



independent competition and regulatory commission

# Water and Wastewater Discussion Paper 3

## **Prices**

**Report 08 of 2007  
August 2007**

The Independent Competition and Regulatory Commission (the Commission) was established by the *Independent Competition and Regulatory Commission Act 1997* to determine prices for regulated industries, advise government about industry matters, advise on access to infrastructure and determine access disputes. The Commission also has responsibilities under the Act for determining competitive neutrality complaints and providing advice about other government-regulated activities. Under the *Utilities Act 2000* the Commission also has responsibility for licensing utility services and ensuring compliance with licence conditions.

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For further information on this investigation or any other matters of concern to the Commission, please contact the Commission on 6205 0799.

# Foreword

The Independent Competition and Regulatory Commission (the Commission) is responsible for determining the tariffs that ACTEW Corporation (ACTEW) applies for the provision of water and wastewater services in the ACT. In order to determine these charges, the Commission undertakes a comprehensive inquiry into ACTEW's water and wastewater business on a regular basis, typically once every four or five years. Each inquiry results in the determination of a price path to apply for the length of the subsequent review period. The most recent review determined a price path to apply for the four years from 1 July 2004 to 30 June 2008.

It should be noted that the tariffs for water and wastewater set by the Commission recover the prudent and efficient costs of ACTEW providing those services. They do not include a recovery of the scarcity value of water, nor do they include costs incurred by the ACT Government to manage water conservation in the territory. The ACT Government has introduced a Water Abstraction Charge (WAC) that goes towards the recovery of these costs. In addition, the ACT Government has announced a tax to apply to utilities in the ACT. These are costs that may also be included in the final price that customers pay for water and wastewater services. The Commission, however, is not responsible for determining these charges and taxes.

In preparation for the next price inquiry, which will determine water and wastewater tariffs to be charged by ACTEW in the ACT from 1 July 2008, the Commission is releasing a series of discussion papers. These papers, and any comments made in response, will form the basis of the regulatory approach to be adopted by the Commission in conducting the inquiry. This discussion paper is the third of a series of three the Commission has released between late 2006 and early 2007.<sup>1</sup>

The first discussion paper addressed the technical regulatory issues the Commission must consider in the determination of a regulatory price path. The second addressed issues related to the calculation of an appropriate return on capital. This paper discusses issues related to the actual pricing of water and wastewater services. The decision regarding the pricing of water and wastewater services is the final stage of the regulatory process and can occur only when the total efficient costs of the regulated business have been determined.

The importance of water management, including water and wastewater pricing, has been brought to public attention in recent years as a result of the drought that has affected the ACT and much of south-eastern Australia. In the ACT, the increased prominence given to water management and, in particular, to the security of water supply, culminated in a debate surrounding the possible construction of a new dam. It was in this context that a pipeline between the Cotter and Googong catchments was constructed, increasing ACTEW's ability to store water previously lost from the Cotter catchment. In addition, the ACT Government introduced water restrictions during the drought, and Permanent Water Conservation Measures (PWCM) were introduced in the ACT in March 2006.

The Australian Government and state governments have identified water management as a significant issue. The National Water Initiative (NWI), signed by all members of the Council of Australian Governments (COAG) in 2004, builds on the 1994 COAG framework for water reform.

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<sup>1</sup> The Commission initially intended to release five discussion papers. However, the five discussion papers have been condensed into three.

In addition, the Australian Government has implemented the Australian Government Water Fund, which provides funds for projects that invest in water infrastructure and improved water management techniques. The recent establishment of the Department of the Environment and Water Resources also demonstrates the significance of water management

The attention being given to water management issues by governments, and the increasing public awareness of water management issues, is an indication of the importance of water resources. In view of this, the Commission's task in completing the 2007–08 price review and approving water and wastewater tariffs for the following years, while having regard to government policies and relevant social, economic and environmental considerations, is an important step in any national water management strategy.

As always, the Commission believes that community involvement is a crucial part of the regulatory process. The Commission will seek submissions from the ACT community on matters relating to water and wastewater pricing and the level of service that customers expect to receive for the price they pay.

Based on this discussion paper series, and any submissions made in response to the discussion papers, the Commission will release a working conclusions paper in September 2007. As the initial step in the formal price inquiry process, the paper will detail the Commission's approach to the 2007–08 price review. The Commission expects to release a draft decision by November 2007 and a final decision by 1 March 2008. The Commission will seek comments from interested parties, and intends to hold a public hearing, between the releases of the draft and final reports.

| <b>Event</b>                                      | <b>Date</b>    |
|---|----------------|
| Release of information paper                      | August 2006    |
| Release of discussion paper 1                     | November 2006  |
| Release of discussion paper 2                     | March 2007     |
| Release of discussion paper 3                     | August 2007    |
| Close of submissions on discussion papers         | 31 August 2007 |
| Release of working conclusions paper              | September 2007 |
| Close of submissions on working conclusions paper | October 2007   |
| Release of draft report                           | November 2007  |
| Close of submissions on draft decision            | December 2007  |
| Public hearing                                    | February 2008  |
| Release of final report and price direction       | 1 March 2008   |

**Paul Baxter**  
**Senior Commissioner**  
**August 2007**

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# 1 Introduction

The primary motivation of price regulation is to ensure that a natural monopoly provider of essential services does not take advantage of its market power and earn monopoly profits. To achieve this goal, regulators often set prices on a cost recovery basis—that is, the regulator allows the business to earn revenue roughly equivalent to the efficient costs of operating the business. In the determination of these efficient costs, the regulator must develop a regulatory regime that provides appropriate incentives for the regulated business to undertake necessary investment in the maintenance and expansion of the network as required. In addition, it is necessary for the regulator to ensure that there are incentives for the regulated business to be productively efficient.

In the determination of efficient costs and the calculation of tariffs to recover these costs, the Independent Competition and Regulatory Commission (the Commission) views its role as being an independent arbitrator sitting between the producer, in this instance ACTEW Corporation (ACTEW), and consumers. The Commission's aim is to guard against the exercise of market power and the extraction of monopoly rents, while at the same time ensuring ACTEW has appropriate investment and productive incentives.

A regulated industry differs from a competitive market. In a competitive market, price is determined by the relative supply, demand and market power of producers and consumers and provides signals regarding investment decisions. In addition, competitive pressures compel businesses to seek efficiencies in production. However, in a regulated market the linkage between price and investment decisions, where current price influences future investment decisions, is broken because price is determined on a cost-recovery basis.

The regulatory process commonly used in Australia can be viewed as a two-step process. The first step involves the determination of the total efficient costs of the business, which was the subject of discussion papers 1 and 2. The second step involves the calculation of prices, or tariffs, such that the regulated business is able to recover its efficient costs. The calculation of tariffs is the subject of this discussion paper, the final in a series of three papers the Commission is releasing prior to the forthcoming regulatory review to determine water and wastewater tariffs in the ACT from 1 July 2008.

When determining tariffs, it is necessary for the Commission to be conscious of the context within which the review is taking place. That is discussed in Chapter 2.

Chapters 3 and 4 provide a discussion of water and wastewater pricing respectively, including a review of the theoretical literature regarding appropriate pricing. Chapters 3 and 4 also provide summaries of the current approaches adopted in the ACT and other jurisdictions and examine the issues to be considered when determining prices for the forthcoming regulatory period.

Chapter 5 details how interested parties may make submissions on the matters raised in this discussion paper.



## 2 Context

There are numerous factors the Commission must consider when determining efficient costs and calculating the prices that ACTEW may charge for water and wastewater services. These include:

- the Terms of Reference (TOR) under which the investigation is to take place
- the legislative requirements of the *Independent Competition and Regulatory Commission Act 1997* (ICRC Act)
- ACT Government and Commonwealth Government policies
- the issues being raised in the current public debate on water pricing.

Given the many factors to which the Commission must have regard, it is inevitable that there will be instances where these factors compete. In these situations, the Commission must decide what it considers to be the most appropriate response, while having regard to the various interests. The remainder of Chapter 2 discusses the various factors.

### 2.1 Terms of Reference

The Commission is to undertake the investigation of ACTEW in accordance with the Terms of Reference (TOR) received from the ACT Government. The complete TOR can be found at Appendix 1.

In February 2007, pursuant to subsection 15(1) of the ICRC Act ('the Act'), the Attorney General, Mr Simon Corbell MLA, referred to the Commission the matter of an investigation into, and the making of a price direction for, regulated water and sewerage services provided by ACTEW. Pursuant to subsection 16(1) of the Act, the Commission must take the following into consideration when conducting the investigation:

- The territory intends to continue to impose the Water Abstraction Charge (WAC) on ACTEW and all other water takers to reflect the value of water as a scarce resource.
- The charge may be set for the period 2008–09 to 2013–14 to support the policies of the ACT Government as set out in the document *Think Water, Act Water—Strategy for sustainable water resource management in the ACT*, which has as its target a 'reduction in per capita consumption of mains water by 12% by 2013 and 25% by 2023'. The charge should support such further reductions in water consumption as are necessary, having regard to the impact of drought or other factors affecting the availability of water for supply in the territory.
- In making the price direction, the Commission is required to have regard to the charge and the possibility that the territory will change the level of the charge, as well as ecologically sustainable development and National Water Initiative (NWI) policies agreed to by the ACT Government.

In arriving at its decision on price direction, the Commission is required to examine all regulatory models available to it under subsection 20A(1) of the Act and to report on the various costs and benefits to ACTEW, the territory, and the community resulting from each approach. The TOR requires the Commission to have regard to a number of factors specifically identified, including ACTEW's objectives under the *Territory-owned Corporations Act 1990*.

In accordance with section 16(2)a of the Act, the Commission is required to provide its final report by 1 March 2008.

## 2.2 Legislative requirements

As in all price determinations, the Commission must have regard to the requirements contained in the ICRC Act:

- the protection of consumers from abuses of monopoly power in terms of prices, pricing policies (including policies relating to the level or structure of prices for services) and standard of regulated services
- standards of quality, reliability and safety of the regulated services
- the need for greater efficiency in the provision of regulated services to reduce costs to consumers and taxpayers
- an appropriate rate of return on any investment in the regulated industry
- the cost of providing the regulated services
- the principles of ecologically sustainable development
- the social impacts of the decision
- considerations of demand management and least cost planning
- the borrowing, capital and cash flow requirements of people providing regulated services and the need to renew or increase relevant assets in the regulated industry
- the effect on general price inflation over the medium term
- any arrangements that a person providing regulated services has entered into for the exercise of its functions by some other person.

In regard to the principles of ecologically sustainable development, section 20(5) of the ICRC Act states:

*ecologically sustainable development* requires the effective integration of economic and environmental considerations in decision-making processes through the implementation of the following principles:

- (a) the precautionary principle—that if there is a threat of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- (b) the inter-generational equity principle—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- (c) conservation of biological diversity and ecological integrity;
- (d) improved valuation and pricing of environmental resources.

## 2.3 ACT Government policy

In addition, the Commission must take into account any ACT Government policy which affects the supply and demand for water and wastewater services or the operation of ACTEW. ACT

Government policy that potentially influences the decisions of the Commission includes the *Think Water, Act Water* (TAW) strategy document released in April 2004.<sup>2</sup>

The aims of the TAW strategy are to:

- increase the efficiency of water usage in the ACT
- provide a long-term, reliable source of water for the ACT and region
- develop a cross-border (ACT–New South Wales) water supply agreement
- protect the water quality of the ACT and surrounds
- incorporate water-sensitive urban design principles into urban, commercial and industrial development
- promote and provide for community involvement in the management of ACT water resources.

Targets to reduce per capita consumption of mains water by 12% by 2013 and 25% by 2023 are included under the goal of increasing water use efficiency. A target of increasing reclaimed water use from 5% to 20% by 2013 is also included.

The TAW foreshadowed the introduction of Permanent Water Conservation Measures (PWCM), which were introduced on 31 March 2006. The measures included restrictions on the types of hose fittings that could be used and the manner in which houses, cars, and lawns could be watered. The aim of the PWCM is to reduce water consumption by 8% per year.<sup>3</sup> It is necessary that the Commission consider the impact of these policies in its decisions on the pricing of water and wastewater services provided by ACTEW.

Another ACT Government policy that impacts on the Commission's decisions on the pricing of water is the WAC, a charge levied by the ACT Government on water taken from the catchment. The amount of the charge is determined by the ACT Government and applied on a per kilolitre basis. The charge is currently 55 cents per kilolitre and the revenue received is passed by ACTEW to the ACT Government. The first 25 cents per kilolitre are used to offset costs incurred by the ACT Government related to catchment management, the scarcity value of water and environmental costs such as environmental flows. The revenue received from the remaining 30 cents per kilolitre 'provides a return on a valuable resource and assists in managing demand'.<sup>4</sup>

The Commission has no role in determining the level of the WAC, although it has previously advised the ACT Government on a methodology for calculating the WAC.<sup>5</sup> It should also be noted that as ACTEW does not receive revenue from the WAC, this revenue is not used to offset the total efficient costs of ACTEW. However, the WAC significantly increases the marginal cost of water. It is therefore necessary to consider the elasticity effect of the WAC when determining water tariffs. This issue is discussed further in Chapter 3.

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<sup>2</sup> *Think Water, Act Water* and related documents are available from Environment ACT or from the TAW website, at [www.thinkwater.act.gov.au](http://www.thinkwater.act.gov.au)

<sup>3</sup> J Stanhope MLA, *New water saving measures for Canberra*, media release, ACT Government, Canberra 22 Mar 2006; ACT Department of Territory and Municipal Services, 'Permanent water conservation measures in the ACT', pamphlet, ACT Government, Canberra, Mar 2006.

<sup>4</sup> ACT Treasurer's response to Question on Notice number 60 during the 2006 Select Committee on Estimates. The response can be located at: <http://www.parliament.act.gov.au/downloads/issues-papers/Stanhope%20Treasurer%202006.pdf>

<sup>5</sup> ICRC, *Final report: water abstraction charge*, ICRC, Canberra, Oct 2003.

The ACT has also recently entered into a memorandum of understanding (MOU) with the New South Wales and Commonwealth governments regarding cross-border water supply.<sup>6</sup> The MOU is aimed at establishing a framework under which the region will have access to ACT-controlled water and at assisting the New South Wales Government when making decisions regarding new developments in the region. The Commission must consider the manner in which to treat water supplied under the MOU.

## 2.4 Commonwealth Government agencies, programs and initiatives

The Commission must be mindful of all Commonwealth Government water programs and agencies involved in water and wastewater management. These include the Murray–Darling Basin Commission (MDBC), the National Water Commission (NWC), the NWI, the Australian Government Water Fund (AGWF), and the Office of Water Resources (OWR).

The MDBC was formed to give effect to the 1987 Murray–Darling Basin Agreement that was signed by the governments of the Commonwealth, New South Wales, Victoria and South Australia. Queensland signed the agreement in 1996 and the ACT signed on through an MOU in 1998. The purpose of the Agreement is ‘to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray–Darling Basin’.<sup>7</sup> The MDBC has now been subsumed into the Department of the Environment and Water Resources.

