IPART
New South Wales

Independent Pricing and Regulatory Tribunal

Submission to Inquiry by Productivity Commission to Australia's Urban Water Sector

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1 Introduction and summary

We welcome the opportunity to be able to participate in the Productivity Commission's inquiry into Australia's Urban Water Sector.

This submission seeks to follow the chapters discussed in the Commission's Issues Paper. This necessarily leads to some repetition in our comments and recommendations. Where appropriate each chapter finishes with recommendations of changes that could be introduced to improve the operation of the urban water industry.

The drought highlighted failures in institutional arrangements for balancing the demand for and supply of water services.

In addition, the efficiency gains made in the 1990s and early part of this decade have not been sustained. Lack of competitive pressure, higher standards and water security concerns are driving higher costs.

We see merit in the following regime for industry structure and competition.

- Governments should ensure that demand and supply projections are published for water each year, including estimates of the total and unit costs of each augmentation option. The National Urban Water Pricing Principles that were agreed to by COAG in 2008 provide some useful guidance; they emphasise continuous updating of information, selection of options based on a clear and careful comparison of all demand and supply options and the use of pricing and markets where feasible.
- Water supply agencies seeking additional supply should put their needs to tender by requesting bids for supply of a given quantity and quality.
- There should be an effective regime for access to the natural monopoly pipes and facilities so that others can compete to supply the widest range of services to end use customers.
- Whenever possible there should be a structural separation between bulk water supply and water retailers; in other cases an accounting separation should be implemented.
- If sufficient actual or potential competition is apparent consideration could be given to separating water retailers from the natural monopoly pipes and facilities, after giving appropriate weight to the initial and continuing transaction costs.
- Postage stamp pricing needs to balance administrative efficiency and the need to encourage clear demand and supply signals.
- Pricing should be based on full cost recovery; in particular the usage price for water should be based on the long run marginal cost of supply [1].

[1] Where there are no capacity constraints long-run marginal cost (LRMC) approximates short-run marginal cost (SRMC).

A major cost driver for the industry is government imposed standards. Minimum standards are necessary to protect public and environmental health and to provide consumer protection. These standards should not be set in isolation of consideration of their benefits and costs and the community's willingness to pay.

Key issues are security of supply and drought response. In this context, the balancing of supply and demand has both a long term and a short term perspective.

The relative roles of restrictions and pricing should be seen in this context. Restrictions are not the solution to long term imbalances in demand and supply. However, they have strong community support particularly for use in drought.[2]

Scarcity pricing is mooted as an alternative to restrictions. Scarcity pricing could be introduced solely at the wholesale level or at both the wholesale and retail levels. If introduced solely at the wholesale level it would create incentives for the retailer to source alternative supplies and/or pursue demand side options including reducing leaks and encouraging improved water use efficiency. At present, in the absence of restrictions, there are strong financial incentives for a retailer to sell more water without consideration of short term supply shortages.

There are significant transactions costs to introducing scarcity pricing at the retail level. The reach and sophistication of meters would have to be greatly improved if it was to have any substantial effect. At present many tenants do not receive water bills and customers in multi occupancy dwellings do not receive separately metered bills. Water meters are read in arrears and billed at a frequency no greater than once a quarter (with the exception of large industry and commercial users).

While there is in principle a role for both scarcity pricing and restrictions the mandatory application of scarcity pricing at the retail level would require strong supporting welfare policies for the poorest households. Preferences and price elasticities vary between water users and their different water uses (eg, indoor /outdoor).

There may also be scope for innovative pricing options that are offered on a voluntary basis. For example, electricity bill discounts are offered to industry for interruptible loads.

The issues facing the non metropolitan urban water industry vary greatly within that sector. Areas of growth face similar issues to the major metropolitan centres. However, many country towns feature a declining and ageing population and poor infrastructure. The increasing costs of service provision will have to be borne by an ever declining and increasing welfare dependent population. This situation is not unique to the provision of water services to these communities.

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2 NSW Government "*Updating the Metropolitan Water Plan, community Views – summary of findings from Phase 1 of consultation*", p 2.

