



The *Allen Consulting* Group

Urban Water

A vision and road map for national progress

April 2009

Report by the GAP Forum on Urban Water

The Allen Consulting Group



The Allen Consulting Group Pty Ltd
ACN 007 061 930, ABN 52 007 061 930
Global Access Partners Pty Ltd
ACN 000 731 420, ABN 74 000 731 420

Melbourne

Level 9, 60 Collins St
Melbourne VIC 3000
Telephone: (61-3) 8650 6000
Facsimile: (61-3) 9654 6363

Sydney

Level 12, 210 George St
Sydney NSW 2000
Telephone: (61-2) 8272 5100
Facsimile: (61-2) 9247 2455

Canberra

Empire Chambers, Level 2, 1-13 University Ave
Canberra ACT 2600
GPO Box 418, Canberra ACT 2601
Telephone: (61-2) 6204 6500
Facsimile: (61-2) 6230 0149

Online

Email: info@allenconsult.com.au
Website: www.allenconsult.com.au

Global Access Partners Pty Ltd

Level 3, 53 Balfour Street
Chippendale NSW 2008
PO Box 978, Strawberry Hills NSW 2010
Telephone: (61-2) 8303 2416
Facsimile: (61-2) 9319 5754

Disclaimer:

While The Allen Consulting Group endeavours to provide reliable analysis and believes the material it presents is accurate, it will not be liable for any claim by any party acting on such information.

© The Allen Consulting Group 2009
© Global Access Partners Pty Ltd 2009

Contents

<i>Executive Summary</i>	v
Chapter 1	2
<i>Introduction</i>	2
1.1 The motivation for reform	2
1.2 The GAP Forum on Urban Water	3
Chapter 2	5
<i>Background on Urban Water</i>	5
2.1 Introduction	5
2.2 Characteristics of urban water	6
2.3 Current arrangements	11
2.4 Summary	16
Chapter 3	17
<i>The case for reform</i>	17
3.1 Overview	17
3.2 Issues with the use of water and related services	17
3.3 An alternative vision	21
3.4 Summary	23
Chapter 4	25
<i>Lessons from other markets and approaches to reform</i>	25
4.1 Introduction	25
4.2 Background of reform in Australia	25
4.3 The experience in energy and other industries	26
4.4 Other water markets	32
4.5 Summary	35
Chapter 5	36
<i>Consumer attitudes</i>	36
5.1 Introduction	36
5.2 Community Attitudes to Water	36
5.3 Sensitivity to price	37
5.4 Retail contestability	40
5.5 Consumers in different jurisdictions	41
5.6 Conclusions	41

Chapter 6	43
<i>Reform of bulk water supply</i>	43
6.1 Introduction	43
6.2 Contestability in the supply of bulk water	43
6.3 Using water entitlements to drive reform	45
6.4 Administered scarcity pricing	48
6.5 Integrated water resources and grid planning	48
6.6 Implications of reform in bulk supply	49
6.7 Summary	53
Chapter 7	54
<i>Reform of urban water functions</i>	54
7.1 Introduction	54
7.2 Unbundling the urban water market supply chain	54
7.3 Alternatives where unbundling is not practical	60
7.4 Features and options by supply chain element	61
7.5 Summary	64
Chapter 8	65
<i>Retail Competition</i>	65
8.1 Introduction	65
8.2 Retail contestability and alternatives	66
8.3 Issues and considerations	67
8.4 Summary	70
Chapter 9	72
<i>A vision and road map for urban water</i>	72
9.1 Introduction	72
9.2 Assessment of the path forward	73
9.3 The road map to reform	74
9.4 Summary recommendations	81
References	83

Executive Summary

This report presents an achievable vision and a practical road map for addressing one of Australia's most pressing issues — the sustainable supply of water to our cities. The road map and its accompanying recommendations have been developed by the Allen Consulting Group flowing from discussions among a group of water industry and policy experts, which have come together in a forum under the auspices of Global Access Partners (GAP). The report is reflective of those discussions and comments by forum members on drafts, but it should not be assumed that every participant would agree with every recommendation.

Background

The recent drought has had a dramatic effect on our available water supplies. Inflows to our main urban water storages in the last decade are only 43% (Perth) to 65% (Melbourne) of their long term average.¹ The water shortages facing many Australian cities have prompted questions about whether current institutional arrangements in urban water are serving us well. Similar network industries including rural water, electricity and gas and others such as telecommunications, rail, ports and airports have undergone successful market and regulatory reform over recent decades.² Why not urban water?

In response, in 2008 Global Access Partners (GAP) initiated a forum 'on the major challenges facing the urban water sector' with the objective:

To develop a vision and road map for urban water that supports the long term economic, environmental and social needs of Australia, and to map out a pathway and key actions to achieving this vision.

Forum members have been drawn from senior people in the water industry, the Commonwealth and State Governments, the private sector and Non Government Organisations (NGOs). Forum members, however, do not represent their organisations but rather have collaborated in an independent exercise to think through the issues facing urban water and propose some practical solutions, and as noted above not every forum member would necessarily agree with every recommendation.

Special nature of water

The forum considered that any reform of urban water needed to start by considering its special characteristics.

Water is essential for basic human needs such as drinking, cooking and sanitation. Households also use water for other purposes, which they may value highly, for example maintaining gardens and swimming pools. In the non-residential sector, water is used for a variety of purposes relating to production and business activity.

¹ WSAA report card for 2007/2008 (WSAA 2008).

² For example, the energy market reforms have been estimated as adding \$1.5 billion to national income by the year 2000. See Energy Reform Implementation Group, 2007 *Energy Reform The way forward for Australia: A report to the Council of Australian Governments*, January 2007, Canberra, p.9.

Water can be supplied in a range of different qualities, although it is typically treated to a potable standard. However, this standard may not be necessary for many uses (for example, cleaning, flushing and garden reticulation). Nevertheless, it is also critical that public health and safety is not put at risk due to inadequacies in water supply, treatment and wastewater disposal.

Australia's urban water supply is subject to uncertainty due to its heavy reliance on rain-fed dams. Short-term fluctuations in rain-fed supply can be moderated by storage, as water is relatively inexpensive to store once a storage facility has been built. The ability to store water means that decisions need to be made between using it today and keeping it in reserve for future periods — a decision complicated by uncertainty surrounding future rainfall.

There are a variety of supply sources and options — one of which is desalination, which has reduced in cost as the technology has improved. Desalination offers a means of reducing supply uncertainty, as it is independent of rainfall. The feasibility of various options differs from one region to the next. And some options are more capital intensive than others. These characteristics of water supply imply the need for short, medium and long term planning to optimise the selection of options.

Unlike electricity and gas, transporting water against gravity involves high pumping costs. Conversely, transporting water with gravity can occur at a relatively low cost. The network economics can constrain the geographic extent of a network and the number of users that are able to participate in a wholesale market for water, however, water networks in many ways are not fundamentally different from other networks.

Government owned corporations and monopoly franchises serve most urban water and wastewater users. A mixture of Government departments and Government owned corporations manage the planning and provision of urban water supply and functions.

The problems

The forum also determined that a clear identification and understanding of the problems is needed before reform can be considered.

Current shortages have exposed a number of flaws in Australia's existing water management arrangements. State and Territory governments have responded to the water supply problems in their capital cities with restrictions on use, new major augmentation initiatives and supply system upgrades. Although the public has largely responded well to the restrictions, and embraced the need for increased investment in water infrastructure, the question needs to be asked — is there a better way?

Under the current approach, both households and commercial consumers of water services do not have the freedom to choose services or the level of service they receive. Restrictions impose limits on how much water can be used, how it can be used and when it can be used.

Restrictions place substantial financial and inconvenience costs on users. Restrictions have resulted in the loss of amenity and recreation value associated with degrading of green public space, sporting fields, residential gardens and pools. Restrictions can lead to irreversible damage to gardens. The cost to households of medium level restrictions has been estimated to be around half of the average household water bill, or \$150 per household.³

The policy of restrictions has prompted heavy household investment in relatively expensive alternative water sources such as rainwater tanks and grey-water systems. There are also adverse economic impacts on businesses supplying the garden industry (for example, nurseries and turf farms).

The costs extend to large commercial and industrial water users, many of which have been forced to either scale back production or invest in expensive retrofitting of water appliances and alternative supply sources, for example storm water capture and recycling. This is despite potentially cheaper sources of water being available through options such as water trade and development of new bulk sources.

The absence of a competitive market for urban water, together with a variety of institutional constraints, has impeded some potentially attractive solutions. In some cases the absence of market signals and legal restrictions prevent urban water utilities seeking the most cost effective ways to meet their customers' needs. Private sector parties that might provide alternative solutions have often been deterred from doing so by institutional barriers that:

- reduce transparency;
- give rise to distorted pricing that does not reflect consumer demand or cost of supply;
- limit access to information and access to infrastructure; and
- prevent third parties from getting access to planning approvals.

Furthermore there are concerns that key decisions relating to water are highly political and planning for water is far from transparent.

The vision

The report's vision is for an urban water future in which:

- There is a secure level of water supply to meet society's essential needs, society has confidence in the quality of water, and that consumers (particularly the vulnerable) and the environment are appropriately protected.
- Households have the freedom to choose from a range of options and can afford their basic water needs.
- Businesses and communities can access secure supplies of water in the least cost manner.
- The water and wastewater industry have the incentive and the means to meet society's water needs at lowest-cost without facing unnecessary constraints.

³ Grafton and Ward (2007) estimated the cost of restrictions in Sydney in the year ending June 2005 to be around \$235 million or \$150 per household.

This vision describes the situation that already applies for the supply of most goods and services — a combination of market competition and carefully designed regulation. No two markets are identical and applying this model requires careful consideration both of water industry specific issues, and in particular local market characteristics.

Greater competition is both feasible and likely to be beneficial. The reliance of urban centres on individual supply sources is decreasing as new supply sources emerge and as water grids expand. In any case, some degree of competition appears feasible through allocating water entitlements. Although there are some natural monopoly elements such as pipeline networks, many functions appear to be contestable once regulated access to such infrastructure is provided. Retail competition is possible and given the diversity of users and needs, may well be desirable to ensure customers' needs are met.

However, an urban water market is only possible with carefully designed regulation to:

- ensure a minimum level of supply security;
- protect consumers (especially the vulnerable);
- protect the environment;
- ensure water quality and safety; and
- facilitate competition.

Although an urban water market would not avert a drought, it can make communities more resilient to its effects and industry more responsive to it.

Road map for change

The longer-term vision described above can be achieved through a competitive market approach coupled with appropriate regulation and that this is likely to be both practical and beneficial.

However, a move to a competitive urban water market cannot happen overnight as:

- Most urban centres are currently focussing on major capital works in response to supply shortages, and these clearly need to take precedence in the shorter term.
- The enabling changes to the industry and infrastructure will take some time to happen and will occur unevenly in different urban markets.
- Design of the markets, regulation and institutions is a necessary precondition and this will require some focussed research, which in itself is a lengthy process.
- Reform will need to be introduced in a careful manner including a well thought out communication program to ensure that community attitudes move together with the reforms.

For these reasons, the forum does not support a ‘big bang’ approach to reform, as it is risky, impractical and unnecessary. Rather, it recommends a staged and contingent reform process. ‘Staged’ in that the forum has identified a number of steps and phases. ‘Contingent’ in that the lessons from each phase can be used to inform decisions on subsequent steps and phases.

It is possible to move to an interim industry structure that delivers a range of benefits of itself and also establishes structures and institutions that are essential for the transition to a more fully competitive market. The interim structure would allow for some competition at the wholesale level but would stop short of full competition until the benefits and design requirements become clear. The final decision to move to a fully competitive market is best made once the results of the move to an interim structure are known and understood.

While the appropriate timing of reforms will necessarily vary from one jurisdiction to another, the forum is of the view that a successful staged approach would include:

- an initial period of market, regulatory and institutional design and planning, necessary to enable the above reforms, which could possibly take one to two years to implement;
- an interim market featuring a competitive wholesale market, to be put in place in two to four years; and
- subject to further analysis, a competitive retail market within five to ten years.

The suggested reforms are to support objectives over the longer term and are not contingent on current or short-term issues. This timeline allows the new structure to be introduced at a time when current supply constraints should have eased but before the next round of major augmentation decisions.

Although each market will require unique treatment to a certain extent, the majority of necessary work on the design of markets, regulation and institutions would be common to all markets. As such, some work, especially the early steps, would be suited to being undertaken cooperatively through the COAG process.

A proposed high-level road map for reform is depicted in Figure A.1 below. It depicts a shift from the current structure, characterised by monopoly suppliers and a lack of competition, to an interim stage with constrained competition, and then to the final stage of competitive markets for bulk supply, retailing and other services.

The road map includes a set of immediate actions (detailed in Table A.1) to move to the interim structure. A research program underpins these actions and the interim structure.

Figure A.1

ROAD MAP FOR REFORM

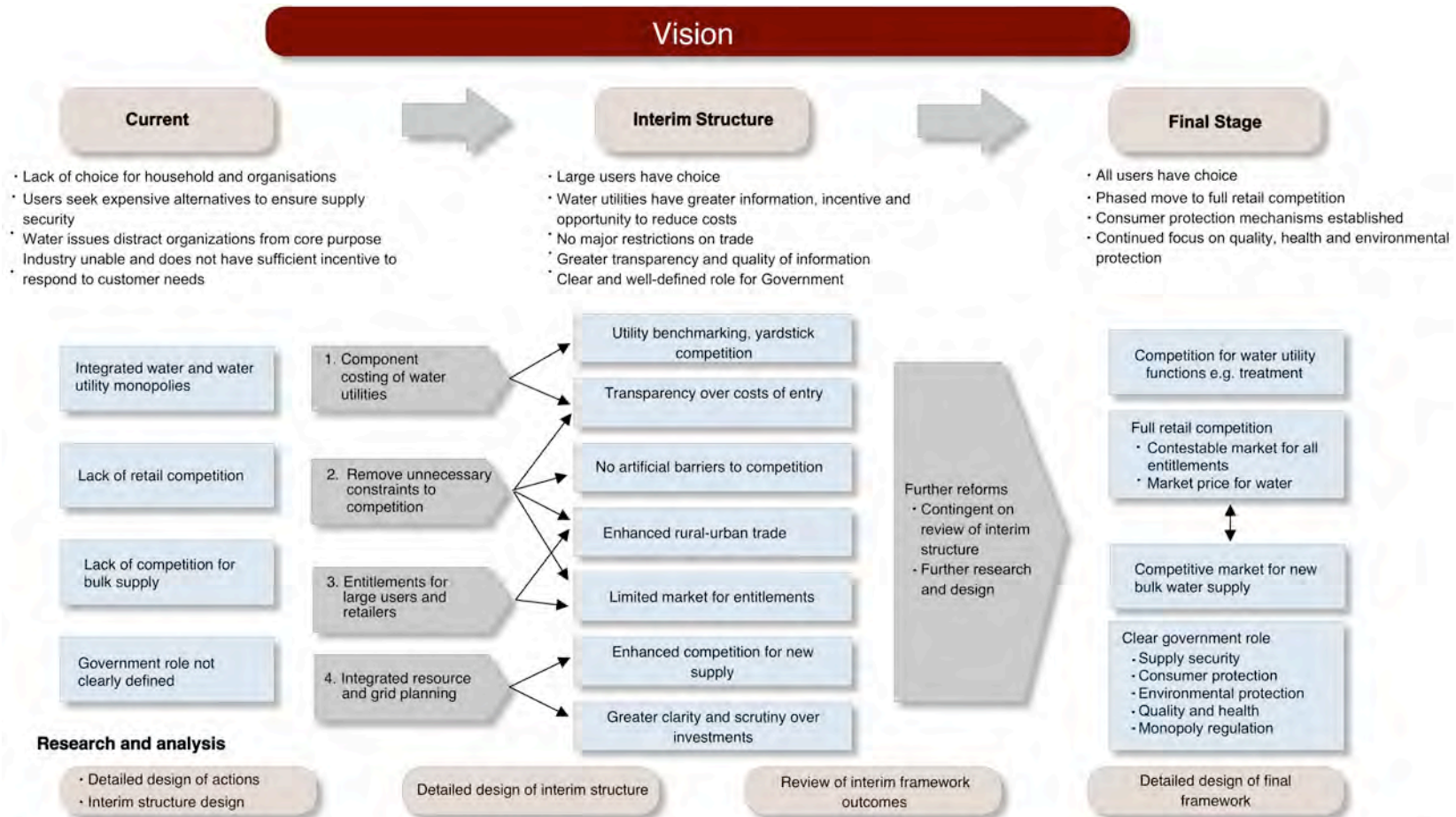


Table A.1

IMMEDIATE ACTIONS

	Description	Benefits and Comments
Develop component costing of water utilities	<p>Costs are currently only calculated and reported at an aggregate level</p> <p>Involves identifying and separately costing the key elements of the supply chain including transmission, distribution, treatment, storage, sewerage and drainage.</p>	<p>Enables industry to compare costs across different regions so as to identify opportunities for efficiencies and provide potential for yardstick competition between organisations</p> <p>Provides a basis for identifying where restructure may be beneficial</p> <p>Enables more effective economic regulation of monopoly elements.</p>
Remove unnecessary constraints to competition	<p>Establish third-party access regimes</p> <p>Continue to break-down barriers to urban-rural trade</p> <p>Remove any other legislative barriers to competition.</p>	<p>Provide clarity as to how access to essential water and wastewater infrastructure would be obtained and pricing would be determined</p> <p>Enables greater trade in entitlements</p> <p>Promotes competition that fosters efficient service delivery and innovation in water use and supply.</p>
Allocate tradeable entitlements to large users and retailers	<p>Allow large users and retailers to trade water entitlements.</p>	<p>Enable large users to better manage their access to and use of water (dependent on a third-party access)</p> <p>Establishes a market for entitlements</p> <p>Reveals a market price for water, thus reducing reliance on administered prices to signal the scarcity value of water.</p>
Develop a best practice model for integrated water resources and grid planning	<p>Examine the alternative models for more independent, transparent and integrated water resources and grid management planning and determine the most effective model.</p> <p>This examination should cover a range of roles including integrated resources planning, grid planning, information services, reviews of regulatory, market and institutional structures, and might also include roles in grid operation, market operation, and possibly procurement.</p> <p>The models should clearly identify where independence and transparency can provide benefits.</p>	<p>Greater transparency and scrutiny over key planning information for the benefit of new participants</p> <p>Better decision making from a more robust and contestable planning process</p> <p>Enables more competitive and less prescriptive sourcing of supply</p> <p>Overcomes information asymmetries.</p>

Source: GAP Forum

Summary of recommendations

1. That Australian Governments commit to establishing a competitive urban water market supported by effective regulation so as to achieve a vision that ensures:

- *There is a secure level of water supply to meet society's essential needs, society has confidence in the quality of water, and consumers (particularly the vulnerable) and the environment are appropriately protected.*
- *Households have the freedom to choose from a range of options and can afford their basic water needs.*
- *Businesses and communities can access secure supplies of water in the least cost manner.*
- *The water and wastewater industry have the incentive and the means to meet society's water needs at lowest-cost without facing unnecessary constraints.*

2. That this vision is best implemented in a phased and contingent manner through the adoption of an interim industry structure featuring competition in bulk supply, which would be reviewed before proceeding to a fully competitive retail market.

3. That the first steps towards the interim structure be taken as soon as possible and include the following four priority actions:

- a. *Conduct detailed accounting of regulated water utilities*
- b. *Remove unnecessary constraints to competition in water and waste-water services*
- c. *Trial use of entitlements to water supply for retailers and large users*
- d. *Develop a model for a more independent, transparent and integrated water resource and grid planning.*

4. That an initial period of research over the next one to two years is required to underpin the reform program. This research is best be undertaken on a cooperative basis through COAG and should include:

- a. *Design of the four priority actions identified*
- b. *Initial design of interim market and industry framework*
- c. *Detailed design of the interim market and industry framework.*

Part 1

Introduction and Background

Chapter 1

Introduction

1.1 The motivation for reform

The challenge of urban water

Recently, the supply of water in Australia's urban centres has come under unprecedented scrutiny as drought has depleted water storages around the country. Table 1.1 outlines the greatly reduced percentage inflows to main storages of each city over the past ten years compared to the long-term averages:

Table 1.1

ANNUAL INFLOWS TO MAIN STORAGES OF MAJOR CAPITAL CITIES

City	Inflow to main storage in last 10 years as a percentage of long term average
Melbourne	65
Brisbane	44
Sydney	43
Adelaide	65
Perth	43

Source: WSAA (2008)

Most state and territory governments have responded to the risk of water supply shortfalls in their capital cities with stringent demand management measures, major new augmentation initiatives and supply system upgrades.

Demand has predominantly been curtailed by restrictions on outdoor water use. Restrictions have attracted significant debate. Such measures are rare in other industries and have largely been criticised by economists as inefficient. In particular, restrictions on water use impose high costs on users — both financially and in time — and prevent those willing to pay for additional water from getting access to the resource.