In February 1994, in response to concerns about the state of many of Australia’s river systems, the Council of Australian Governments (COAG) developed a national policy for the efficient and sustainable reform of Australia’s rural and urban water industries. The Water Reform Framework proposed an integrated approach to address environmental degradation of river systems including strategies such as:

- allocation of water to the environment
- ecological sustainability of new developments
- institutional reform
- protection of groundwater
- adoption of the integrated catchment management approach
- micro-economic reform.

In June 2004, the COAG extended the Water Reform Framework through the NWI.

The NWC was established as an independent statutory agency within the Prime Minister’s portfolio in 2004. Its mission is to assess and help with implementing the NWI, which is aimed at increasing the efficiency of Australia’s water use and ensuring the health of river and groundwater systems. It also administers two programs under the \$2 billion AGWF—the Water Smart Australia and Raising National Standards programs.<sup>8</sup>

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<sup>6</sup> Memorandum of Understanding between the Australian Capital Territory and the State of New South Wales and the Commonwealth of Australia on Australian Capital Territory and New South Wales Cross Border Water Resources 2006, effective 17 August 2006.

<sup>7</sup> [http://www.mdbc.gov.au/about/murraydarling\\_basin\\_initiative\\_\\_overview](http://www.mdbc.gov.au/about/murraydarling_basin_initiative__overview)

<sup>8</sup> <http://www.nwc.gov.au/nwi/index.cfm>

In September 2006, the Prime Minister announced the establishment of the OWR, which was part of the Department of the Prime Minister and Cabinet. Its task is to oversee all of the initiatives currently undertaken by Commonwealth Government agencies and to assist the NWC.<sup>9</sup> The OWR was subsequently transferred to the Department of the Environment and Heritage and the department was renamed the Department of the Environment and Water Resources.

On 25 January 2007, the Prime Minister announced the National Plan for Water Security, a \$10 billion, ten-point plan to improve water efficiency and address over-allocation of water in rural Australia.

The National Plan for Water Security builds on the COAG Water Reform Framework and accelerates the implementation of the NWI. Designed to ensure rural water use is placed on a sustainable footing over the next decade, it is intended to significantly improve water management across the nation, with a special focus on the Murray–Darling Basin, where the bulk of agricultural water use takes place.

The National Plan for Water Security includes:

- a nationwide investment in Australia’s irrigation infrastructure to line and pipe major delivery channels
- a nationwide program to improve on-farm irrigation technology and metering
- the sharing of water savings on a 50:50 basis between irrigators and the Commonwealth Government, leading to greater water security and increased environmental flows
- a strategy for addressing, once and for all, water over-allocation in the Murray–Darling Basin
- a new set of governance arrangements for the Murray–Darling Basin
- a sustainable cap on surface and groundwater use in the Murray–Darling Basin
- a commitment to major engineering works at key sites in the Murray–Darling Basin such as the Barmah Choke and Menindee Lakes
- an expansion of the Bureau of Meteorology’s role to provide the water data necessary for good decision making by governments and industry
- a taskforce to explore future land and water development in northern Australia
- completion of the restoration of the Great Artesian Basin.

## 2.5 Current public debate

In recent years there has been much debate in the media, among politicians, and within the general public about water management and water pricing. The current drought has focused attention on the scarcity of water and the importance of effective resource management regimes and pricing methodologies. A common theme which appears to be emerging is that water is underpriced, so water prices need to increase to reflect the true value of water being consumed. Related to this issue are suggestions that water pricing can be used as a demand management tool during times of water shortage.

It is important to understand these arguments in the context of a regulated utility such as ACTEW. As highlighted in discussion papers 1 and 2, the Commission regulates ACTEW on a cost-

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<sup>9</sup> [http://www.pm.gov.au/News/media\\_releases/media\\_Release2153.html](http://www.pm.gov.au/News/media_releases/media_Release2153.html)

recovery basis. Under such an approach, ACTEW earns enough revenue to recover the cost of operating and maintaining the water and wastewater network while receiving a market return on capital invested. Similar approaches towards the pricing of urban water are adopted in states such as New South Wales, Victoria, and Western Australia. In this context water prices, as determined by regulators such as the Commission, are set at a level that ensures full cost recovery. The issue of whether the price charged for water reflects its scarcity value is a separate matter.

In the ACT, the government imposes the WAC, which is aimed at recovering costs associated with management of the catchment, the scarcity value of water, environmental costs, and providing a return to the ACT Government on the value of water consumed. In this sense, it is evident that the price ACT customers pay for water already reflects not only the cost of providing water services, but also to some degree the scarcity value of water consumed. It may be argued that although in some jurisdictions the scarcity value of water is not taken into account, in the ACT the WAC captures the scarcity value of water. The issue of the magnitude of the scarcity value of water is one that needs to be addressed. There appears to be little discussion on the magnitude of the scarcity value or on a methodology for determining it.

As part of the NWI, the Department of the Prime Minister and Cabinet commissioned an investigation into the efficiency of urban water provision and the degree to which full cost recovery was being attained. In November 2006, the department released a discussion paper entitled *Securing Australia's urban water supplies: opportunities and impediments*, prepared by Marsden Jacob Associates (MJA). A significant conclusion of the discussion paper was that water utilities operating in Australian capital cities were generally undercollecting revenue compared to the revenue that would be collected under full cost recovery. For the ACT, the discussion paper stated that ACTEW recovered only 80% of its costs during 2004–05 and that an increase in revenue of 25% is therefore justified.<sup>10</sup>

The analysis undertaken by MJA drew heavily from data contained in 'WSAAfacts 2005', a document produced annually by the Water Services Association of Australia (WSAA) detailing the performance of Australian water utilities.<sup>11</sup> The information contained in 'WSAAfacts 2005' includes financial performance measures for ACTEW from 1999–2000 to 2004–05. The Commission observes that the data in 'WSAAfacts 2005', on which the MJA analysis is based, are inconsistent with the audited data submitted to the Commission by ACTEW and subsequently verified by engineering experts engaged by the Commission.

Given that the data provided to the Commission are authorised by the ACTEW Board of Directors and independently audited for accuracy, prudence and comprehensiveness, MJA's reliance on 'WSAAfacts 2005' was, in this instance, both puzzling and concerning. In general, the Commission rejects the assertion that regulated water prices are not fully cost-reflective as claimed by MJA. Indeed, the Commission observes that for a number of years the ACT water pricing arrangement has satisfied the COAG target requirement for urban water prices to be set at the upper bound defined in the National Competition Policy Agreement on related reforms for water and the subsequent NWI.

The use of price as a demand management tool has also been mentioned in the current public debate. The use of this tool in times of scarcity must be considered carefully in the context of a cost-recovery regulatory regime, given the possibility that an increased volumetric price, without a

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<sup>10</sup> Marsden Jacob Associates, *Securing Australia's urban water supplies: opportunities and impediments*, a discussion paper prepared for the Department of the Prime Minister and Cabinet, Nov 2006, p. vii.

<sup>11</sup> Water Services Association of Australia, 'WSAAfacts 2005', WSAA, Melbourne, 2006.

corresponding adjustment to the fixed charge included in the total price, may lead to increased revenues beyond those required by the service utility to meet its efficient costs.

There are numerous factors the Commission must take into account when determining water and wastewater prices. These include:

- the TOR received by the Commission, which sets the context for the particular price inquiry
- the legislative framework
- ACT Government and Commonwealth Government policies
- the issues raised in the current public debate.

In its assessment of these potentially conflicting factors, the Commission must always be mindful that its role is to regulate the revenues of ACTEW such that ACTEW does not overrecover revenue relative to its efficient costs. Determining and charging for these services to account for the scarcity value of water is a separate issue undertaken by government, although an issue that must be addressed by the Commission when considering the impact of prices on consumers, the service provider itself, and the wider environmental and social welfare issues identified in the ICRC Act.



## 3 Water pricing

Following the determination of efficient costs, the Commission is responsible for the calculation of tariffs. This chapter:

- provides an introduction to the theoretical debate regarding water prices
- outlines the pricing structure currently in place in the ACT
- summarises the approaches adopted in other jurisdictions
- discusses some of the possible options that may be adopted in the ACT.

### 3.1 Theoretical issues

#### 3.1.1 The market for water

The first step in any economic analysis of the pricing of a good or service is to describe the characteristics of the market for that good or service. This is especially true for water. Water is considered an essential service, one of life's necessities. Within Australia, water is also a commodity with tradeable allocations, and is an input into the production process for agriculture and manufacturing. In an urban setting, water is a good or product, like many other goods or products: providing it to consumers incurs costs and demand depends on price and other factors such as income and external factors such as the weather.

Water is an interesting good or service to study beyond the fact that it is an essential service. Many of the characteristics of the urban water market are not consistent with the commonly stated assumptions made of goods and services in economic textbooks. This does not imply that rigorous economic analysis cannot be applied to the market for water; rather it implies that analysis of the market for water must take into account the realities of the market. The standard economic textbook model of markets makes no distinction in the timing of decisions, such as when prices are set and when consumption occurs. Further, the standard model assumes that all consumers have perfect information about the prices they face and that all producers have perfect information about their costs of production. It is reasonable to assert that none of these assumptions applies to the regulated market for urban water services.

The common regulatory model has yearly price resets for most regulated services, such as gas and electricity distribution services and water and wastewater services. The Commission resets the price for water and wastewater every financial year and those prices remain in effect for 12 months. Thus, there is no direct reason to argue that consumers are unaware of the price of water. However, empirical studies of water demand have often found that, when faced with multipart tariffs, consumers behave as if they are responding to the average price and not the marginal price.<sup>12</sup> Given that prices for water are perfectly observable, why is it that consumers behave as if they are not? One reason might be that consumers are unaware of the quantity of water they are consuming at any given time. For example, consumers might know the duration of their average

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<sup>12</sup> The average price is defined as the total bill for water including the fixed charge divided by the number of kiloliters consumed. See the citations below.

shower but might not know the rate of flow (in kilolitres per minute).<sup>13</sup> Typical accumulation meters for water are not readily available at the point where the consumer is using water (for example in the bathroom), and the metering that does exist is not easily readable by most consumers.

Alternatively, consumers may alter their behaviour in response to water bills but not to prices because they do not pay for the water they use until well after it has been consumed. Water is a different good from petrol, for example. Water and petrol both have prices that can be easily observed; however, petrol is different from water in that consumers pay for it when they receive it and can alter their driving behaviour when faced with price changes. By contrast, consumers receive quarterly water bills for the water they consumed over the previous three months. Given that consumers may be unaware of the amount of water consumed or the price of that water, the direct feedback to consumers from prices in the market for water is not as strong as it is in the market for petrol.

Prices for water are often set long before the level of demand is known. For the past two price determinations, the Commission has set the price of water based on a typical-year approach. That is, the Commission assumes that the quantity of water demanded will be equal to the amount demanded under typical climate conditions. However, climate conditions and hence water demand vary considerably from year to year. In dry years, without water restrictions water usage is high and in wet years (with wet summers) it is lower. Prices are set before demand is known and there is no market mechanism to adjust prices based upon changes in demand due to external factors such as the weather. In contrast, the price of petrol varies more frequently in response to changes in worldwide and local supply and demand factors.

On the supply side of the market, the cost of water, or more importantly the marginal cost of water, is potentially unknown at the time when prices are determined. In the ACT, water sourced from the Googong Dam has a different average and marginal cost than water sourced from the Cotter Dam and this is different from the cost of obtaining water from the Bendora Dam. The amount of water that will be sourced in the next year from each of the possible water sources in the ACT is unknown at the time when prices are determined and fixed for the year. It depends on the overall amount of rainfall and evaporation leading up to, and during, the year as well as the relative inflows to each of the catchments.

The Commission takes the view that careful consideration of the actual water market, including the regulatory process and any potential government policy considerations, is necessary when considering the structure of tariffs. Standard catch phrases such as ‘price should equal marginal cost’ are meaningless unless the complexities of the market are understood. If marginal cost is uncertain or consumers are responding not to marginal prices but to average prices, setting price equal to marginal cost is a meaningless exercise. In the following discussion of water tariffs, the Commission attempts to explore some of these complexities more thoroughly.

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<sup>13</sup> Shower flow can vary, depending on the type of showerhead, from six to 16 litres per minute. A five-minute shower would use between 30 and 80 litres. It is worth noting that an 80-litre shower costs a consumer around 20 cents at the current price. An alternative explanation for consumers’ ignorance of prices or quantities might be that for most household activities that use water, the cost of the water is very small. Hence, consumers have little incentive to closely monitor their behaviour.

### 3.1.2 The role of prices in a regulated market

In a market economy, prices play the crucial role of allocating goods and services from those who can efficiently produce them to those who most value them, thus ensuring that an economically efficient outcome occurs. In an unregulated market, where prices are set by the interaction of the competing forces of supply and demand, prices move to equilibrium levels to balance these competing forces. Thus, prices send signals to both sides of the market, including signalling the potential profitability of future investment. At the margin, both producers and consumers make production and consumption decisions based on the prevailing market price. The feedback from these signals may affect the future investment decisions of both producers and consumers.

It is not clear that the same signals are sent in a regulated market, especially the signal that price sends to the supplier with respect to potential investment. In an unregulated market, market forces drive the incentive for investment and price is a credible signal of future market outcomes. Price regulation may break the relationship between market price and investment. For example, the level of the current marginal price in the tariffs for a regulated water and wastewater services provider may have no impact on the incentive for the utility to invest. The driver for making efficient investment is based on the return that a business expects to earn from that investment. Given that in a regulated market prices are set to recover costs, granting a fair rate of return on capital investment and providing certainty that this will continue into the future is more likely to drive efficient investment. If a business knows that it will recover its efficient costs, the structure of water tariffs will have no effect on its decision to invest.<sup>14</sup>

The Commission is interested in the role prices play in the market for water in the ACT. If changing the structure of water tariffs has an insignificant effect on the behaviour of water customers and/or the regulated water business, the primary role of water tariffs is to recover the cost of providing the service to customers. If, on the other hand, consumers are truly responsive to the structure of the water tariffs, tariff structure is an important issue. The Commission is interested in receiving comments on this issue from interested stakeholders.

### 3.1.3 Prices and cost recovery

The focus of this chapter is on the setting of prices and the structure of tariffs under incentive regulation. While the Commission sets prices to recover the full cost of providing water and wastewater services as prescribed by COAG agreements and ACT Government policy, it is important to discuss the consequences of this prescription.

There are several implications and observations that follow from the cost-recovery requirement. First, if there were not full cost recovery, taxpayers (and hence water and wastewater customers since almost all taxpayers are water and wastewater customers) would ultimately bear the cost. Second, relaxing the requirement of full cost recovery does not fundamentally change the problem faced by the regulator when determining tariffs. Finally, the economic justification for government to absorb a portion of the cost of providing water and wastewater services needs to be examined.

