imposed when the cap is breached.

Instead, the Tribunal aimed to develop an ‘in principle’ position on the appropriateness of a wholesale step price, and to determine its priorities for wholesale price structure reform as part of the 2005 water price review. It did this by considering the concept of a wholesale step price, to assess how effective it is likely to be in meeting these three objectives, whether the likely benefits of using it to meet these objectives are sufficient to outweigh the potential risks, and whether other available options might be more effective or more appropriate to meet these objectives.

For the fourth objective, creating a pool of funds to finance demand management and/or supply augmentation, the Tribunal did not undertake any assessment at all. Although the concept has been proposed as a reason for introducing a wholesale step price, it is not the Tribunal’s role to decide whether to establish a fund of this kind as part of price structure reform. Rather, this is a matter for the NSW Government.

4.2.3 Considering a link between retail and wholesale prices

To assess whether, if a step price structure was introduced, there should be a direct link between wholesale and retail prices, the Tribunal took into account the considerations discussed in Chapter 2 and stakeholder feedback on this issue. The purpose of such a link would be to ‘pass through’ any increase in Sydney Water’s costs due to the application of the wholesale Tier 2 charges to end users via the retail price.

Box 4.1 The critical role LRMCM in setting wholesale water prices

As Chapter 2 discussed, a water agency's Long Run Marginal Cost (LRMC) represents the incremental costs (per unit of water) of funding measures to bring the demand and supply of water into balance. In its review of the role of wholesale water prices in reducing demand for water in Sydney, the CIE discussed using the LRMCM for setting wholesale water prices in detail. It made some important points about how this LRMCM should be calculated. It argued that:

- In the circumstances that Sydney currently faces, LRMCM should be calculated by developing the least-cost package or sequence of measures that is required, as part of an integrated plan, to achieve and maintain a balance between water supply and demand, and to meet with Hawkesbury-Nepean environmental flow requirements.
- If the wholesale water price is intended to signal the SCA's costs to Sydney Water, the appropriate LRMCM is the SCA's *agency* LRMCM, rather than *social* LRMCM.
 - The SCA's LRMCM would reflect only the costs associated with the sequence of measures that the SCA will undertake as part of an integrated plan to address the demand-supply imbalance and maintain the health of the Hawkesbury-Nepean river system.
 - The social LRMCM would reflect the costs associated with *all* the measures included in that plan, regardless of who will undertake them. For example, it might reflect costs incurred by Sydney Water in implementing water restrictions, and those incurred by its customers in complying with recently introduced standards for water efficiency in new buildings (BASIX).
 - The agency LRMCM is more appropriate for pricing because it ensures that customers do not pay twice for any water efficiency measures they undertake (that is, when they undertake them and through the price of water), and discourages excessive investment in supply augmentation and demand management (which could occur if the wholesale price of water is set to recover costs that the SCA will not incur).
- In addition, the agency LRMCM would need to be reasonably accurate. If the wholesale water price were set with reference to a LRMCM that was too high, it would encourage over-investment in demand management and supply augmentation. Many of these investments will be long-term projects that cannot be easily reversed if lower estimates of LRMCM are made subsequently. If this price were set with reference to a LRMCM that was too low, it could lead to under-investment in demand management and supply augmentation, and thus fail to help close the supply-demand gap.

The Tribunal agrees with this view of the LRMCM. However, a reliable estimate of the SCA's LRMCM is not currently available, and cannot be calculated until several matters are resolved:

- a decision must be made on the environmental flow commitments to the Hawkesbury-Nepean river system
- a least-cost sequence of demand management and supply augmentation measures designed to close (and keep closed) the gap between supply and demand must be developed as part of an integrated water plan for the Sydney Basin
- the implementation costs of this least-cost sequence of measures for the SCA (and Sydney Water) must be calculated.

Even if these matters are resolved quickly, the calculation of the SCA's LRMCM will be a complex process. A reliable estimate may not be available in time for the 2005 metropolitan water price review, although a preliminary estimate might be calculable following the introduction of the metropolitan water strategy.

However, while the Tribunal believes a reliable estimate of the LRMCM is a critical input for further analysis of the structure and level of the wholesale water price, stakeholders should not take this to mean that it intends to set this price based on the SCA's agency LRMCM alone. In line with the requirements of the IPART Act, the Tribunal will have regard to a range of matters, one of which will be the objective of signalling the SCA's LRMCM to encourage Sydney Water to reduce demand.