After a long period of very limited investment in new supply infrastructure, most Australian capital cities are now investing heavily in new supply sources. In recent years, new manufactured water supply sources have begun to emerge such as desalinated and recycled water. Importantly, these 'manufactured' sources of water are not dependent on rainfall. These new sources raise the possibility of a more varied water supply portfolio that could be managed in more responsive and flexible ways compared to traditional rainfall-based systems of dams and groundwater utilisation. When coupled with demand management initiatives, diverse water supplies form a total portfolio that can be optimised.

The water crisis has prompted questions about whether the current institutional arrangements in urban water are serving us well. It has been suggested that alternative models could be:

- more responsive and efficient at managing supply-demand imbalances; and
- better focussed on achieving good environmental outcomes and providing more secure water supplies to customers.

Concerns about climate change have added momentum to calls for a close look at the urban water industry.

Reforms in other industries

In recent years, Australia has undertaken extensive economic reform in many key industries with similar characteristics to urban water. These include large infrastructure and network industries such as gas, electricity, telecommunications as well as road and rail transport. Reforms have also occurred in water supply in rural areas, where markets are increasingly being used to match supply and demand. Success in reforming these industries prompts the question — why not urban water?

It is against this backdrop that water policy makers and resource managers are looking for better ways to operate in what is a more complicated world.

1.2 The GAP Forum on Urban Water

In response to the complex array of policy, institutional and pricing issues confronting the urban water industry, in 2008 Global Access Partners (GAP) initiated a forum ‘on the major challenges facing the urban water sector’.

The GAP Forum on Urban Water reform has the following objective:

To develop a vision and road map for urban water that supports the long term economic, environmental and social needs of Australia, and to map out a pathway and key actions to achieving this vision.

Initial discussions have led to the identification of a number of challenges and issues that the forum should address. These have included, but were not limited to:

- community attitudes towards water use and supply;
- the role of governments and private sectors in the delivery of water services; and
- the management of social and environmental externalities.

This report represents the output of the GAP Forum including supporting research and analysis by the Allen Consulting Group. The road map and its accompanying recommendations have been developed by the Allen Consulting Group flowing from discussions among the forum participants. The report is reflective of those discussions and comments by forum members on drafts, but it should not be assumed that every participant would agree with every recommendation.

For much of the background material (including detail concerning the existing structures, problems and options for reform), the report draws upon existing reviews and research into urban water. These notably include the Productivity Commission's recent (March 2008) "Towards Urban Water Reform" and a variety of recent state reviews.

The report is structured as follows:

- Chapter 2 provides background to the urban water industry, discusses the economic characteristics of urban water and examines existing arrangements.
- Chapter 3 builds the case for reform by first examining the problems with the current arrangements and secondly by putting forward a vision that is consistent with the reforms seen in other industries.
- Chapter 4 reviews the important lessons learned from reforms to other utility sectors, with an emphasis on ways in which markets and competition have been introduced in these sectors to promote efficiency.
- Chapter 5 discusses community attitudes to urban water use. The material in this chapter serves as a reminder of the 'people factors' that need to be considered as part of any strategy to introduce a successful reform program.
- Chapters 6, 7 and 8 contain a number of potential reform options for the industry, ranging from modest initiatives to more complex and aggressive reforms. Chapter 6 focuses on reform for bulk water supply. Chapter 7 focuses on the functions of water and wastewater utilities and Chapter 8 considers retail competition.
- Chapter 9 contains an outline of the Forum's vision for urban reform and a potential road map for moving forward.

Chapter 2

Background on Urban Water

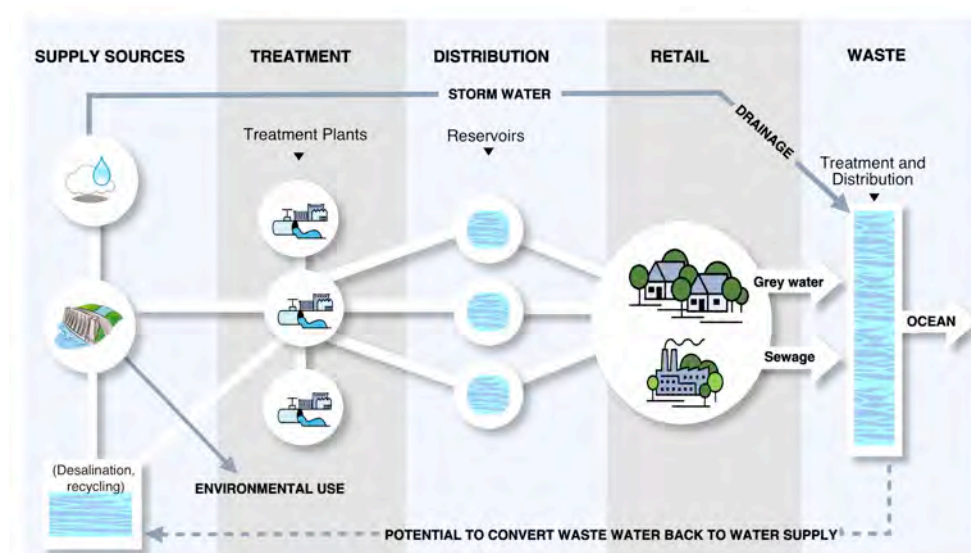
2.1 Introduction

Overview of urban water supply

Urban water supply and wastewater management can be broadly depicted as consisting of functions ranging from water harvesting and storage through to provision of drainage and the management of sewerage. The key functions are depicted in Figure 2.1 and described in Table 2.1 below.

Figure 2.1

URBAN WATER SUPPLY



Source: Allen Consulting Group

Table 2.1

KEY WATER FUNCTIONS

Functions	Components
Supply, harvesting and storage	Water storage and harvesting including catchments, dams, aquifers, desalination, recycling and stormwater collection
Treatment	Treatment of water to meet appropriate standards
Distribution	Water transport, system operation and management of temporary storage (reservoirs)
Retail	Billing services, marketing, customer management
Wastewater	Sewerage transportation Wastewater treatment and disposal
Drainage	Collection and transportation of storm water

Source: Allen Consulting Group

2.2 Characteristics of urban water

Every industry has distinguishing features that are important considerations in how the industry should be managed. The urban water industry is no exception. There are a number of important physical and economic characteristics of urban water. Some features are common with other recently reformed industries such as gas and electricity. This section considers these features in regards to supply and use of urban water.

Urban water supply

Uncertain supply and cheap storage

Two key features of water that are particularly relevant to Australian urban water management are:

- the rain-fed supply of water is uncertain; and
- water (while in dams and reservoirs) is relatively cheap to store.

These two features result in a unique allocation problem. How should current stocks of water be allocated between current and future consumption? And given the uncertain supply, what is the most efficient (least cost) way of achieving supply security?

These questions in turn lead to the question of how much of a supply ‘buffer’ should be maintained as an insurance against extensive drought and future growth in demand. Water (like energy) is considered to be an essential service — at least for basic indoor household needs so a minimum buffer is required. But maintaining surplus capacity is expensive and also limits the ability to adapt to changing seasonal and demanding conditions. It may be the case that multiple, small-supply augmentation projects that could be progressively brought ‘on-line’ would be more efficient than investing in large capacity supply infrastructure. The size of a supply buffer involves a trade-off between consumer willingness to pay for reliability and the cost of constructing and maintaining surplus capacity.

The issue of planning for uncertain supply is particularly challenging for Australian urban water management. For the most part, Australia’s urban water supplies are based on rainfall that is highly erratic. Much of the Australian continent is subject to periodic droughts that can be severe and extended (as recent history demonstrates). This, combined with the historical availability of cheap land, has resulted in Australian cities tending to be more reliant on large dams than their international counterparts. The uncertainty of supply heightens the problem of determining how much water should be kept in reserve for future consumption.

A solution to the uncertainty problem is to produce water by processes such as desalination, recycling sewage and collecting and treating stormwater for reuse. In most urban centres there is no practical limit to the amount of water that may be extracted from these and other sources. But the cost of desalination and recycling can be prohibitively high relative to existing sources.

In the absence of a decentralised market system for managing bulk water supply, a key challenge in urban water management is selecting optimal portfolios of efficient supply options via a centrally administered process.

Supply sources differ by location

A further feature of water (compared to other utilities such as electricity) is that the nature of the water catchments and the supply alternatives can vary significantly by location. For example:

- The dependence on dams as catchments varies (for example, Perth sources about half of its water from aquifers; Adelaide draws its water from a combination of the Mt. Lofty catchment and the Murray River; and Sydney, Melbourne and Brisbane have relied heavily on large dams).
- The reliability of rainfall varies across different catchments. For example, rainfall into Sydney's key catchments has been significantly more variable than for Melbourne's key catchments.
- The level of natural water supply relative to water usage varies. For example, Darwin and Hobart have minimal water supply issues.
- The potential sources of supply and the relative ranking of costs associated with various supply sources are highly dependent on the hydro-geography of a region. For example:
 - Desalination is not feasible for Canberra and is very costly for Brisbane due to the nature of the coastline.
 - Urban-rural trading is a possibility for Melbourne, Adelaide, Canberra and Perth but is probably not practical to any significant degree for Sydney.

There are also some important demand and demand management factors that vary by urban centre including population size (easier to provide emergency supplies to Canberra than Sydney) and the extent of water metering installation.

Another important feature of water is that, relative to its value, it is very expensive to transport against gravity. Water is heavy and unlike gas cannot be compressed. A key implication is that the water markets serving Australia's major cities are not (and are unlikely ever to be) as closely integrated as for example electricity markets have become.

The combination of these features means that each market needs to be considered separately, particularly in regard to the supply of water. A 'one size fits all' approach to urban water is unlikely to succeed.

The nature of the water cycle

Water is unique among the commodities we use in the way it moves continuously through land, oceans and the atmosphere. This process, known as the water cycle, has a number of important implications for water management.

A significant implication relates to the clear allocation of rights to use the water. As water falls across the land and flows towards the sea it may pass through or alongside a number of property owners who can potentially extract the water for use. The dispersed and fluid nature of water has led to a number of difficulties in defining who has what rights for water use. For example:

- rights to many water resources are over-allocated; and
- the rights to capture stormwater are not clearly defined.

Lack of clarity of rights can hinder the development of markets by making trading more difficult. The issue of water rights is considered in depth by the Productivity Commission (2003).

Another implication of the water cycle is that there may be third-party effects associated with different water uses. For example, some of the water used for irrigation will return to the river system from which it was extracted to the benefit of the environment and/or users downstream. These third-party benefits may be lost if instead the water is transported to other markets.

Other features of urban water supply

There are a number of other features of urban water supply that are shared with other recently reformed industries. Of note these include:

- New investments in supply tend to be significant projects that add substantially to capacity. The main options to extend supply in urban settings (for example, desalination) involve large-scale investments.
- The main options to extend supply (like desalination, new catchments and recycling) often have significant environmental impacts that need to be managed. This is also true of investments in recently reformed industries such as electricity.
- Urban water is a network industry. Urban water like electricity, gas and telecommunications, involves components of transmission and distribution along fixed network infrastructure.

Urban water use

There are also many important features about urban water use. When considering water management, commentators often point out a number of demand characteristics. For example:

- There are different types of water users and different types of water.
- Water is essential for human life.
- Water demand is price inelastic.
- Water quality is important for public health.

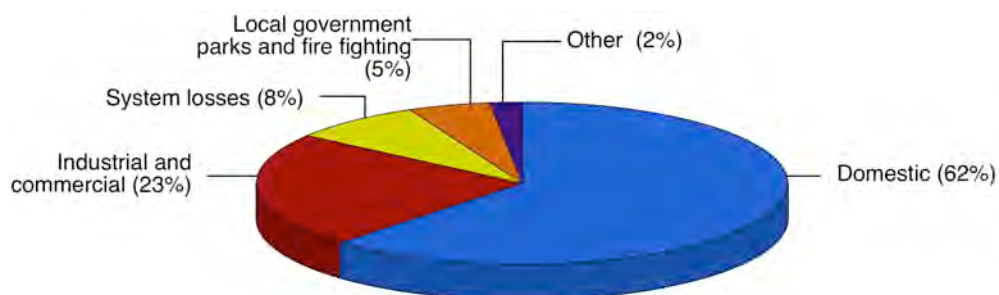
As discussed below, most of these characteristics tend not to be unique to water. Rather they are shared, at least to an extent, with a number of other commodities including those such as electricity and gas for which the industries have undergone significant reforms.

Different types of users and different types of water

When discussing urban water, it is common to consider drinking quality water for domestic (i.e. household) use. There are however a range of different users and types of water.

As shown in Figure 2.1, domestic use comprises less than two-thirds of Australian consumption. Almost a quarter of Australian urban water is for industrial and commercial purposes. The extent of industrial and commercial use is a potentially important consideration. This feature is also true of other recently reformed markets such as energy.

Figure 2.1

URBAN WATER CONSUMPTION (2000-2004)

Source: Productivity Commission (2008)

There are also different types of water characterised by water quality attributes (ranging from potable water, to water that may be safely used for washing, to grey water that may be used only for garden watering)⁴. Water services can also differ along a number of dimensions including:

- capacity; and
- reliability or security of supply (or cost of).

Similarly, electricity and gas also have significant quality dimensions and significant costs and technical challenges have to be met so that supply of an appropriate standard can be achieved to suit the customers' needs. For example, naturally occurring gas varies significantly and usually needs to be treated to reach a standard, which can be very costly. Some customers require very different standards, for example, electricity supply to a smelter compared to a household. Arguably, the quality dimension in electricity needs to be much more carefully controlled than water and in real time. There can be significant costs and interruptions when these standards are not met. Like water, significant effort is often required to make gas and electricity a commodity.

Water is essential

Water is a necessity for human life. Water use is often described as having some essential (for example, for drinking) and some discretionary components (for example, for washing cars). This is equally true with other goods such as housing, food and clothing and also for the recently reformed energy industries.

As with other goods and services however, the distinction between what is essential and what is discretionary is often grey. A recent detailed residential water use study (summarised in Table 2.1 below) identified the main category of uses. The study found that of an average daily indoor per capita use of 169 litres (equivalent to 523 litres per household),⁵ over 70 per cent was used on showers, clothes washing and toilets.

⁴ The costs to separating products can be significant and may prevent the development of different product lines.

⁵ The study was conducted by household. Average indoor use per capita was found to fall with household size with a significant drop from 1 person to 2 person households. Use did not vary greatly for household sizes between 2 and 6 persons.

Table 2.1

AVERAGE DAILY INDOOR PER CAPITA WATER USE

Category	Litres	Percentage
Shower	49.1	29%
Clothes washing	40.4	24%
Toilet	30.4	18%
Tap	27.0	16%
Leaks	15.9	9%
Bath	3.2	2%
Dishwasher	2.7	2%
Total	168.7	100%

Source: Yarra Valley Water (2004)

A number of commentators have made suggestions as to a minimum water requirement. Grafton and Ward (2007), for example, suggest a minimum level of 50 litres per person per day.⁶

Given the essential need for water, a key concern is ensuring that people can afford their essential water needs and in particular that the vulnerable are protected from excessive price increases. In Australia there are a number of social programs and policies designed to protect the vulnerable. A key consideration is whether existing protections are sufficient.

Water demand is price inelastic

The demand for water is often described as being inelastic to changes in price. There have been many attempts to measure the demand elasticity.⁷ Some estimates have ranged from as little as -0.15 to over -1 (Box 2.2).

Box 2.2

ESTIMATES OF DEMAND ELASTICITY

Dalhuisen et al. (2003) present a comprehensive meta-analysis of 64 US econometric studies, estimating a mean price elasticity of -0.41. A study by Graham and Scott (1997) estimated the price elasticity of residential water demand in the ACT region to be in the range of -0.15 to -0.39.

Grafton and Kompas (2007) estimated the price elasticity for urban water in Sydney to be -0.35. Hoffman et al. (2006) conducted a panel data study (data across multiple regions and over time) of urban water demand in Brisbane and estimated a contemporaneous price elasticity of between -0.67 and -0.55. Another panel data study, by Xayavong et al. (2008) for Perth, estimated an indoor elasticity of between -0.70 and -0.94, and an outdoor elasticity of between -1.30 and -1.45.

Source: Extracted from Hughes et al. (2008)

⁶ The Productivity Commission (2008) note that South Africa sets 'basic human needs' at 25 litres per person per day.

⁷ Broadly defined as the percentage change in demand in response to a one-percentage change in price.

As demand elasticity estimates (with a few exceptions) range between 0 and -1⁸ water is by definition demand inelastic.⁹ The estimates for the demand elasticity of water, although low, are similar to the elasticity of most broad commodity groups for which there are few substitutes (for example, food and energy). The short-term elasticity of most broad commodity groups tends to be around -0.5.¹⁰

It is also the case that price elasticity of demand estimates are based on existing prices, and may not be reflective of water at higher prices. For example, if prices for water were to rise (as is projected to occur following the current round of investment in water infrastructure), the demand may become more (or potentially less) price-elastic.

Water quality is important for public health

Given that people consume water, the quality of urban water is important for public health. While this is an important consideration, this is also true for food. Furthermore, there are also major public safety issues concerning gas and electricity supply and for that matter transport networks as well. All these industries are similar in that they have public health and safety regulations designed for their particular risks.

2.3 Current arrangements

Current Institutional Arrangements

In most jurisdictions, the urban sector is typically characterised by vertically integrated, government-owned water providers that operate as regulated monopoly businesses. Even where some disaggregation has taken place the public sector monopoly characteristics have been retained. Under these institutional arrangements, water supply is a largely centralised function and there is little or no scope for markets to develop, other than perhaps in providing services to the monopoly and in providing on-site alternatives to businesses and households such as recycling options, rainwater tanks and water efficiency services.

Unlike the rural water sector, where markets have been operating for over fifteen years, the urban water sectors in most States and Territories do not display competitive, or market characteristics. While there are some aspects of the rural sector that would benefit from further reform, there is a generally accepted market framework that facilitates water trading (including some water trading for urban use). No such generally accepted market framework exists for the urban water sector.

Current Pricing Arrangements

In Australia, governments or economic regulators rather than market forces determine urban water prices. Prices, thus, do not necessarily reflect fundamental supply and demand conditions.

⁸ Based on their review of other studies Hughes et al. (2008) chose to use an elasticity of -0.41 for their modelling. Grafton and Kompas (2007) also conducted a review and chose to use -0.35 for their modelling of Sydney water.

⁹ Demand is defined to be *inelastic* when the measure of demand elasticity is between 0 and -1. Demand is defined to be *elastic* when the demand elasticity is larger (in absolute value) than -1.

¹⁰ See Clements (2006) for a summary.

Urban water pricing is generally set so as to ensure cost recovery of the water services. Users are typically charged a two-part tariff, comprising a fixed charge and a variable charge levied on the volume used. The pricing of urban water varies by jurisdiction. Table 2.1 summarises the water charges for Australian capital cities. A notable feature of water is that it a cheap resource relative to electricity, gas, petrol and other ‘essential’ services. The volumetric rate in all capital cities is less than \$2 per kilolitre.

The approach commonly used by regulators in setting volumetric prices is based on the long run marginal cost (LRMC, see Box 2.3). The LRMC pricing approach involves determining over a long time period, the optimal investment program and then setting volumetric prices at levels that recover costs.

Under certain conditions LRMC pricing would reflect the pricing that would occur in a competitive market. An important way in which LRMC pricing differs from what would occur in a competitive market is that under a LRMC approach prices do not vary with current storage levels.

Table 2.1

CAPITAL CITIES’ WATER PRICES AS AT 1JULY 2008

City	Fixed Charge	Quantity	Usage Charge
Adelaide	\$148.00 to \$157.40	0 to 120KL 120 - 520KL pa >520 KL pa	\$0.71 per KL \$1.38 per KL \$1.65 per KL
Brisbane	\$148.12	0 to 255KL pa 256 to 310KL pa > 310 KL pa	\$0.59 per KL \$0.63 per KL \$1.12 per KL
Canberra	\$85.00	0 – 0.548KL per day (0-200KL pa) > 0.548 KL per day (>200KL pa)	\$1.85 per KL \$3.70 per KL
Melbourne	\$75.54 to \$126.52	0 to 160 KL pa 161 to 320 KL pa > 321 KL pa	\$1.01 to \$1.02 per KL \$1.20 to \$1.22 per KL \$1.78 to \$1.97 per KL
Perth	\$180.50	0 to 150 KL pa 151 to 350 KL pa 351 to 550 KL pa 551 to 950 KL pa > 950 KL pa	\$0.643 per KL \$0.828 per KL \$0.997 per KL \$1.425 per KL \$1.714 per KL
Sydney	\$75.70	0 to 100 KL per qtr (0 to 400 KL pa) > 100 KL per qtr (> 400 KL pa)	\$1.61 per KL \$1.83 per KL
Hobart	Based on property value		No usage charges
Darwin	\$114.21		

Source: WSAA Report Card 2007-08

Box 2.2

THE LONG RUN MARGINAL COST PRICING APPROACH

The long run marginal cost (LRMC) pricing approach was developed as an approach for dealing with 'lumpy' investments i.e. investments where the minimum efficient scale of new infrastructure is large such that the new investment would have a significant impact on total supply.

In a competitive market the market-clearing price will be at the point of short run marginal cost – the cost of providing an additional unit given the existing capacity. When investments are lumpy and production cannot be cheaply stored then, market-clearing price will vary substantially before and after a new source of supply is introduced. Pricing at LRMC can thus be used to stabilise prices overtime.