Ultimately, the full cost of providing water will be borne by either taxpayers or customers or some combination of the two. Prior to 1994, the full cost of providing water and wastewater services in the ACT was not recovered from the revenue generated from water sales. The Commission's first

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<sup>14</sup> The mix between fixed and volumetric charges may affect the variability of revenue over time. This is a second order effect at best, compared to the setting of a fair rate of return on capital.

price direction for water and wastewater was released in May 1997 under the ACT Energy and Water Charges Commission banner.<sup>15</sup> Currently, the full cost of water and wastewater services is covered by the consumers of those services. Given that most ratepayers are also water and wastewater customers, the pre-1994 situation and the current situation both result in the cost of these services being borne by the ACT community. The bottom line is that the cost of providing water and wastewater services to the ACT will be paid for primarily by ACT residents. For example, if it became government policy for only 80% of the costs of water and wastewater services to be paid for by customers and if the government wanted to maintain the same financial position, it would have to make up the 20% reduction in cost recovery through increased taxes and charges. Ultimately the same residents would bear the burden of the cost recovery. The Commission's role in this instance is not to set the level of cost recovery but to ensure that there is an efficient provision of water and wastewater services. This includes setting efficient prices that take into account government policy, the TOR and the conditions set out in the ICRC Act.

The above example, where the government requires only 80% of the cost of water and wastewater services to be borne by customers, does not change the nature of the problem faced by the Commission in terms of determining prices and the structure of tariffs. There is still the problem of recovering a fixed amount of revenue through prices, albeit a slightly smaller quantum of revenue. The Commission would still need to determine the structure of tariffs for water and wastewater in order to recover this reduced amount of revenue. Thus, partial cost recovery does not alter the task faced by the Commission when determining prices and the structure of tariffs.

A consumption externality occurs when there are benefits accruing to others from an individual's consumption of the good or service. Consider, for example, the provision of bus services and the provision of water, in terms of revenue recovery from customers and benefits to others. In the ACT, fare-box recovery for bus services is around 20% of the total cost of providing bus services.<sup>16</sup> Commuters who use the bus network provide a benefit to other commuters through reduced congestion and demand for car parking spaces.<sup>17</sup> The greater the patronage of the bus network, the less the government (or private developers) need spend on parking lots or road infrastructure. Thus a benefit accrues to all residents of the ACT from increased bus patronage. Subsidising water consumption may not have the same effect. There is a potential benefit, in terms of health and hygiene, from providing water to all households and making sure that water is affordable. However, this benefit is best met through targeted payments to those households in need and through safety net provisions. Subsidising water in general to all consumers would result in additional demand, higher-level water restrictions in the short run, and ultimately the need for additional capital expenditure to enable additional demand to be met.

### 3.1.4 Water pricing—theory

#### *Marginal cost pricing*

Economic theory suggests that to achieve the most efficient outcome, price should be set equal to marginal cost. Pricing at marginal cost ensures that consumption occurs up to the point where the marginal cost of producing an additional unit is equal to the marginal benefit gained from its

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<sup>15</sup> ACT Energy and Water Charges Commission, *Investigation into ACTEW's Electricity, Water & Sewerage Charges 1997/98*, ACTEWCC, Canberra, May 1997.

<sup>16</sup> ICRC, *Final Determination: ACTION pricing for the period 1 July 2003 to 30 June 2006*, Report 4 of 2003, ICRC, Canberra, May 2003.

<sup>17</sup> There is also a reduction in pollution and greenhouse gases that accrues not only to residents in the ACT but also to the rest of Australia and perhaps the entire world.

consumption. The concept of marginal cost pricing is well established in economic theory and is one of the basic principles of economics. However, economists have known that there are situations where marginal cost pricing may not be optimal. Baumol and Bradford (1970) in an aptly named paper provide a general proposition and examples of when marginal cost pricing may not be the best outcome attainable.<sup>18</sup> Spence (1977) demonstrates that non-linear pricing schedules may be optimal when there are heterogeneous consumers.<sup>19</sup> Roberts (1979) shows that non-linear pricing may be optimal in the pricing of public utilities.<sup>20</sup> All of these results have been well known to economists for decades.

Price in a competitive market is determined by the relative supply, demand and market power of producers and consumers. However, in a regulated market, price is determined by the regulator on the basis of efficient cost recovery. In regard to water pricing, setting price equal to marginal cost would result in the water utility recovering all variable costs associated with the treatment of the final kilolitre of water to a potable standard and any pumping costs required to deliver water to customers. However, setting price in this manner implies that the water utility would not receive revenue to account for the fixed costs associated with water provision. These fixed costs include items such as the maintenance of dams, reservoirs and the reticulation network, and investment in additional capacity as required. By not allowing the regulated water utility to recover these costs, it has no incentive to undertake such works. This would inevitably result in reduced service standards and potential capacity constraints.

### ***Two-part tariffs***

To address the issue of underrecovery when price is set at marginal cost, two-part tariffs have been suggested as the most efficient way in which to price regulated services such as water provision. Two-part tariffs consist of a fixed charge and a volumetric charge. In a regulatory setting, such an approach has the benefit of enabling the fixed charge to be determined at a level that ensures the recovery of the efficient costs of the regulated business.

A two-part tariff approach, with the volumetric charge set at marginal cost and the fixed charge determined on the basis of recovering the remaining revenue, is recommended by Sibly in two recent publications.<sup>21</sup> Sibly argues that:

A two-part tariff can simultaneously satisfy the twin objectives of efficiency and revenue requirement for an urban water provider. Two-part tariffs levy a fixed access charge on each customer and additionally impose a volumetric charge. The fixed charge paid by the customer is independent of the volume consumed. It therefore does not influence the consumers' choice of volume. Thus, the volumetric charge is efficient if set equal to the marginal cost. The fixed charge is thus set to make up the shortfall between the revenue from a marginal cost price and the revenue needed to cover total costs.<sup>22</sup>

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<sup>18</sup> W Baumol, and D Bradford, 'Optimal departures from marginal cost pricing', *American Economic Review*, vol. 60, no. 3, 1970, pp. 265–283.

<sup>19</sup> M Spence, 'Non-linear prices and welfare', *Journal of Public Economics*, vol. 8, no. 1, 1977, pp. 1–18. (Non-linear pricing refers to any pricing schedule where there is not a constant price per unit. Examples include quantity discounts and the inclining block tariffs commonly used in water pricing.)

<sup>20</sup> K Roberts, 'Welfare considerations of non-linear pricing', *Economic Journal*, vol. 89, no. 353, 1979, pp. 66–83.

<sup>21</sup> H Sibly, 'Urban water pricing', *Agenda*, vol. 13, no. 1, 2006, pp. 17–30; H Sibly, 'Efficient urban water pricing', *Australian Economic Review*, vol. 39, no. 2, 2006, pp. 227–237.

<sup>22</sup> H Sibly, 'Efficient urban water pricing', op. cit., p. 232.

In addition, Sibly argues that, in times of drought, the volumetric charge should be increased to account for the increase in the marginal cost of water. In turn, the fixed component could be reduced to ensure that the revenue requirement is still satisfied.<sup>23</sup>

Dwyer (2006) also supports two-part tariffs and states that:

... the ideal two part tariff charge is an access price based on a 'lump sum' rating of the value of the land serviced, as used to be the case in Australia, plus a uniform charge solely representing marginal cost...<sup>24</sup>

Regulators such as the Economic Regulation Authority (Western Australia) (ERA) and the Essential Services Commission of Victoria (ESC) have adopted two-part tariffs for non-residential water tariffs.

However, support for a two-part tariff with the volumetric charge set at marginal cost and a fixed charge designed to ensure revenue recovery is not universal. Fisher (1990) argues that marginal cost pricing is efficient in a competitive market which includes characteristics such as many firms, no barriers to entry or exit, no indivisibilities or immobilities in the factors of production, easy substitutability among factors of production, and no externalities in production or consumption.<sup>25</sup> He states, 'The world of public utilities, where the marginal cost pricing advocates have been most influential, differs from this textbook universe in nearly every respect'.<sup>26</sup>

### ***Inclining block tariffs***

While simple two-part tariffs have been adopted by some regulators for non-residential tariffs, there appears to be a movement by regulators toward inclining block tariffs (IBTs), especially in the case of residential customers. These regulators include the Commission in the ACT, ERA in Western Australia, ESC in Victoria and the Independent Pricing and Regulatory Tribunal (IPART) in New South Wales. An IBT differs from a two-part tariff in that there is more than one volumetric rate. Under an IBT, the volumetric rate increases in a stepped manner as consumption increases. Current ACT water tariffs are an example of an IBT, where a low price is set for consumption up to 100 kilolitres, a higher price is set for consumption between 100 and 300 kilolitres and a higher price again is set for consumption in excess of 300 kilolitres.

The rationale given by regulators for adopting IBTs, apart from the recovery of efficient costs, centres around the assumption that IBTs encourage water conservation because they allow for the price of water to increase as consumption increases.<sup>27</sup> In addition, IBTs are seen by regulators as being sufficiently flexible to allow them to balance the many competing factors that they must consider when determining water prices.

Criticism of IBTs follows from the idea that economic efficiency can be attained only through a single marginal price of water. If two customers are paying for water at different marginal prices due to different levels of consumption, one of the two prices cannot be allocatively efficient. The

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<sup>23</sup> *ibid.*, p. 235.

<sup>24</sup> T Dwyer, 'Urban water policy: in need of economics', *Agenda*, vol. 13, no. 1, 2006, p. 10.

<sup>25</sup> PS Fisher, 'The strange career of marginal cost pricing', *Journal of Economic Issues*, vol. 24, no. 4, Dec 1990, pp.77–92.

<sup>26</sup> *ibid.*, p. 78.

<sup>27</sup> See ESC, *Metropolitan and regional businesses' water plans 2005–06 to 2007–08, final decision*, ESC, Melbourne, Jun 2005, pp. 87; ICRC, *Final report and price direction: investigation into prices for water and wastewater services in the ACT*, Report 8 of 2004, ICRC, Canberra, Mar 2004, pp. 118–121; IPART, *Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: prices of water supply, wastewater and stormwater services, final report*, op. cit., p. 103.

volumetric price for water should be set equal to the marginal cost of water to achieve efficiency. Sibly states this:

The key requirement for economic (allocative) efficiency is that the volumetric charge should equal the opportunity cost of water.<sup>28</sup>

However, in the next sentence Sibly states: ‘The volumetric charge has to be flexible in the face of changing demand and supply conditions’.<sup>29</sup>

Sibly is correct that IBTs are inefficient, but this needs to be qualified. If prices are set in advance by the regulator without knowing the precise demand and cost conditions, a simple two-part tariff will only be efficient in the rare cases where the regulator perfectly forecasts cost and demand conditions.

### ***Long run marginal cost***

Regardless of whether a two-part tariff or an IBT is adopted, there is a need to determine the volumetric rate to be charged. One approach increasingly being adopted by Australian regulators is to base volumetric rates on what is referred to as long run marginal cost (LRMC).<sup>30</sup> The ERA, the ESC, and IPART have all stated a preference for determining volumetric charges with reference to LRMC.<sup>31</sup> The ESC states that setting volumetric water prices with reference to LRMC is ‘consistent with providing efficient signals about the costs of providing services and incentives for sustainable water use by allowing customers to balance the relative costs and benefits of consuming water’.<sup>32</sup> Further arguments made for the adoption of LRMC include the idea that customers should be aware of the impact that their consumption today is likely to have on the cost of the provision of water in the future. However, each regulator acknowledges that there is a range of matters that it must consider when determining tariffs, including demand management, and environmental and social concerns. As such, LRMC is generally used as a guide in pricing decisions.

The term LRMC, as defined by the ERA, the ESC, and IPART, is somewhat misleading. Theoretically, LRMC is defined as the cost of producing an additional unit when all factors of production (capital and labour) are variable. That is, the least cost combination of inputs able to produce a given level of output when all factors of production may vary. In essence, LRMC refers to a hypothetical cost based on an assumption that all factors of production could be altered instantaneously to produce at least cost. This definition of LRMC is of limited value in the context of a water utility as it is obvious that not all factors of production (dams, reticulation systems etc.) can realistically be varied to produce the combination of inputs required to produce at least cost. Rather, the cost defined as LRMC by the ERA, the ESC, and IPART can more appropriately be considered an ‘incremental cost’.

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<sup>28</sup> H Sibly, ‘Urban water pricing’, op. cit., p. 18.

<sup>29</sup> *ibid.*

<sup>30</sup> Generally, if IBTs are adopted, the lowest block is determined with reference to LRMC while higher blocks are based on other considerations.

<sup>31</sup> See ERA, *Final report: Inquiry on urban water and wastewater pricing*, ERA, Perth, Nov 2005, p. 30; ESC, *Estimating long run marginal cost: implications for future water prices, information paper*, ESC, Melbourne, Sep 2005, p. 1.; IPART, *Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: prices of water supply, wastewater and stormwater services, final report*, op. cit., pp. 105–106; IPART, *Investigation into price structure to reduce the demand for water in the Sydney Basin, final report*, IPART, Sydney, Jul 2004.

<sup>32</sup> ESC, *Estimating long run marginal cost: implications for future water prices, information paper*, op. cit.

MJA (2004) discusses incremental costs in a paper prepared for the Queensland Competition Authority.<sup>33</sup> The paper argues that pricing at marginal cost leads to an allocatively efficient outcome and considers whether short run or long run marginal cost should be adopted. It concludes that, based on the price fluctuations that may occur if short run marginal cost pricing is adopted, long run marginal cost is more appropriate. MJA distinguishes between two broad approaches that can be adopted to calculate LRMC: marginal incremental cost (MIC) and average incremental costs (AIC). The Commission considers these terms to be preferable to the use of LRMC, given the difference between the theoretical definition of LRMC and what is actually calculated by regulators. While a detailed discussion of the approaches is beyond the scope of this paper, the following brief summary of the methodologies, based upon MJA's analysis, may prove instructive.<sup>34</sup>

In simple terms MIC is calculated by:

- forecasting demand into the foreseeable future
- estimating the capital works required to meet this forecast demand
- estimating the cost of these capital works
- adjusting demand upwards by an increment
- reconsidering the capital works required to meet this adjusted demand
- calculating the difference in cost between these two demand scenarios in net present value terms.

AIC is calculated as follows:

- forecasting demand into the foreseeable future
- estimating the capital works required to meet this forecast demand
- estimating the cost of these capital works
- calculating the average cost per unit delivered by these capital works in net present value terms.

MIC is marginal in the sense that it determines a marginal cost increase associated with an incremental increase in demand. This is compared to the average cost of future capital works calculated using the AIC approach. It appears that the ERA, the ESC and IPART adopt MIC when determining their value of LRMC.

The calculation of either MIC or AIC provides a methodology for determining price. However, regardless of which approach is adopted, the calculation of the cost estimate relies heavily upon projections of demand and future capital works. Any errors or misjudgements in those projections will result in potentially misleading estimates of costs.

The underlying economic model for which the LRMC calculations are made does not appear to have been formally constructed in the economics literature. The original discussion of LRMC can

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<sup>33</sup> Marsden Jacob Associates, 'Estimation of long run marginal cost: a report prepared for the Queensland Competition Authority', Nov 2004.