The Tribunal's next steps towards deciding on the structure and level of the wholesale water price are discussed in Chapter 5. If an estimate of the SCA's LRMCM is available, it will most likely be a reference point for setting the usage component of this price.

4.3 Analysis and conclusions

The Tribunal's analysis and conclusions on the first three of the possible objectives for a wholesale step prices discussed above, Sydney's Water's proposed D-factor option, and a link between wholesale and retail water prices are discussed below.

4.3.1 Objective 1: Removing the financial incentive for Sydney Water to maximise its water sales

Several stakeholders supported the introduction of a step price to remove the apparent financial incentive under the current pricing structure for Sydney Water to maximise water sales. They argued that this incentive is not consistent with the Government's objective to reduce demand for water from the drinking water catchments.

A step price could potentially neutralise this incentive if the Tier 2 usage charge were set so that the marginal revenue Sydney Water could earn from sales of water in excess of the step quantity was equal to the marginal cost of supplying this water. However, the Tribunal has two major concerns about using a step price for this purpose:

- First, it doubts that it would be effective in reducing demand. There is no evidence to suggest that the apparent financial incentive to maximise water sales influences Sydney Water's decision making. For example, Sydney Water has been active in developing demand management programs in recent years. Because it is a Government owned business, Sydney Water responds to more than financial incentives. In addition, while a step price structure might remove this incentive, it would not encourage demand management by creating a new financial incentive to ensure that demand was less than the step quantity.
- Second, as Sydney Water pointed out in its submission, a step price structure used for this purpose could create financial risks for Sydney Water. It would not earn higher-than-expected profits when its total sales exceeded the step quantity, but it could earn lower-than-expected profits when its total sales fell below the step quantity (assuming prices were set to recover its revenue requirement based on forecast sales equivalent to the step quantity). Under the current pricing arrangements, additional revenue earned from above-forecast sales can balance revenue shortfalls due to below-forecast sales over the determination period.

In its review for this investigation, the CIE suggested an alternative approach for removing the financial incentive to maximise sales without creating these financial risks. Under this approach, a notional cap would be placed on Sydney Water's demand, then:

Over the period of a price determination, prices would be set to recover expected costs on a sales volume 'forecast' equal to the cap. This would allow for a 'loose' cap whereby above cap sales in some periods would be allowed to cancel out with below cap sales in others. ... [but] in the event that total sales [for the whole period] exceeded [the cap,] some adjustment would be required. This approach allows the business some 'insurance' against under-recovery in any *individual* year, given that it has the prospect of recouping that in later years.

This adjustment could take the form of a reduction in the fixed component of the retail price at the start of the *next* price determination period. (Use of the fixed component would be likely to have less undesirable signalling effects for consumers. If the usage

price were reduced this would weaken its desirable role in communicating scarcity costs. It would also have an uncertain impact on revenue.)³⁵

However, the Tribunal recognises that some stakeholders may have concerns about this alternative approach. For example, given the long lead time for some investments, it may be preferable to have a mechanism that sends an immediate signal in response to a breach of the cap. Under the CIE's proposed approach, such a signal would not be sent until the next determination period.

In summary, the Tribunal does not believe introducing a wholesale step price is an appropriate way to remove the apparent financial incentive for Sydney Water to maximise its sales, because of the concerns outlined above. It may give further consideration to the CIE's alternative approach during the 2005 price review if it decides that this incentive needs to be removed.

4.3.2 Objective 2: Creating a market for efficient demand management and supply augmentation

Several stakeholders noted in their submissions to this investigation that the wholesale water price could potentially be used to support the development of a market for alternative water supply and demand management options. Some suggested using the price of alternative water sources as a reference point in setting water prices. For example, the Hawkesbury-Nepean Catchment Foundation argued that step prices (or 'demand management charges') should be set at the marginal costs of recycling water to potable quality.³⁶ A member of the public suggested that the preferred pricing option should be determined on its potential to encourage a shift in the reliance on potable water to rainwater collected in tanks.

However, a step price structure would only contribute to this objective for the proportion of water sold above the step quantity. For example, while the Tier 2 usage charge could be set in a way that makes alternative water supply or demand management options economically attractive, the Tier 1 charge would probably need to be similar to (or even lower than) the current usage charge to ensure revenue neutrality for the SCA. Any market created would therefore be limited to dealing with excess demand, which is likely to fluctuate significantly from year to year.