Source: Allen Consulting Group

There are a number of ways in which current water pricing diverge from what we might see in competitive markets:

- Prices do not reflect changes in water availability or scarcity. The volumetric rate is generally fixed over long time periods and thus does not vary with changes in storage levels and forecasts of supply and demand.¹¹ 'Scarcity pricing' is commonly used to describe the approach whereby water price reflects water scarcity (see Box 2.3).
- Prices do not reflect cost of constituent components of the water utilities. In general, prices are set to recover overall system-wide costs, and costs associated with potable water supply are often recovered through wastewater charges.

¹¹ In recent years tariffs have been 'rebalanced' such that a proportion of fixed costs are recovered through the volumetric charge. This has been done to strengthen the scarcity signal to users – as a means of overcoming the 'market failure' of not having the cost of water commodity incorporated into the price. In a competitive market we would expect to see a higher loading on the fixed charge, as this reflects the true cost structure of a water business.

Box 2.3

SCARCITY PRICING

The term 'scarcity pricing' is often used in regards to water. It simply refers to a pricing approach whereby the water price reflects the relative availability of supply (both current stores and expected future supply) compares with demand. This may be because the price is determined by a market or has been administratively set to balance short term supply and demand.

'Scarcity pricing' is used in contrast to common pricing approaches where prices are set independent of current storage levels. Under a 'scarcity pricing' approach, water prices would rise as dam levels fell (and vice-versa). The price reflects that as water becomes more scarce (for example, during a drought) the opportunity cost of using water for immediate consumption increases.

The 'scarcity pricing' approach is, in effect, no different to a market pricing approach which matches supply and demand. It is perhaps that supply of water is largely uncertain that the term 'scarcity pricing' is commonly used in regards to water.

The term is often considered to apply to both wholesale and retail prices. This need not be the case. For example, potentially retailers may pay water prices that vary with storage levels but do not pass these price changes through to end-users (for example, because of existing contracts, regulations or due to the administration costs of changing prices).

'Scarcity pricing' is observed with other commodities. For example, changes in estimates of oil reserves can have an immediate effect on oil prices. Changes in oil prices are passed immediately through to consumers (for example, through to petrol prices).

Source: Allen Consulting Group

Current supply and demand management measures

As a result of supply shortages fuelled by the drought, growing demand and inflexible pricing practices, there has been a recent imbalance between supply and demand.

The shortages have necessitated other policies to manage demand and supply. In the absence of using prices to manage demand, alternative demand management measures (most notably water restrictions) have been implemented during shortages. Water restrictions are in place in all Australian capital cities except Hobart and Darwin (see Table 2.1 below).

Other demand management techniques include public awareness campaigns, water saving initiatives, mandatory building design standards, water sensitive urban planning and government-funded rebates for rainwater tanks and water efficient appliances.

Table 2.1

SUMMARY OF WATER RESTRICTIONS IN CAPITAL CITIES AS AT 1 JULY 2008

City	Level	What's permitted
Brisbane	Stage 6	Bucket or watering can of gardens and lawns between 4pm to 7pm three days per week on an odd and evens basis. Safety and potential aspects of vehicles only by bucket or commercial car wash.
Sydney	Stage 3	Hand held hose and drip irrigation only on Wednesdays and Sundays before 10am and after 4pm. Hosing of vehicles and residential building structures fitted with a trigger nozzle is allowed to a maximum of 10L/minute. All other watering systems are banned.
Adelaide	Stage 3	Hoses fitted with a trigger nozzle and drip systems can be used for gardening on an odds and evens basis for a maximum of 3 hours per week. Buckets can be used anytime. Sprinklers and other watering systems are banned
Melbourne	Stage 3a	Hand held hoses between 6am to 8am on two days a week. Lawn watering banned. Only vehicle mirrors, windows and lights can be washed by bucket. Manual drip systems and automatic systems for limited hours two times per week on an odds and evens basis.
Perth	Not defined	Perth has permanent rules for watering gardens that include sprinkler rosters on two days a week and daytime sprinkler bans.
Canberra	Stage 3	No sprinkler or other irrigation system may be used on private gardens. Watering of lawns not permitted. Hand held hose between 7am and 10am; and 7pm and 10pm on alternate days as per the odds and evens system. Vehicle washing banned except at commercial car wash.
Hobart	No restrictions	
Darwin	No restrictions	

Source: Adapted from WSAA Report Card 2007-08

To manage supply additional policies have included public investment in new supply (for example, desalination), augmentation of supply and incentives to for private investment in supply (for example, promotion of using water tanks).

The new desalination plants being constructed in Sydney and Melbourne are significant augmentations and when combined with additional programs should substantially alleviate the supply-demand imbalance. The 45 GL desalination plant in Perth is currently providing about 20 per cent of Perth's metropolitan water supply and another larger plant is being planned.

2.4 Summary

Box 2.1

KEY POINTS

Urban water supply involves a number of supply sources (e.g. dams and desalination) and a range of functions that include bulk supply, treatment, distribution, retailing and waste management.

Urban water supply has some important features for policy consideration

- Rain fed supply is uncertain and water needs to be stored for future use.
- Urban water supplies vary by geography and are (largely) not integrated.
- Water flows across land making a clear allocation of rights difficult.

Urban water use also has important characteristics which are in the main similar to existing reformed markets including that:

- usage is diverse, particularly in how water is used, but also in its qualities and by the type of user;
- some use is essential;
- demand is price inelastic, similar to other broad commodity groups; and
- quality is important to public safety and health.

Key features of current urban arrangements include:

- The urban water sector is characterised by vertically integrated, government-owned water providers that operate as regulated monopoly businesses.
- Pricing typically involves a mixture of fixed and volume based charges, with the volume based charges set to reflect be fixed over long periods.
- Demand restrictions rather than pricing to manage demand.

Chapter 3

The case for reform

3.1 Overview

The current arrangements, marked by the absence of both competition and the institutional structures to support competition, have attracted strong criticism. Commentators such as the Productivity Commission have pointed to a range of inefficiencies (see for example Box 3.1) that exist compared with the alternative of a market-based approach that is common to other industries. The magnitude of these problems represents a strong case for reform, and warrants a rigorous and careful analysis of alternative models for meeting urban water demand.

Box 3.1

INEFFICIENCIES OF CURRENT ARRANGEMENTS

- The failure of supply augmentation decisions to achieve timely and least cost balancing of supply and demand.
- The lack of innovative supply options, product choice and options for water users.
- The lack of a relationship between the price of water and its scarcity.
- The inability of water users to use water in ways that are most valuable.
- The artificial separation of water resources into rural and urban sectors that remove opportunities for inter-sectoral trade.

Source: Productivity Commission (2008) Towards Urban Water Reform

This section considers in more depth the problems with the existing arrangements and presents an alternative vision for urban water reform.

3.2 Issues with the use of water and related services

Usage restrictions

Water restrictions, combined with various public awareness schemes, have been claimed to be successful in managing demand (see VCEC 2008: p. 60-61 for a summary). The community seems to have been willing to bear restrictions, at least in the short term, in response to a crisis. Furthermore water restrictions have received some public support.¹²

There are, however, significant costs associated with water restrictions. Compared with pricing, water restrictions are an inefficient way to ration demand for water.

Restrictions also impose significant costs on users who would be willing to pay for additional water for discretionary needs. In effect, restrictions prevent water being supplied to those users that value it the most.

¹² For example, the NSW 2006 Metropolitan Water Plan reports that from a January 2005 survey, 62 per cent of respondents felt that the existing restrictions regime (Level 2 restrictions including a ban on sprinklers) was 'about right'.

Secondly, restrictions prevent consumers using water in some of the ways that are considered valuable to them. For example restrictions prevent consumers making the most of the garden or swimming pool even though they may be willing to sacrifice other uses (or other resources). Some of these costs are financial (for example, loss of plants) while others may incorporate a loss of welfare (for example, the enjoyment of a swimming pool or a garden).

Restrictions cause consumers to invest in expensive alternatives such as private water storage (for example, water tanks).¹³ Restrictions can also promote households to undertake inefficient activities to avoid restrictions (for example, taking showers to increase more grey water to be used in the garden).

There have been a number of attempts to quantify the cost of water restrictions. Grafton and Ward (2007) recently estimated the net cost (the deadweight loss in welfare) of water restrictions in Sydney to be about \$150 per household per year. These results are consistent with other international (Mansur and Olmstead 2006), and Australian studies (e.g. Hensher et al. 2006).¹⁴ Further, households have indicated they would rather pay a higher water bill to finance other supply options (CSIRO 2007).

Effectiveness of restrictions during severe shortages

A further potential problem with water restrictions is their effectiveness during severe shortages. While higher prices will discourage all uses of water, demand restrictions can only be practically applied (without unthinkable incursions on people's liberties) on outside water use. Inside water use cannot be directly monitored with current metering.

It is possible, due to the presence of water meters, to monitor the total amount of consumption by households and businesses. However, enforcing strict limits and doing this by household size or other new dimensions would require significant changes in the government approach and may substantially raise administrative and social costs.

Other costs of demand management approach

In addition to the direct costs to users, there are other costs associated with the demand management approach. These include the costs of enforcing demand restrictions and costs of formulating and implementing demand management programmes.

There are also emerging instances of restrictions contributing to social tension. We are unaware of any comprehensive review of these costs.

Equity

There are significant equity concerns with the current demand management approach. The Productivity Commission (see Box 3.1) notes a number of ways by which the demand restrictions are likely to harm the poor more so than the rich.

¹³ Grafton and Ward (2007) estimated a \$3.4 million annual net welfare loss for Sydney associated with rainwater tank installation to offset water restrictions. This estimate of welfare loss does not include the cost of the space that a rainwater tank takes up.

¹⁴ Results of studies vary. For example, Hensher et al. (2006) found that households were not willing to pay to more remove mild restrictions but would pay on average over \$200 to remove more severe restrictions. Different studies used different techniques and are not directly comparable. See Grafton and Ward (2007) for a discussion.

Box 3.1

INEQUITIES OF CURRENT ARRANGEMENTS**Water restrictions are also inequitable**

The implicit assumption that non-price restrictions must be fairer than price-based alternatives is open to challenge. It would be surprising if an instrument as indiscriminate as restrictions on water uses did not have its own inequities. For instance, some might consider it unfair that prescriptive restrictions mean that:

- the damage from dead gardens tends to afflict outer areas more than, usually wealthier, inner city locales
- children are banned from playing under sprinklers — most acutely felt in generally less wealthy areas with limited access to swimming pools or the sea
- households that economise indoors but have large gardens with flowers, fruit trees and vegetable plots experience very high costs, whereas households of the same composition that are heavy indoor users, but have native vegetation or minimal gardens, may be scarcely affected
- less wealthy residents are less able to avail themselves of relatively high cost options (e.g. bores, rainwater tanks and commercial supplies) to mitigate the damaging effects of restrictions.

Nevertheless, if the effect of higher water prices on low-income households were considered untenable, there would be scope to use targeted measures to offset those effects while retaining the beneficial incentives from efficient prices. The options include direct measures (e.g. provision of a fixed quantum of low-priced 'essential' water to all households) and indirect measures (e.g. tax-welfare arrangements).

Source: Extract from Productivity Commission (2008) Towards Urban Water Reform (p. XXI)

Other commentators have also argued that equity concerns should not be a justification for the current arrangements. For example Grafton and Ward (2007) point out that water and wastewater bills are small compared to household incomes, that there is a well-developed welfare system already in place and that there are alternative arrangements that could provide appropriate pricing signals and provide targeted assistance to the vulnerable households.

Issues with supply of water and related services***Investment in supply***

A common concern is that water utilities have under invested and have been required to pay dividends to government instead of reinvesting in infrastructure. Despite the benefit of hindsight, it is unclear whether early investment could have been justified given the information at hand at the time.

Critics have argued that many investments to augment supply (or demand reduction) are inefficient. The Productivity Commission (2008) review provides the example of a rebate scheme for dishwashers that are estimated to save water at a cost of \$30/kilolitre - a cost that is over 10 times that of desalination.

Other concerns relate to the investment approach and pricing philosophy, in particular the current management philosophy of setting price to long run marginal cost and attempting to optimise investment, is inappropriate for Australia. Sibly (2006) argues that the long run marginal cost pricing approach that has been adopted is not appropriate for Australian conditions. He states that:

... there are two problems with its [the LPMC pricing approach] application to current Australian circumstances. It assumes that the optimal investment rule is in place, and capacity may be fully utilised when required. Neither of these requirements is usually true for Australian water utilities. ...

Another challenge with the fixed pricing approach is its appropriateness for providing incentives for dealing with uncertainty of supply. With fixed pricing, private suppliers do not benefit from increases in prices during water shortages and thus do not have incentive to make investments that would help to improve supply security. Under a 'scarcity pricing' (i.e. market driven pricing) approach suppliers would be rewarded for more accurately assessing and managing uncertainty.

Under current arrangements it is also difficult to assess supply alternatives with different levels of certainty and cost. For example, while desalination is a more expensive source of supply than a catchment, it offers greater certainty of supply. Scarcity pricing also enables a market to develop where end-users select their level of pricing risk and thus reveal their preferences for security of supply.

Incentives for efficient operation of manufactured water

The lack of 'scarcity pricing' creates challenges for the efficient operation of manufactured water operations. For example, the variable costs of running a desalination plant are significant. When dam levels are close to over-flowing it is likely that it will be inefficient to run a desalination plant at capacity.¹⁵ Scarcity pricing signals could be used to determine when it is efficient for the desalination plant to be in operation.

Incentives for cost efficiency and innovation

Lack of competition reduces the incentive for water utilities to look to drive cost and service improvements.

A concern raised by forum members is that there is a lack of innovation, product choice and options. Currently users are limited in the product and service options that are offered. While water is typically viewed as a commodity, there are differentiating aspects to water provision including water quality, reliability, security and capacity.

A further concern raised regarding the efficiency of water utilities is whether the significant land resources controlled by urban water utilities are being put to best use.

Lack of trading between rural and urban use

It is generally acknowledged that there are substantial benefits and greater scope for more substantial trade between some rural and urban areas. Around two-thirds of water extracted in Australia is used for agricultural purposes. Despite this opportunity, to date there has only been limited trading between rural and urban use.

¹⁵ In addition to losses from overflow in the dams, there is a marginal cost of evaporation to be considered and the time value of additional running costs to be considered.

The barriers to urban-rural water trade are far from transparent. There are ‘generally few legislative restrictions to trade’ but that there is an ‘acknowledged political reticence to take advantage of rural–urban transfers as a source of urban water supplies and some policymakers appear to discourage it.’ (Productivity Commission, 2008: p. 77).

As acknowledged in the Productivity Commission review, there are potential distortions to efficient outcomes that may result from rural-urban trading. These include distortions brought about by environmental externalities and other third party impacts and problems with existing charging practices. However, these issues do not appear insurmountable.

It thus appears that urban-rural trading offers great prospects to address problems of supply in both rural and urban regions. While some barriers to trade still need to be addressed; a move towards more competitive markets would create a greater incentive to capture opportunities.

Supply quality

The quality of drinking water is naturally a significant concern and an issue that has previously received significant attention. Currently there appears to be consumer confidence in the quality of drinking water but concerns may be raised if supply and treatment facilities were privately managed, and especially in the case of water recycling from sewage. Such concerns may be mitigated or addressed by setting of standards and stringent regulations and through public education.

Environmental concerns

Concern for the environment is often raised in regards to reviews of urban water supply. The chief environmental concerns raised appear to be as follows.

- New supply sources will have significant environmental impacts (for example, a new desalination plant may add to greenhouse gas emissions and may have impacts on the aquatic environment).
- Pressure on supply will result in reduced allocation of water to environmental flows.
- Pressure on supply will result in ‘environmentally unfriendly’ measures to increase supply (for example, increased land clearing in catchments areas to maximise flows into dams).

These concerns appear to be largely important considerations in developing water policy rather than issues that would prevent the effectiveness of any water policy options.

3.3 An alternative vision

What is an alternative that we might strive for?

Given the success of market reforms in other industries, the forum viewed that a reasonable alternative for consideration is a vision based on market competition and carefully designed regulation.

The market approach is generally preferred to a centrally planned approach as it empowers consumers and provides strong incentives for participants to be efficient and meet customers' needs. However, as with other industries there is a need for Government regulation, for example in ensuring security of supply, curtailing market power, protecting consumers, imposing community service obligations, protecting the environment, ensuring quality and safety and encouraging industry competition.

Such a vision could address many of the problems described in this chapter. Although the vision would not have averted a drought, it would have made businesses and communities more resilient to its effects. Even if the vision had been in place it is possible that there would have been no significant changes to supply. This is because of the unexpected timing of droughts and the long time frame involved in major supply augmentations, in supply. However, it also possible that if customers (both households and businesses) could choose they may have revealed a stronger preference for supply security than the water industry assumed. More importantly, given a well functioning retail market, consumers who needed water for outdoor use could have used less indoors or purchased more to the benefit of others who valued it less. As described earlier in this chapter, the benefits of removing the existing restrictions can amount to around half of the average household water bill. This is in addition to the benefits to community and businesses and increased efficiency in the provision in services.

Is such a vision achievable?

While such a vision has strong attractions, it is not immediately obvious that it is fully achievable in practice. There are many potential challenges, barriers and considerations in relation to its implementation. Relevant issues include:

- Some key elements of the urban water industry have strong 'natural monopoly' characteristics.
- Consumers may be accepting of existing arrangements and resistant to change.
- The costs of metering water consumption are high (relative to the value of the water).
- There are many potential reasons for Government intervention, particular in regards to consumer protection, ensuring quality and health standards, ensuring security of supply and protecting the environment.
- How to manage the transition from the current arrangements to a more market based industry?

These and other issues are considered in the following chapters.

3.4 Summary

Box 3.1

CHAPTER 3: KEY POINTS

The current pricing and institutional arrangements have attracted significant criticism.

Regarding demand management

- Despite some success in reducing demand and public acceptance, water restrictions are estimated to be a relatively (vs. efficient pricing) expensive means of managing demand.
- The *net* welfare cost of restrictions in Sydney has been estimated at around \$150 per household per year.
- Demand management measures are unlikely to be effective during extreme water shortages.
- The equity of existing arrangements has been questioned, particularly in comparison to an alternative of more targeted support programs.

The efficiency and effectiveness of current arrangements with respect to managing supply have also been criticised. Concerns raised with the current arrangements include the lack of competition and barriers to trade that reduce incentive for cost reductions, service improvements, innovation and options for more efficiently enhancing supply.

An alternative vision could be based on market competition and carefully designed regulation. Such an approach could have significant benefits by empowering consumers and providing strong incentives for participants to be efficient and meet customers' needs.

Although such a vision would not have averted a drought, it would have made communities more resilient to its effects and the industry more responsive to it.

Part 2

Lessons and Considerations

Chapter 4

Lessons from other markets and approaches to reform

4.1 Introduction

In the last two decades, Australia has undertaken extensive economic reform in a number of key natural monopoly network industries including gas, electricity, telecommunications, ports, airports as well as road and rail transport. This chapter examines the reforms in these markets to draw lessons for urban water both in terms of the outcomes and the process of reform.

The chapter also examines the experiences in international and rural water markets. These are of particular interest in regard to how other water markets deal with the issue of uncertain supply.

To set the scene, the chapter begins with a background of reform in Australia. This is followed with a review of reforms in other markets and the operations of water markets elsewhere.

4.2 Background of reform in Australia

In the early 1990s, in recognition of the importance of competition in the business sector in enhancing productivity and improved living standards, federal, state and territory governments committed to undertake reform. This commitment was established in the National Competition Policy (NCP).

The NCP was an agreement between federal, state and territory governments in 1992 to consider all aspects of government policy that influences the competitive behaviour and competitive environment of firms, individuals, and government agencies involved in the supply of traded goods and services in the Australian economy. The NCP established a consistent economic regulatory framework for the Commonwealth and all the States and Territories, which was directed at maintaining and promoting competition in all forms of business activity.

A Committee of Inquiry was set up in 1992 to undertake an independent inquiry into NCP, chaired by Professor Fred Hilmer. The terms of reference were drawn up in consultation with the States and Territories and gave special emphasis to areas outside the Trade Practices Act.

The Hilmer Review describes restrictions imposed by regulation or government ownership at all levels of government as the greatest impediment to enhanced competition in many key sectors of the economy (Hilmer 1993 p. xxix). It discusses the need to redress the competitive restraining effects of government owned or controlled monopolies that bottleneck “essential facilities” infrastructure.

Hilmer and related reforms can be grouped into four broad areas:

- extension and revision of the market conduct rules of the Trade Practices Act;
- systematic review of regulatory restrictions on competition by all governments;

- extension of prices oversight to government businesses; and
- extending competition and improving efficiency in infrastructure provision.

Following extensive consultations and the assessment of numerous public submissions, the Inquiry presented its report to the Heads of Governments in August 1993. Subsequently, inter-governmental consultation and Federal financial compensation negotiations undertaken through the Council of Australian Governments (COAG) resulted in the broad acceptance of Hilmer's proposals.