The COAG process has advanced the adoption of independent price regulation and economically sound pricing principles. The establishment of a national regulator is particularly suited to situations where there are national or interstate markets. Urban water supply is generally regional or catchment based. While there is a need to establish national guidelines (eg, water quality) and common approaches to pricing, there are disadvantages to having a national regulator for regional and state based operations. In particular, too uniform a national approach at this stage risks losing the advantages that can come from diversity and experimentation at the State level.

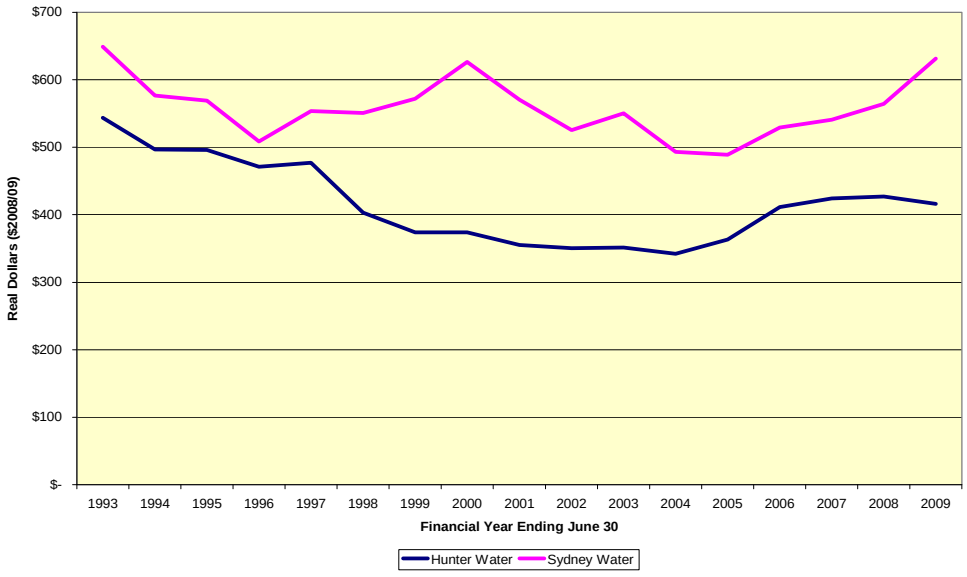
As a result of recent developments, the water industry has changed from reliance on a single water source (storage in large dams) to a range of sources including desalination, recycled water for non-potable uses, demand management and transfers between rural and urban water users as well as storage in dams. Because of the increasing use of recycled water, the supply of water and wastewater, and their pricing, are more closely related than in the past.

2 Efficiency

2.1 Efficiency

The NSW metropolitan water industry made significant efficiency gains throughout the 1990s and early 2000s. For example, Sydney Water's operating costs were less in 2005 than they were in 1993, measured in real terms.

Figure 2.1 Operating Cost per property ($2008/09)



Note: Excludes accruals for employee and other provisions.

Data source: Sydney Water and Hunter Water 2008/09 Annual Information Return (AIR) to IPART.

However, the water industry has not sustained those gains in recent years. Costs have increased driven in part by higher standards; funding of otherwise non-financial recycled water schemes; and major capital additions to improve security of supply. Much of this increase reflects increased capital works.

The following table which has been extracted from IPART's most recent price determination for Hunter Water shows the cost drivers underlying the price increases for a typical Hunter Water domestic customer.

Contribution of requirements for operating expenditure and capital investment to the expected increase in a typical residential customer's bill, 2008/09 to 2012/13 ($2008/09)

		IPART determination
Operating expenditure		**$44**
Capital investment:		
Tillegra Dam	$32	
Subsidy for Kooragang Island Recycled Water Scheme	$0	
Sewer projects required to meet DECC standards	$26	
Sewer transport and treatment plant upgrades	$53	
Water supply system development and upgrades	$19	
Other system augmentation, and water resource capital expenditure	$30	
		$160
Removal of developer charges, (all costs recovered through customer prices)		**$16**
Total		**$220**

Note: Typical bills are based on households with water and sewerage services consuming 200kL of water per annum.

The costs of collection, treatment and disposal of wastewater are major contributors to the industry's costs. Higher standards are being introduced for the transport and discharge of wastewater to further protect the environment.

Sales growth has been curtailed through a combination of changes in the customer base, improved efficiency in water use and water restrictions because of drought. The aggregate use of water in Sydney was approximately the same in 2009/10 as it had been in 1976.