The Tribunal is not convinced that the financial incentive created by a higher Tier 2 price would further encourage Sydney Water to address basic demand management initiatives (such as reduced leakage) or to support the development of a market for alternative supply and demand management options. It is also concerned that because the dynamics of the alternative supply market in Sydney are largely unknown, using a step price to stimulate this market is a high risk strategy. In addition, because the true scarcity value of water is not currently known, using a step price in this way could send inefficient signals to the market. There is some possibility that Sydney Water may be encouraged to enter into contracts with providers of water that may be hard to reverse later if better information about the scarcity value of water shows them to be unnecessarily expensive.

³⁵ Centre for International Economics, *Water price restructuring and the role of Sydney's wholesale water price*, pp 28-29.

³⁶ Hawkesbury-Nepean Catchment Foundation submission to IPART, p 4.

The Tribunal believes that the wholesale water price could more effectively support the development of such a market by retaining the current structure, setting a higher usage charge with reference to the SCA's LRMC, and reducing the fixed access charge. The Tribunal was not able to analyse the potential impacts of this option in any depth due to the lack of a reliable estimate of this LRMC. However, it considers that it would send a stronger, more efficient signal to Sydney Water about the need to undertake demand management and consider alternative sources of supply. The signal would be stronger because it would apply to all the water Sydney Water purchases from the SCA; it would be more efficient because it would only support alternative supply and demand management options that are more cost effective than the SCA's program of initiatives to achieve a balance between supply and demand.

In summary, the Tribunal recognises that this objective is a very important function of the wholesale water price structure. However, it believes that introducing a step price structure is not the best way to meet this objective. Rather, setting a single usage charge with reference to the SCA's LRMC, and setting the fixed charge to ensure it earns its allowed revenue requirement is likely to deliver more benefits for less risk.

4.3.3 Objective 3: Giving meaning to a 'cap'

While a volumetric cap on extractions from the Sydney catchment is not currently in place, it is a very real possibility in the near future.³⁷ However, as stakeholders have pointed out, such a cap is unlikely to be effective in reducing demand if it is not attached to a clear financial incentive for Sydney Water to avoid breaching the cap. A wholesale step price could be used to create this incentive if the step quantity was set to be equivalent to the cap, and the Tier 2 usage charge acted as a 'penalty price' for Sydney Water, and ensured that it would earn less profit if its sales exceed the cap.

Several stakeholders supported the use of a step price for this purpose. For example, the Total Environment Centre supported step or penalty pricing at the wholesale level because it considers current incentives for Sydney Water to meet demand management targets to be inadequate.³⁸ The Nature Conservation Council argued that under a step price structure, the Tier 1 usage charge should be set with reference to the SCA's LRMC as this properly takes into account all environmental costs, while the Tier 2 charge should be "a penalty price which deprives Sydney Water of a commercial return from retailing tier two water to its customers."³⁹

³⁷ On 23 March 2004 the Hawkesbury-Nepean River Management Forum released its final report with recommendations to The Hon. Craig Knowles MP, Minister for Infrastructure and Planning, and Minister for Natural Resources and The Hon. Robert Debus MP, Attorney General and Minister for the Environment. Among the recommendations was the establishment of an annual volumetric cap to limit water drawn from storages. Sydney Water Corporation would have a water demand target of 550GL per year by 2011 in order to meet the pressures of population growth, environmental flows and climate change, with an interim target of 570GL per year by 2008.

³⁸ Total Environment Centre submission, p 5.

³⁹ Nature Conservation Council submission, p 6.

However, the CIE questioned whether a penalty price would be a useful regulatory tool within an integrated NSW Government plan for managing the demand-supply imbalance. It argued that:

If *all* the demand management measures put in place by SWC are part of an agreed integrated planning approach they will be efficient by definition. Failure to meet cap extraction levels would then be a result of factors beyond SWC control, provided the agreed measures are implemented. Penalty prices would have no useful role under this scenario.

Only if SWC demand management measures are partly or fully discretionary can the step or penalty wholesale price perform as a regulatory incentive. How useful a tool is it likely to be?

Given that the Government has indicated that it will develop an integrated metropolitan water plan later this year, this argument seems logical. Furthermore, if a penalty was needed to give meaning to the cap, other regulatory mechanisms—such as making compliance with the cap a condition of Sydney Water’s operating licence and attaching a financial penalty to breaches of this condition—could achieve the same objective more simply, and with no implications for the SCA’s revenue.