Further COAG discussions in February 2006, led to the signing of the Competition and Infrastructure Reform Agreement (the CIRA). A central objective of the CIRA is to establish a simpler and more consistent national approach to economic regulation of significant infrastructure. The aims of the CIRA are to reduce regulatory uncertainty and compliance costs for owners, users and investors in significant infrastructure and to support the efficient use of such infrastructure.

The CIRA reflects the expectations that:

- effective competition is the most effective means through which to promote economic efficiency and consumer welfare; and
- significant infrastructure should only be regulated when it can be demonstrated that the absence of effective competition has resulted in infrastructure owners and service providers exploiting market power.

4.3 The experience in energy and other industries

The energy market experience

The reforms undertaken in energy markets (both gas and electricity) are of particular interest when considering possible reform to urban water.

Firstly, there are many parallels between the energy and urban water sectors, and it is likely that many of the institutional principles applying to the energy sector could be transferred to water. As with the urban water market, both gas and electricity are assessed by looking at the following four elements:

- Supply.
- Transmission.
- Distribution.
- Retailing.

Another similarity between energy and water sectors is the concern with environmental issues, equity (and consumer protection), safety and security of supply. Secondly, many of the energy reforms are well established and lessons can thus be learnt in regards to benefits of reform and the reform process.

Overall, reforms in the energy market have been seen as positive. For example, in early 2007, the Energy Reform Implementation Group (ERIG) reported that energy reforms to the year 2000 ‘resulted in an increase in national income of \$1.5 billion with Australia having some of the lowest electricity prices in the developed world.’¹⁶

Australia’s natural gas market

Substantial reform of the natural gas industry came as a result of a 1994 COAG agreement to “free and fair” trade in natural gas both intra- and inter-state. Prior to this agreement, gas pipelines were either exclusively owned by governments or were only permitted to operate with government approval. The transmission pipeline and distribution businesses were affiliated and the government controlled prices.

The aims of reform were:

- to separate the natural monopoly and potentially contestable elements;
- to make the potentially contestable elements responsive to demand, innovation, risk and entrepreneurship; and
- to effectively regulate the natural monopoly elements.

This included an agreement to create no additional exclusive franchises for retail, distribution and transmission and to make existing franchise agreements more competitive. The distribution and to some degree also the transmission elements were seen to have natural monopoly characteristics, whereas the supply and retail elements were seen to be potentially contestable.

Reform in the gas sector has been largely successful. It has led to an improvement in gas supply, operational efficiency and responsive price changes. The reforms have been credited with *inter alia*:

- removing barriers to trade;
- establishing a regime with a focus on upfront certainty led to major investment in expanding the grid, new entry in retail and new production;
- in Victoria — creating a spot market and a pro-competitive industry structure that has been successful in creating retail competition and encouraging new exploration and production;
- achieving improvements in service quality and reductions in cost in the regulated natural monopoly elements, in particular through incentive regulation; and
- providing significant regulatory certainty for investors in privatised businesses.

However, the framework has also been criticised on a number of fronts, and in response has evolved significantly over the last decade.

¹⁶ Energy Reform Implementation Group, 2007 *Energy Reform The way forward for Australia: A report to the Council of Australian Governments*, January 2007, Canberra, p.9.

The electricity market

Introducing competition into the electricity market was a complex, difficult and highly controversial exercise. Prior to the introduction of full retail contestability, prices were generally set by governments or government owned electricity businesses. Consumers can now choose their retailer, although the network businesses, in recognition of the potential for abuse of market power, are subject to independent price regulation in line with a national set of rules.

Although market forces determine the wholesale price of electricity, the price that most consumers pay for electricity in most jurisdictions is still subject to regulatory control, particularly for smaller customers. This regulation has generally taken the form of retail price controls. Retail price controls were considered by governments to be a necessary transitional measure to provide a safety net for consumers following the disaggregation of the electricity sector and the introduction of competition. Governments implemented retail price controls to protect consumers who are unable or unwilling to participate in the competitive market. These 'safety net' arrangements were introduced as a transitional measure to provide a regulatory discipline on the market as a proxy for market discipline. There are also a range of Community Service Obligations (CSOs) imposed on the industry to ensure that vulnerable consumers have access to affordable electricity services as part of a broader social policy agenda.

The electricity reforms have largely been successful. Since the introduction of competition in the generation and retail sectors, the industry has had more freedom to set its prices. At the same time, competition has put downward pressure on prices.

Community attitudes to reforming the energy sector

The suggestion of reform and privatisation in both the gas and electricity markets was controversial and it was difficult to inform and convince consumer attitudes, primarily on issues of safety, reliability and quality.

Concerns about the possible decline of worker safety under a privatised system led to public demonstrations, primarily from the trade unions. Their main argument was that reform would make the industry more dangerous. Similarly, consumers raised concerns about potentially higher prices and lower reliability and quality of supply, which were expected to diminish if private companies were involved. Some parties argued that such monopoly businesses should always remain in government hands. Many in the community could not understand how competition was possible where monopoly infrastructure remained. There were also concerns about privatisation by government being equivalent to 'selling the crown jewels'.

The perspective of hindsight has since shed some interesting light on these concerns. Consumer attitudes have now largely changed and experience has shown that there has been no reduction to either worker or household safety in light of competition. Further, in many cases, reliability of supply has actually increased while costs have fallen.

Experience from other industries

There have also been substantial reforms in other industries including transport and telecommunication sectors. While each sector has its own unique characteristics and has taken its own reform path including many controversies and lessons, in broad terms the reforms in these other industries have been seen as successful, including in many cases benefits in terms of:

- a greater choice and flexibility for consumers;
- a reduction in prices for consumers;
- higher productivity levels; and
- stronger investment in infrastructure.

For the telecommunications industry, the reforms that began in 1989 led to a network duopoly in 1991 and eventually led to the removal of restrictions in carrier licences in 1997. These reforms added \$12.3 billion to the Australian economy in 2002 – 03 (Australian Communications Authority 2003) and it is likely the benefits are even more substantial in following years.

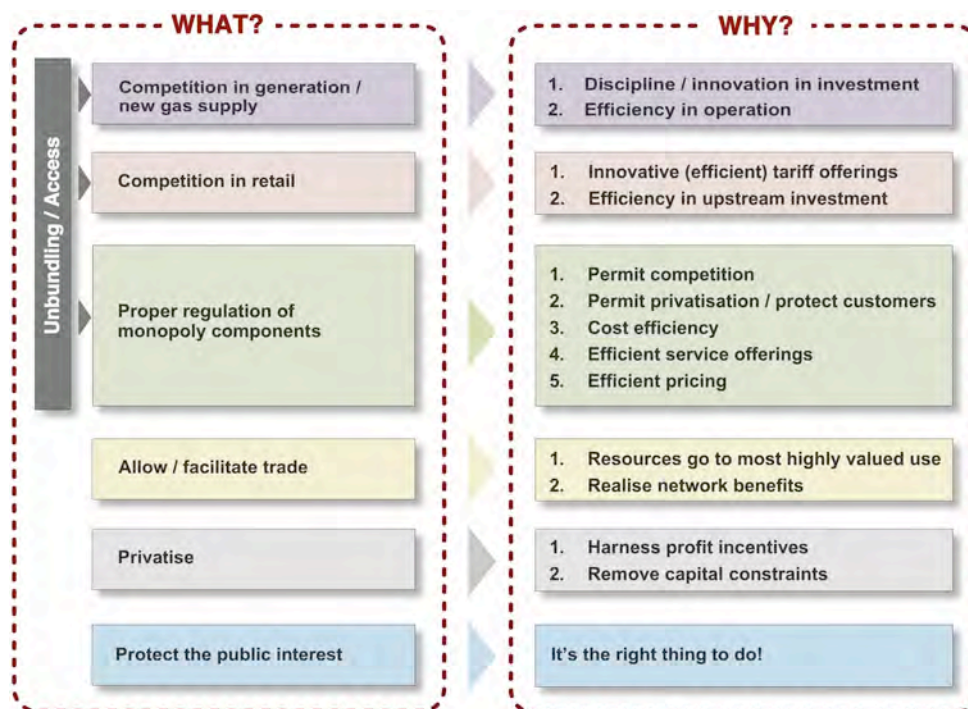
The Productivity Commission (1999) explains that the reforms to Australia's railways have led to greater competition and significantly higher productivity. It led to an increase in the number of railways from six in 1991 to nineteen in 1999 and total factor productivity increased by 8 per cent (PC 1999).¹⁷

Process of reform

The process of reform in the electricity and gas markets has been similar. An overview of the energy market reform logic used in the electricity and gas reform is summarised in Figure 4.1. Within this market, individual markets govern supply in both wholesale and retail sectors, and there is an open access regime in place for the transmission and distribution networks.

¹⁷ Despite the reforms, there are a number of impediments that remain, including the commercial unsustainability of many government owned railways, inadequate investment in infrastructure, a lack of commercial focus (with government as a shareholder) and a lack of competitive neutrality.

Figure 4.1

THE ENERGY MARKET REFORM MODEL

Source: Allen Consulting Group

There are two key elements of the market reform model shown in Figure 4.1, which could be considered in any reform of the urban water market:

- unbundling of the natural monopoly parts of the industry supply chain (in this case, transmission and distribution) from potentially contestable parts (generation and retail); and
- regulation of the monopoly infrastructure in the industry supply chain to prevent the misuse of market power (including the ability to limit competition in upstream or downstream markets by refusing to supply infrastructure services, or by charging monopoly prices for services provided by the infrastructure).

Consequently, while the unbundling and regulation of monopoly elements of the industry supply chain create or increase the *potential* for competition to emerge in the potentially contestable parts of the industry, the reforms must also support the entry of potential competitors. In the energy sector this required, for example, removing any legislative barriers to competition, as occurred with the introduction of full retail competition in the retail electricity market, and ensuring government-owned and private entities compete on a competitive neutral basis.

The market model is premised on the assumption that it is *competition* in the delivery of goods and services that will benefit consumers by maintaining downward pressure on prices, encouraging improved service delivery, supporting the development of innovative products and provide choice for consumers through a range of alternative price and service offerings.

However, as a general principle, it has been recognised that attempts to promote a level competitive playing field, including by providing for third party access (and extending prohibitions against anti-competitive behaviour in the *Trade Practices Act*) would not always be sufficient of itself to facilitate the establishment of effective competition (see Box 4.1).

Box 4.1

WHY STRUCTURAL REFORM MAY BE NECESSARY

Protection of public monopolies from competition through regulation or other policies allows anticompetitive market structures to develop. Rectifying strategies include liberalising market access and ensuring public monopolies adhere to competitive neutrality principles. These strategies, however, will not always be sufficient to establish effective competition. Structural reform may be needed to dismantle an integrated government monopoly business.

Such reform can involve separating the (potentially) competitive elements from the monopoly elements. Structural reform is important where a public monopoly is to be privatised.

Privatisation without structural reform could result in a private monopoly supplanting the public monopoly, with few real gains and potentially considerable risks. Clause 4 of the Competition Principles Agreement (CPA) sets out obligations of governments that aim to reduce the risks of such adverse outcomes

Source: NCC (2005: 3.1)

In this context, it is worthwhile quoting some particularly relevant passages from the Hilmer Report (Hilmer et al. 1993: variously, pp.218–222), which led to the establishment of the National Competition Policy (and Part IIIA of the Trade Practices Act):

“A number of industries currently dominated by public monopolies involve an element with natural monopoly characteristics, in the sense that a single firm can supply the entire market most economically

... where there is a vertical relationship between the two activities, particularly **when access to the natural monopoly element is essential for effective competition in the downstream or upstream market**. ...[this] **raises concerns that control over access to the monopoly element may be misused to stifle or prevent competition in the potentially competitive sector**. Even if access is not actually misused, the potential for such behaviour may deter new entry to, or limit vigorous competition in, markets dependent on access to the natural monopoly element...

... There are two broad alternatives for addressing concerns of these kinds. First, **the natural monopoly element can be separated from the potentially competitive elements**. Alternatively, **the integrated structure could be left intact, and reliance placed instead on more intrusive regulatory controls to guard against ... the potential misuse of control over access to the natural monopoly element...**

...The Committee strongly supports structural reforms over intensive conduct regulation. ... **The Committee is ... mindful that incumbents ... may have strong incentives to resist wide-ranging structural reform.**

Against this background, the Committee considers that these issues should be subject to a rigorous, open and independent analysis of the costs and benefits of various reform options. **Moreover, where the natural monopoly element is vertically integrated with the potentially- competitive activity, the Committee considers there should be a presumption in favour of full structural separation**, leaving those who support some lesser reform to establish why this is in the long term public interest.” [emphasis added]

While the focus of the Hilmer Report was on public monopolies in areas such as telecommunications, electricity and gas, its comments and conclusions could equally apply to water.

It is also worth noting that Clauses 4(3)(b) and (c) of the National Competition Policy requires that before governments introduce competition into a market traditionally supplied by a public monopoly, a review must be undertaken into the merits of separating any natural monopoly elements from potentially competitive elements of the public monopoly, and the merits of separating potentially competitive elements of the public monopoly.

4.4 Other water markets

Australian rural water markets

Australian rural water markets are of interest for two reasons:

- Firstly, reforms undertaken in rural water markets provide a useful example for considering reform in the urban water sector.
- Secondly, rural water markets also need to address the problem of managing supply uncertainty and seasonal changes.

Recent major reforms in rural water markets, stemmed from the National Water Initiative (NWI), agreed at a Council of Australian Governments meeting in 2004 (with the Tasmanian Government joining in June 2005 and the Western Australia Government joining in April 2006).

The NWI aims to increase the efficiency of Australia's water use, leading to greater certainty for investment and productivity, for rural and urban communities, and for the environment. It aims to achieve a nationally compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes.

To achieve this objective, the Commonwealth and the States and Territories agreed that water markets should:

- facilitate opportunities for trade within and between jurisdictions where river systems are physically connected;
- minimise transaction costs on water trades achieved through good information flows in the market, and compatible water access entitlement, registry, and regulatory arrangements;
- develop an appropriate mix of water products based on water access entitlements (these can be traded either in whole or in part, and either temporarily or permanently, or through lease arrangements or other trading options that may evolve over time);
- recognise and protect the needs of the environment; and
- provide appropriate protection of third-party interests, for example, the interests of financiers.

Rural water market reform outcomes

The introduction of water market reform has enabled irrigators to trade water with one another, which has revealed the marginal benefit from consuming an additional unit of water in rural areas.

The efficiency gains from introducing reform to rural water markets have been significant. The Productivity Commission (2004) has estimated that water trading significantly reduces the impact of drought on irrigated production, with some modelling work estimating the losses in gross regional product as a result of drought could be reduced by at least 50 per cent.

The reforms have in some cases, enabled scarcity pricing — where the prices for seasonal allocations rise and fall with water availability and with demand variations. The amount of water trade, however, while growing, is still light — particularly for ‘permanent’ trade of water entitlement. In 2007-08 the value of market turnover (for both allocations and entitlement) was approximately \$1.7 billion, constituting 32,000 trades and 2515 GL of water (National Water Commission, 2008).

Rural water markets operate differently to the urban water market, as urban water users do not own property rights to water and therefore cannot individually interact in markets to buy and sell water.

In rural areas, irrigators access water by holding an entitlement (or property right) to a share of water from a specified water source, such as a river, catchment or aquifer. A volume of water is allocated to an entitlement each irrigation season, with the allowable volume determined by the amount of water available from the water source. Derivative products, such as leases and contracts can add flexibility to water trade in entitlements and seasonal allocations (Productivity Commission 2008).

Water markets in other countries

Reforms undertaken in Scotland's urban water sector

The water industry in Scotland originally comprised three separate, vertically integrated water utilities. These were merged into one utility several years ago, called Scottish Water, with the objective of dramatically reducing costs and developing investment programs in infrastructure required to deliver commensurate levels of service and environmental improvements achieved in England. Unlike in England, Scottish Water was not privatised and remains a government business enterprise (GBE).

The Scottish Economic Regulator - Water Industry Commission for Scotland (WICS) oversees the Scottish water industry and sets prices. The WICS drew upon pro-competition legislation that had already been introduced in Europe to introduce competition to the Scottish water industry. In preparation for the introduction of competition WICS facilitated the separation of the retail functions from other functions within Scottish Water. In the process a number of groundbreaking codes and service agreements were established. Subsequently the retail arm of Scottish Water was established as a separate legal entity.

On 1 April 2008 the retail market was established and four water retailers currently exist – Scottish Water, Suez, Osprey (Anglian Water) and a relatively small filter manufacturer. Surprisingly, Scottish Power — which shares the same customers — has not applied for a Retail License. There is some conjecture that the merging of energy and water utilities in the UK is not working.

WICS claimed retail margins in the order of 11 per cent (possibly to encourage prospective Retailers to seek Licences) but this has been disputed by at least one of the Retailers who believe the margins in reality are less than 5 per cent. Only major customers are eligible to participate in the retail market. There are no plans to extend competition to households in the foreseeable future. These industrial customers consume approximately 30 per cent of Scotland's urban water, with domestic households consuming 60 per cent.

WICS believe the market has been successful to date with 30 per cent of major customers now on lower tariffs than they were 6 months ago. An interesting incentive offered by WICS is that major customers that reduce Scottish Water's wholesale costs are entitled to half the savings. This can be done by cleaner production (reducing trade wastes discharges) or through water conservation.

The cost of setting up the new regime was GBP 17.5 million. This cost has been borne by Scottish Water's customers but WICS estimates that this cost will be offset within four years through lower prices to major customers.

WICS next priority is to further disaggregate Scottish Water's distribution, transmission, storage and treatment costs and to do so on a regional basis. WICS experience in separating out the retail business leads them to believe there are further significant cost savings possible in the upstream elements.

Across the border, the English regulator OFWAT is planning to introduce similar competition reforms and has recently published an issues paper. English utilities claim to be more efficient and say that their retail margins are too low to attract any competition and that new retail entities need to have control of abstraction licenses and augmentation decisions if they are to have any chance of differentiating prices in a retail market. Another key issue for the English is how the GBP 27 billion already invested in the British water industry would be disaggregated into retail, distribution and storage elements.

While the above reforms are innovative they seem to have the greatest potential where the incumbent is already grossly inefficient. This is less likely to be the case in most major Australian water utilities. In Australia our current priorities are an investment to improve water supply securities and the potential for cost reduction rests more obviously at the wholesale end of the system. In Victoria, for example, there is the advantage of an active water trading market that, allied with a State Water Grid, offers enormous potential to introduce more competition in the wholesale end of the market. This does not exclude competition at the retail end of the system but it will be important to ensure that both are developed in simultaneously to optimise the overall benefits to customers and the environment.

4.5 Summary

Box 4.1

CHAPTER 3: KEY POINTS

There are significant lessons from reform in other industries:

- Market reforms in other industries have been largely beneficial in driving innovation and reducing costs, resulting in lower prices and improved services for consumers.
- Initial significant community resistance to energy reforms, dissipated once consumers benefited from lower prices and greater reliability.
- Market reforms have generally been more successful where there is the potential for competition and a practical regulatory framework has been established.
- Environmental, quality and equity concerns were significant points of contention in other industries. Market reforms have been successfully implemented with these factors in mind.

Key steps in the process of market reform that has been successful in network industries includes:

- identification and unbundling of monopoly elements; and
- regulation of monopoly infrastructure to prevent misuse of market power.

In regards to other water markets:

- attempts are being made to introduce competition in the water functions of treatment and distribution and waste services in other jurisdictions; and
- water trading in rural markets has been effective in setting prices that reflect scarcity.

Chapter 5

Consumer attitudes

5.1 Introduction

There is a strong perception amongst forum members that community members believe that water is special and that the water industry is different from other utility industries. There was also a consensus that community support is crucial to effective reform, and that community attitudes need to be better understood to inform the design and communication of any reform program.

Quality social research on the community's attitude to water is not readily available publicly. As such, the forum has sought to gain insights from a senior practitioner, Mr Brent Taylor, Research Director of the Values Bank Research Centre who has significant experience in the social and market research of network industries. In the water industry, he carried out a project for Water Services Association of Australia (WSAA) in 2003 as well as water projects in Sydney and South East Queensland. He has carried out nine projects for electricity distributors in South Australia, Queensland and New South Wales. Issues of retail contestability in electricity were explored by holding focus groups and conducting quantitative surveys. This chapter, based on this experience and includes an outline of lessons learnt from this research into community attitudes to water.

5.2 Community Attitudes to Water

Water enjoys a special place in the community's thinking. Water is an evolving 'community good' that increasingly resembles electricity and gas as it moves from being a 'natural' product to being 'manufactured' commodity.

Water as a primary product

Water utilities are seen to be different from any other utility in that water forms the basis of life. The community understands that humans cannot survive long without water, whereas going without gas and electricity can be socially and financially burdensome but is seldom life threatening, as was the case with Melbourne's extended gas outage and the experience of Western Sydney's extended electricity supply interruptions.

In relation to food production, the community often confuses rural water supplies for agriculture with urban water supplies. City dwellers often want to save urban water so the farmers have more to use for agriculture (especially in drought) or for stressed rivers, even though there is often no connection between the two water supply systems. In addition, the community has a sentimental and historical connection with farming and tends to take the side of farmers in relation to water issues.