Potentially, greater competition could deliver lower costs and introduce innovative solutions to service provision. Available studies (refer to IPART's literature review) of the economies of scale and scope in the water industry suggest that a water agency the size of Sydney Water, for example, may not suffer from diseconomies of scale. It is not clear that there would be benefit from separating the water business from the wastewater business.

Already, the water agencies put out much of their capital works and an increasing proportion of their operating activities (eg, metering, maintenance) to competitive tendering. BO[3] (eg, Sydney desalination plant) and BOOT[4] (eg, Sydney water filtration plants) arrangements have been adopted for some major capital works.

These actions help minimise the costs for a given solution but do not ensure that the adopted solution is the most efficient or that the institutional arrangements underlying service delivery are efficient.

3 Build and operate.

4 Build, own, operate and transfer.

The NSW Government passed the Water Industry Competition (WIC) Act in 2006 to harness the innovation and investment potential of the private sector in the water and waste water industries.

The core reforms introduced by the WIC Act are:

- the establishment of a new licensing regime for private sector providers of reticulated drinking water, recycled water and sewerage services
- provisions to authorise IPART to arbitrate certain sewer mining disputes
- the establishment of a third-party access regime for water and sewerage infrastructure.

To date, the Water Industry Competition Act has encouraged competition through the provision of new and incremental services. In addition, it has provided a licensing regime which has allowed recycling water projects and some privately owned wastewater projects to operate. The Sydney desalination plant has recently been licensed under WICA. However, the incumbent government owned utilities continue to dominate the NSW water market.

2.2 Competition for the market

The water industry is capital intensive and elements of the industry display natural monopoly characteristics. This especially true of the transport networks for water and wastewater. A starting point for reform is accounting separation of the natural monopoly elements of the industry from the potentially competition aspects (including supply of bulk water, water and wastewater treatment and retail supply). These separate accounts should be published.

While duplicating natural monopoly services is inefficient, it does not preclude competition for the market i.e. the sale, lease or contracting out of the monopoly business to a private owner/operator.

Because a private operator is involved, well designed regulatory arrangements that include both pricing and standard of service are required to make pursuit of the private interest by the owner or operator consistent with the public interest.

2.3 Comparative Competition

The vertically integrated water utility that supplied the city of Melbourne was split into three separate retail suppliers on a zonal monopoly basis. It has been suggested that there has been significant improvement in efficiency as a result of the pressure on management to outperform neighbouring utilities. Before such a regime is introduced elsewhere, it is imperative that expected efficiency gains from comparative competition outweigh the potential losses from the duplication of administration costs, and any scale efficiency loss. It should also be considered as to whether comparative competition can be achieved without zonal disaggregation

through transparent and publicly accessible benchmarking of inter-catchment utilities. Whilst the National Performance Reports are a good first step, the possibility of regulators sharing and publishing detailed information from annual information returns to the regulator should also be considered as an alternative to disaggregation. If consistent performance reporting can be developed, interstate utilities may provide useful benchmarks.

2.4 Competition in the market

In the electricity industry the monopoly components (transmission and distribution) were separated from the non monopoly components (generation and retail). The water industry is more capital intensive than the electricity industry and the monopoly components comprise a more significant component of the industry's costs.

However, the increasing costs of new water supplies and the possibility of offering a more varied menu of services[5] creates greater opportunities for introducing competition than in the past.

The public availability of information on demand and supply forecasts and the costs of known options is essential for this purpose.

The NSW government regularly publishes its metropolitan water plan for Sydney including its preferred options for balancing demand and supply. This action was taken as a consequence of the drought and in recognition that even in the absence of drought there was a growing imbalance between demand and supply. However, as a consequence of the plan the government has largely determined the mix of solutions and largely by whom and how those solutions are to be delivered for the next few years. This does, however, provide an opportunity to consider how the next round of augmentation can be managed.

There is the opportunity, particularly with the passing of the *Water Industry Competition Act 2006* which encompasses an access regime, for the introduction of greater competition at this level.

We particularly see scope for independent bulk suppliers of water. The first two independent suppliers may well be the SCA or its disaggregated dams, and a standalone desalination utility.