In summary, the Tribunal believes that a wholesale step price is not likely to be the most appropriate way to give meaning to a cap on extractions from Sydney’s catchment. However if a cap is imposed on Sydney Water, the Tribunal will consider whether a penalty should be imposed if Sydney Water’s purchases exceed the cap as part of its review of Sydney Water’s operating licence.

4.3.4 Sydney Water’s proposed D-factor option

In its submission to this investigation, Sydney Water proposed an alternative to a wholesale step price that would also create financial incentives for it to save water at the wholesale level: a ‘D-factor’. Under this option, Sydney Water would earn a reward for achieving sales below the estimated safe yield of the catchment, and be penalised for sales above the safe yield. Sydney Water suggested that the penalty per kL could be set at “the marginal rate where Sydney Water would have an incentive to invest in demand management and alternative supplies”. Penalties and rewards would be administered through an annual adjustment to its revenue requirement (as determined by the Tribunal to calculate retail prices).

The key point of difference between using a higher Tier 2 step price to encourage Sydney Water to keep demand below the safe yield and using its proposed D-factor option is that the latter would create both positive and negative financial incentives. Theoretically, Sydney Water could cope with the penalties imposed in the years when its demand exceed the safe yield by earning rewards in other years when demand was below the safe yield.

However, the Tribunal’s investigation identified several major problems with the D-factor option that it believes cannot be resolved at this time. This first is that this option could create excessive revenue volatility. At the public hearing the Tribunal held on 25 March 2004, Sydney Water acknowledged this problem, commenting that:

...when we model [the D factor]... in a real-time scenario, it leads to fluctuations that could definitely send perverse signals that would lead to IPART having to constrain those signals and manage them.

The second problem is that the D-factor option could lead to excessive demand management investment by Sydney Water. As the CIE noted, rewarding Sydney Water for over delivering on its demand management targets

...could again lead to a level of demand management expenditure which is not optimal. With cost pass through of demand management costs available to SWC, the Tribunal would then have the difficult task of deciding what comprised prudent demand management expenditure. But prudent expenditure would be that estimated to lead to targeted savings, not overkill. Any better-than-target outcomes would therefore be, in a sense, windfall and the case for rewarding them dubious.⁴⁰

Sydney Water's submission also noted this drawback:

If the D-factor incentive rate was set too high, Sydney Water may have perverse incentives to invest in demand/supply programs that are not least-cost to the community.

The Total Environment Centre had similar concerns about the likely response of Sydney Water if a D-factor were to be introduced, noting that a "marketplace for water savings" has not been established.⁴¹

Because of these problems, the Tribunal does not believe a D-factor is an appropriate alternative to using a step price to encourage Sydney Water to manage its demand.

4.3.5 Link between wholesale and retail prices

The Tribunal raised the possibility of a link between wholesale and retail step prices in its Issues Paper for this investigation. It received limited feedback on this possibility, but those stakeholders who did comment were opposed to it. For example, the SCA argued that a prescribed link between the retail and wholesale Tier 2 usage charges to pass wholesale price increases through to retail customers would dampen the incentive for Sydney Water to seek out alternative supply options. However, it acknowledged that some level of pass-through may be an important signal to retail customers.

The Tribunal has given this issue further consideration, and does not see a need to create a link between wholesale and retail step prices at this time. In particular, it believes the possible introduction of a retail inclining block tariff should not be dependent in any way on the introduction of a step price at the wholesale level.

However, a broad reference between wholesale and retail prices may be possible. The Tribunal may undertake further analysis on this during the 2005 price review, when specific price structures may be compared.

⁴⁰ Centre for International Economics, *Water price restructuring and the role of Sydney's wholesale water price*, p 30.

⁴¹ Total Environment Centre submission p 5.

5 TRIBUNAL'S NEXT STEPS

The Tribunal's findings and conclusions on appropriate structures for retail and wholesale water prices will form part of its considerations for the 2005 metropolitan water price review.

This investigation of price structures was intended to be a prelude to the 2005 metropolitan water price review, at which the Tribunal will set the levels and structures of the prices Sydney Water and the SCA can charge from July 2005. While the investigation considered a range of matters that the Tribunal takes into account as part of its price setting process, its scope did not include all the key elements of this process.

As a part of the 2005 price review the Tribunal will separately determine the revenue requirements of Sydney Water and the SCA for the next determination period, based on its estimate of the efficient operating and capital costs each agency will need to incur to provide appropriate levels of service during this period. It will then determine the prices each agency can charge to generate this level of revenue.