The community also understands that water supplies in Australia are largely weather-based, so supply is inextricably connected to climate, storage and use, on par with other primary produce. The water industry has done excellent work in reinforcing this connection and the daily updates of water storage levels in newspapers and via other media attract significant interest.

The industry has been able to enlist community goodwill to reduce water consumption and more recently accept long-term water restrictions. This willingness has been enhanced as the water industry is perceived to be on the side of consumers, or that they are working for the public good.

Historically, the water industry is generally seen as having provided a high quality service cheaply and in a ‘fuss free’ way. Consumers appreciate this and uniformly rate water companies highly in any surveys conducted measuring consumers’ trust in corporations.

Consumers believe they understand water and are more comfortable with it than they are with electricity and gas. But the public tends to overlook aspects such as the very substantial public health benefits of clean water and sanitary disposal of waste. This lack of understanding is as a direct result of the water industry’s reliability. Health scares are rare, although the problems experienced by Sydney consumers are still remembered.

Water as an industrial product

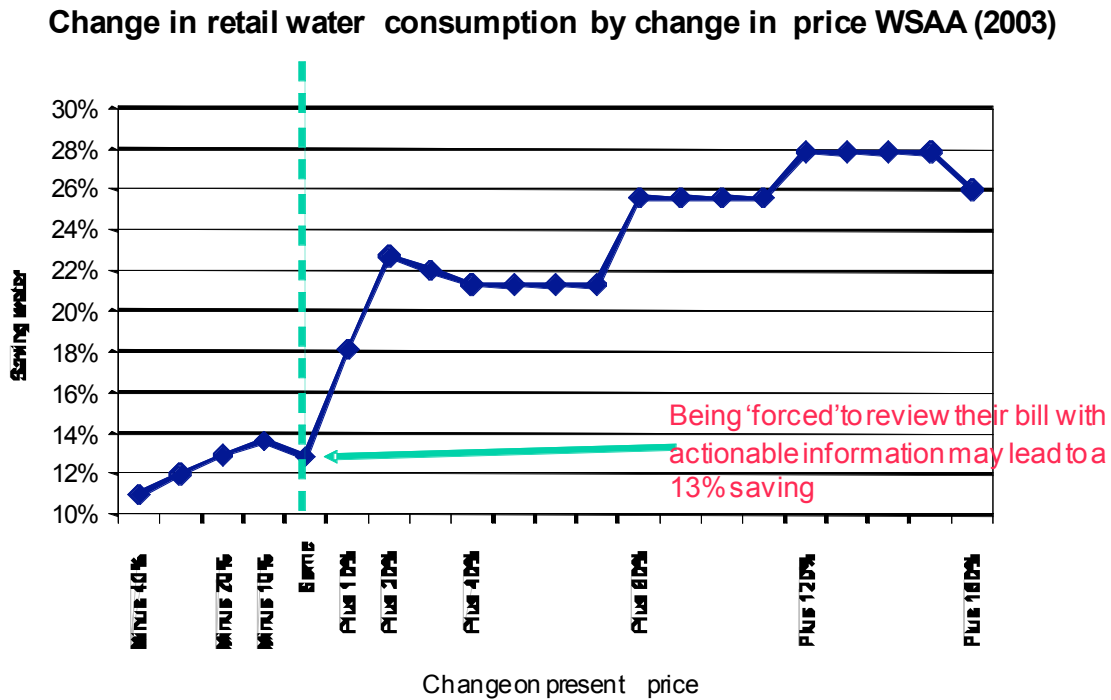
While water looks like a primary product to consumers, it is actually a semi-industrial product relying on huge engineering infrastructure to deliver the product to consumers’ taps within defined standards. It is not quite as ‘industrial’ as electricity and is about the same as natural gas. While this is obvious to those in the various utilities, it is not so obvious to consumers. For consumers gas and electricity are industrial products, whereas water is perceived as a primary product.

One of the consequences of providing a more regular supply through desalination is that consumers will tend to uncouple water from its ‘natural’ origins and consider it more like gas and electricity. It will become more of an obviously manufactured product as it is in Dubai where it is simply seen as a user-pays commodity.

5.3 Sensitivity to price

This section has been informed by a project carried out for the Water Services Association of Australia in 2003. The project was conducted for water authorities and companies in Sydney and Melbourne and included choice modelling to determine the impacts of changing information on retail water bills for consumers. In the choice model, various different layouts and complexity of bills were presented with varying price and information. The following chart presents the outcome for changes in price with different information configurations combined.

Figure 5.1



Source: Values Bank Research Centre, WSAA (2003)

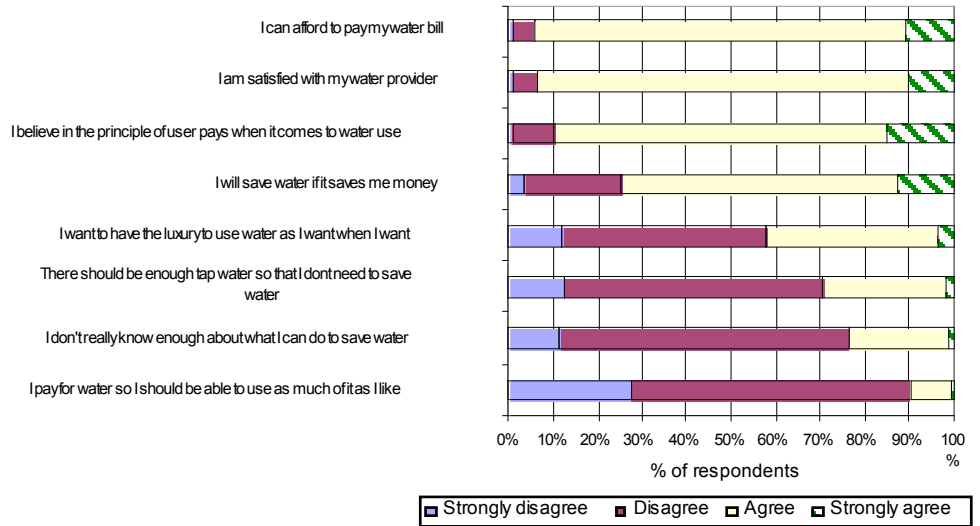
This graph leads to the conclusion that forcing people to pay attention to their bills has the effect of getting them to review their consumption. Even if there is no price increase or a reduction, there is some cognitive processing and consumers claim that they will save between 11 per cent and 13 per cent in water use. An increase in price makes consumers vigilant and they process the information on the bill much more. Any price increase will do this and its size above 20 per cent to 160 per cent is not particularly important as can be seen on this graph. A 10 per cent increase in price not as good at changing anticipated behaviour as a 20 per cent increase but a 20 per cent increase is nearly as good as an 80 per cent increase.

The implication of this research is that since changing the bill will cause a drop in consumption, any increase in price to increase revenue will probably need to be greater than 20 per cent to increase the return for a unit of water sufficiently.

In addition, the WSAA 2003 study confirmed that people can generally afford to pay their bills, believe in the principle of user-pays and are only moderately motivated to save money by saving water. This means that price rises will need to be reasonably high to induce saving above that of new information.

Figure 5.2

PAYING FOR WATER

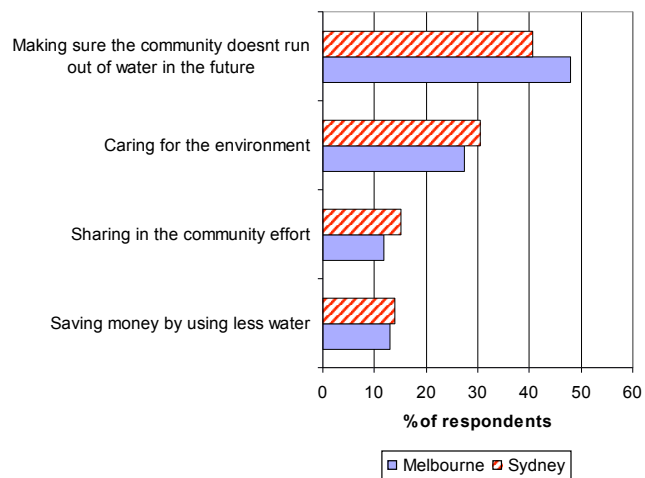


Source: Values Bank Research Centre

But at the pricing levels operating at the time of the study, consumers were more motivated to save water for community good than to save money.

Figure 5.3

WHAT WOULD MOTIVATE YOU TO SAVE WATER



Source: Values Bank Research Centre

In 2003, conservation and community good were more powerful motivators of conservation than price.

What consumers value

The charts above indicate that while consumers would be happy to receive pricing cuts, this was not the primary concern. In 2003 they were also quite relaxed about price increases so the regulatory emphasis on reducing price through efficiency is not of particular interest to consumers.

Little information was available on consumers' attitude to reliability of water supply but there is significant experience from the electricity industry that can be extrapolated. In the water industry, consumers have a tolerance for a certain number of interruptions each year and therefore do not highly value a perfectly reliable supply. This tolerance varies between regions depending mainly on the area's interruption history and the frequency of interruptions to which consumers are accustomed – the greater the history of interruption, the greater the tolerance.

In relation to reliability, there appears to be no reason to expect the water industry would be treated differently to the electricity industry. Users understand that water is delivered using engineering systems where problems can be fixed relatively quickly.

The issue that is of more importance for consumers is the long-term security of supply. It is generally believed that private enterprise, with its motive of profit to shareholders, will not guarantee long-term security of supply. In focus groups, people regularly point to the abandonment of training in key skill areas by the privatised utilities as an example where private enterprise is putting long-term security of supply at risk.

5.4 Retail contestability

By and large, the public finds retail contestability in gas and electricity slightly bemusing. They do not really understand how undifferentiated products such as gas and electricity, which are delivered by fixed networks, can be offered by competitive retailers. Their recent experiences reinforce this in that they find the search costs too high for the marginal benefits they might gain from changing retailers. In other words, they do not perceive any real retail competition in these markets. Few consumers are willing or able to conduct any type of research to try and understand how retail contestability has affected price. In any event, they are not particularly interested in slight price savings and any argument in this direction necessarily involves statistical modelling, which is viewed suspiciously by consumers and businesses alike.

While the research undertaken has not tested community attitudes to retail contestability or privatisation in the water industry, it seems likely that the community do not recognise a need for it, particularly as most people report little trouble paying their bills. Indeed, there is likely to be strong opposition as it will move control of supply from a trusted group who are perceived to predominantly work in the public's interest to businesses whose primary loyalty is to their shareholders. The community is likely to value public control of the certainty of supply over pricing efficiencies in this 'primary' industry.

5.5 Consumers in different jurisdictions

Experience indicates that what applies for consumers in one jurisdiction, does not necessarily apply to other jurisdictions.

In the water price elasticity study discussed previously, curves for Sydney and Melbourne consumers were similar but varied in magnitude. Other attitudes varied considerably as they did for some of the retail areas in Melbourne.

Other studies in water and electricity show that the results can be markedly different between jurisdictions. For example, in establishing consumer based electricity reliability standards, the results from Brisbane, Sydney and Adelaide all varied quite markedly.

5.6 Conclusions

Forum participants were of the view that if a reform is to be introduced, then it will need to be done so in a careful manner including a well thought out communication program to ensure that community attitudes move together with the reforms.

In line with this view, the forum does not support a ‘big bang’ approach to any reform program, as it is risky, impractical and unnecessary. Rather, it would favour a staged and contingent reform process. ‘Staged’ in that the reform should ideally identify a number of clear steps and phases, with each step justifiable by itself and also be able to be clearly explained to business and to the community. ‘Contingent’ in that the lessons from each phase should be used to inform decisions on subsequent steps and phases, in order to reflect the current uncertainty on the optimal design of the future industry, but also in order to monitor and to address evolving community concerns and expectations.

Part 3

Options

Chapter 6

Reform of bulk water supply

6.1 Introduction

This chapter considers the options and implications of market-based reforms to the management of urban bulk water supply. The chapter begins by considering the contestability of bulk water supply in urban settings. It then considers alternative options to enhance competition and/or emulate competitive markets. Finally, it considers the implications of such reforms.

6.2 Contestability in the supply of bulk water

The problem of managing bulk water supply could be potentially solved if there were different suppliers competing in the provision of bulk supply. In a competitive market, a bulk water supplier would set prices taking into account their expectations about current stocks and future supply and demand.

Currently, urban water users obtain their water from state-owned water utilities, which act as planners, suppliers, distributors and retailers to make investments and manage available water. Although, in some jurisdictions there is significant contracting to the private sector for operation and maintenance services and for capital projects (and also some examples of PPPs), there are no existing competitive markets for bulk supply to urban water markets.

Sources of supply

A competitive market could potentially be established if there were a number of alternative sources of cheap supply. Unfortunately, while numerous sources of alternative supply (including desalination, recycled water and storm water) exist, the costs of these alternatives are generally significantly greater than water from existing catchments.

Table 6.1 summarises the supply sources by major urban centre. In most urban centres there are a variety of supply sources. At present, with the exception of Perth, urban water supply sources in Australian capital cities are predominantly climate dependent. Water is being sourced from rain-fed catchments, river systems or aquifers.

Within a city these supply sources are becoming increasingly interconnected, so that water could potentially be traded between different supply sources. A system of supply that is more extensive and interconnected enables (with third party access) greater potential for competition.

As can be seen from Table 6.1, supply in major urban centres is heavily concentrated among a small number of sources, with the exception of Perth. In Perth, there are a number of competing supply sources including aquifers, dams and desalination plants, with no one source having significant market power if operated independently. In contrast, for example, in Melbourne and Sydney, the bulk of water sources are supplied through one entity.

Table 6.1

CURRENT SUPPLY SOURCES OF BULK WATER SUPPLY

Criteria	Sydney	Melbourne	Brisbane	Perth	Adelaide
Current sources of supply	Warragamba dam + 11 other dams / reservoirs	Thompson dam plus 8 other reservoirs	Variety of dams	Desalination, dams, aquifers reservoirs	Reservoirs River Murray Some groundwater
Extent of supply that is climate dependent	≈100%	100%	100%	>50%	100%
Interconnectedness of supply sources	Medium	High	High	High	Medium
Concentration of supply	High. Nearly 80% storage in Warragamba Dam	High 60% from Thomson Dam	Medium 3 dams store 75% of water	Low <20% from any single source	High At least 40% from River Murray, most of the remainder from Mt Lofty catchment

Source: Allen Consulting Group analysis

However, the degree of concentration of supply sources is changing. There are a number of publicly announced investments in urban water infrastructure in addition to other potential changes that could create greater scope for development of viable competition in urban water markets. The proposed changes include:

- new sources of manufactured supply (for example, including desalination and recycling);
- breaking down of barriers for urban-rural trade; and
- greater interconnection of markets (for example, pipelines linkages in Melbourne and Brisbane to form larger interconnected grids).

The future urban water supply situation is summarised in Table 6.2. There are two significant changes:

- Firstly, the extent of supply that is climate dependent will fall as there is increased used of manufactured water sources.
- Secondly the concentration of supply will change significantly.

Table 6.2

FUTURE SOURCES OF BULK WATER SUPPLY

Criteria	Sydney	Melbourne	Brisbane	Perth	Adelaide
Current sources of supply	Warragamba dam plus 11 other reservoirs	Thompson dam plus 8 other reservoirs	Variety of dams	Desalination, aquifers and reservoirs	Murray River, reservoirs and aquifers
Major future projects	Desalination	Desalination, new links to Goulburn, Gippsland and Geelong	Desalination, recycling, more dams & interlinked sources	Desalination, recycling	Desalination, recycling
Potential for trade with rural markets	Low	Medium	Low	Medium	High
Extent of supply climate dependent	> 75%	> 75%	> 75%	Potentially <50%	?
Concentration of supply	High	Medium – High	Medium – High	Low	Potentially Low

Source: Allen Consulting Group analysis.

The scope for strong competition between facilities in most cities will however be limited. In Sydney, the new desalination plant will provide for around 15 – 20 per cent of current water consumption. Despite this and other supply sources a significant portion of Sydney’s water supply will be sourced from (or via) the single Warragamba dam facility.

For Melbourne, the situation will change more significantly. In the future, a desalination plant connected to the state water grid will service Melbourne. Furthermore, the Sugarloaf pipeline will connect Melbourne and the state water grid thus integrating the Melbourne water market with the rest of the state. Regardless, for the foreseeable future Melbourne’s water supply sources will be heavily concentrated.

Perth and Adelaide perhaps have the most potential for effective competition among bulk supply sources. Adelaide’s water requirements could be significantly supplied from the Murray River. With a well functioning trading scheme and third-party access to essential infrastructure, private entities could potentially purchase bulk water to be supplied to the Adelaide market. In Perth, there is a mix of surface water, groundwater, desalination and rural-urban trade options.

Despite the current degree of concentration in supply sources, competitive markets for supply can be potentially created through the allocation of entitlements. This is discussed in the next section.

6.3 Using water entitlements to drive reform

Tradeable water entitlements represent a potentially simple but effective way to achieve significant reforms in urban water. As discussed in this section below, water entitlements could be used to create competitive markets for bulk supply or through more limited use address some of the problems of the current arrangements.

There are many ways in which water entitlements may be defined (see Box 6.1) and different ways that they may be allocated (see Box 6.2). While these issues are important, an evaluation of these is beyond the scope of this report.

Using entitlements to create competition in bulk supply

Tradeable water entitlements can be used to create competitive markets in bulk supply. One approach to breaking down the market power of large catchments in urban water and introducing competition in the bulk supply of urban water is through the method of allocation of tradeable water entitlements from these sources. Under such an approach, the entitlement owners would be able to choose between using (or trading) water today and holding it for future use (or trade).

A number of different models have been proposed (Sibly and Tooth 2007, Young, McColl and Fisher 2006). The Sibly and Tooth model involves the periodical auctioning of rights to the water stocks in dams (and potentially aquifers) to parties who then compete in the provision of bulk water.¹⁸ This change when coupled with effective third party access and retail competition could lead to a competitive market for bulk urban water supply. Under such an arrangement, a scarcity spot price for water would evolve. In periods of drought, entitlement holders would hold back water in expectation of higher future prices. Competitive pricing would encourage parties to investigate alternative sources for water. Competition would ensure an efficient allocation between current and future use.

Such a system could work in conjunction with private ownership of other supply sources. In effect the model breaks down the existing market power held by those that control the output of the large dams that dominate a number of urban water markets.

Such models have received some attention and to-date no major 'in principle' problems have been identified. The Victorian Competition and Efficiency Commission in their recent review (VCEC 2008) acknowledged such models and recommended that further research be conducted.

¹⁸ The model is similar to the use of 'capacity markets' (or forward contracts) that are used in bringing competition to electricity markets in US and European markets. The concept has advantages in the water sector because due to the low cost of storage, water stock and not future flows can be traded.

Box 6.1

TYPES OF WATER ENTITLEMENTS

There are a number of types of water entitlements. For example, entitlements can be established for:

- the stock of water (for example, in a reservoir);
- a share or quantity of future water; and
- the storage capacity of a dam.

In regards to entitlements for future water there are additional important options. For example, entitlements may be provided for a fixed volume of inflows, a percentage or some combination of the two. Entitlements may also be defined in terms of the priority in which future inflows are allocated.

Common entitlements in rural markets are often for a combination of the above. For example, a 'capacity share' entitlement provides for a percentage of storage and inflows.

Entitlements may also vary in other important dimensions in regards to duration, security, flexibility, divisibility and transferability. Restrictions in terms of some of these dimensions can significantly impact on the effectiveness in improving the allocation of water between different uses and over time. For example, restrictions on transferability may prevent water being used for its most valuable use. Restrictions on divisibility of entitlements may prevent efficient trading.

Source: Allen Consulting Group

More limited use of entitlements

An alternative proposal is to use entitlements in a more limited fashion. For example, one proposal is that retailers and/or large users be able to purchase water entitlements. Such a proposal may enable large businesses to overcome water restrictions by purchasing entitlements to additional water.

Retailers could potentially compete for water supply, for example in Melbourne, which is served by multiple retailers, retailers could also trade entitlements to better manage their water supplies. Such an approach has the advantage of establishing a market for entitlements and providing a limited trial prior to a more widespread use.

Box 6.2

ALLOCATION OF WATER ENTITLEMENTS

There are a number of ways in which entitlements may be allocated. Alternative allocation mechanisms include

- Auctioning (for which there are also a host of alternative methods).
- Competitive tender.
- Free allocation.

The debate as to how water entitlements may be allocated is similar to the debates in the allocation of:

- Carbon pollution permits.
- Rights to radio spectrum.
- Rights to use Crown land.

Source: Allen Consulting Group

6.4 Administered scarcity pricing

A potential method for introducing scarcity pricing is for it to be administered by the regulator (as opposed to market-driven prices that would form under a system of tradeable entitlements). This could involve the regulator setting a formula for bulk water prices such that the prices vary with changes in current stores and expectations of future supply.

In its recent review, VCEC (2008) recommended that investigation of this option be included in the future work program (see VCEC section 8.5).¹⁹

There are a number of challenges with such an option. Firstly, we are not aware of any jurisdiction in which there is regulated scarcity pricing.