5 For example, different grades of water and different levels of reliability of supply.

2.5 Recommendations

1. The urban water industry includes both natural monopoly and potentially completive elements. It is important to retain the advantages of economies of scale in the natural monopoly elements while obtaining the benefits of competition where possible. Careful consideration should be made of the benefits and costs of competition before it is introduced.
2. Separate accounts should be published for the natural monopoly and potentially competitive segments of the water industry.

3 Supply of water and wastewater services

The objective of the water and wastewater industries is to provide the services that people want at minimum cost. Because of the importance of water, careful attention needs to be paid to defining public health, environmental and security of supply standards. The definition of minimum standards is a role for governments; above the minimum consumer preferences come into play. In all cases standards should be set so that the marginal costs of increasing standards by a small amount equates to the marginal benefits.

Once standards have been set, they should be achieved at minimum cost. Achieving this involves a judicious mixture of information provision to the market, regulation of natural monopoly elements and competition. We are now entering a new phase in which the community's need for water will increasingly be met from a diverse range of sources each of which has different costs and benefits. Experience in operating in these new conditions is still being gained and views about the roles of information provision, regulation and competition understandably differ at this stage. A number of experiments are being undertaken in Australia and we will have a better understanding of these possibilities in several years time.

Some preliminary comments are made below:

3.1 The Provision of Information & Competition

3.1.1 Information Position

The water market will work better if there is good information about the demand and supply of water and the options that are available. This appears to be a role of Government. A government agency that is independent of the incumbent water providers should publish demand and supply projections for water each year. At the same time this Government agency should publish the total and per unit costs of each augmentation option each year.

The National Urban Water Planning Principles that were adopted by COAG[6] provide some useful guidance on how the balance between the demand and supply of water can be achieved.

1. Deliver urban water supplies in accordance with agreed levels of service.
2. Base urban water planning on the best information available at the time and invest in acquiring information on an ongoing basis to continually improve the knowledge base.

6 http://www.environment.gov.au/water/policy-programs/urban-reform/nuw-planning-principles.html, accessed on 29 October 2010.

3. Adopt a partnership approach so that stakeholders are able to make an informed contribution to urban water planning, including consideration of the appropriate supply/demand balance.
4. Manage water in the urban context on a whole of water cycle basis.
5. Consider the full portfolio of water supply and demand options.
6. Develop and manage water supplies within sustainable limits.
7. Use pricing and markets, where efficient and feasible, to help achieve planned urban water supply/demand balance.
8. Periodically review urban water plans.

In particular, these principles emphasise continuing updating of information, selection of options based on a clear and careful comparison of all demand and supply options and the use of pricing and markets where possible.

Additional water should be obtained through a competitive tendering process. Under this process, the water agency would require bids to provide a certain amount of water of a given quality. Incumbents and other proponents of projects would be treated on an equal basis. Competitive sourcing arrangements are discussed in more detail in, for example, IPART's 2005 report on our investigation into water and wastewater service provision in the Greater Sydney region. In that report we argued that the use of competitive sourcing to procure additional water supplies has the potential to increase the level of competition and innovation in Sydney's water and wastewater industry. This approach has been used successfully in other industries to create opportunities for new entrants to participate in the industry and strengthen incentives for innovation. It can be implemented without significant change to Sydney's current water structure. Therefore it is a logical first step to opening the industry up to competition. IPART's 2005 report discusses in some detail how competitive procurement can be introduced more broadly in the Sydney region. In that report we recommended that Sydney Water should be required to use "more innovative, outcomes-based competition procurement". This could be supported by a requirement for the water agencies to purchase water in the most economically efficient manner.

Water Quality Standards

Governments or government-appointed authorities are charged with setting and ensuring compliance with health, environmental, and service standards for water and sewerage services. These standards should be subject to cost-benefit analysis. It is inefficient to raise such standards beyond the point where the costs to the community of increasing standards exceeds the value which consumers place on the higher standards.

In the case of potable water quality, the Australian Drinking Water Guidelines (ADWG 2004) set out a management framework to assure safety at the point of use. These guidelines are recommended by a panel comprising both health and engineering expertise. This process is operating satisfactorily.

There should be absolute minimum standards for the quality of water from all reticulated town water supply systems. However, the costs of surpassing these standards may be more or less than the benefits from surpassing these standards in different town water supplies. Therefore in maximising societal benefits we are likely to see different service standards across town water suppliers above absolute minimum standards.