This review only reports on the appropriateness, potential effectiveness and likely impacts of several alternative pricing structures. The prices and price scenarios included in this report are intended to illustrate the potential impacts of the price structure options considered, and are based on the revenue requirements of Sydney Water and SCA as determined in 2003. They should therefore not be seen as necessarily indicative of the actual prices that will be set in 2005.

However, the Tribunal invites stakeholders to comment on the findings and conclusions in this report in their submissions to the 2005 price review.

As indicated elsewhere in this report there are some significant information gaps that the Tribunal would like to see addressed prior to implementing significant price structure change. A key gap is a better understanding of the longer term costs of bringing supply and demand into balance, or the long run marginal costs of retail and wholesale supply. To ascertain these costs with any precision further information is required about the cost, yield and timing of the wide range of supply augmentation and demand management measures that might be adopted together with an understanding of the likely adoption sequence of these measures. The Tribunal will seek to work with water businesses and relevant Government agencies in the coming months to address these information gaps.

5.1 Next steps for retail prices

If the Tribunal decides to implement a retail inclining block tariff in 2005, this task will include balancing the levels of the new price components, which will involve a series of steps, outlined below. The Tribunal has also considered some of the practical boundaries around each of these price components.

Determining an appropriate level for the Tier 1 usage price.

One of its key considerations in determining the Tier 1 usage price will be an estimate of Sydney Water's LRMC that reflects the projected demand management and supply augmentation activities it will undertake as part of a NSW Government integrated plan to address the water supply-demand imbalance in Sydney. It will also consider other factors. For example, if the LRMC is below the current usage price, the Tribunal may be reluctant to

set the Tier 1 price below that level, because this would send a perverse signal to all water users about the scarcity value of water in Sydney. Additionally, the level of a retail Tier 2 price and the additional revenue stream it generates effectively places an upper limit on the Tier 1 Price.

Determining an appropriate level for the Tier 2 usage price.

The Tribunal believes there should be a simple and clear relationship between these charges, such as a 50 per cent or 100 per cent step up to make the concept of a Tier 2 price easier for customers to understand and to maximise the effectiveness of this price signal.

Establishing the step quantity

The step quantity is the volume of water available to customers at the Tier 1 usage price. The Tribunal's preference is to set the step point at a high level, such as 400kL per annum, so that most households, even large families, can meet all of their non-discretionary water use at the Tier 1 price. This will reinforce the objective of targeting discretionary water use with the Tier 2 price.

Determining the fixed water charge for all customers

The Tribunal is likely to set fixed charges at a level that collects the residual of Sydney Water's revenue requirement after the other components have been set. However, given the revenue volatility introduced by a retail step price it is inclined to retain a reasonable level of fixed charge, which has the effect of stabilising revenue.

The Tribunal has also considered transitional issues associated with implementing a new price structure. A quick transition to a new water price structure, rather than a series of minor price changes, might be useful in sending a strong signal to customers. However, it could create a price 'shock' for customers, especially if they have not had fair warning about new prices so that they can alter their behaviour. Once the Tribunal has settled on final price structures in 2005 it will consider an appropriate rate of change.

5.2 Next steps for wholesale prices

Although the Tribunal is not inclined towards the introduction of a wholesale step price in 2005 it considers that there is potential to rebalance the current price structure so that the usage price paid by Sydney Water for all the water it purchases from SCA better reflects its true scarcity value. However, as noted elsewhere in this report, additional information about the long run marginal cost to SCA of addressing the supply demand imbalance is a critical input to any adjustment of wholesale price. This cost needs to be assessed within the context of the Government's integrated plan for achieving and maintaining a balance between Sydney's water supply and demand.

There appear to be several critical parameters that need to be considered or resolved in developing a long run marginal cost estimate for the SCA:

- the level of environmental flow commitments to the Hawkesbury-Nepean river system and consequent future safe yield of the SCA catchment
- a least cost sequence of demand management and supply augmentation measures as part of an integrated water plan for the Sydney Basin

- the timing and costs to SCA of implementing the measures it is responsible for as part of an integrated water plan or least-cost sequence of demand management and supply augmentation measures.

A higher level of certainty on some of these matters may be apparent following resolution of the Metro Water Strategy foreshadowed by the Government for release in August 2004. The Tribunal will seek to take account of a settled Government strategy in setting final prices in 2005.