<sup>34</sup> A more detail discussion of how LRMC is calculated can be found in ESC, *Estimating long run marginal cost: implications for future water prices, information paper*, op. cit; Marsden Jacob Associates, 'Estimation of long run marginal cost: a report prepared for the Queensland Competition Authority' op. cit; and price directions from other regulators.

be found in Turvey (1969).<sup>35</sup> In fact, MJA refer to LRMC as ‘Turvey marginal cost’. The underlying model, represented graphically in the MJA report<sup>36</sup> and the ESC report,<sup>37</sup> is that future demand is equal to the product of per capita demand multiplied by the number of customers. Given that the number of customers is rising over time, forecast demand would rise over time if the per capita demand remains constant. The increase in future demand necessitates an increase in capital expenditure. If there is an incremental increase in per capita consumption, future capital expenditure will need to be brought forward. Similarly, if there is an increase in the growth rate of new customers, future capital expenditure will need to be brought forward. In fact, the only reason that future capital expenditure is necessary in the diagrams presented by MJA and the ESC is growth in the number of customers, not growth in per capita consumption. In these circumstances, the economically correct way to attribute future capital costs would be to charge future customers a connection fee.<sup>38</sup> If this analysis is accurate, it implies that future capital costs have been incorrectly attributed and the calculation of LRMC does not yield an efficient outcome.

A further issue that must be considered if LRMC is to be used to determine the marginal price is the interaction between setting prices based on an estimate of incremental cost and IBTs. By definition, an IBT has more than one volumetric charge. Where that is the case, at least one of the volumetric charges must be set at a level other than the calculated incremental cost. IPART considered this issue in an investigation of price structures it undertook in 2004 and concluded that:

... 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.<sup>39</sup>

In addition, there is a need to determine the level of usage at which the various price steps occur. IPART adopted an IBT with a single step charge at 400 kilolitres. The rationale behind this decision was explained as follows:

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.<sup>40</sup>

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<sup>35</sup> R Turvey, ‘Marginal cost’, *The Economic Journal*, vol. 78, 1969, pp. 282–299.

<sup>36</sup> Marsden Jacobs Associates, ‘Estimation of long run marginal cost’ op. cit., fig. 2.3, p. 12.

<sup>37</sup> ESC, *Estimating long run marginal cost: implications for future water prices, information paper*, op. cit., fig. 3.1, p. 10.

<sup>38</sup> The economically efficient connection fee would be the incremental cost attributed to an additional customer.

<sup>39</sup> IPART, *Investigation into price structures to reduce the demand for water in the Sydney Basin, final report*, op. cit., p. 20.

<sup>40</sup> *ibid.*

### *Using price for demand management*

One suggestion that has been made during the recent drought and the period of continuous water restrictions is that price should be used as a tool for short-term demand management.<sup>41</sup> The economic theory behind this notion is quite simple. The law of demand states that quantity demanded is inversely proportional to price—the higher the price of the product, the less the consumer will demand. If the goal is to limit the quantity demanded, simply raise the price to the level at which demand is reduced to the desired amount. This proposal has been made many times in recent years. The justification for using price as the primary demand management instrument is that it results in a more efficient outcome as opposed to using quantity rationing through water restrictions.

An alternative suggestion is to create a market for water trading within the ACT by providing every consumer with an allocation or quota and making these allocations tradeable. As consumers traded their allocations, the resulting equilibrium price would be the price that results in the desired quantity being demanded. Those consumers who wished to use more water than their quota permitted would purchase part of the allocation from those who planned to use less, and market forces would lead to the equilibrium price. In theory, this plan should produce an outcome similar to using price for demand management, with the main difference being that the regulator does not need to have any information about the nature of demand to implement a water trading scheme.

Using price as a demand management tool assumes there is a genuine reason for a government policy decision to limit the amount of water abstracted and consumed.<sup>42</sup> Over the past several years, the ACT has used water restrictions as a tool to manage demand. Increasing levels of water restrictions place more severe constraints on the manner and timing of outside water use by water customers. Each level of restrictions has a corresponding daily usage target. For example, the ACT is currently under stage 3 water restrictions with a target of 97 megalitres per day, which is a 35% reduction in daily water use compared to PWCM levels. Under stage 3 water restrictions there are limits on outdoor watering and a ban on vehicle washing except at commercial establishments that use recycled water.

Economists classify water restrictions as a quantity-rationing scheme. Rationing by quantity can be achieved by other means, such as first come first served or quotas per person. In general, quantity rationing is viewed as being economically inefficient because the rationed outcome can result in an allocation where consumers who most value the product or service do not necessarily consume it. The economic inefficiency exists because there are potential gains from trade between consumers, where consumers with low valuations for the product could sell their allocation to consumers with higher valuations, thus making both consumers better off. Quantity rationing commonly leads to secondary markets (often illegal) where individuals who have lower valuations for the product resell their allocation to individuals with higher valuations.<sup>43</sup> The difference between a strict quota

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<sup>41</sup> The focus of this section is on using price as a means to solve a short-term need to reduce demand. There are many medium- and long-term solutions for demand management that may include price as well. Government programs that promote water saving fixtures and devices, as well as education programs that change behaviour, will not solve a short-term supply–demand imbalance. Alternatively, investment in new sources of water, whether through new dams or desalination, can solve medium- to long-term supply–demand imbalances but would not be classified as demand management programs.

<sup>42</sup> The Commission is aware there is a debate on the necessity for water restrictions in the ACT. This is an ACT Government policy decision so for the sake of the discussion in this section the assumption that short-term demand management is necessary will be accepted without analysis.

<sup>43</sup> The classic example of a secondary market is scalping (which is often illegal) of tickets to exclusive sporting or entertainment events. As long as the price of the ticket is less than the highest price that would clear the market, selling tickets on a first come basis results in a secondary market for tickets.

per person and water restrictions is that water restrictions are an imperfect means of limiting quantity.

Water restrictions are an imperfect form of quantity rationing for a variety of reasons. Most importantly, water restrictions limit the means by which water customers can use water outdoors but do not limit the amount of water they can use. If customers cannot use sprinklers but can use hand-held hoses, the amount of water they will use depends on their perceived need for water and the value of their garden relative to the value of their time. During extended dry periods, individuals will use more water than during periods of frequent rain, regardless of the level of water restrictions. In addition, consumer willingness to abide by the limitations imposed by water restrictions may wane over time. Thus, it needs to be recognised that water restrictions are a 'soft' quantity restriction, given that the target level of consumption may be exceeded.

The alternative to quantity rationing is to use price to ration water demand. In theory, this is a simple exercise. The only piece of information needed is the price elasticity of demand for water. The price elasticity measures the responsiveness of the quantity demanded to changes in the level of prices. The elasticity of demand equals the percentage change in quantity divided by the percentage change in price. Thus, to determine the appropriate percentage change in price, one only has to divide the desired percentage change in quantity by the absolute value of the elasticity of demand. For example, if a 20% reduction in quantity is the goal and the elasticity of demand is 0.2, a 100% increase in price would result in that outcome. Although this appears to be a simple economic exercise, in practice it is fraught with difficulties. Suppose that the elasticity of demand was actually 0.1: to achieve a 20% reduction in quantity would require a 200% increase in price. Accurate estimates of the elasticity of demand are hard to produce, and even if it were possible to estimate it accurately, the theory would only hold for small changes in price. As consumers have not faced 100% or 200% increases in price at any one time, the effect of such a large change in the level of the price is unknown. This issue is explored in more detail below.

### ***Practical constraints***

It is useful to reiterate some of the practical problems or constraints the Commission faces when approaching the theoretical issue of how to determine water tariffs. In calculating water prices, the regulator must be mindful of a range of practical constraints. Under the current regulatory regime, it is necessary for the Commission to determine prices in advance and leave them unchanged for a set period of time. Prices are calculated by regulators to ensure that regulated businesses do not earn monopoly rents. These prices are then left unchanged for a period of time, allowing a degree of price stability for customers. Leaving prices unchanged, typically for a period of one year, also recognises the difficulties which exist in the water industry, given the delay between consumption and payment. In an unregulated market, customers are typically aware of the quantity of a good they are consuming; in the regulated water market, a delay exists between when customers consume water and when they are billed for this consumption. In the ACT, consumption is measured using simple accumulation meters which are read manually and record only total usage. No information is recorded as to when usage occurred. Meters are read (and customers billed) quarterly, with bills determined on a cumulative annual basis. Because the meters do not record any information about when consumption occurred and because of the delay between consumption and when customers are billed the ability to continually adjust prices to send updated price signals is restricted.

### ***Conclusion***

There are numerous arguments for the various approaches to determining the structure of water tariffs. While it may be argued on strict theoretical grounds that two-part tariffs result in the most

efficient outcome, regulators must take into account a wide range of often competing factors when determining prices. IBTs with volumetric charges, in some instances based upon estimates of incremental cost, have been proposed by regulators as a way of sending appropriate price signals to customers while allowing prices to address a range of further factors. Regulators must be also be conscious of the practical constraints in the water market that, to a certain extent, dictate the manner and frequency with which prices can be adjusted.

### 3.2 Current arrangements—ACT

The Commission utilised an inclining block tariff during the 1999–2000 to 2003–04 price determination. This consisted of a fixed charge and two blocks with a step that declined over time to 175 kilolitres per year in 2003–04. The prices in place during 2003–04 were:

- a fixed water supply charge of \$125
- a 43 cent variable component for the first 175 kilolitres consumed
- a \$1.05 variable component for consumption thereafter.

For the 2004–05 to 2007–08 price determination, a new structure for the price of water was introduced with the Commission reducing the fixed charge and introducing an additional block into the inclining block structure, such that there are steps at 100 kilolitres and 300 kilolitres. This resulted in the average price of water increasing with increased levels of consumption and was aimed at sending a clear message to customers to reduce their consumption of water.

The Commission took the following factors into account when determining water prices:

- revenue recovery and stability
- community expectations
- government policy
- social and equity matters
- marginal and average prices
- reduced consumption
- simplicity, ease of understanding
- timing
- marginal costs.

In addition to the prices determined by the Commission, the ACT Government levies a WAC on each kilolitre of water consumed. The WAC was introduced in 1999 and was set at a level of 10 cents per kilolitre. It was increased to 20 cents per kilolitre from 1 January 2004, and 25 cents per kilolitre from 1 July 2005. The WAC was further increased on 1 July 2006 to its current level of 55 cents per kilolitre. The Commission is unaware of any other Australian jurisdiction that levies a similar charge. In addition, the ACT Government enacted the Network Facilities Tax (NFT) in December 2006, which is imposed on all network industries in the ACT. It is calculated at a rate per kilometre of infrastructure and is applied to the water, wastewater, electricity, natural gas, and telephone network businesses in the ACT. In 2007–08, the NFT on the water network will add 9 cents per kilolitre to the price of water. The WAC and the NFT mean that total volumetric water prices in the ACT are the highest urban rates in Australia, as far as the Commission is aware.

Table 1 ACT water prices (\$ nominal)

| Water                | 2004–05 | 2005–06 | 2006–07 | 2007–08 |
|----------------------|---------|---------|---------|---------|
| Fixed \$/pa          | 75      | 75      | 75      | 75      |
| Tier 1 0–100 \$/kL   | 0.52    | 0.58    | 0.66    | 0.775   |
| Tier 2 101–300 \$/kL | 1       | 1.135   | 1.29    | 1.67    |
| Tier 3 301+ \$/kL    | 1.35    | 1.53    | 1.74    | 2.57    |

In the determination of water tariffs, the Commission has not distinguished between residential and non-residential customers. That is, all water customers, regardless of their size and the use to which they put water, are charged the same prices. During the most recent price determination process, the Commission considered the introduction of differing charges for residential and non-residential customers. However, it was decided that a single tariff structure would reduce complexity in billing, improve customer understanding of charges, and reflect the fact that the cost of supplying a kilolitre of water does not vary according to the identity of the user.

ACTEW also sells bulk water to Queanbeyan City Council (QCC). The Commission does not regulate the price of this bulk water but has stated its preference that prices should be set at a level, such that there is no cross-subsidisation between ACT and Queanbeyan customers.

### 3.3 Current arrangements—other jurisdictions

This section briefly introduces and compares the different water price regulation regimes in Western Australia, Victoria, and New South Wales. The pricing structure for each jurisdiction is presented and a brief discussion of the rationale behind the different structures. These jurisdictions were selected as they are priced by independent regulators in a manner similar to that which exists in the ACT.

Prices and price structures differ between each of the jurisdictions and each has different price steps, such that the unit price changes at different levels of consumption. All the jurisdictions also maintain a fixed yearly charge for the provision of water, although this varies between jurisdictions.

#### 3.3.1 ERA—Western Australia

The ERA was tasked to undertake the price determination for water and wastewater by the West Australian Treasurer, in accordance with section 32(1) of the *Economic Regulation Authority Act 2003* (WA).

Western Australia’s water and wastewater utilities are publicly owned. The ERA chose to use a price cap approach to regulation aimed at providing incentives to reduce costs. The Water Corporation is by far the State’s largest water service provider, servicing Perth and surrounding districts. Other industry participants include AQWEST, the Bunbury and Busselton water boards, local governments and irrigation scheme cooperatives.<sup>44</sup> This section focuses on the prices set for the Water Corporation, as it predominantly services an urban region similar to the ACT.

<sup>44</sup> <http://www.era.wa.gov.au/water/industryLicensing.cfm>

The ERA prices water differently for residential and non-residential users. Residential users are currently charged a tariff, which consists of a fixed charge and five inclining blocks. Non-residential users currently have a four-part tariff with three blocks, the middle of which is the highest.

In its most recent determination, the ERA deemed that the current price structure for water had too many steps and is in the process of reducing to two the five inclining blocks that residential customers currently face. For non-residential customers, the price determination will move to a fixed price and a single usage charge. The motivation behind the changes is to reduce the complexity and administrative costs of the system.

Table 2 Water Corporation's water prices, (real 2005–06 dollars)<sup>45</sup>

| Water—residential           | 2005–06 | 2006–07 | 2007–08 | 2008–09 | 2009–10 | 2014–15 |
|-----------------------------|---------|---------|---------|---------|---------|---------|
| <b>Water Corporation—WA</b> |         |         |         |         |         |         |
| Service charge \$/pa        | 152.30  | 140.18  | 128.05  | 115.93  | 103.81  | 110.24  |
| Block 1 (0–150 kL) \$/kL    | 0.42    | 0.52    | 0.62    | 0.72    | 0.82    | 0.82    |
| Block 2 (151–350 kL) \$/kL  | 0.68    | 0.72    | 0.75    | 0.79    | 0.82    | 0.82    |
| Block 3 (351–550 kL) \$/kL  | 0.92    | 0.90    | 0.87    | 0.85    | 0.82    | 0.82    |
| Block 4 (551–950 kL) \$/kL  | 1.21    | 1.21    | 1.21    | 1.20    | 1.20    | 1.20    |
| Block 5 (951+ kL) \$/kL     | 1.52    | 1.44    | 1.36    | 1.28    | 1.20    | 1.20    |

### 3.3.2 ESC—Victoria

The ESC is the economic regulator of the Victorian water and wastewater sector, which comprises 20 water businesses that provide services to all of Victoria's urban and rural customers.<sup>46</sup> Since the water businesses are separate entities, they have different prices and have been treated differently. Three urban water jurisdictions were chosen, City West Water, Yarra Valley Water and South East Water, as they were considered to be most comparable with the ACT for purposes of illustration.