Effluent Discharge Standards

Increasingly stringent requirements are being placed on urban water utilities' discharges to inland waterways. These requirements should be subject to transparent and rigorous cost-benefit analysis and there should be consideration of whether the same environmental outcome could not be achieved at a lower cost. For example, the early planning processes for an expensive capital upgrade to treat inland effluent discharges should include cost-benefit analysis of all available options to ensure that upgrade represents value for money. Other options might include:

- Piping the effluent to an alternative discharge point where lower levels of treatment may be adequate for the receiving environment.
- Offset increases in discharges by reducing the equivalent discharges from other industries impacting the same waterway (eg, turf farms, market gardens, dairies) at lower cost
- Put in place third-pipe recycled water reticulation systems where this is cost effective.

Where the cost of more stringent requirements exceeds the benefits to society they should not be undertaken. It is critical that such analysis is undertaken early in the planning process rather than only as part of the legislative environmental impact assessment.

As part of its activities IPART undertakes annual audits of the activities of the major water utilities in NSW. These audits have consistently found high or full compliance with current drinking water and environmental requirements. However, continuing vigilance is required given the importance of water and sewerage services to public health.

Asset Management Standards

The provision of efficient and effective water and sewerage services requires that the assets used to provide these services are optimally managed. As an example, the recently developed Operating Licence for Sydney Water requires the utility to demonstrate that its asset management practices incorporate:

a. robust and transparent methodologies for determining and prioritising licensing and other regulatory requirements and current and future service levels as well as identifying the infrastructure needed to achieve those service levels and requirements;

b. robust, transparent and consistent processes, practices and programs to ensure sustainable delivery of service levels and regulatory requirements, based on sound risk management practice, including:

- asset inventory
- asset planning incorporating both business and technical risk assessments
- maintenance of adequate records and robust and reliable data
- asset replacement, rehabilitation, augmentation, creation/acquisition and/or substitution (asset and non asset substitutions)
- management of service provision, including contracts
- monitoring and condition assessment
- proactive and reactive maintenance
- operations
- training and resourcing
- contingency planning covering both emergency management and business continuity, and
- asset rationalisation and disposal

c. robust and transparent decision making processes that balance acceptable risk with cost and service provision to achieve prudent, efficient and effective operating and capital investment

d. an approach that achieves the lowest cost of service delivery through the effective life cycle management of the asset base, and

e. robust and transparent processes of review and continuous improvement in asset management.

These provisions are consistent with current best international practice.

These provisions are appropriate to a large utility. However, the essential features of rigorous analysis and processes that link service requirements through a risk management process to operational outcomes are required for all water and sewerage service providers.

3.2 Recovery of efficient economic costs

The important principle here is full recovery of efficient costs only. Provided that standards are correctly designed (see above), the next step is to establish the minimum costs (both operating and capital) to achieve these standards. These costs comprise operating costs, depreciation (an allowance for capital consumed) and a market based return on capital. It is important that only efficient costs are recovered through prices. IPART's views on price structure are discussed further in Chapter 4.

As agreed as part of the 1994 COAG Strategic Water Reform Framework and the 2004 National Water Initiative, all efficient costs of water and sewerage activities should be recovered through a combination of developer charges, and fixed and usage charges. Inefficient costs should be borne by the water utility concerned and ultimately by their owners.

IPART is concerned that full cost recovery is not being achieved due to subsidies from local, state or federal Governments that distort price signals. However, IPART recognises that government assistance may be necessary in meeting minimum standards in some communities. However, this should be done through transparent customer service obligation (CSO) payments rather than accepting non-commercial rates of return on capital or cross-subsidies. Subsidies for capital expenditure should be unusual.

3.3 Urban-Rural Trading

In principle, water trading should be considered with all other supply augmentation options for urban water supplies.

In a draft of its 2005 paper[7] looking at rural-urban water trading, the CSIRO estimated that the cost per kL of piping water from the mid-north coast of NSW to Sydney was in the order of $2.60 ($2005). At the same time, the LRMC of desalinated water was approximately $1.90 per kL. This estimate included the costs of powering the plant entirely by renewable energy. It is unlikely that the ratio of the costs will move in favour of piping the water from the mid North Coast of NSW over desalination. Obtaining water from the North Coast is unlikely to be a cost effective option for the Sydney Basin for the foreseeable future.