GLOSSARY

ABL	Australian Business Limited
BASIX	Building Sustainability Index
Catchment Authority	Sydney Catchment Authority
CoAG	Council of Australian Governments
CIE	Centre for International Economics
DEC	Department of Environment and Conservation
GL	Gigalitre (1 billion litres)
IPART	Independent Pricing and Regulatory Tribunal
IPART Act	<i>Independent Pricing and Regulatory Tribunal Act, 1992</i>
kL	Kilolitre (1 thousand litres)
LRMC	Long Run Marginal Cost
ML	Megalitre (1 million litres)
PED	Price Elasticity of Demand
PIAC	Public Interest Advocacy Centre
SCA	Sydney Catchment Authority
SWC	Sydney Water Corporation
Sydney Water	Sydney Water Corporation
Tribunal	Independent Pricing and Regulatory Tribunal

APPENDIX 1 TERMS OF REFERENCE

As a prelude to the commencement of the next periodic pricing review for Sydney Water and Sydney Catchment Authority, the Tribunal is requested to investigate and report on using pricing structures to reduce demand for water in the Sydney Basin.

This review is to cover:

- The use of a step price paid by Sydney Water to the Sydney Catchment Authority for extractions above the estimated safe yield of the catchment as determined from time to time.
- The establishment of pricing principles and a framework that may be adopted in moving from current retail tariff structures to alternative retail tariff structures. Pricing options for consideration should include inclining-block tariffs and reductions in fixed water charges.

In undertaking this review the Tribunal should have particular regard to:

- The potential affordability and equity impacts of alternative pricing structures, including step prices, on different customer groups.
- The potential for differential pricing for different customer classes and different end uses of water – such as industrial, commercial, residential and non-residential outdoor use.
- The likely water conservation impacts of alternative price structures.
- Water pricing principles agreed to by the Council of Australian Governments.

The Tribunal is to investigate and report by 31 July 2004.

APPENDIX 2 PRICE RESTRUCTURE AND THE INTERRELATEDNESS OF FIXED/VARIABLE CHARGES

The Tribunal has modelled prices to generate the same level of revenue as Sydney Water currently receives. This means that for each of the options presented, the Tribunal has restructured prices so that the overall outcome is revenue neutral to Sydney Water. Sydney Water's revenue requirement for the 2005 price path is not yet known so in order to analyse the impact of price restructure the Tribunal has focused on alternatives that generate the same level of revenue which it allowed at the 2003 determination.

The assumption of revenue neutrality means that choosing an appropriate retail price structure becomes a question of rebalancing the individual components within the price structure to generate a given level of revenue, rather than changing the total price level.

A change in one component of the price structure (eg, the Tier 1 or Tier 2 usage charge) must be offset by a change in another component (eg, the fixed charge). The combination chosen will depend upon how the Tribunal thinks the components should be balanced to meet its chosen objectives.

The remainder of this section looks at how each component can be used to achieve different objectives.

A2.1 Potential components of the price structure

The Tribunal has 4 components which may be changed when restructuring retail prices:

- The Tier 1 water usage price.

The water usage price is the price paid by customers for each kL of water used. This water usage charge may consist of:

- a simple flat per kL rate where the price paid by all customers is the same for every kL of water consumed, or
- a tiered rate where the usage price increases depending upon the volume of water consumed.

If a two tiered price structure is used, the Tier 1 water usage price is the price paid by customers for each kL of water used up to the step quantity. An increase in the Tier 1 water usage price increases the marginal price of water for all customers and signals to all customers that water is scarce.

- The Tier 2 water usage price.

Under a two-tier price structure, the Tier 2 water usage price is the price paid by customers for each kL of water used in excess of the step quantity. An increase in the Tier 2 water usage price increases the per kL price of water for consumption above the step quantity and applies only to those customers who consume large volumes of water. A Tier 2 price sends a strong conservation signal to large water users.

- The fixed access price

The fixed access charge is a flat annual charge paid by all residential customers who are connected to the water supply system. The fixed access charge does not vary with the volume of water consumed and reduces the variation in water bills across the customer base. The presence of a fixed charge for all customers has the effect of smoothing water bills across the population.

- The step quantity.

A step quantity (or step point) is only used in an inclining block tariff structure. It is the point above which each additional kL of water sold is priced at the Tier 2 usage price. Under a two-tiered price structure, residential customers are allocated a fixed volume of water (step quantity) at the Tier 1 price. Should a customer wish to consume more than this fixed amount, each additional kL would be charged at the Tier 2 price. A lower step quantity means that a larger number of water users are forced to pay the Tier 2 water usage charge and are therefore exposed to the stronger price signal.