Secondly, calculating an appropriate scarcity price is complex. We are not aware of any published method to calculate scarcity prices. The informational requirements would be significant. Key information gaps relate to the responsiveness of demand and supply and high water prices.

6.5 Integrated water resources and grid planning

Another option for reform is to change the method by which water investment is planned and undertaken. There are a number of bulk water planning functions including information gathering and forecasting, grid management, identification of options, decisions on supply augmentation and supply sourcing.

How these functions are organised varies substantially by jurisdiction. Currently many of the functions tend to be undertaken by the organisations with responsibility for supply and infrastructure operation (the water utilities) and/or by government departments. Concerns in some jurisdictions are that there is a lack of transparency and equal access and scrutiny over key planning information. This in turn makes it more difficult for new participants to compete and offer innovative and cost effective methods of meeting supply objectives. As a result competitive outsourcing of supply tends to be prescriptive.

An alternative model is to create a framework for planning that is more integrated and has a greater degree of independence and transparency. A planning body (or bodies) would need to have a focus on security of supply. It could be charged with facilitating the identification of least cost options for meeting a stated level of supply security using an open and transparent process. The planner could research and release information about demand and supply options.

A planning body (or bodies) could also potentially take on additional roles including grid operator, market operator, provider of information and research, and an advisory role including undertaking industry reviews with references from government and possibly advising on (or even overseeing) procurement.

¹⁹ The VCEC recommend a work program include 'whether a centrally determined water value model could be developed that attempts to replicate the operation of an actual competitive water market, and whether [associated] tariff reforms [...] would be a useful step.' Pg. 196

Such models would also be likely to require the establishment of an explicit security of supply standard for each integrated urban water supply. Any required additional supply requirements could then be competitively tendered, with the successful bidder being the party that provided the additional supply that met the overall security of supply requirements at the lowest expected cost.

Such models could provide for government agencies and/or Ministers to have decision-making powers on key issues as required. The planning bodies could be simply limited to an advisory role, or they could have scope for independent decision making subject to a range of possible check and balances.

This kind of institution could undertake functions in the water sector similar to those performed by bodies such as NEMMCO and VENCORP in the national electricity and Victorian gas markets respectively. Such arrangements in energy markets have been recognised as enabling a clearer delineation of key roles and responsibilities and also of avoiding potential conflicts of interest.

The Western Australian Economic Regulation Authority has recommended a variation on such a model for the water industry. Specifically, it recommended:

An Independent Procurement Entity be established with responsibility for ensuring least expected cost balancing of supply and demand within the Integrated Water Supply System subject to the constraint of maintaining security of supply at a level set by the Government. (ERA, 2008: p.ix)

6.6 Implications of reform in bulk supply

Any major reform such as the introduction of bulk supply competition will have significant implications for demand and supply of urban water. Such implications include:

- the need to remove existing barriers to competition;
- managing security of supply;
- implications for users;
 - the need for water restrictions and other demand management methods;
 - the variation in water prices and the ensuing equity and impact of vulnerable households; and
 - the reading of water meters.

Each of these factors is considered in more detail in the remainder of this section.

Current barriers to competition

Even where there is potential for competition from competing sources, there are often other potential barriers to effective competition, including a lack of clarity of rights and a lack of third party-access to existing infrastructure.

Clarity of rights

A lack of clarity of water rights may prove to be an important barrier to investment in obtaining supply and thus to greater competition in supply. For example, stormwater and wastewater recycling may prove to be potential sources of cheap supply. The rights to use these sources are not clearly defined.

The catchment rights to water may also be unclear. For example:

- there is potential for two different catchments to seek access to the same water;
- users upstream of a catchment may divert water from the catchment; and
- constraints (for example, environmental) may prevent a catchment manager from maximising use of a catchment.

Lack of clarity of rights (or limitations on water rights) may also be a barrier to urban-rural trade. As discussed in Chapter 3 urban-rural trade provides a significant opportunity to improve urban supply security with gains to both urban and rural communities.

Creating a competitive market for water supply as discussed above would create greater incentive for organisations to pursue these trading options. As a result, the barriers to urban-rural trade will become more transparent. With such changes there would be little need for governments to encourage further integration. Conversely, some of the potential issues associated with such trades (including environmental and other externalities and inefficient rural pricing) will likely become more prominent.

Environment control and quality

The private provision of bulk water supply raises issues of environmental control and quality. A number of associated reforms are also likely to be required, including the following:

- establishing minimum standards for potable water that is permitted to enter the urban water distribution network; and
- clear requirements for environmental use and management of environmental externalities.

Other barriers

New suppliers would need to have access to the existing treatment and distribution network. In addition, where new suppliers seek to construct new infrastructure, they should be given equivalent access rights to public and private land as those granted to the incumbent operator. These requirements are discussed in the following chapter.

The other existing barriers to the emergence of effective competition are likely to be the urban water industry structure and the legislative and statutory framework governing the industry. Both of these factors, and hence the extent to which effective competition develops in urban water markets, are largely in the control of the respective state governments.

Managing security of supply

A critical consideration for water policy is ensuring security of supply. Running out of water is an unacceptable scenario and any changes to the management of supply will come under careful scrutiny to ensure a secure supply. That said, the current supply problems have actually occurred under a government controlled and centrally planned system.

The problem of supply security is changing with new investment. An advantage of some new water production facilities such as desalination is that they provide greater security of supply. Regardless, the issue of supply security will likely still remain at the forefront of urban water policy.

A key question is whether market competition and scarcity pricing would increase or decrease the risk of running out of water. There are likely to be competing forces:

- Market pricing would lead to more responsive supply and demand:
 - Increased prices focus consumers on all water uses, not just those covered by demand restrictions. As such scarcity pricing is likely to be more effective in managing demand. This is particularly the case during times of severe shortage when water use needs to be conserved.
 - If bulk water prices are allowed to rise, then private suppliers will have an incentive to invest so as to capture the price rise opportunity.
- Government may be more likely to invest in ensuring secure supplies when it controls water supply assets.

There appears to be public benefit in a high degree of security of supply over and above the value to individual consumers. Severe shortages may have negative externalities such as social disharmony and pressure on health and emergency services.

As such there may be a justification for some Government intervention in ensuring a minimum level of supply. This does not necessarily mean Government control of water supply assets. It may instead, for example, involve the Government entering into, or requiring the industry to enter into, long term contracts to ensure water supply to the central procurement model as discussed above.

The need for water restrictions and other demand management methods

If either market pricing or administered scarcity pricing were used to balance supply and demand, then the key argument for water restrictions would be removed (other than in what should be rare emergency situations). During water shortages the price would increase and water use would fall. After heavy rains water prices would likely fall and water use would increase.

Pricing and metering

Scarcity pricing and metering

Scarcity pricing implies that water usage prices will vary over time, which implies the need for real-time information on water consumption or at the least, a series of readings at more frequent intervals than that available using current metering practices. A challenge to the introduction of scarcity pricing is that more frequent reading of current water meters is an expensive process.

This problem is being addressed in the electricity market through the introduction of meters that record time of use and/or can be read remotely. However, installation of such meters is also expensive and it is thus natural to question whether there are less expensive methods to overcome this constraint that reduces the benefits of introducing scarcity pricing.

Prima facie, it would appear that the cost of monitoring water usage might represent a significant hurdle without the installation of 'smart meters'.

There are however a number of potential solutions. Firstly, there is consideration of rolling out smart water meters, with the roll out of smart electricity meters. Secondly, potentially a lot can be done with the existing simple metering technology (Sibly and Tooth 2007). A retailer, for example, could charge customer rates (or a rate formula) that reflect how the water price might be expected to move or actually moved over the metering period.

The nature of water pricing is such that if there is no additional rainfall, the price of water will rise slowly as water stocks fall but could fall quickly in response to heavy rain. Thus the future maximum price for water can be predicted with a reasonable degree of certainty and different rate designs may be possible that provide appropriate pricing signals without exposing either party to excessive risk.

Further research is required to examine the costs and benefits of rolling out smart metering for water meter reading and also how scarcity pricing might be implemented in the absence of smart metering.

Extent of metering

A second metering issue is that meters are not installed for many households. Most apartments are not individually metered; meaning residents may have to share in the costs of excessive use by others in the same building. Similar issues arise for caravan parks.

There have been calls for individual metering of apartments, however this may not be efficient. Installation of meters is expensive and thus there are costs and benefits of installing new meters. It would appear that the decision whether to install individual apartment meters may be best done on a case-by-case basis and something that the building management (typically a strata scheme) may be best placed to decide upon.

6.7 Summary

Box 6.1

CHAPTER 6: KEY POINTS

Despite, significant new investments, supply sources for the foreseeable future in most capital cities will be heavily concentrated and climate dependent.

There are a number of alternatives to promote or emulate competition.

- A policy of allocating entitlements to water captured by large storages could potentially be used to enable bulk water competition and/or better manage water supplies.
- Potentially scarcity pricing could be administered centrally.
- Create an independent body with responsibility for planning and a special focus on security of supply.

There are significant implications and considerations of introducing competition in bulk water supply. These include:

- Demand restrictions may be redundant.
- The Government's role and approach in ensuring security of supply needs to be clarified.
- New approaches to retail plans and meter reading will be required.
- There will be increase private activity in sourcing bulk supply (for example, urban-rural trade).

Chapter 7

Reform of urban water functions

7.1 Introduction

The previous chapter focussed on options to reform management of bulk water supply and implications of these reforms. This chapter looks more generally at the functions of urban water utilities and opportunities for institutional and structural reform.

As discussed earlier in this report, a number of concerns have been raised suggesting that the current urban water industry may not be delivering efficient and effective outcomes — including inefficient or lack of appropriate investment in infrastructure. In addition, the urban water industry has been characterised by some as lacking of innovation and having high operating costs.

This chapter begins by revisiting the supply chain for urban water and considering the scope for unbundling the supply chain. It then considers the options for reforming the wholesale and retail functions of the supply chain.

7.2 Unbundling the urban water market supply chain

As discussed in Chapter 4, a first step in structural reform is to consider what are the natural monopoly elements of the supply chain and how these can be unbundled from the contestable parts. Table 7.1 summaries the extent to which each function has natural monopoly elements and which are contestable.

As summarised in Table 7.1, the distribution functions (relating to both water and waste) possess natural monopoly elements. Experience in other markets suggests that a monopoly in distribution should not be a barrier to enabling effective competition in other elements. The physical characteristics of urban water distribution infrastructure are similar in nature to those of infrastructure used in the transmission and distribution of natural gas and electricity.

With respect to the natural gas industry in most cases, ownership and/or operation of gas transmission and distribution resides within entities that are separate to operators of natural gas fields or retailers. Similarly in electricity, ownership of the transmission and distribution system tends to be separate from electricity generators and retailers.

Consequently, there is no *a priori* reason to consider that urban water distribution infrastructure could not be (functionally and physically) separated from urban water supply (water treatment plants) infrastructure and the retailing of potable water to consumers in urban areas.

Table 7.1

CONTESTABILITY OF WATER SUPPLY FUNCTIONS

Functions	Potential for competition?	Comment
Supply management <ul style="list-style-type: none"> • Catchment management • Groundwater management • Operation of desalination, recycling or stormwater plants, etc 	Some	Significant market power in some instances
Water treatment	Yes	Possibly contestable in medium to large markets
Distribution <ul style="list-style-type: none"> • network infrastructure and system management • for water and sewerage 	No	Large economies of scale compared to the size of the market. Unlikely to be economic to replicate.
Drainage	No	Has public good characteristics
Sewage services, Treatment and disposal	Yes	Possibly contestable in medium to large markets
Retailing (of water and sewerage services)	Yes	No monopoly elements. No natural barriers to entry and exit

Source: Allen Consulting Group

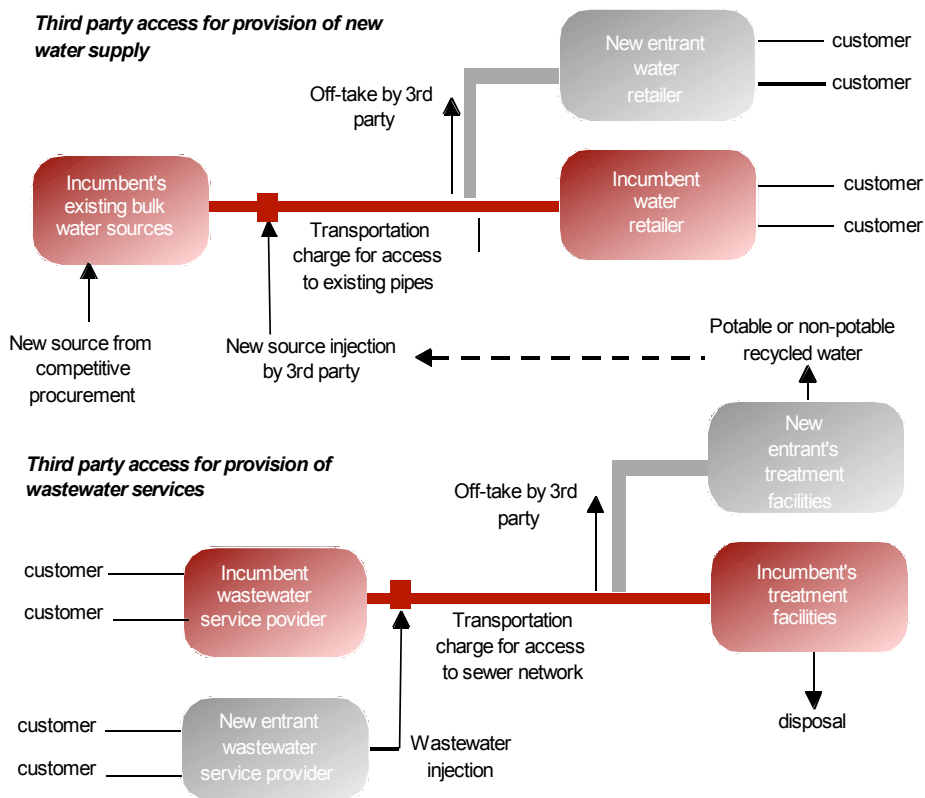
As it would be inefficient to replicate these distribution functions, competition is only possible through unbundling it from the other parts of the supply chain and providing access to the grid at regulated prices ('third party access') to the monopoly elements.

How might access to urban water distribution infrastructure be provided?

A number of third party access scenarios are possible in Australian urban water markets. For example, Figure 7.2 presents a conceptual diagram of how third party access arrangements could facilitate the provision of new water supplies and wastewater services. Other configurations and scenarios could be developed. For example, AGL has proposed to decommission disused gas and water pipes to transport new sources of recycled water.

Figure 7.2

CONCEPTUAL THIRD PARTY ACCESS SCENARIOS



Source: Allen Consulting Group (2007)

A general statutory right of access to services provided by the monopoly infrastructure facility already exists under Part IIIA of the *Trade Practices Act*, provided certain prescribed conditions are met. Part IIIA also provides for prices to be determined for such services. This framework was developed in response to the finding of the Hilmer Review that competition reform in Australia required the development of effective regulatory arrangements for “bottleneck” infrastructure. The mechanisms for regulating access are described in general terms in guidelines published by the National Competition Council, which are summarised in Box 7.1.

Box 7.1

MECHANISMS OF REGULATION UNDER PART IIIA OF THE TRADE PRACTICES ACT

The regime set out in Part IIIA establishes legal rights for third parties to share the use of certain infrastructure services of national significance on reasonable terms and conditions. Technically, the regime provides access not to the infrastructure itself, but to services provided through the infrastructure. If, for example, a business gains a right to access a railway line to run trains, then that right would not allow it to physically operate the railway. Rather, the right of access would be the business's right to run its trains on the railway subject to control by the railway operator. The service in this case would be a rail service.

...

The establishment of Part IIIA of the *Trade Practices Act* in 1995 drew together the various pathways to access under an umbrella framework. It covers existing access regimes and provides a mechanism for access to services that were previously outside the scope of access regulation. A number of regimes (notably, those for telecommunications and airport services), however, remain partly or fully outside Part IIIA.

In essence, Part IIIA covers nationally significant infrastructure services where:

- the development of competitive infrastructure would be contrary to the interests of the community as a whole because the infrastructure has natural monopoly characteristics; and
- access is necessary to promote competition in an upstream or downstream market — that is, access regulation would address structural impediments to competition in a market that relies on the infrastructure service as an input.

...

Part IIIA establishes three pathways for a party to seek access to an infrastructure service:

- through declaration;
- by using an existing effective access regime; or
- under terms and conditions set out in a voluntary undertaking approved by the Australian Competition and Consumer Commission (ACCC).

Source: NCC (2002: 3-8).

However, Part IIIA and similar 'negotiate and arbitrate' models may not be the most effective approach for third party access to major network infrastructure. Using Part IIIA of the Trade Practices Act, can be time consuming and costly and thus a deterrent for a potential entrant.

An alternative is to develop industry specific access arrangements based on up-front price reviews, such as for electricity and gas networks. Ideally such arrangements would set out, at a minimum, terms and conditions of access, and the basis of how access prices are to be determined.

Water utilities in some jurisdictions are already subject to independent oversight of pricing. In addition, State-based access arrangements for urban wastewater and water infrastructure are being developed in Australia and overseas (see Box 7.2 below).

Box 7.2

THIRD PARTY ACCESS IN URBAN WATER EXAMPLES

- In New South Wales, the *Water Industry Competition Bill 2006* provides a framework for private sector players to access water and wastewater infrastructure.
- The Western Australian Economic Regulation Authority has recommended that a State-based access regime for urban water distribution infrastructure be developed, including provisions for negotiated access between the infrastructure owner and the access seeker, independent dispute resolution and an appeals mechanism (ERA, 2008: p.xi).
- In the United Kingdom, the Water Act 2003 requires 'water undertakers', which are companies that provide water services in defined geographic areas and own the supply system and other infrastructure in that area, to publish an access code setting out the basis upon which it will permit access to its water supply system. The access codes are required to contain standard policies common to all water undertakers and specific terms that apply for access to a particular water undertaker's supply system (Ofwat, 2004: p.7 and 58).

Source: Allen Consulting Group

Are there benefits to unbundling?

Although it might be possible to unbundle elements of the urban water structure supply chain, it may not be beneficial to do so. This may be because the potential cost reduction opportunities are small or because there are significant economies of scale and/or scope in the other functions that justify maintaining single entities.

Cost reduction opportunities

In its review of the underlying costs and industry structures of metropolitan water industries, IPART (IPART, 2007: p. 21) noted that the natural monopoly element of the water (and wastewater) supply industry (i.e. the transportation/distribution infrastructure) was significantly higher than in the electricity and gas industry (refer Table 7.1).

Table 7.1

SIGNIFICANCE OF TRANSPORTATION COSTS

	Transportation infrastructure as a per cent of assets	Transportation costs as a per cent of total costs	Production costs as a per cent of industry costs
Water/wastewater	70	21	31
Electricity	50	8	50
Gas	60	14	40

Source: Tasman Asia Pacific (1997) referenced in IPART (2007: p.21)

It has been suggested that the high proportion of water distribution costs as a percentage of urban water industry costs explains the localised nature of urban water supplies (IPART, 2007: p.20), although others have suggested that:

...the significance of particular supply chain components, and hence the potential for competition in the market, can vary between location and can change over time (with factors such as increasing scarcity of water from traditional supply sources and technological development) (IPART, 2007: p.21).

In particular we would expect that as new production sources such as recycling and desalination are introduced the significance of production costs might increase.

Economies of scale and scope

Economies of scale and scope do not appear to be major factors that would influence the unbundling of the supply chain.

There have been a number of recent reviews that provide some guidance as to the importance of scale and scope. In general there appear some economies of scope between major elements and some economies of scale.

Box 7.3

CONCLUSIONS AND RECOMMENDATIONS OF REVIEWS MADE IN DIFFERENT JURISDICTIONS

In Queensland, the Queensland Water Commission (QWC) recommended that a Bulk Transport Business be established, which would own all major pipelines other than the Western Corridor Pipeline. While consistent with the market model, the QWC's recommendations actually result in an increased concentration of water market participants, albeit that they will no longer be vertically integrated.

The QWC's approach reflects a view that the current institutional arrangements for urban water supply in South East Queensland, where bulk water supply treatment and transport assets are owned by some 25 entities, suffers from serious systemic weaknesses (QWC, 2007: p.viii).

In Western Australia, where the Water Corporation, a single integrated-provider, provides the bulk of the State and wastewater services, the ERA concluded that:

- There are synergies between the [Water] Corporation's bulk water operations and distribution functions, which indicate it, may not be appropriate at this time to separate these functions (ERA, 2008: p.xi).
- There are likely to be minimal gains from any disaggregation of the Corporation's Perth [retail] operations at this time (ERA, 2008: p.xi).

In Victoria, the recent VCEC review (VCEC 2008) noted that:

- 'very little empirical evidence on economics of scale in water distribution and sewage collection' p. 85.
- 'nothing in the literature that suggest strong synergies between the two [distribution and retail]', p. 86.
- no evidence of economies of scope between water distribution and waste distribution.