The ESC is required to assess the water plans submitted by each of the 20 regulated water and wastewater utilities against certain principles outlined in the Water Industry Regulatory Order (WIRO). The ESC must decide whether to approve or specify the prices or the manner in which prices are to be determined for the services provided by these businesses over the regulatory period. Clause 7 of the WIRO specifies that the ESC must set prices for water for a three year period starting 1 July 2005. The ESC is primarily guided by the regulatory framework set out in the *Essential Services Commission Act 2001* (Vic) and the *Water Industry Act 1994* (Vic).<sup>47</sup>

There are a number of similarities between the price structures of the three different Victorian water businesses presented here. They each adopt different pricing structures for residential and non-residential customers. The residential sections each have four-part tariffs, one fixed charge required for access to the network, and three usage charges that vary with consumption. Like the ACT's current prices, these usage charges can be characterised as IBTs.

<sup>45</sup> ERA, *Final report: inquiry on urban water and wastewater pricing*, op. cit., p. 216.

<sup>46</sup> <http://www.esc.vic.gov.au/public/Water/Welcome+to+Water.htm>

<sup>47</sup> ESC, *2008 water price review consultation paper: framework and approach*, ESC, Melbourne, Dec 2006, pp. 6–7. This document is located at: <http://www.esc.vic.gov.au/NR/rdonlyres/9A700AE6-3D7E-4FF6-A2F1-749F54EF5117/0/CNPFrameworkandApproach2008WaterPriceReview20061004.pdf>

The ESC adopted ‘inclining block tariffs for residential customers on the basis that they enable businesses to target discretionary water use—where price elasticity of demand is relatively higher and water users have greater scope to adjust their behaviour in response to the price signal’.<sup>48</sup>

In setting the block tariff pricing structure, the ESC noted that:

Deciding the number of blocks, the threshold consumption level and the appropriate usage charges to be set for each block can be complex. While a well designed block structure can provide signals to customers to conserve water, a poorly designed one can produce unintended consequences, and impact adversely on customers who are not able to change their water consumption.<sup>49</sup>

Unlike the Commission, the ESC prices water differently for non-residential customers. Non-residential customers are charged a two-part tariff consisting of a fixed charge and a usage charge. The usage charge is generally less than the highest-level usage charge that is applied to residential customers. It is argued that for non-residential customers, a two-part tariff sends adequate signals about the LRMC of water provision.<sup>50</sup>

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<sup>48</sup> ESC, *Water price review, final decision*, ESC, Melbourne, Jun 2005, p. 98.

<sup>49</sup> ESC, *Metropolitan and regional businesses’ water plans 2005–06 to 2007–08, final decision*, op cit., p. 87.

<sup>50</sup> ESC, *Water price review, final decision*, op. cit.

Table 3 Victorian urban water prices (\$ nominal)<sup>51</sup>

|                            | 2005–06 | 2006–07 | 2007–08 |
|----------------------------|---------|---------|---------|
| <b>City West Water</b>     |         |         |         |
| Water—residential          |         |         |         |
| Service charge \$/pa       | 96.54   | 101.30  | 105.73  |
| Block 1 (0–160 kL) \$/kL   | 0.78    | 0.82    | 0.8564  |
| Block 2 (161–321 kL) \$/kL | 0.92    | 0.96    | 1.0049  |
| Block 3 (322 kL +) \$/kL   | 1.36    | 1.42    | 1.4846  |
| Water—non-residential      |         |         |         |
| Service charge \$/pa       | 140.59  | 147.53  | 153.99  |
| Usage charge \$/kL         | 0.87    | 0.91    | 0.9507  |
| <b>South East Water</b>    |         |         |         |
| Water—residential          |         |         |         |
| Service charge \$/pa       | 43.85   | 45.40   | 47.60   |
| Block 1 (0–160 kL) \$/kL   | 0.78    | 0.81    | 0.84    |
| Block 2 (161–321 kL) \$/kL | 0.92    | 0.96    | 1.02    |
| Block 3 (322 kL +) \$/kL   | 1.44    | 1.55    | 1.65    |
| Water—non-residential      |         |         |         |
| Service charge \$/pa       | 43.85   | 45.40   | 47.60   |
| Usage charge \$/pa         | 0.88    | 0.95    | 1.02    |
| <b>Yarra Valley Water</b>  |         |         |         |
| Water—residential          |         |         |         |
| Service charge             | 57.98   | 60.66   | 63.13   |
| Block 1 (0–160 kL) \$/kL   | 0.78    | 0.82    | 0.8517  |
| Block 2 (161–321 kL) \$/kL | 0.92    | 0.96    | 0.9992  |
| Block 3 (322 kL +) \$/kL   | 1.36    | 1.42    | 1.4763  |
| Water—non-residential      |         |         |         |
| Service charge \$/pa       | 94.11   | 98.46   | 102.47  |
| Usage charge \$/kL         | 0.84    | 0.88    | 0.9178  |

### 3.3.3 IPART—New South Wales

Section 11 of the *Independent Pricing and Regulatory Tribunal ACT 1992* (NSW) (IPART Act) permits IPART to conduct investigations and make reports to the minister on the determination of the pricing for a government monopoly service supplied by a government agency specified in schedule 1 of the IPART Act. Water supply authorities constituted under the *Water Management Act 2000* (NSW) are listed as government agencies for the purposes of schedule 1 of the IPART Act. IPART has the power to determine the period of price regulation.

IPART is responsible for regulating water supplied by Sydney Water Corporation, Hunter Water Corporation, Gosford City Council, and Wyong City Council and recently released determinations for each of these businesses. Two of the determinations apply for three and a half years: the

<sup>51</sup> Pricing information was taken from the final price determinations located at <http://www.esc.vic.gov.au/public/Water/Regulation+and+Compliance/Decisions+and+Determinations/Urban+Price+Review+2005-08/>  
Prices for 2006–07 were taken from: City West Water Tariff Schedule 1 July 2005–1 June 2007; South East Water Tariff Schedule 1 July 2005–30 June 2007; Yarra Valley Water Tariff Schedule 1 July 2005–30 June 2007.

decision applying to the Sydney Water Corporation, from 1 October 2005 to 30 June 2009, and the decision applying to the Hunter Water Corporation, from 1 November 2005 to 30 June 2009.<sup>52</sup> The decisions regarding the Gosford City Council and Wyong City Council apply for three years, from 1 July 2006 to 30 June 2009.<sup>53</sup> IPART decided that approximately four years was an appropriate time for determinations to apply due to the expected changes within the water market. The variable regulatory periods were, in part, selected in order to align the regulatory periods for the next review.

Like the Commission, IPART does not distinguish between residential and non-residential customers when it prices water. However, fixed charges do increase with meter size, while the volumetric charge is the same for both residential and non-residential users. IPART introduced an IBT with a fixed charge and a two-tiered price structure for Sydney Water Corporation and Hunter Water Corporation, while a simple two-part tariff was introduced for Gosford City Council and Wyong City Council.

The principal aim of the price structure that consists of a fixed charge and two price tiers is to encourage water conservation, with the volume at which the step occurs intended to target discretionary outdoor water use. In addition, IPART argued that the fixed costs of water services should be reduced, relative to previous levels, and the per-unit costs increased. It was claimed that this introduces an incentive to consume less water, as the per-unit cost of water will comprise the greater part of the bill. A reduction in the use of water will decrease the bill by a greater amount than previously but an increase in the use of water will increase it by a greater amount than previously.<sup>54</sup>

IPART observed that this price structure could potentially be used to send a strong signal about the need to reduce water consumption, particularly discretionary water consumption. In addition, it concluded that the potential adverse impacts of this price structure on vulnerable customers could be minimised if the consumption level which triggers the tier-two usage charge can be set at a level that ensures that the bulk of households can meet their basic, non-discretionary needs without incurring this charge.<sup>55</sup>

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<sup>52</sup> IPART, *Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: prices of water supply, wastewater and stormwater services, final report*, op. cit., p. 20.

<sup>53</sup> IPART, *Gosford City Council, Wyong Shire Council: prices of water supply, wastewater and stormwater services, report*, IPART, Sydney, May 2006, p. 13.

<sup>54</sup> IPART, *Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: prices of water supply wastewater and stormwater services* op. cit., pp. 96–130.

<sup>55</sup> *ibid.*, p. 18.

Table 4 NSW water prices (\$ nominal)<sup>56</sup>

| Water                           | 2005–06 | 2006–07 | 2007–08 |
|---------------------------------|---------|---------|---------|
| <b>Gosford City Council—NSW</b> |         |         |         |
| Service charge \$/pa            | 80.82   | 83.24   | 85.32   |
| Usage charge \$/kL              | 0.93    | 1.12    | 1.36    |
| <b>Wyong Shire Council—NSW</b>  |         |         |         |
| Service charge \$/pa            | 92.25   | 91.54   | 93.83   |
| Usage charge \$/kL              | 0.93    | 1.12    | 1.36    |
| <b>Sydney Water—NSW</b>         |         |         |         |
| Service charge \$/pa            | 76.73   | 64.42   | 56.17   |
| 0–400 \$/kL                     | 1.20    | 1.26    | 1.339   |
| 401+ \$/kL                      | 1.48    | 1.63    | 1.828   |
| <b>Hunter Water—NSW</b>         |         |         |         |
| Service charge \$/pa            | 30.14   | 35.03   | 38.24   |
| 0–1,000 kL \$/kL                | 1.09    | 1.14    | 1.20    |
| 1,001+ \$/kL                    | 1.03    | 1.10    | 1.18    |

### 3.3.4 Other Australian jurisdictions

The Queensland Competition Authority has published guidelines for the pricing of water, but ultimately the responsibility for pricing rests upon the local councils in that state. In South Australia water and wastewater pricing is not determined by an independent regulator, although the Essential Services Commission of South Australia has provided advice to the South Australian Government in water pricing decisions. In the Northern Territory, a Water and Sewerage Pricing Order issued by the Regulatory Minister dictates water and sewerage tariffs. In the Northern Territory they have a two-part tariff structure for water prices.

In Tasmania, the Hobart City Council is responsible for determining water prices. The water tariff for residential customers is linked to a property tax system.<sup>57</sup> The tax is based on the property's annual assessed value, which is an estimate of the property market's rental value. Non-residential customers and other customers that are deemed to be high water users may have to pay a tariff of 60 cents per kilolitre for water that they consume over an amount that is indexed to the property's annual assessed value. In 2003–04, the Hobart City Council approved in principle a two-part tariff for water, but has yet to implement the tariff.

## 3.4 Possible options and issues

There are numerous issues the Commission must consider when determining the structure of water tariffs to apply over the forthcoming regulatory period. The Commission's primary concern is that the tariffs determined enable ACTEW to recover its efficient costs. However, in determining the tariffs, the Commission must take into account a wide range of other factors. These include the requirements of the TOR, the ICRC Act, ACT and Commonwealth Government policies, and the

<sup>56</sup> Prices taken from: IPART, *Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: prices of water supply, wastewater and stormwater services, final report*, op. cit.; and IPART, *Gosford City Council, Wyong Shire Council: prices of water supply, wastewater and stormwater services, report*, op. cit.

<sup>57</sup> Hobart City Council, *Guidelines for property owners: water tariffs–2003/2004*, Hobart City Council, Jul 2003. This document is located at: [http://www.hobartcity.com.au/hccwr/\\_assets/main/lib60037/water\\_tariffs\\_-\\_2003-2004.pdf](http://www.hobartcity.com.au/hccwr/_assets/main/lib60037/water_tariffs_-_2003-2004.pdf)

practical constraints regarding the determination of prices and current billing arrangements. This section provides a discussion of some of the issues the Commission will consider when determining the most appropriate structure of tariffs to recover the efficient costs of ACTEW.

### **3.4.1 Structure of water tariffs**

The water tariffs currently in existence in the ACT can be characterised as inclining block tariffs. They consist of a fixed charge of \$75 and three volumetric charges. The first volumetric step applies to consumption up to 100 kilolitres, the second to consumption from 100 kilolitres to 300 kilolitres, and the final to consumption in excess of 300 kilolitres. In addition to the tariffs as determined by the Commission, the ACT Government levies a WAC on a volumetric basis. The Commission has no role in determining the WAC, although it believes that the WAC will continue to be levied as a per kilolitre charge on all water abstracted. The revenue from the WAC is collected by ACTEW on behalf of the ACT Government. It is currently not included in the revenue considered by the Commission when calculating tariffs such that ACTEW can recover its efficient costs. However, should the ACT Government decide to apply the WAC as a direct charge to ACTEW for water (not as a passed through to consumers charge), the Commission would need to include this charge in the total operating costs that ACTEW would need to recover through water tariffs.

The Commission has noted some of the theoretical arguments made regarding the structure of tariffs. These arguments centre on the adoption of either a two-part tariff or some form of IBT. In the case of a two-part tariff, it is argued that the volumetric charge should be set at marginal cost with the remaining revenue requirement received via a fixed charge.

Should an IBT be adopted, a decision must be made regarding the number of steps and the volume at which the steps occur. Regulators have adopted a variety of approaches in response to these decisions. For example, the ERA is moving towards an IBT structure with two tiers for residential customers with the step at 550 kilolitres; the ESC has adopted a three-tiered structure for urban customers with steps at 160 kilolitres and 321 kilolitres, while IPART has adopted a range of two tiered IBTs and simple two-part tariffs.

As part of the forthcoming price review, the Commission will reconsider the structure of water tariffs including:

- whether a two-part tariff, an IBT, or some other form of tariff structure is preferable
- if an IBT is adopted, the point at which the step(s) occur
- the amount of any fixed charge.

### **3.4.2 Calculation of volumetric charge**

Assuming that some form of volumetric charge is adopted, there is a need to determine the rate at which it is set. There appears to be a trend amongst Australian regulators for setting volumetric prices based upon an incremental cost estimate (MIC or AIC). In situations where an IBT structure has been adopted, the lower tier price is generally set at an estimate of incremental cost (MIC or AIC) while higher tier prices are based upon other factors such as demand management considerations. However, as noted previously, there are difficulties associated with accurately estimating incremental cost (MIC or AIC), given the problems associated with forecasting customer numbers and demand.

In the Commission's most recent price determination, the volumetric charges were determined in such a manner as to create a situation where the average price faced by a customer is 'U' shaped. That is, the average price of a kilolitre of water falls initially before increasing as consumption increases. The Commission adopted this IBT structure because it considered that it most appropriately addressed the range of factors it was required to address, including being responsive to social and equity concerns. In addition, the structure took into account arguments that suggest water customers may respond to historical average cost rather than current marginal cost when making consumption decisions.