A2.2 Balancing the components

The precise balance of these components in the final price structure will depend upon the desired outcome of the price reform. The remainder of this section describes the basic choices and consequences for the Tribunal in choosing a balance.

1. Balance between fixed versus usage charges.

The Tier 1 price affects all retail customers. The Tribunal may decide to increase the Tier 1 water usage charge if wants to send a strong conservation signal to all customers. An increase in the Tier 1 price also means that customers are rewarded for reducing their water consumption in the form of a lower water bill.

Because a large proportion of revenue is already generated through the water usage charge, a small increase in the Tier 1 water usage charge would need to be offset by a large decrease in the fixed charge. This increases water bills for large water users and decreases bills for low water users because a larger proportion of the total bill is calculated based on the volume of consumption. The fixed charge reduces the variability in the size of water bills across the customer base.

2. The introduction of a large Tier 2 price.

The Tribunal may choose to introduce a large Tier 2 water usage price if it desires to send a strong water conservation signal to only those customers who consume large volumes of water. A large Tier 2 water usage price has the effect of substantially increasing water bills for very large customers, while reducing bills for a large number of smaller water users.

A Tier 2 water usage charge is designed to target discretionary water consumption by applying only to large water consumers. This assumes that a greater proportion of a large water user's consumption is for discretionary purposes and that these customers are therefore more able to reduce consumption. If the step quantity were based on average consumption, the assumption is that all above average consumption is discretionary. Particularly in the case of large families this assumption may be incorrect.

With the introduction of a Tier 2 price, a reduction in the fixed access or Tier 1 price would be necessary to maintain revenue neutrality.

The large increase in bills for large water users brought about by a high Tier 2 water usage charge necessarily means that the majority of customers (who are not exposed to the Tier 2 price because they do not use enough water) will pay less. It is only the marginal use above the step quantity which is charged at a higher price and only those customers who use more than the step quantity will be faced with increased bills.

3. Setting the step quantity

The step quantity determines the number of customers who are exposed to the Tier 2 price under an inclining-block tariff price structure. A reduction in the step quantity would increase the number of customers exposed to the Tier 2 price. The Tribunal may choose to reduce the step quantity if it desires to send a strong conservation signal to a larger number of customers.

Because a reduction in the step quantity exposes more customers to the Tier 2 price, it must be offset by a greater reduction in the fixed charge, a low Tier 2 price or a decrease in the Tier 1 price to maintain revenue neutrality.

If the step quantity is set at a high enough level, most of the water consumption by residential customers will attract the Tier 1 water usage price only. Only those customers who use very large volumes of water will be forced to pay the Tier 2 water usage charge for a portion of their consumption.

APPENDIX 3 APPROACH USED TO IDENTIFY VULNERABLE CUSTOMERS

In its price setting role for water, the Tribunal is guided by the requirements of the IPART Act. Section 15 of the IPART Act requires the Tribunal to consider consumer protection when making pricing decisions.

Changing water price structures will mean that some customers will pay more for water than they do at present, while others will pay less. For those customers who potentially face a higher water bill, the Tribunal must consider whether this change is likely to cause significant financial hardship, and if so, whether this hardship can be addressed effectively.

A3.1 What is the Tribunal trying to do?

For each price structure option, the Tribunal considered whether the potential impacts on vulnerable customers are reasonable within the broader costs and benefits of that option.

The Tribunal is not trying to *completely* eliminate the possibility that customers least able to pay more for water may face a bill increase. If the number of customers in this situation is small enough, then other measures can be taken to alleviate any extra financial hardship. For example, Sydney Water could have a rebate scheme for households that have a large number of people under one roof, or assist those customers to reduce their consumption.

The options in this report that were analysed in detail show the number of vulnerable customers that could face bill increases under that option. The following section will define ‘vulnerable’ customers and show how this data was derived.

A3.2 Identifying impacts on vulnerable customers

The problem of financial hardship arises when prices change in a way that increases water bills for customers who are least able to afford an increase (vulnerable customers). This will happen when the customer in question:

1. faces a water bill increase because of the amount of water used in the household
2. has a low household income for the number of people supported by that income; and
3. will have difficulty in reducing water consumption (generally because of household size) in future to avoid paying a higher bill.