Source: Allen Consulting Group

7.3 Alternatives where unbundling is not practical

When vertical disaggregation (unbundling) of the supply chain to create competition in the market for water and wastewater services is not appropriate, alternative options may be considered. Alternative arrangements for more competitive outcomes include:²⁰

- ‘yardstick’ or comparative competition;
- competition for the market; and
- competitive procurement.

Yardstick competition

Yardstick competition involves arrangements such that the performance of like organisations can be compared either formally or informally to create competitive pressure on the organisations. One way to create organisations for comparison is to horizontally disaggregate, for example, by splitting a monopoly organisation on a geographic basis.

Competitive pressure can then be applied using sophisticated benchmarking techniques as an input into the price regulation process. As noted by IPART (2007) the former is used in the UK.

A simpler form involves public pressure via the release of performance and efficiency information. This more reflects the case of Melbourne where there are three comparable organisations who provide retail and network operations services.

A further advantage of yardstick competition is that through comparison opportunities for improving efficiency can be identified.

Competition for the market

Competition for the market involves competition for an exclusive contract to supply services water and wastewater services to a specified standard. As noted by IPART (2007), this is the most commonly used method by governments around the world to bring competition for water and wastewater services.

A key challenge is establishing such arrangements so that there is sufficient competitive pressure for re-tendering while still giving sufficient incentive for capturing opportunities to improve efficiency. Contracts may vary from a small number of years to long-term contracts of up to 20 years.

Competitive procurement and sourcing

Competitive procurement is the contracting of services that supply inputs to water and wastewater utility functions. Examples include basic operations and maintenance work. An extension of simple procurement is more strategic sourcing whereby tenders are given greater freedom as to how to meet a set of objectives.

²⁰ See IPART (2007) for a detailed description of different arrangements.

7.4 Features and options by supply chain element

This section considers the particular issues associated with the unbundled elements of the supply chain.

Supply management

The potential for introducing competition in bulk water supply is discussed in the previous chapter. As noted in this chapter, in a market such as Perth where there are multiple supply sources there is significant potential for open competition between water suppliers. In such a case, competition would cause competing suppliers to strive for cost efficiencies and improved management of catchments.

In other markets where there is a dominant source of supply, there is potential for allocation of water entitlements to create a competitive market for supply of water. The allocation of water entitlements does not however create competition for the management of the dominant supply catchment (for example, the management of Warragamba dam in Sydney).

In these situations there are a number of potential models. One simple alternative would be to competitively outsource the management of the catchment.²¹ Similarly once a competitive market has been created for water supply, there is little reason to prevent the private management of desalination and other manufactured water sources.

Interim reforms might be considered, if a competitive market for water supply was not created or it was not acceptable to have private management of key water supplies. Other reform models might include:

- Yardstick competition of catchment managers; and
- Outsourcing selected catchment management functions.

It appears there always will be a Government role in oversight of water supply management for reasons including ensuring quality standards, public safety, environmental protection; and ensuring organisations do not obtain excessive market power. This is similar to other major infrastructure industries.

Water and waste treatment and waste disposal

Although there are some economies of scale associated with the treatment of water and waste, it is generally recognised that the treatment functions of water and wastewater are contestable. Thus once appropriate third party access regimes are in place (and any other legislative entry barriers are removed) competition could potentially develop in treatment facilities. Furthermore the management operation of existing treatment facilities could be open to competitive tender.

Clearly treatment (of water and waste treatment) requires controls to ensure quality of service. There is however no reason why these functions could not be opened up to competition.

²¹ Once the entitlements to water are allocated, the catchment manager has no longer market power over the control of water price.

Distribution

The distribution network infrastructure has the characteristics of a natural monopoly. With the possible exception of some very large users who may pay to by-pass parts of the network, it is not feasible for users to duplicate the pipes connecting the system. Furthermore there are significant economies of scale and scope in managing the network. In such circumstances, the most practical option is for a regulated monopoly provider to construct and maintain the network.

As discussed above, water distribution infrastructure represents a significant proportion of the costs of the urban water supply. Until recently it appears that much of the investment in the industry has also been on distribution infrastructure. Consequently, it is desirable to ensure that investment in urban water distribution infrastructure is as efficient as possible.

In Australia, the value of new investments in electricity and gas transmission and distribution infrastructure is a key driver of regulated revenues and prices. Accordingly, an infrastructure service provider has an incentive to invest in the asset, at least where it is able to have the value of the investment added to the regulatory asset value and can earn an appropriate rate of return on this asset. In the absence of appropriate controls over the values of investment added to the regulatory asset value or the rate of return, service providers may face incentives to make inefficient investments in the infrastructure assets, so as to increase the regulatory asset value and thus increase regulated revenues and prices.²²

To counter these incentives, regulatory frameworks in electricity and gas transmission and distribution have included mechanisms to attempt to ensure that only economically efficient investment is added to regulatory asset values (see Box 7.1). The National Competition Policy requires that future investment in new rural water schemes or extensions to existing schemes are undertaken only after appraisal indicates such investments are economically viable and ecologically sustainable. It may be relevant to consider applying similar requirements for future urban water investments, including in water supply sources and water distribution infrastructure.

²² The types of behaviour that may be engaged in by infrastructure service providers could include:

- exerting insufficient cost control on new assets, so that the realised cost of new assets is in excess of the minimum achievable cost;
- “gold-plating” assets, with investment undertaken that is in excess of that necessary to meet demand for services;
- constructing assets with sub-optimal designs and configurations, with a consequent higher cost of assets to meet a particular level of demand for services;
- constraining the nature of development of the assets, so that certain augmentations of the asset are undertaken even though another type of investment may have been more economically efficient (for example, a pipeline service provider could refuse to construct connection assets for a new gas source where this would reduce gas use and gas transportation from more distant sources, with a consequent reduction in pipeline revenues).

Box 7.1

REGULATING NEW INVESTMENT IN NETWORK INDUSTRIES – WA EXAMPLE

The Western Australian Electricity Network Access Code requires that new investment in large transmission or distribution projects satisfy an up-front *regulatory test*, which is based on a similar test in the National Electricity Rules. The *regulatory test* is applied at a time prior to investment being made (and expenditure sunk), and has as its objective the ranking of the net benefit of a particular project against possible alternatives (including the alternative of doing nothing, or doing the same thing at a different time).

The regulatory test provides a mechanism for ensuring that:

- a proposed capital project returns a net benefit (measured in economic terms); and
- the proposed project returns the greatest net benefit when compared with alternative projects, alternative project timings, and/or alternative means of meeting energy demand.

Source: Allen Consulting Group

One approach to create competitive pressure in distribution management is to split the network along geographical lines. This approach has been adopted in Melbourne where three retailers manage geographically separate parts of the network. Splitting the network in such a way creates potential for ‘yardstick’ competition. The split in Melbourne appears to have been quite successful in creating incentives to drive down costs and improve service, and the recent VCEC review of the industry recommended that the structure continue, albeit with some changes including in relation to shared services.

Drainage (and stormwater management)

Drainage involves the capture and transportation of stormwater (and related waste) from public locations.

Drainage has the characteristics of a local public good. Common drainage facilities are both non-rival (one resident’s benefits are not affected by another) and non-excludable (it is not possible to exclude some from the benefits). As such, the ‘free rider’ problem can arise, and so public goods are generally funded through taxation or some kind of mandatory charge. In the case of water, the costs are generally recovered through mandatory charges on property either through local council rates and/or charges by the local water utility.

There are two issues associated with drainage. Firstly there is a question of funding. The drainage infrastructure and service has some components that are local to council areas and some that apply to broader areas. There may be potential for improvement of the funding mechanism so as to ensure appropriate incentive to improve drainage.

A second issue relates to the rights to use the stormwater captured by drains. Stormwater has the potential to be a cost effective alternative source of supply. To ensure appropriate private investment in stormwater mining, the rights to the storm water need to be clarified. The appropriate allocation of rights to achieve an efficient outcome is not straightforward.

7.5 Summary

Box 7.1

CHAPTER 7: KEY POINTS

- Introducing competition requires *unbundling* the natural monopoly elements from the contestable elements of the supply chain.
- Distribution has characteristics of a natural monopoly. Other elements of the supply chain appear to be contestable.
- For unbundling to be effective, a third party access to the monopoly infrastructure is required. Third party access regimes have worked in similar industries and should be effective in water and wastewater services.
- There appear to be some benefits to unbundling: Although most of the cost base is with distribution, there are also few economies of scale and scope in keeping the supply chain vertically integrated.
- There are alternative methods (such as 'yardstick competition') that can be used to bring greater competitive pressure to the monopoly elements.
- Some of the supply chain elements (e.g. drainage and storm water management) have special features that need special consideration.

Chapter 8

Retail Competition

8.1 Introduction

This chapter considers the potential for retail competition and its implications.

There is a clear distinction that can be made between wholesale and retail water markets. While there is some overlap between the two groups, retail markets have distinct characteristics (see Box 8.1) and thus warrant special consideration.

Box 8.1

DIFFERENCES BETWEEN WHOLESALE AND RETAIL WATER MARKETS

Wholesale water market participants generally:

- Are relatively small in number compared to retail customers.
- Purchase large quantities of water and are typically concerned about securing some certainty of supply.
- Have a more sophisticated understanding of the water market and industry and have the incentive to directly manage their risks in contracting for water.
- May have more options than retail customers in terms of alternatives to potable water, such as water recycling or using non-potable water.
- Are businesses whose final product is water or for which water is a significant part of the cost structures or a critical input to their business.
- Can include water storage and harvesting firms, retailers, irrigators, water recyclers, resources companies, electricity generators and other major commercial and industrial users, and also intermediaries such as water brokers.

Retail water customers generally:

- Are large in number compared to wholesale participants.
- Purchase relatively small amounts of water each.
- Can range from households to small businesses up to major corporations.
- Purchase water through an intermediary, such as a water retailer.
- Are businesses where water generally represents a small component of the cost structure of the business or are households where water is small component of the household budget.
- Do not have a sophisticated understanding of the water market and industry and do not have a strong incentive to directly manage their risks in contracting for water.

Source: Allen Consulting Group

The role of retail

The *retailing function* involves securing a supply of water (or disposal of wastewater) that meets the relevant security and other standards, managing the necessary contracts for the delivery of that water (or disposal of wastewater) through the grid to retail customers, marketing to and servicing retail customers and perhaps providing related services (e.g. technical or plumbing services, efficiency audits).

To date in Australian urban water markets, water has largely been marketed by vertically integrated utilities as a simple commodity with a fixed pricing structure. While urban water retailers are currently vertically integrated entities encompassing a range of functions, the role of the retailing function has been fairly limited or hidden within the broader business.

In the future the role of the retail function could expand significantly. Firstly, there is significant potential for the 'water services' offering to expand along a number of dimensions.

Perhaps the most prominent of these will be in respect of security of supply and risk associated with scarcity pricing. If water prices were allowed to fluctuate then users (both households and business) may demand differing arrangements to manage the risks associated with fluctuations. Retail offerings might include, for example, fixed rates up to a volume limit with exposure to spot prices above the volume limit.

Retail offerings may also differ along other dimensions including reliability of supply, capacity and water quality.

If the market for supply of water (and waste water services) opens to competition, then the role of the retail may also expand in regards to the competitive sourcing of water supply and services.

8.2 Retail contestability and alternatives

Current retail arrangements

Urban water retailing in Australia has almost universally been undertaken on the basis of exclusive area franchises created under government statutes. This has allowed the vertically integrated retailers to aggregate loads of retail customers to underpin their ability to invest in long-term supply infrastructure. The choice of investment in these supply options was usually decided on the basis of some form of central planning by the business or with Government.

Overview of alternatives

At first glance there appear to be few significant barriers to entry for providing a retailing function, provided a retailer has third party access to existing infrastructure. To provide retailing services, a retailer merely needs a customer base and the ability to contract with wholesale providers to deliver the product and services. Retailers could then compete on different dimensions including billing services and different pricing plans. Although there would be some local scale advantages, customers who do not require additional physical services could be serviced by any number of competitors.

Introducing competition to the urban water retail market could result in innovative proposals as possible new participants consider entering the market. Competition compels new thinking, encourages more product choice (in terms of supply reliability and billing/payment options and enhanced opportunity for more flexibly pricing) and provides incentives for productivity improvements.

Competition also exerts pressure on bulk suppliers in relation to the cost and reliability of water supply. New and different product characteristics could be added to the market, and the ability of retailers to compete on product mix would be expanded.

One possible source of potential competition is the existing energy retailers. This also opens up the option of combining the retail sale of water with the retail sale of electricity and gas. The cost of providing an additional service would presumably be lower than the cost of the first service and it would enable many the same staff, systems and infrastructure to be used.

Retail contestability need not be a 'big bang'. It can be limited and it can also be phased. Contestability may initially be limited to only the largest users. Consideration could then be given, if there are thought to be benefits, to extending the threshold for contestability in steps over time subject to review.

8.3 Issues and considerations

The introduction of retail contestability also comes with costs. The transaction costs of allowing contestability to occur further downstream into the market of the smaller retail customers may be high and include metering, systems, and administrative and marketing costs. Before considering contestability, governments would need to be convinced that any potential benefits outweigh these significant costs.

One issue for a new entrant retailer may be the lack of access to water entitlements currently allocated to (or effectively held by) existing retailers. This would not be an issue if the bulk supply market were also opened up to competition as discussed in Chapter 6.

If retail contestability were introduced, pricing arrangements would need to be reviewed to ensure that any major cross subsidies are removed and that prices broadly reflect the cost and risks of serving specific types of customers. In the absence of such changes, competition could be stifled and/or there could be 'cherry picking' of profitable types of customers leaving the uneconomic customers to be served by the existing retailers.

Alternatively, tariff structures could also be used to provide some customer choice without contestability. For example, if customers have a fixed quota of water for essential use, they could receive a rebate if they do not use their quota. Also, existing retailers could simply be required to offer a discretionary component as part of their tariff structure, rather than having full contestability.

The government would also need to be convinced that retail contestability would not undermine the ability of retailers to contract for an efficient long-term supply. A market and/or planning mechanism would also need to be in place to assure the security of supply.

Once retail contestability is established there should be no need for retail price and service regulation other than perhaps in relation to a fall-back option for a residual group of smaller customers who have not opted for contracts, until competition can be seen to be well established.

Prudential regulation

With fluctuating prices retailers will aim to offer long term contracts with customers for supply of water. This raises a prudential risk, where retailers offering long term fixed contracts would be exposed if water shortages pushed up water prices excessively.

Some prudential regulation may be required to ensure consumers are protected from the case where a retailer is unable to meet its contractual obligation to customer in the case of price rises.

Equity and protection for vulnerable households

Water is an essential service and therefore a key policy objective of any institutional arrangements is that all users should have access to essential water and sewerage services regardless of their means. When considering a market based approach to water, it is important to consider equity in pricing for services and consider the impact of prices on vulnerable households.

In particular, the current round of investment in securing the water supplies to Australia's cities comes at a much higher marginal cost than traditional sources. This will lead to significant price increases for households and business. For many households, this will be a small part of household budgets and should not have a major impact. However, for some lower income households, this increase may well have a significant impact given tight household budgeting especially with coincident increases in other essentials such as energy, food and housing.

Under the current system, urban water businesses are required to assist customers who have payment difficulties. This includes a case-by-case assessment and provision of alternative arrangements in accordance with a customer's capacity to pay including a range of payment options, offering to extend the due date for bills and appropriately referring customers to government funded assistance programs. In Victoria in 2006-07 assistance was provided to 1092 customers, with an average grant size of \$291. The government also provides concessions to low income households, which amounted to \$82.6 million in concession payments towards water bills in 2006-07.

A key concern with scarcity pricing is that during periods of shortage the cost of water may increase significantly, putting pressure on vulnerable households. This issue may well be able to be managed through a combination of measures, some of which already exist in most jurisdictions. These include:

- a tariff structure that provides a low-priced component of essential water is one way to manage this issue. Some account of household size may also be able to be incorporated into tariff design. The benefit is best provided as a lump sum so that consumers receive a rebate for any essential allocation not used. This maintains appropriate incentives and gives further benefits to water efficient low-income households;
- the introduction or modification of a Community Service Obligation (CSO) concession scheme for households meeting particular criteria (such as welfare card holders); and

- processes and procedures to support customers with payment difficulties, including relief schemes.

The cost and equity of such schemes would compare very favourable to the current arrangements and there are a number of possible methods to implement such a scheme. For example, in a contestable environment, these could be enforced on all retailers through licensing or regulatory requirements (as is the case for energy).

Such schemes could be implemented with relative ease, as almost all urban households in metropolitan households are metered. However, as mentioned earlier, an important exception is individual apartments in apartment buildings and also residents of caravan parks.

Another key challenge for targeted assistance (a problem present in the existing arrangements) is how to determine an allocation given the administrative difficulty in determining household size.

Other consumer protection issues

If retail contestability is introduced, measures may need to be taken to ensure that the interests of retail users, including households and small businesses, are protected.

Drawing on the experience in the energy sector, a potential range of actions to protect consumers in a contestable retail market may include:

- licensing to ensure compliance with basic prudential and operational requirements of the market;
- a code of conduct for retailers and standard contracts;
- complaints handling mechanisms including an independent complaints handling body; and
- some arrangements for a retailer of last resort (RoLR).

A number of the above mechanisms are already in place to some degree in a number of jurisdictions but may need to be adapted for contestability.

A RoLR scheme would ensure that customers are not disconnected from their water supply should their retailer fail. One option is to develop similar arrangements to the RoLR scheme used for electricity in energy retailing. Such a scheme is not currently required as current utilities are obliged to connect retail users and are unlikely to fail given the monopoly arrangements and the government ownership.

Box 8.1

THE VICTORIAN RETAILER OF LAST RESORT (ROLR) SCHEME FOR ELECTRICITY

The RoLR for electricity in Victoria is run through the ESC that, in accordance with legislative obligations, worked with a steering committee (comprising industry and the government) and the community to develop RoLR processes and regulatory arrangements. For small customers in the electricity market, their contract with a retailer is automatically terminated upon failure of that retailer. They are then sold electricity and/or gas by their RoLR at tariffs, terms and conditions approved by the ESC. Large customers are sold electricity and/or gas by the RoLR at tariffs, terms and conditions commercially negotiated between them and the RoLR. The obligations of the RoLR cease after three months and small customers that have not chosen to transfer away from the RoLR or enter into a market contract with the RoLR will be placed onto a default arrangement with their local retailer after three months.

Source: Allen Consulting Group

8.4 Summary

Box 8.1

CHAPTER 8: KEY POINTS

- The *retailing function* involves marketing to and servicing retail customers. In the future there is scope for increased retail differentiation in offerings particularly in terms of pricing plans but also in service levels, product options and security of supply
- Currently the retail function is vertically integrated with distribution. However, retailing is potentially contestable as there appears to be no natural barriers to entry and exit to retail.
- There are a number of issues and considerations with introducing retail competition.
- If retail competition were introduced, then there would be a reduced need for independent price and service regulation.
- However, retail competition may also require other regulation, including prudential standards for retailers and increased measures to protect consumers, including codes of practice, standard contracts, complaints handling processes and retailer of last resort arrangements.

Part 4

The Way Forward

Chapter 9

A vision and road map for urban water

9.1 Introduction

Chapter 3 provided a case for reform by presenting the problems associated with the current arrangements and proposing that an alternative vision could be based on market competition with carefully designed regulation. The question was raised whether such a vision, was achievable given the features of urban water.

The intervening chapters have discussed the options for and the implications of market based reforms in urban water. As demonstrated in the prior chapters it appears that:

- there are no compelling reasons to why competition in bulk water markets can not be established in all urban water markets;
- there appear to be strong monopoly elements in urban water utilities, however there is no reason why the other elements can not be contestable;
- retail competition is potentially viable; and
- there is a role for Government regulation.

Given these findings a vision based on market reforms is likely to be both achievable and beneficial. The report's vision for urban water is stated in Box 9.1

Box 9.1

VISION FOR URBAN WATER

The report's vision is for an urban water future in which:

- There is a secure level of water supply to meet society's essential needs and society has confidence in the quality of water, and that consumers (particularly the vulnerable) and the environment are appropriately protected.
- Households have the freedom to choose from a range of water options and are able to afford their basic water needs.
- Businesses and communities can access secure supplies of water without expensive investment and distraction from their core activities.
- The water and wastewater industry have the incentive and the means to meet society's water needs at lowest-cost without facing unnecessary constraints.

Source: GAP Forum on Urban Water

This vision is not prescriptive. It merely describes an approach whereby industry participants compete to best meet the needs of their customers in the least cost manner. For example, with market competition we might find some households choosing contracts such that the prices they pay vary during a drought and others choosing contracts whereby they pay a fixed amount.

The question remains as to how a transition to such a vision can be achieved. This chapter provides the road map for reform.

9.2 Assessment of the path forward

While, in the longer term a competitive market for urban water is likely to be both feasible and beneficial, a move to a competitive urban water market cannot happen overnight. Of note:

- Most urban centres are currently focussing on major capital works in response to supply shortages and these clearly need to take precedence in the shorter term.
- The enabling changes to the industry and infrastructure changes will take some time to happen and will occur unevenly in different urban markets.
- Design of the markets, regulation and institutions is a necessary precondition and this will require some focussed research, which will also take some time.
- Reform will need to be introduced in a careful manner including a well thought out communication program to ensure that community attitudes move together with the reforms.