### *Customer response to marginal or average cost*

Economic theory suggests that in competitive markets consumers react to marginal prices when making consumption decisions. However, there are a number of characteristics of the water market, including the market in the ACT, that indicate this may not necessarily be the case. These characteristics are a result of the manner in which water consumption is measured and bills calculated.

As identified in the discussion of practical constraints in Section 3.1, water consumption is measured using accumulation meters. These meters simply record the volume of water used, with customers billed on a quarterly basis. Accumulation meters store no information about when consumption has occurred and are often in inaccessible locations, making it impractical for customers to monitor their own consumption. This results in customers being generally unaware of how much they have consumed. The only time at which customers receive information about their consumption is on receipt of a bill, which typically covers the preceding three-month period. Because water customers are unaware of their level of consumption (and therefore the tier price to which they are exposed), they may be unaware of the price they are being charged.

The regulated water market, where customers may be unaware of their level of consumption and the price they are to be charged, differs from that which exists for products provided in a competitive market, for example, petrol. Motorists who purchase petrol know the price they face in advance and determine their level of consumption based upon that knowledge. In that situation it is reasonable to consider that consumption decisions are based on an analysis of the marginal price per litre of petrol. However, water customers, who receive their bills after consumption has occurred, may base their future consumption decisions on an analysis of the most recent available information. This would mean that customers may make consumption decisions based upon an analysis of average costs calculated from recent bills.

The initial study of whether customers respond to marginal or average price was conducted by Shin (1985).<sup>58</sup> Shin analysed residential electricity consumption under a declining block tariff and found that the empirical evidence supported the hypothesis that customers who are not well-informed respond to perceived average price as opposed to marginal price. A later study by Nieswiadomy and Molina (1991), which focused on water prices, found that residential water customers responded to marginal price when faced with inclining block structures and average price when responding to decreasing block structures.<sup>59</sup> However, a further study conducted by Nieswiadomy (1992), which among other things investigated the effect of price structure on

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<sup>58</sup> J Shin, 'Perception of price when price information is costly: evidence from residential electricity demand', *Review of Economics and Statistics*, vol. 67, no. 4, Nov 1985, pp. 591–598.

<sup>59</sup> ML Nieswiadomy and DJ Molina, 'A note on price perception in water demand models', *Land Economics*, vol. 67, no. 3, Aug 1991, pp. 352–359.

residential water demand, concluded that customers reacted more to average price than marginal price.<sup>60</sup>

It should be noted that the mere existence of a debate surrounding whether customers respond to marginal or average price has important consequences. The limited information available to customers due to the current metering arrangements can be used to explain why consumers may respond to average price. This limits the immediacy of a price/consumption decision at the consumer level and, on at least a daily basis, clouds the analysis that can be undertaken by researchers using data collected by water utilities.

### ***Overcoming metering constraints***

Ideally, water customers would be aware of the price they are being charged and the quantity they are consuming. If this were the case, customers would be able to make informed consumption decisions based upon up-to-date price information. As discussed, the current metering arrangements, which consist of accumulation meters often located in less readily accessible areas, limit customers' access to this information.

A possible way to provide customers with the information required to make informed decisions about their consumption would be to replace the current water meter stock with meters capable of providing customers with easily accessible, up-to-date information about the price they face and their level of consumption. To be effective, the meters would need to be able to provide instantaneous information in an easily accessible location, preferably inside the residence, on the amount of usage and its cost, thereby allowing customers to make informed consumption decisions. Because it is likely to be impractical to locate the meter itself within the residence, some form of remote technology that sends information from the meter to a display device inside the residence may be necessary. While installation of such meters would allow improvements in the ways in which water is charged, the cost of purchasing and installing the meters may be prohibitive. For example, if the total cost of purchasing and installing a single meter was \$500, the total capital expenditure would be \$65,000,000, given 130,000 customers. Assuming a return on capital of 10%, this would result in an increase in water bills of approximately \$50 per customer per year.

Given the probable expense of installing water meters, the Commission considers their imminent introduction unlikely. Therefore, the approach to billing will probably have to be considered in terms of the metering technology currently available.

### **3.4.3 Billing**

Water tariffs are adjusted on 1 July each year and apply for a period of 12 months. Customers receive bills approximately every three months. The current fixed charge of \$75 is divided evenly among the four bills so that customers face a fixed charge of \$18.75 every quarter. At the beginning of every financial year (1 July), each customer's annual consumption is 'reset' to zero. Water consumed is then charged at the appropriate volumetric rate on a cumulative basis as consumption increases through the tariff blocks.

For those customers whose meters are read on 30 June, it is a simple matter of resetting consumption, as all water usage until 30 June is charged according to the old rates with all

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<sup>60</sup> ML Nieswiadomy, 'Estimating urban residential water demand: Effects of price structure, conservation, and education', *Water Resources Research*, vol. 28, no. 3, Mar 1992, pp. 609–615.

subsequent consumption charged at the updated rates. However, it should be noted that few meters are actually read on 30 June thereby allowing direct observation of actual water use for the 1 July to 30 June year. Water meters are read by a team of meter readers on a rotational basis. That is, the meter reading teams move through the suburbs reading each meter once every three months. This means that few meters are actually read on 30 June.

For the majority of customers whose meters are not read on 30 June, there is a need to estimate the consumption that occurs during each financial year as the current fleet of water meters record only consumption. No information about when consumption occurred is recorded. To address this issue, a pro-rata approach is adopted where consumption is apportioned between the old and new rates on the basis of the number of days to which the meter read applies that fall in each financial year. For example, where a customer's meter is read on 1 June and again on 31 August approximately one-third (30/92) would be charged at the old rates and approximately two-thirds (62/92) would be charged at the new rates.

#### 3.4.4 Daily pricing

Under the current approach, a customer who consumes a constant volume of water during each quarter may receive a larger bill for the final quarter compared to the first quarter of the financial year. Consider a customer who consumes 100 kilolitres in each quarter. Water consumed during the first quarter will be charged at the first tier, currently with the lowest price, whereas water consumed during the final quarter will be charged at the higher price. Despite consumption within each quarter remaining constant, the customer receives a higher bill for the final quarter.

'Daily pricing' was suggested during the previous price determination as a possible remedy for this situation. Under daily pricing, the annual price structure is applied on a daily basis at each meter reading. That is, the annual allocation of water in each consumption band is determined as a daily allowance. The daily allowance is then multiplied by the number of days in the billing period to determine the quarterly bill. The following example of the comparison between daily pricing and the current pricing structure was contained in the previous price direction.<sup>61</sup>

Suppose that the tariff structure for water was 50 cents per kilolitre for the first 365 kilolitres and \$1.00 for each kilolitre after 365 kilolitres. In a 365-day year under annual pricing, as soon as the customer exceeds 365 kilolitres in the year they begin paying for water at the higher price. Daily pricing applies the step at every meter reading so that if there have been 91 days since the last meter reading then the customer pays 50 cents per kilolitre for the first 91 kilolitres and \$1.00 for each kilolitre consumed above that amount during the billing period.

The Commission stated it would investigate the introduction of daily pricing during the current regulatory period. The analysis undertaken by the Commission identified a number of concerns with daily pricing. These included the possible creation of perverse outcomes. Under daily pricing it is possible that two customers who consume the same amount annually but with different consumption profiles may face different bills. For example, under daily pricing, a customer who consumes 50 kilolitres per quarter will face a lower bill than someone who consumes 200 kilolitres in a single quarter. It is also possible that customers who use the same amount and have the same profile may face different bills depending upon their billing dates. The Commission decided

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<sup>61</sup> ICRC, *Final report and price direction: investigation into prices for water and wastewater services in the ACT*, op. cit. pp. 122–123.

against the introduction of daily pricing on the basis that there were no obvious benefits and that it may lead to perverse outcomes.

It is arguable that the current billing arrangements in operation are appropriate given the current metering technology available. However, the Commission is willing to consider any suggestions on methodologies that would improve the current arrangements.

### 3.4.5 Response to water shortages

There has been much debate regarding the most appropriate way to reduce water consumption during times of shortage. Water restrictions have typically been adopted and have become common in the ACT as well as other jurisdictions during the drought experienced in recent years. In March 2006, the ACT Government introduced PWCMs aimed at reducing per capita demand by 8%. However, it has been suggested that price may be a more appropriate tool to reduce demand during times of water shortage, although there is no universal support for this view.

Sibly (2006) states that water restrictions lead to an inefficient outcome because they ignore the marginal benefit customers receive from water consumption. He argues this point by examining the effect of water restrictions that prohibit the watering of gardens:

This prohibition ignores the variation in the benefit of gardens across consumers. In particular, keen gardeners may place a very high value on their prized creations, and be particularly badly affected by restrictions. At the same time, others may unthinkingly be using water for unrestricted activities that have a relatively low marginal benefit. Rationing therefore does not account for the potential difference in the marginal surplus across consumers, and therefore risks creating an inefficiency in consumption.<sup>62</sup>

Rather than impose restrictions on use, Sibly argues that during times of water shortages, the price of water should be increased to reflect the rise in marginal cost associated with increases in scarcity and environmental costs.<sup>63</sup> This increase in price, rather than the imposition of water restrictions, would act to restrict consumption, leading to an efficient outcome where only those customers whose marginal benefit is greater than the increased price will consume water.

Sibly notes that there has been a reluctance to increase prices during droughts and contends that this may be because it could 'be seen by customers and voters as grossly unfair to exploit their occurrence to raise the volumetric charge'.<sup>64</sup> However, he points out that under an efficient two-part tariff the actual impact on customers' bills would probably be less than that suggested by the change in volumetric rate, because the expected increase in revenue from volumetric charges would be offset by a reduction in the fixed charge. The Commission notes that this argument surrounding revenue neutrality is also applicable to an IBT structure.

Using price as a demand management tool raises the question of how much prices need to increase to achieve the reduction in consumption considered necessary. While elasticity estimates of water have been calculated, these estimates are based on relatively small changes in price which are often calculated from consumption changes from one year to the next. The Commission considers it likely that there would need to be considerable changes to water prices to effect the significant reductions in consumption considered necessary in times of water shortages. To the best of the Commission's knowledge, no empirical studies have examined this issue.

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<sup>62</sup> H Sibly, 'Efficient urban water pricing', op. cit., p. 233.

<sup>63</sup> *ibid.*, p. 235.

<sup>64</sup> *ibid.*

Managing demand via prices, as opposed to water restrictions, may lead to increases in the frequency with which prices are adjusted. Water prices are currently adjusted once a year, most recently on 1 July 2007. However, water restrictions are imposed in response to changes in levels of storage held in dams. The announcement of a change in water restrictions occurs irregularly and multiple changes often occur in a single year.

Leaving aside arguments about whether customers should be exposed to frequent price fluctuations in a regulated market, adjusting prices on such a regular basis would lead to practical problems. As noted previously, the meters currently installed in the ACT are accumulation meters which record no information about when consumption has occurred. Where prices are changed between meter reads, a pro-rata approach, whereby consumption during each price period is estimated and bills are determined accordingly, has been adopted. Under this approach, the price signals received by customers would be an average of the old and new prices. The more frequently prices are adjusted, the more often customers would face this average price. Although it is possible to adjust prices more frequently, the more often prices are adjusted, the less accurately estimated consumption reflects actual consumption, thus eroding the effectiveness of any pricing signals.

### **3.4.6 Interaction between prices and the Water Abstraction Charge**

The WAC is a charge levied by the ACT Government on water taken from the ACT catchments. The amount of the charge is determined by the ACT Government and applied on a per kilolitre basis. The charge is currently 55 cents per kilolitre with revenue received from the WAC collected by ACTEW through water bills and passed on to the ACT Government. The first 25 cents per kilolitre are used to offset costs incurred by the ACT Government for catchment management, the scarcity value of water and environmental costs such as environmental flows. Revenue received from the remaining 30 cents per kilolitre ‘provides a return on a valuable resource and assists in managing demand.’<sup>65</sup> While the Commission has no role in determining the level of the WAC, it must be mindful of its impact when determining water prices. The level of the WAC must be taken into account when determining customer responses to price changes, given that it is applied in addition to the volumetric rate set by the Commission.

A difficulty arises in that, as stated in the TOR, the ACT Government has a desire to actively use the WAC to achieve a range of goals. These include reducing consumption in an attempt to meet the water usage targets in the TAW and adjusting price to influence demand during times of drought and water scarcity. There is limited detail available on how the ACT Government may alter the WAC to achieve these goals, although if the aim is to further reduce consumption, an increase in the WAC would appear likely. The uncertainty surrounding the future value of the WAC and the manner in which it is currently administered (that is, as a fixed charge per kilolitre on all consumption) makes it difficult to determine the most appropriate tariff structure because as the level of the WAC varies, any price signals the Commission may be attempting to provide to customers may be diminished.

### **3.4.7 Unmetered**

Properties that are unmetered are currently billed under a ‘deemed’ approach. Under this approach, unmetered properties are billed on the basis of a deemed consumption of 175 kilolitres. Most unmetered properties are units, flats, and townhouses that were constructed prior to the

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<sup>65</sup> *see* footnote 4.

introduction of volumetric charging and as such had no meter installed due to matters of cost savings associated with unnecessary works. However, in the case of flats, each is metered, although the information is used for monitoring purposes, not for billing. Some more recent developments, particularly multi-storey developments continue to be unmetered.

While a deemed approach is relatively straightforward to administer from a billing perspective, there are benefits from customers being charged based upon their level of consumption. Bills that reflect actual consumption encourage reductions in profligate water use and provide customers with cost savings for reductions in usage.

As part of the previous price direction, the Commission recommended that unmetered properties become the exception, as opposed to the norm. The Commission required ACTEW to investigate the possibility of using the data collected for monitoring purposes for billing. In addition, the Commission required ACTEW to bring forward a pricing proposal based upon overall consumption within a unit complex rather than the current deemed approach.

The Commission will assess the developments that have occurred in regard to unmetered properties and whether there is a need to alter the current arrangements.

#### **3.4.8 Bulk water**

ACTEW provides bulk water to the QCC and potentially could be called upon to provide water to other urban areas outside the ACT. While the Commission does not currently regulate the price of this water directly, the expected revenue from the sale of bulk water is taken into account in the determination of the revenue requirement of ACTEW which consumers in the ACT are required to meet. The Commission will reconsider the treatment of revenue received from the supply of bulk water during the upcoming price review. In addition, should either the QCC or ACTEW wish, the Commission could revisit the current supply arrangements that exist between ACTEW and the QCC.

The possible treatment of bulk water to other regional centres, including Yass, Bungendore and Goulburn, will also be considered.