The Tribunal used its household survey to identify the number of customers that might be in this situation for each price structure option. The steps used to identify these customers are outlined below.

A3.2.1 Current water consumption – who could get a higher water bill?

The Tribunal’s first step was to compare the current and new water bill for all customers under each of its preferred pricing options. This process allowed the Tribunal to determine which customers are likely to receive a bill increase and which customers are likely to receive a bill decrease under each option.

For each of its preferred options, the Tribunal was then able to focus its attention on those customers who:

- pay for their water use (many residents in Sydney do not receive a water bill, so they will not be directly affected by price structure changes), and
- would receive a bill increase.

By definition, customers that did not fall into this category would not experience any direct financial impacts from a price structure change.

A3.2.2 Will these customers have difficulty affording a price increase?

The Tribunal's second step was to identify how many of the customers identified in Step 1 above were likely to find a price increase particularly difficult to afford. This required a consideration of both total household income and also upon how many people are living in the household - total household income must be spread across the needs of each of its occupants.

To do this, the Tribunal established several threshold income levels, based on the number of people in a household. If a household identified in Step 1 had an income level that was less than the threshold, then the Tribunal assumed that that household would have difficulty affording a price increase.

In establishing income thresholds, the Tribunal was guided by data on poverty lines published by the Melbourne Institute of Applied Economic and Social Research.⁴²

A3.2.3 If so, can they reduce their water use to avoid a price increase?

Data on household size was also an important input into the Tribunal's third step – considering whether those customers identified by Steps 1 *and* 2 could reduce their water use to avoid the potential financial impact of a price restructure.

For this step, the Tribunal had to estimate a reasonably efficient volume of water consumption for each household size. Households that use more than this efficient level should be able to reduce their consumption in response to a price increase.

Those customers identified by Steps 1 and 2, *and* whose consumption is already efficient, are considered vulnerable. To summarise, these customers:

- pay for the water that they consume
- face an increase in their water bill
- will have difficulty affording a price increase
- can not easily reduce their water consumption to avoid a price increase.

This group of customers are referred to as 'vulnerable' customers throughout the body of the report. The final step in the Tribunal's vulnerable customer impact analysis is to consider the magnitude of bill increases for this key group.

⁴² Melbourne Institute of Applied Economic and Social Research, *Poverty Lines: Australia*, June Quarter 2003.

A3.2.4 Consider the magnitude of bill increases for this key group

Having identified the number of vulnerable customers for each option, the Tribunal estimated the magnitude of the financial impact on these customers. To do this, the Tribunal compared the proportion of vulnerable customers receiving at least a 5, 10 and 15 per cent bill increase respectively.

This information on vulnerable customers was then balanced against the potential water savings and other costs and benefits of each option.

APPENDIX 4 WHEN MIGHT A TIER-TWO PRICE BE APPROPRIATE?

The Tribunal's preliminary view—that the most appropriate price structure for residential customers in Sydney is an inclining-block tariff—should be understood in the context of specific circumstances that affect Sydney at the present time. An inclining-block tariff may not be appropriate in all situations, but its focus on discretionary consumption makes it very suitable as one of a suite of measures to address a significant supply and demand imbalance.

The Tribunal considers that the following factors support the use of an inclining-block tariff:

- **There is a significant supply and demand imbalance.** Where the demand for water significantly exceeds the available supply, measures to encourage a reduction in demand will be necessary for the future sustainability of the water supply system. An inclining-block tariff price structure is one of a range of appropriate demand management options that could assist in rectifying this situation.
- **There is a desire to send a strong conservation signal to consumers by targeting discretionary water consumption.** The Tribunal has assumed that large water users have a larger volume proportion of discretionary consumption. Therefore, if the step quantity is set high enough, an inclining-block tariff price structure has the effect of targeting this discretionary water use.
- **The reductions in water demand are not outweighed by adverse impacts on potentially vulnerable customers.** Restructuring prices means that some customers are likely to face increases in their water bills while others will face decreases. If an inclining-block tariff is found to result in very large bill increases for a large number of vulnerable customers, the benefits of such a price structure may be outweighed by these customer impacts.
- **It is used in combination with other non-price measures to assist in reducing water demand.** An inclining-block tariff is designed to specifically focus on reducing discretionary water consumption. It should not be seen as 'stand-alone' measure but one of a range of tools that could be used to assist in reducing water demand. An inclining-block tariff should not be seen as a substitute for other non-price initiatives.

APPENDIX 5 REFERENCE LIST

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