For these reasons, the forum does not support a ‘big bang’ approach to reform, as it is risky, impractical and unnecessary. Rather a staged and contingent reform process is recommended. ‘Staged’, in that there are a number of steps and phases. ‘Contingent’, in that the lesson from each phase can be used to inform decisions on subsequent steps and phases.

It is possible to move to an interim industry structure that delivers a range of benefits of itself, but which also establishes structures and institutions that are essential for the transition to a more fully competitive market. The interim structure would allow for some competition at the wholesale level but would stop short of full competition until the market is ready for it. The final decision to move to a fully competitive market is best made once the results of the move to an interim structure are known and understood.

In terms of timing, while the appropriate timing will differ by jurisdiction, the forum is of the view that:

- a period of market, regulatory and institutional design and planning will be necessary to enable the above reforms, and this is likely to take one to two years;
- an interim market structure could be put in place in a two to four year time scale; and
- a fully competitive market should be viable in many major urban markets in a five to ten year time scale.

This timeline has the added benefit that the new structure would be introduced at a time when current supply constraints are likely to have eased but before the next round of major augmentation decisions are likely to be necessary. This is a reform for the longer term.

While each market will require unique treatment to some degree, the majority of the necessary work on the design of markets, regulation and institutions would be common to all markets. As such, some of it, especially the early steps, would be suited to being undertaken cooperatively through the COAG process.

If the reforms are to proceed and be comprehensive, then the Commonwealth Government needs to take a role in providing reform leadership through COAG.

The road map to reform and next actions are discussed in the next section.

9.3 The road map to reform

A proposed high-level road map to reform is depicted in Figure 9.2 below. It depicts the shift from the current structure, characterised by monopoly suppliers and a lack of competition, to an interim stage with constrained competition, and then to the final vision of competitive markets for bulk supply, retailing and other services.

Underpinning these changes is the need for a clear role for Government in a number of areas. Firstly there will be a Government role in ensuring a minimum level of secure supply such that it can be confident that the essential water needs of all households will be met. Secondly, there is will be a need for a number of consumer protection measures including financial support for the vulnerable and other measures such as ensuring that there is a *Retailer of Last Resort* and retailers are prudentially sound. Finally, there will be a need for ongoing environmental protection and continued need for regulation of the remaining monopoly elements of the supply chain.

The road map includes a set of immediate actions (detailed in Table 9.1) to move to the interim structure. A specific research program underpins these actions and the interim structure.

These immediate actions and the research steps are described in further detail in following below.

Table 9.1

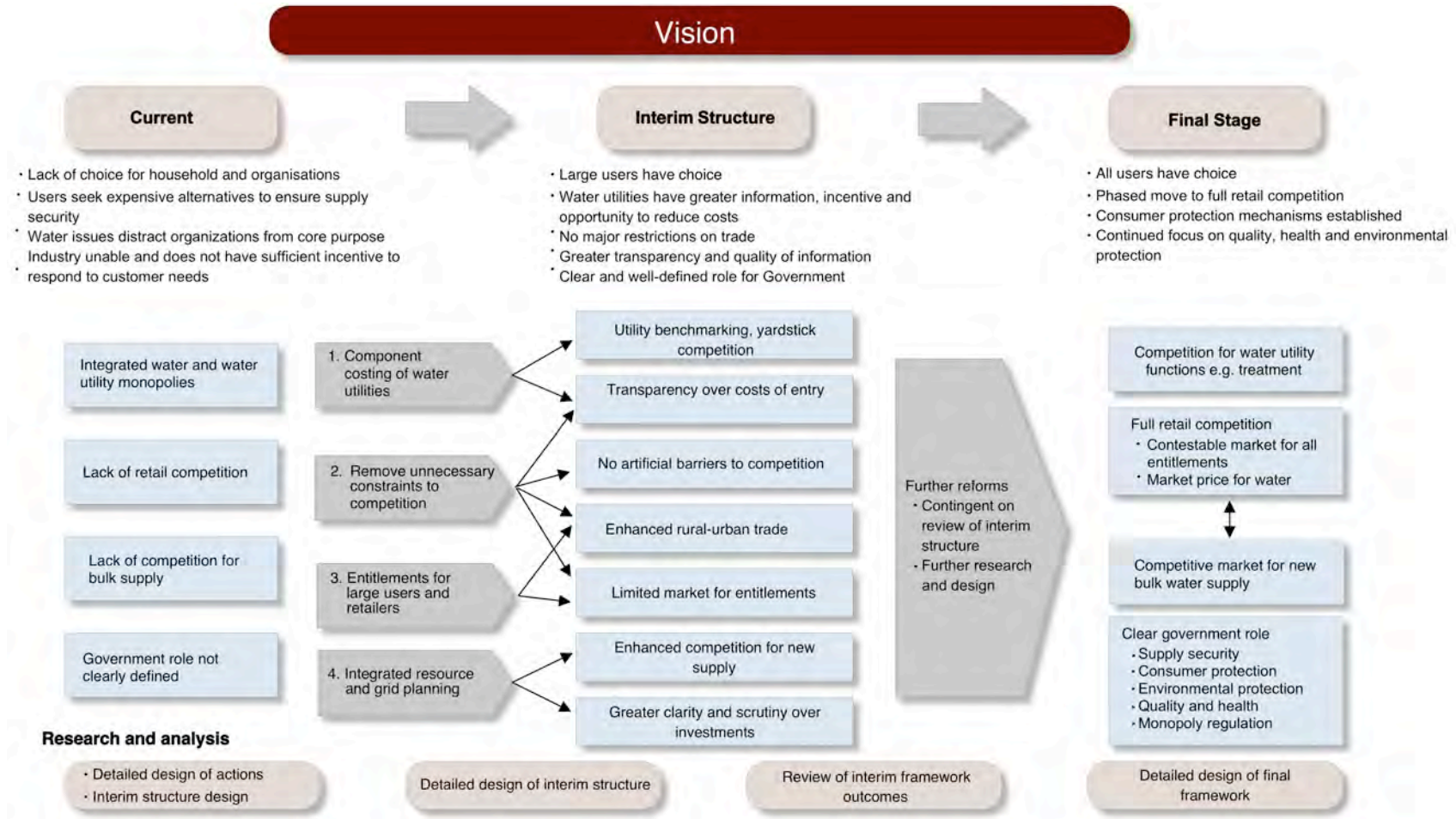
IMMEDIATE ACTIONS

	Description	Benefits and Comments
1. Component costing of water utilities	<ul style="list-style-type: none"> • Costs are currently only calculated and reported at an aggregate level • Involves identifying and separately costing the key elements of the supply chain including transmission, distribution, treatment, storage, sewerage and drainage. 	<ul style="list-style-type: none"> • Enables industry to compare costs across different regions so as to identify opportunities for efficiencies and provide potential for yardstick competition between organisations • Provides a basis for identifying where restructure may be beneficial • Enables more effective economic regulation of monopoly elements.
2. Remove unnecessary constraints to competition	<ul style="list-style-type: none"> • Establish third-party access regimes • Continue to break-down barriers to urban-rural trade • Remove any other legislative barriers to competition. 	<ul style="list-style-type: none"> • Provide clarity as to how access to essential water and wastewater infrastructure would be obtained and pricing would be determined • Enables greater trade in entitlements • Promotes competition that fosters efficient service delivery and innovation in water use and supply.
3. Allocating tradeable entitlements to large users and retailers	<ul style="list-style-type: none"> • Allow large users and retailers to trade water entitlements. 	<ul style="list-style-type: none"> • Enable large users to better manage their access to and use of water (dependent on a third-party access) • Establishes a market for entitlements • Reveals a market price for water, thus reducing reliance on administered prices to signal the scarcity value of water.
4. Develop a best practice model for integrated water resources and grid planning	<p>Examine the alternative models for more independent, transparent and integrated water resources and grid management planning and determine the most effective model.</p> <p>This examination should cover a range of roles including integrated resources planning, grid planning, information services, reviews of regulatory, market and institutional structures, and might also include roles in grid operation, market operation, and possibly procurement.</p> <p>The models should clearly identify where independence and transparency can provide benefits.</p>	<ul style="list-style-type: none"> • Greater transparency and scrutiny over key planning information for the benefit of new participants • Better decision making from a more robust and contestable planning process • Enables more competitive and less prescriptive sourcing of supply • Overcomes information asymmetries.

Source: GAP Forum

Figure 9.2

ROAD MAP TO REFORM



The interim structure

The interim structure provides for constrained competition and a clear role for Government.

Wholesale competition in bulk supply will be enabled through the removal of existing barriers to competition and through greater transparency provided by the independent planner. A market should also develop for bulk water entitlements between large users and retailers. Such a market will be a testing ground for a more complete market combined with retail competition.

Large users with their ability to purchase bulk water entitlements coupled with third-party access to essential infrastructure will be potentially able to choose between securing their own water needs or using an existing retailer.

Competition in the provision of water utility functions will be made possible through third-party access to essential infrastructure, supported by component costing of water utilities functions. As a result of these changes, new entrants will be able to identify and act on opportunities to compete in functions such as treatment and waste removal. Note that these changes enable but do necessitate disaggregation (either vertically or horizontally). The component costing in itself should also enable some benchmarking of functions between different water utilities.

As part of the detailed design for the interim structure the Government's role and regulations around supply security, environmental protection, quality and health and monopoly regulation may require some review so as to facilitate wholesale competition.

Immediate actions

Establish component costing of water utilities

A key step towards the vision is to conduct detailed accounting of the elements of the existing regulated urban water utilities. Whereas costs are currently only calculated and reported at an aggregate level, this step would involve identifying separately costing the key elements of the supply chain including

- Transmission.
- Distribution.
- Treatment.
- Storage.
- Sewerage.
- Drainage.

The approach has a number of advantages. Firstly, it enables industry participants to compare the costs across different regions so as to identify opportunities for efficiencies and provide potential for yardstick competition between organisations.

Secondly, it opens the door for disaggregation of the functions. It will be easier for both regulators and potential entrants to better assess the merits of disaggregation as this process would involve greater understanding of the costs (and thus potential benefits) and also the linkages between functions (and thus economies of scope). Furthermore, in conjunction with a third party access regime, the accounting would provide potential entrants greater certainty of the costs to access essential infrastructure.

Potential steps towards more detailed accounting of water supply functions are:

- as part of pricing reviews pricing regulators require water utilities to identify costs by function, and identify key activity drivers of those functions;
- to support comparability across jurisdictions, regulators agree, where appropriate, on standards for costing;
- water utilities and regulator undertake benchmarking to identify opportunities for cost improvement; and
- costing data is made available for the basis of third-party access to infrastructure.

Remove unnecessary constraints to competition

As discussed in this paper there are a number of existing artificial barriers to competition and trading in the provision of water supply functions. By removing unnecessary barriers some immediate benefits can be achieved and a basis for full competition can be established.

Progress on removing barriers to competition and the exact nature of these barriers may vary by jurisdiction. Regardless there appear to be a number of common steps that may be undertaken. These include:

- establish third-party access regimes, with the goal of providing clarity as to how access to essential water and wastewater infrastructure would be obtained and pricing would be determined;
- continue to break-down barriers to urban-rural trade; and
- remove any other legislative barriers to competition.

Allocate tradeable entitlements

The forum recommended that the allocation of entitlements be available for large-users and retailers as a means of better managing water supply.

As discussed in Chapter 7, entitlements can potentially be used to create competitive markets in bulk water supply. The move to a full market model appears, however, unnecessary at this stage. An interim step (akin to the pricing reforms in energy markets) is to allow large users (for example, businesses, Government organisations) and retailers access to water entitlements.

Such a step would have a number of important benefits. Firstly, it would give large users and retailers the ability to better manage their access to and use of water. Large users dependent on water could purchase entitlements to obtain surety of supply.²³ Conversely users that can reduce the water needs cheaply may trade their entitlements when water is scarce. Secondly, it would enable a market for entitlements to evolve, opening the way for further developments.

It is recognised that there are many design issues in regards to the type of the entitlements and as to how they are allocated.²⁴ These issues are not unique to water – for example, similar issues have arisen in regards to Carbon Trading Permits. There are some minimum design requirements. Of note entitlements should be designed such that they are compatible with existing rural markets.

It is recommended that research be undertaken as to the issues regarding the design and allocation of water entitlements.

Create a more independent, transparent and integrated water resources and grid planning framework

It is recommended that there is a move towards a more independent, transparent and integrated water resources and grid planning framework. Currently, responsibility for urban water supply planning is largely with the incumbent urban water supplier utilities and the relevant government department. This approach causes a number of problems. Firstly, the approach puts new suppliers at a disadvantage relative to the incumbent. Secondly, the lack of independence tends to result in a lack of transparency and scrutiny over planning assumptions and process. Finally, the planning objectives may not align with those of other parties involved in urban water management.

There would be major benefits in doing some focussed work on developing a best practice model for integrated water resources and grid planning. The aim would be to examine the alternative models for integrated water resources and grid management and determine the most effective model.

This examination should cover a range of roles including integrated resources planning, grid planning, information services, reviews of regulatory, market and institutional structures, and might also include roles in grid operation, market operation, and possibly procurement.

The models should clearly identify where independence and transparency have benefits.

²³ Similarly retailers could potentially trade entitlements to better serve their customers needs (e.g. by purchasing from rural markets to ensure supply).

²⁴ As discussed in Chapter 5 there are different types of entitlements and a range of allocation methods.

The model involves the creation of an independent body (or bodies) creating with responsibility for planning and with a special focus on security of supply. A key focus of the planner would be to ensure that supply would always be sufficient to meet basic requirements. The planning process would be undertaken in an open and transparent manner. Under this model the independent planner researches and releases information about demand and supply options. The objectives, assumptions and analysis would be clearer and more transparent. This would benefit new participants in particular and enable more competitive and less prescriptive sourcing of supply. For example, new participants with benefit of the planning information may propose alternative approaches of meeting the objectives.

The planning body (or bodies) could undertake reviews of regulatory, market and institutional structures and may also take on other roles including:

- grid operator, i.e. overseeing the operation of the network grid;
- market operator, for example, managing the market for and the trade of water entitlements;
- providing information on and undertaking research into the industry and the market;
- an advisory role including on industry reviews commissioned by government; and
- possibly providing advice on or overseeing procurement, for example, managing tenders for supply under certain circumstances.

Such models could provide for government agencies and/or Ministers to have decision making powers on key issues as required. The planning bodies could be simply limited to an advisory role, or they could have scope for independent decision making subject to a range of possible check and balances.

From the interim structure to the final stage

The interim structure provides a platform for moving to the final stage and achievement of the vision. Moves towards the final stage will only take place if the perceived benefits outweigh any potential costs. The ‘act, learn, act’ approach will be used throughout the process.

Figure 9.2 describes how this may occur. Following the establishment of the interim structure, further reforms will be undertaken contingent on a review of the structure’s outcomes.

Further reforms will require additional research and design. The key change in moving from the interim structure to the final stage will be the establishment of retail competition. Full retail competition entails customer being able to choose their retailer and choose from the options the retailer offers. Retailers will be able to meet their customer needs how best they see fit. For example, competing retailers may provide a range of service packages differing by the level of pricing risk.

The move to full retail competition will be a significant step. Of note, there are important implications for Government. As a result of retail competition additional consumer protection measures will need to be considered (as noted above, including financial support for the vulnerable and other measures such as ensuring that there is a *Retailer of Last Resort* and retailers are prudentially sound). To minimise the impact the move to full retail competition could be phased so that different customer groups are progressively provided with retail choice.

Research and analysis

Research is required to support each of the immediate actions described above and to meet the overall interim structure design. Much of the research will be common across jurisdictions. As such it is recommended there is some benefit to Commonwealth leadership and coordination.

As the reform process progresses a detailed design of the interim structure will be required. This is likely to be more location specific.

Further research will also be required in moving past the interim structure towards the long-term vision. In particular there are a number of issues relating to a market-based competition model that warrant further investigation. Of note, these include:

- consumer protection arrangements; and
- implications of market (i.e. ‘scarcity pricing’) at a wholesale and retail level.

9.4 Summary recommendations

A summary of the key recommendations is listed below.

Summary of recommendations

1. That Australian Governments commit to establishing a competitive urban water market supported by effective regulation so as to achieve a vision that ensures:

- *There is a secure level of water supply to meet society's essential needs, society has confidence in the quality of water, and consumers (particularly the vulnerable) and the environment are appropriately protected.*
- *Households have the freedom to choose from a range of options and can afford their basic water needs.*
- *Businesses and communities can access secure supplies of water in the least cost manner.*
- *The water and wastewater industry have the incentive and the means to meet society's water needs at lowest-cost without facing unnecessary constraints.*

2. That this vision is best implemented in a phased and contingent manner through the adoption of an interim industry structure featuring competition in bulk supply, which would be reviewed before proceeding to a fully competitive retail market.

3. That the first steps towards the interim structure be taken as soon as possible and include the following four priority actions:

- a. *Conduct detailed accounting of regulated water utilities.*
- b. *Remove unnecessary constraints to competition in water and waste-water services.*
- c. *Trial use of entitlements to water supply for retailers and large users.*
- d. *Move towards independent and transparent planning.*

4. That an initial period of research over the next one to two years is required to underpin the reform program. This research is best be undertaken on a cooperative basis through COAG and should include:

- a. *Design of the four priority actions identified.*
- b. *Initial design of interim market and industry framework.*
- c. *Detailed design of the interim market and industry framework.*

References

- Clements, Ken (2006), *Price Elasticities of Demand are Minus One-half*, University of Western Australia Business School, discussion paper 06-14, available at <http://www.biz.uwa.edu.au>, accessed 30/07/2007
- ERA (2008), Western Australia Economic Regulation Authority, *Inquiry into Competition in the Water and Wastewater Services Sector: Final report - 2008*
- Energy Reform Implementation Group, 2007, *Energy reform: the way forward for Australia*, Report to COAG
- Grafton, Quentin and Kompas, Tom, 'Pricing Sydney Water,' *Australian Journal of Agricultural and Resource Economics* 51:3 (September 2007), 227–241.
- Grafton, Quentin and Ward, Michael, (2007) 'Prices versus Rationing: Marshallian Surplus and Mandatory Water Restrictions,' ANU International and Development Economics Working Papers IDEC07-05 (2007), http://www.crawford.anu.edu.au/degrees/idec/working_papers.php.
- Hensher, D., Shore, N. and Train, K. (2006), 'Water Supply Security and Willingness to Pay to Avoid Drought Restrictions', *The Economic Record*, 81, 56-66.
- Hilmer, F., Rayner, M., and Taperell, G. (1993), *National Competition Policy*, Report by the Independent Committee of Inquiry.
- Hughes N, Hafi A, Goesch T and Brownlowe N 2008, 'Urban water management: optimal price and investment policy under climate variability', ABARE Research Report 08.7, available at www.abare.gov.au, accessed September 23, 2008
- Industry Commission 1997, *International Telecommunications Reform in Australia*, www.pc.gov.au/ic/research/information/phone
- IPART (Independent Pricing and Regulatory Tribunal of New South Wales) 2007, *Literature Review: Underlying costs and industry structures of metropolitan water industries*, September.
- Mansur, Erin T. and Olmstead, Sheila M. 2006, *The Value of Scarce Water: Measuring the Inefficiency of Municipal Regulations*, AEI-Brookings Joint Center For Regulatory Studies, Available at www.aei-brookings.org
- NCC (2005), National Competition Council 2005, *Assessment of governments' progress in implementing the National Competition Policy and related reforms*, Melbourne
- Ofwat Annual Report 2005-06, www.ofwat.gov.uk/aptrix/ofwat
- Outcomes of Ofwat's internal review of market competition in the water sector*, 2007.
- Productivity Commission 2003, *Water Rights Arrangements in Australia and Overseas*, Commission Research Paper, Productivity Commission, Melbourne.
- Productivity Commission 2004, *Modelling water trade in the Southern Murray Darling Basin*, Staff Working Paper, Canberra
- Productivity Commission 2008, *Towards Urban Water Reform: A Discussion Paper*, Research Paper, Melbourne
- Sibly, Hugh and Tooth, Richard, 2007, 'Bringing Competition to Urban Water Supply,' University of Tasmania School of Economics and Finance discussion paper 2007-05 (2007).
- Sibly, Hugh (2006), 'Urban Water Pricing,' *Agenda* 13:1 (2006).
- Turvey, R. (1971), *Economic Analysis and Public Enterprise*, Allen and Unwin, London.

VCEC (2008), Victorian Competition and Efficiency Commission 2008, *Water Ways: Inquiry into Reform of the Metropolitan Retail Water Sector*, final report, February.

WSAA (2008), Water Services Association of Australia, WSAA Report Card for 2007/2008: Performance of the Australian Urban Water Industry and projections for the future. Available at www.wsaa.asn.au/

Yarra Valley Water, 2004 Residential End Use Measurement Study, available from www.yarravalleywater.com.au, accessed September 23, 2008.

Young, M., McColl, J. and Fisher, T. 2007, 'Urban water pricing: How might an urban water trading scheme work?', Droplet 5, University of Adelaide, February.