#### **3.4.9 Residential and non-residential tariffs**

In the most recent price determination, the Commission implemented a single tariff structure which applies to both residential and non-residential customers. This approach was adopted on the grounds that there is no difference in the cost of supplying water to one customer over another. However, as demonstrated in the summary of other jurisdictions' tariff structures, it is not uncommon for the tariffs faced by residential and non-residential customers to differ. Where there is a difference between the tariffs charged to each customer group, there appears to be a tendency for non-residential customers to face a comparable fixed charge to that of residential customers but for non-residential customers to face a single volumetric charge typically set at the lowest residential tier. This implies that if there is no difference in the cost of supplying water to one customer type over another, residential customers are, to some extent, subsidising non-residential water use. However, it may be less expensive to service non-residential customers compared to residential customers due to reduced costs such as lower meter-reading costs and default rates.

While any cross-subsidisation, if it exists, may be unattractive from an equity perspective, the Commission may need to consider whether water should be supplied at a 'reduced' rate to non-

residential customers whose water use provides a positive externality to the ACT community. For example, water used in the maintenance of sporting ovals, recreational spaces, and national attractions provides a benefit to the community as a whole. However, the cost of water used in the maintenance of these facilities is borne in full by those organisations whose task it is to maintain these areas. It could be argued that due to the public benefits associated with the availability of sporting ovals, recreational spaces, and national attractions they should receive a reduced price for water.

Alternatively, there may be grounds for arguing that if it is cheaper to service non-residential customers, they should face a lower price than residential customers.

The Commission will consider arguments about whether residential and non-residential tariffs should differ and whether there is a case for determining a separate price that applies to water use that creates a significant social benefit.

### **3.4.10 Water allowance**

In the recent debate on water pricing in the ACT, a strong argument was put for using some form of water allowance allocation system. Under one variation of this option, customers would be offered a free allowance of water based on family size or some other factor. This free allowance may then be traded between customers. Water consumed over this free allowance would be charged at a very high rate to limit total consumption.

This has been suggested as a more equitable price structure compared to the current situation where customers are charged for all water consumed. Also the water trading would allow the water to go where it is valued most. Such a system is already in place for large rural irrigators.

Proponents of this option have argued that providing a free allocation of water and then imposing a steep charge on water consumed over that level would reduce the use of water across the board and remove the need for water restrictions. By doing this, governments should be able to ‘choose’ the level of water that is consumed by rationing out the free allocation of water. The basic argument is that people will trade the water to those who want it most. The price of water would rise to equate the demand for water with the supply.

In the long run, if such a water trading system were put in place and made to work effectively then economic theory would hold that the trade that it creates would allocate the water to those who value its use most. It would allow for the transfer of water from customers who do not value the water as much to customers who value it highly.

It is also argued that such a system is good for lower income groups because it would grant a free allocation of water. Part of the free allocation would service essential water needs. The rest could be used or traded as the customer sees fit.

There are a number of costs in setting up such a water trading system. Accurate records would need to be kept of all the water transactions and an effective on-line market would need to be established. Consumers would also need to be educated in order to use the system effectively.

In the short term, the system might not limit water consumption or remove the need for water restrictions. If the price of water consumed over one’s allocation is not high enough, then people will consume over their allocation. The system will substitute a moral incentive (water restrictions

and guilt) with an economic incentive (a high price for water used). It may be the case that the moral incentive not to use water could be much stronger than the economic incentive.

There is also debate about whether consumers respond to the marginal price of water or the average price of water. If consumers respond to the average price of water, then they may be happy to consume more than their free allocation.

In the short term there might be accidental over-consumption by people who are unfamiliar with how the system works. Also, people who do not trade their water because of the costs of entering the market would have an incentive to consume all of their free allocation of water, which might be more than they would consume otherwise. Customers who would normally consume more than a small residential free allocation (such as business customers) may be forced to use more than their allocation if trade takes a while to get started.

The size of the water allocations would affect the efficiency of the market. If the free water allocations are made larger, then the administrative and transitional costs of the market will be less significant. There is a limit to the size of the free allocations and it might not be possible to make free allocations large enough in an urban setting.

### **3.4.11 Seasonal or peak pricing**

The standard practice for water pricing is for prices to be set for the year and for those prices to remain constant over the course of the year. Given that water usage is much higher in summer than winter and that the increased demand is primarily increased discretionary outdoors usage, one possibility would be to adopt seasonal prices. Simple seasonal prices could be implemented with a winter tariff structure for the months from April through September and a summer tariff structure for October through March. This could be achieved in conjunction with daily pricing by setting a higher price for the top tier in the summer months as compared to the price of the top tier in the winter months. Setting a higher price in the summer months when discretionary water usage is high sends a signal to customers about the value of water conservation. It is also quite possible that during periods of peak usage the incremental cost of water is higher than during periods of low usage. Thus, there may be an economic efficiency argument for adopting seasonal pricing.

There are some practical issues that need to be addressed if seasonal prices are to be adopted. The primary problem is that customer meters are not read on the same day across the ACT. While it is possible to apply pro-rata pricing on a quarterly basis, there is the possibility that two customers who consumed identical amounts of water could be charged different amounts due to the timing of their respective meter readings. In addition, large households with little or no discretionary water usage could face seasonally different bills for the same amount of non-discretionary water usage. Finally, the adoption of seasonal pricing would increase the complexity of the tariff structure and make the process of checking whether tariffs satisfy the revenue requirement more difficult to assess. The Commission needs to evaluate whether the potential benefits of seasonal pricing outweigh the costs of implementing such a scheme.



## 4 Wastewater pricing

Wastewater charges account for approximately half of the average residential customer's combined water and wastewater annual bill. This is unsurprising given that the value of the wastewater network is roughly equal to that of the water network. Despite the contribution of wastewater charges to the average customer's annual bill, and subsequently the revenue recovery of ACTEW, less public attention is generally given to the determination of wastewater tariffs than to water tariffs. However, this is not an indication of reduced complexity or lack of attention by regulators. Rather it is an indication of the constraints that exist in regard to charging for wastewater and therefore the lack of flexibility available. This chapter:

- provides an introduction to the debate regarding wastewater prices
- outlines the pricing structure currently in place in the ACT
- summarises the approaches adopted in other jurisdictions
- discusses some of the possible options that may be adopted in the ACT.

### 4.1 Wastewater pricing—discussion

Well-functioning wastewater services are essential for the maintenance of basic health standards. When pricing wastewater, ideally charges would be linked directly to the costs of removing and treating wastewater. This would require knowledge of the volume and treatment costs associated with treating wastewater from each and every customer. Such a pricing scheme would communicate the costs of providing wastewater services to customers and, in theory, allow customers to balance the costs and benefits of producing wastewater such that they would produce an efficient level of wastewater.

However, in practice, such a pricing regime is currently unworkable. For residential customers, wastewater is not metered and no information is available on the volume of wastewater produced by any particular customer. In addition, there is currently no way in which to monitor the type or strength of wastewater produced and therefore the cost associated with treatment.

Typically wastewater charges have been set at a fixed rate based on an average across all customers or some form of property value measure. In addition, customers may be charged on a per fixture basis.

In order for customers to use wastewater services efficiently they will need to be charged a volumetric or marginal charge that represents the cost of processing the wastewater they produce. If there is simply a fixed charge for the use of wastewater then there is no incentive to limit the production of wastewater. Inefficiencies can also arise from the overestimation or underestimation of the volumetric charge for wastewater. If the price of wastewater is set too high, customers will limit their consumption below that which is efficient.

Unlike the economic literature on pricing of water, there is almost no literature on the pricing of wastewater. Indeed, there is very little interest in the community about the structure of the wastewater tariffs. In the 2004 price review, only Parliament House made submissions on the structure of wastewater tariffs.

## 4.2 Wastewater pricing—practice

### 4.2.1 The current system—fixed price

Currently in the ACT there is a fixed price for removing and processing wastewater. Residential and non-residential customers face different charges. Residential customers have a \$398 charge. Non-residential prices are based on the type of institution and the number of fixtures. At the time that this charge was decided upon, the Commission was still waiting on advice from ACTEW about how wastewater was to be priced. The Commission is still waiting for ACTEW's recommendations.

The fixed price has a number of advantages. Fixed charges have the benefit of being quite simple, which reduces the costs of administration. Fixed charges are also very transparent and easy to understand. The New South Wales regulator, IPART, has adopted the use of fixed charges for wastewater.

An unfortunate consequence of the fixed charge is that it does not distinguish between customers that produce large amounts of wastewater and those that produce only a small amount. Properties that are connected to the network but do not produce wastewater have to pay the same amount as properties that produce a large amount. Also, in the ACT customers have no discretion about whether or not to connect to sewerage services. If they have access to sewerage services then they have to pay the fixed charge. As such, there is no financial incentive for consumers to limit their production of wastewater.

In order to avoid these problems, the amount of wastewater produced by each property needs to be measured. Wastewater meters are currently not in place in the ACT and are probably too expensive to justify the cost of installation. Other systems of wastewater pricing try to overcome the difficulties of inequitable wastewater pricing and efficiencies by approximating the amount of wastewater used by properties.

### 4.2.2 Pricing options—volumetric pricing based on water use

Volumetric pricing based on water use is the most common method of approximating wastewater production. This is because there is a correlation between the amount of water used in a household and the amount of wastewater that is produced. This makes sense as wastewater is a by-product of water use. Because there are no wastewater meters installed, volumetric measures of water consumption are the only measure available. This mechanism is currently applied to urban Victorian customers, with the justification that it also reflects the LRMC of the provision of wastewater services. IPART also applies a volumetric charge for wastewater for non-residential customers when water consumption exceeds 200 kilolitres.

There are, however, issues with the volumetric pricing of wastewater. It does not distinguish between water that becomes wastewater and water that might go to other purposes. A large proportion of water used does not become wastewater, and the volumetric charge would apply to this as well. Also, wastewater treatment costs might vary according to the amount of contaminant in the water, as opposed to the volume of wastewater produced. If this is the case, reducing the amount of wastewater might not necessarily reduce the costs of processing that wastewater.

The majority of water that becomes wastewater when used for residential purposes is water that is used for non-discretionary purposes. If the demand for water used for non-discretionary purposes

were highly insensitive to changes in the price of water, pricing for wastewater based on water usage would not decrease the amount of non-discretionary water demanded. Hence, the amount of wastewater services demanded would be insensitive to the price. Discretionary use of water will decrease as the marginal price of water and wastewater increases. However, there is an apparent contradiction here as this system discriminates against customers who use a lot of water for purposes that do not generate wastewater. Customers' bills for wastewater services would not necessarily be linked to the amount of wastewater they produced.

In winter there is a closer correlation between the amount of water used and the amount of wastewater that is produced. Therefore, any estimation of wastewater production based on water use is likely to be more accurate during winter. The ERA's proposal to charge for wastewater based upon water use in the winter months was rejected as being too expensive and complicated to administer.

#### **4.2.3 Pricing based upon suburb, income or other factors.**

Another option is fixed pricing that varies with suburbs or income. There might be a positive correlation between the value of a property and the amount of wastewater that properties produce. If this were true one might maintain that higher valued properties ought to be charged more for their wastewater. Such a system was in place in Western Australia but was abolished because it was expensive and complicated. Valuing property also was contentious. Some expensive, but smaller inner city houses might also produce less wastewater than a larger property elsewhere.

In order to avoid these problems a fixed charge could be levied on the basis of other characteristics. It could be shown that some suburbs produce more wastewater per household than others—which might be a better basis for a fixed charge. Another option would be to base the charge on the characteristics of the properties that are being valued. A property with more toilets, bedrooms or people might produce more wastewater. These estimations might be more equitable than a flat charge for wastewater.

The problem with these measurements is that they are inaccurate and unjust to some customers. Just because wealthy properties generally produce more wastewater, it does not mean that all wealthy properties do. The wealthy properties that do not produce more wastewater would be discriminated against. The same goes for the other measures. Also, these regimes can be costly to administer and complicated. Lastly, such systems would not provide incentives to reduce the production of wastewater, and would encourage the overproduction of wastewater.

### **4.3 Current arrangements—ACT**

Similar to the case for water, the Commission applies a single wastewater supply charge that is applicable to both residential and non-residential customers. However, non-residential customers also pay a charge based on the number of fixtures. An advantage of setting a fixed price is that it becomes relatively easy to forecast accurately customer numbers and subsequently revenue. As such, it is a relatively straightforward task to ensure that ACTEW recovers its efficient costs.

Table 5 ACT wastewater charge (\$ nominal)

| Wastewater  | 2005–06 | 2005–06 | 2006–07 | 2007–08 |
|---|---------|---------|---------|---------|
| Service charge (\$/pa)                                      | 375.32  | 389.00  | 398.80  | 413.76  |
| Fixtures charge for non-residential properties (fixture/pa) | 366.20  | 380.72  | 390.00  | 404.68  |

## 4.4 Current arrangements—other jurisdictions

### 4.4.1 Western Australia

The ERA separates wastewater charges into two categories, residential and non-residential. Residential wastewater charges are linked to the estimated rental value of the property and increase as rental values increase. Non-residential wastewater charges consist of a fixed charge based on the number of fixtures and a usage charge. The usage charge applies to wastewater produced in excess of 200 kilolitres. The ERA applies this to situations where the volume of wastewater can be measured or approximated with reasonable accuracy.

While residential wastewater prices are based on the property's gross rental value, the ERA considered this to be inconvenient because it was complicated, lacked transparency and was costly to administer. In its recent price determination for water the ERA decided that the current charging structure should be replaced by a simpler and more transparent charging structure. Its decision was:

The Authority recommends that a four-block inclining tariff be introduced for residential wastewater charges. Initially, households would be placed in the different blocks based on the current gross rental values of their properties. The Corporation would then move each household over a four-year period to the average charge for the particular block that each household is allocated to. New households, including those households that move, would pay the average charge. Under this approach, the gross rental value methodology would not be required after the initial placement of households to their respective blocks.<sup>66</sup>

The ERA charges a two-part tariff for non-residential wastewater, which consists of a fixed price and a volumetric price. This is because:

The Authority is of the view that this is appropriate in circumstances where volumes of wastewater discharged to sewerage systems can be measured or otherwise determined with reasonable accuracy. The efficiency of volumetric charging is further enhanced because customers have some ability to alter discharges of wastewater in response to prices (for example, to implement technologies that reduce wastewater discharges).<sup>67</sup>

The ERA recommended that the current non-residential wastewater fixed charges, which are based on the number of fixtures, be maintained, whilst the variable charges be reduced over the years.

<sup>66</sup> ERA, *Final report: inquiry on urban water and wastewater pricing*, op cit., p. xv.

<sup>67</sup> *ibid.*, p. 53.

**Table 6 Water Corporation's wastewater prices (real 2005–06 dollars)<sup>68</sup>**

|                                      | 2005–06 | 2006–07 | 2007–08 | 2008–09 | 2009–10 | 2014–15 |
|--------------------------------------|---------|---------|---------|---------|---------|---------|
| <b>Wastewater—residential</b>        |         |         |         |         |         |         |
| Gross rental value \$0–\$4,000       | 241     | 247     | 252     | 258     | 264     | 264     |
| Gross rental value \$4,001–\$5,000   | 254     | 256     | 259     | 261     | 264     | 264     |
| Gross rental value \$5,001–\$6,000   | 299     | 304     | 309     | 314     | 319     | 319     |
| Gross rental value \$6,001–\$7,000   | 346     | 368     | 391     | 415     | 441     | 441     |
| Gross rental value \$7,001–\$8,000   | 396     | 407     | 418     | 429     | 441     | 441     |
| Gross rental value \$8,001–\$9,000   | 448     | 446     | 444     | 443     | 441     | 441     |
| Gross rental value \$9,001–\$10,000  | 495     | 481     | 467     | 454     | 441     | 441     |
| Gross rental value \$10,001–\$11,000 | 534     | 509     | 485     | 463     | 441     | 441     |
| Gross rental value \$11,001–\$12,000 | 569     | 534     | 501     | 470     | 441     | 441     |
| Gross rental value \$12,001–\$13,000 | 604     | 558     | 516     | 477     | 612     | 612     |
| Gross rental value \$13,001–\$14,000 | 636     | 630     | 624     | 618     | 612     | 612     |
| Gross rental value \$14,001–\$15,000 | 668     | 654     | 640     | 626     | 612     | 612     |
| Gross rental value \$15,001–\$16,000 | 706     | 681     | 657     | 635     | 612     | 612     |
| Gross rental value \$16,001–\$17,000 | 739     | 705     | 673     | 642     | 612     | 612     |
| Gross rental value \$17,001–\$18,000 | 766     | 724     | 685     | 648     | 612     | 612     |
| Gross rental value \$18,001–\$19,000 | 798     | 747     | 699     | 654     | 612     | 612     |
| Gross rental value \$19,001–\$20,000 | 832     | 770     | 714     | 661     | 612     | 612     |
| Gross rental value >\$20,000         | 995     | 882     | 781     | 691     | 612     | 612     |
| Average charge                       | 456     | 450     | 446     | 442     | 441     | 441     |
| <b>Wastewater—non-residential</b>    |         |         |         |         |         |         |
| First fixture                        | 516     | 516     | 516     | 516     | 516     | 516     |
| Second fixture                       | 221     | 221     | 221     | 221     | 221     | 221     |
| Third fixture                        | 295     | 295     | 295     | 295     | 295     | 295     |
| Over three fixtures (each)           | 321     | 321     | 321     | 321     | 321     | 321     |
| Vacant land                          | 270     | 270     | 270     | 270     | 270     | 270     |
| Usage charge (over 200 kL) \$/kL     | 1.93    | 1.87    | 1.81    | 1.74    | 1.68    | 1.68    |

#### 4.4.2 Victoria

The ESC implemented different wastewater tariffs for residential and non-residential customers. The ESC considered that wastewater charges for customers should include both fixed and volumetric components, as it would be consistent with pricing at the LRMC of production and also provide incentives for water conservation. The ESC indicated that the measurement of wastewater should be easy to understand and based upon water usage.<sup>69</sup> The ESC implemented the following pricing structure which consists of a fixed charge and a volumetric component based upon water usage.

<sup>68</sup> *ibid.*, p. 219.

<sup>69</sup> ESC, *Metropolitan and regional businesses' water plans 2005–06 to 2007–08, final decision*, op cit., p. 88.

**Table 7** Victoria's urban wastewater prices (\$ nominal)<sup>70</sup>

|                            | 2005–06 | 2006–07 | 2007–08 |
|----------------------------|---------|---------|---------|
| <b>City West Water</b>     |         |         |         |
| Wastewater—residential     |         |         |         |
| Service charge \$/pa       | 102.68  | 107.75  | 112.47  |
| Disposal charge \$/kL      | 1.02    | 1.07    | 1.1191  |
| Wastewater—non-residential |         |         |         |
| Service charge \$/pa       | 181.33  | 190.28  | 198.61  |
| Disposal charge \$/kL      | 1.02    | 1.04    | 1.0890  |
| <b>South East Water</b>    |         |         |         |
| Wastewater—residential     |         |         |         |
| Service charge \$/pa       | 147.02  | 155.00  | 161.00  |
| Disposal charge \$/kL      | 0.95    | 1.00    | 1.05    |
| Wastewater—non-residential |         |         |         |
| Service charge \$/pa       | 222.63  | 215.00  | 191.20  |
| Disposal charge \$/kL      | 0.95    | 1.00    | 1.05    |
| <b>Yarra Valley Water</b>  |         |         |         |
| Wastewater—residential     |         |         |         |
| Service charge \$/pa       | 141.63  | 148.18  | 154.21  |
| Disposal charge \$/kL      | 1.01    | 1.06    | 1.1015  |
| Wastewater—non-residential |         |         |         |
| Service charge \$/pa       | 220.39  | 230.59  | 239.98  |
| Disposal charge \$/kL      | 1.01    | 1.03    | 1.0695  |

#### 4.4.3 New South Wales

For wastewater, both residential and non-residential customers have the same fixed charge except for the Hunter valley where there are different service charges for residential and non-residential customers. In addition to this fixed charge, non-residential customers pay a per-unit charge for their wastewater. This usage charge is levied according to the amount of water that the non-residential customer consumes.

For most regions, the price for wastewater services was set to increase in line with the CPI. In the Gosford Shire, the price in 2006–07 was increased slightly above CPI. This was then set to increase in line with the CPI in subsequent years. The jump in the price was made to fund a backlog sewerage project at Mooney Mooney and Cheero Point.<sup>71</sup>

<sup>70</sup> Pricing information was taken from the final price determinations located at: <http://www.esc.vic.gov.au/public/Water/Regulation+and+Compliance/Decisions+and+Determinations/Urban+Price+Review+2005-08/>  
Prices for 2006–07 were taken from: City West Water Tariff Schedule 1 July 2005–1 June 2007; South East Water Tariff Schedule 1 July 2005–30 June 2007; Yarra Valley Water Tariff Schedule 1 July 2005–30 June 2007.

<sup>71</sup> IPART, *Gosford City Council, Wyong Shire Council: prices of water supply, wastewater and stormwater services, report*, op. cit., p. 68.

Table 8 NSW wastewater prices (\$ nominal)<sup>72</sup>

| Wastewater   | 2005–06 | 2006–07 | 2007–08 |
|--|---------|---------|---------|
| <b>Gosford City Council—NSW</b>                            |         |         |         |
| Service charge—residential and non-residential \$/pa       | 363.99  | 375.73  | 385.12  |
| Non-residential usage charge \$/kL                         | 0.78    | 0.803   | 0.823   |
| <b>Wyong Shire Council—NSW</b>                             |         |         |         |
| Service charge—residential and non-residential \$/pa       | 367.87  | 380.75  | 394.07  |
| Non-residential usage charge \$/kL                         | 0.66    | 0.683   | 0.707   |
| <b>Sydney Water—NSW</b>                                    |         |         |         |
| Service charge—residential and non-residential \$/pa       | 369.43  | 389.56  | 407.81  |
| Non-residential charge \$/kL                               | 1.19    | 1.23    | 1.296   |
| <b>Hunter Water—NSW</b>                                    |         |         |         |
| Service charge \$/pa                                       | 260.06  | 283.92  | 302.83  |
| Service charge—other residential and non-residential \$/pa | 520.13  | 567.84  | 605.65  |
| Wastewater usage charge \$/kL                              | 0.43    | 0.44    | 0.46    |

## 4.5 Issues to be considered

While the price of water attracts most of the attention, the tariff structure of wastewater is one of the important issues the Commission must resolve in the current price review. During the last price review the Commission expected that ACTEW would undertake a review of wastewater charging with the expectation that the review would:

- address any issue of cross-subsidisation between customer groups, including a review of cost allocation arrangements
- consider the merits of alternative pricing options for residential customers
- include a review of trade waste arrangements
- investigate the introduction of a more appropriate approach to charging non-residential customers than the current fixtures-based system. The Commission considers that the current approach to pricing for non-residential customers is inappropriate, as the number of fixtures is not necessarily a good indicator of the impact of a business on the wastewater network, and the issues raised by large customers such as the Department of Parliamentary Services are valid and need to be addressed.<sup>73</sup>

Issues of security of supply for water have dominated the agenda since that time but the Commission still considers this to be an important component of the current price review and expects to introduce new tariff structures for wastewater services beginning July 2008. The Commission is particularly interested in receiving community input on this issue.

<sup>72</sup> Prices taken from: IPART, *Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: prices of water supply, wastewater and stormwater services, final report and determination*, op. cit.; IPART, *Gosford City Council, Wyong Shire Council: prices of water supply, wastewater and stormwater services, report*, op. cit.

<sup>73</sup> ICRC, *Final report and price direction: investigation into prices for water and wastewater services in the ACT*, op. cit., pp. 131–132.



## 5 Community involvement

The Commission is seeking comments from interested parties on the matters raised in this discussion paper and any other issues raised in this series of discussion papers.

To enable the Commission sufficient time to consider the submissions before releasing a working conclusions document in September 2007, the deadline for submissions is Friday, 30 August 2007.

Submissions, correspondence or other enquiries may be directed to the Commission at the following addresses:

The Independent Competition and Regulatory Commission

GPO Box 296  
CANBERRA CITY ACT 2601

Level 2  
12 Moore Street  
CANBERRA CITY ACT

The secretariat may be contacted at the above addresses, by telephone on 6205 0799, or by fax on 6207 5887. The Commission's website is at [www.icrc.act.gov.au](http://www.icrc.act.gov.au) and its email address is [icrc@act.gov.au](mailto:icrc@act.gov.au).

For further information on this investigation or any other matters of concern to the Commission please contact the Commission on 6205 0779.



# Appendix 1 Terms of reference

## Australian Capital Territory

### Independent Competition and Regulatory Commission (Regulated Water and Sewerage Services) Terms of Reference Determination 2007<sup>74</sup>

#### Disallowable instrument DI2007-65

made under the

*Independent Competition and Regulatory Commission Act 1997* ('the Act'), Section 15 (Nature of industry references) and Section 16 (Terms of industry references)

#### ***Reference for investigation under s. 15:***

Pursuant to subsection 15(1) of the Act, I refer to the Independent Competition and Regulatory Commission (the 'Commission') the matter of an investigation into, and the making of a price direction for, regulated water and sewerage services provided by ACTEW Corporation Limited ('ACTEW').

#### ***Specified requirements in relation to investigation under s. 16:***

Pursuant to subsection 16(1) of the Act, I specify the following requirements in relation to the conduct of the investigation:

1. The territory intends to continue to impose a charge on ACTEW (currently the Water Abstraction Charge) to recover from ACTEW (and all other water takers) the costs associated with the taking of water and to reflect the value of water as a scarce resource.
2. The territory may set the charge referred to in paragraph 1 for the period 2008–09 to 2013–14 at a level or levels designed to:
  - a. support the policies of the ACT Government, particularly as set out in the document entitled *Think Water, Act Water—Strategy for Sustainable Water Resource Management in the ACT*, and its target of a 'reduction in per capita consumption of mains water by 12% by 2013 and 25% by 2023'; and
  - b. support such further reductions in water consumption as may be considered necessary or appropriate from time to time having regard to the impact of drought or other factors affecting the availability of water for supply in the territory.

*The setting of this charge will be in conjunction with other existing and possible future demand management policies of a non-price nature.*

3. In making the price direction, the Commission is required to have regard to the charge referred to in paragraph 1 (as well as the possibility that the territory will change the level of the

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<sup>74</sup> Name amended under Legislation Act, s. 60.

charge), the ACT Government policies referred to in paragraphs 2a and 2b, as well as ecologically sustainable development and NWI policies agreed to by the ACT Government.

4. In arriving at its decision on the price direction, the Commission should examine all regulatory models available to it under subsection 20A(1) of the Act, and report on the various costs and benefits to ACTEW, the territory and the community under each approach.
5. In arriving at its decisions in relation to the price direction, the Commission should have regard to:
  - a. ACTEW's need to invest and sustainably maintain and manage its assets to maximise the security of the territory's water supply, particularly having regard to the current severe drought and the longer term impact of the damage to water catchments arising from the 2003 bushfires;
  - b. the commercial value of past investment by ACTEW or its predecessor bodies in infrastructure that continues to deliver services and is needed to sustain a high standard of service to all residents of the territory, giving particular consideration to an optimised depreciated replacement cost valuation as applies in relation to other utilities;
  - c. an assessment of the commercial value of ACTEW's regulatory asset base that gives particular consideration to all investment in the water network (including water and sewerage assets purchased or transferred from the Commonwealth in 1988 at the time of the creation of the ACT Electricity and Water Authority or otherwise gifted to it) and appropriately reflects the re-instatement of assets returned to service as the result of changes to operating procedures during the current period;
  - d. an appropriate allowance for a cost of capital that ensures optimal incentives to invest and to manage the potential risks and costs to the community of under-funding, and under-investment in, infrastructure services;
  - e. ACTEW's objectives under the *Territory-owned Corporations Act 1990* 'to operate at least as efficiently as any comparable business', 'to maximise the sustainable return to the Territory on its investment in the corporation...', 'to show a sense of social responsibility by having regard to the interests of the community in which it operates, and by trying to accommodate or encourage those interests' and 'to operate in accordance with the object of ecologically sustainable development';
  - f. incentives for ACTEW to undertake commercial investment in research and development in water and sewerage services in the territory; and
  - g. achieved efficiencies in service delivery and appropriate incentives to both ACTEW and the operator, currently ActewAGL, to ensure ongoing efficiencies.
6. In accordance with section 16(2)(a) of the Act, the Commission is to provide its final report by 1st March 2008.

Simon Corbell MLA  
Attorney General  
February 2007

## Glossary and abbreviations

|            |   |
|------------|---|
| ACT        | Australian Capital Territory                                      |
| ACTEW      | ACTEW Corporation   |
| AGWF       | Australian Government Water Fund                                  |
| AIC        | average incremental cost  |
| COAG       | Council of Australian Governments                                 |
| Commission | Independent Competition and Regulatory Commission                 |
| ERA        | Economic Regulation Authority (Western Australia)                 |
| ESC        | Essential Services Commission of Victoria                         |
| IBT        | inclining block tariff  |
| ICRC Act   | <i>Independent Competition and Regulatory Commission Act 1997</i> |
| IPART      | Independent Pricing and Regulatory Tribunal (New South Wales)     |
| IPART Act  | <i>Independent Pricing and Regulatory Tribunal ACT 1992 (NSW)</i> |
| kL         | kilolitre   |
| LRMC       | long run marginal costs   |
| MDB        | Murray–Darling Basin  |
| MDBC       | Murray–Darling Basin Commission                                   |
| MIC        | marginal incremental cost   |
| MJA        | Marsden Jacob Associates  |
| MOU        | Memorandum of Understanding                                       |
| NFT        | Network Facilities Tax  |
| NWI        | National Water Initiative   |
| OWR        | Office of Water Resources   |
| PWCM       | Permanent Water Conservation Measures                             |
| QCC        | Queanbeyan City Council   |
| TOR        | Terms of Reference  |
| TWAW       | Think Water, Act Water strategy                                   |
| WAC        | Water Abstraction Charge  |

WIRO                      Water Industry Regulatory Order  
WSAA                      Water Services Association of Australia

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