As illustrated by the above, a major difficulty with rural to urban trade in the Sydney context relates to geography. For instance, the Sydney Catchment Authority has the capacity and the entitlement to draw small amounts of water from the upper reaches of the Macquarie River to supply the upper Blue Mountains. The limitation on trade, however, has been the lack of water resources in the area.

7 CSIRO (2006), Without Water – The Economics of Supplying Water to 5 Million more Australians, May, p 17.

This same limitation on water availability and the inability to physically transfer water between catchments or over long distances, or even from downstream to upstream, has been a constraint on transfers between rural and urban areas.

In the Hawkesbury Nepean system there is likely to be scope for Sydney Water or the Sydney Catchment Authority to purchase any water entitlements held by irrigators that may become available. However, there are still institutional barriers which limit the ability to transfer for example. IPART considers that these barriers should be removed.

Also water, when transferred, retains its characteristics. The security of irrigation water is less than that enjoyed by town water. Therefore, any transferred water will not enjoy the same security as other town water supplies.

3.4 Integrated Water Management

The options of treating stormwater and recycling effluent for either potable or non-potable re-use by industry and households should also be considered. However, a few points are worth noting.

Stormwater Re-Use

Sydney receives an average annual rainfall of 1214 mm per annum[8]. In comparison, Camden, which is 40km south-west of Sydney, receives an average of 860mm per annum. Much of the rainfall in the Sydney Basin comes from south-easterly weather events and summer thunderstorms. These deliver relatively large amounts of water in a relatively short timeframe. This water would need to be stored for processing for either potable or non-potable use and would require further separate storage if it were not to be treated to potable standard.

It has been suggested that there are considerable difficulties in removing many heavy metals, pathogens and toxins from stormwater. The large capital costs of storage given the intermittent supply and significant treatment costs are unlikely to see this to be a viable option except in isolated applications eg, golf course and playing field irrigation. Similarly, there are very few avoided costs in the treatment of stormwater as for the most part this treatment involves little more than screening of stormwater outlets or passage through natural or artificial wetlands. Therefore the LRMC of stormwater re-use can be compared directly with dams, desalination and other options.

8 http://www.bom.gov.au/climate/current/annual/nsw/sydney.shtml, accessed 18 October 2010.

Wastewater re-use (recycling)

Unlike stormwater re-use wastewater recycling has a predictable, constant and manageable supply. There are high processing costs involved and if the water is not treated to potable standards and returned to the main water storage dams (indirect potable reuse) then a duplication of the water distribution network for residential customers is required for non potable (mainly outdoor) users. Given that only around 30% of annual water use in Sydney is for outside purposes, the real costs per kL of providing a second pipe network are likely to be high. These distribution costs per kL are likely to be significantly less for large scale industrial re-use than for residential.

Again, this option should be considered along with all others and should be subject to rigorous cost benefit analysis[9]. This cost-benefit analysis will necessarily include an assessment of what may be significant avoided costs from recycling rather than discharging treated effluent to inland waterways. IPART has identified a methodology for identifying and quantifying these avoided costs.[10]

3.5 Real options approach

The real options approach borrows from finance theory the idea that the right but not the obligation to undertake future action is valuable. Extending the real options approach to water infrastructure suggests that a small scale investment in a low volume water production facility (or demand management) during a drought may forestall a large investment in a dam or a desalination plant that may not be needed for some time into the future if at all. The cost of the small scale plant can be seen as the cost of buying the options. The real options approach is valuable in the face of uncertainty (eg, about rainfall in the future). It is of less value when there is a chronic demand/supply imbalance.

The real options approach provides advantages in indicating when augmentation can take place. It has been used to calculate "trigger points" – where dams are sufficiently empty to justify investment in expensive alternatives such as desalination plants. This calculation helps to ensure that augmentations are not commenced well before a trigger point is reached and therefore will not waste capital on excessive capacity. Conversely, undertaking the calculation will assist in assessing the time at which options with low costs but big lead times can be taken up.

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9 With recycled water costs averaging between $3.50 and $5 per kL for residential properties this option is unlikely to be the least cost option given current technologies in the absence of offsetting future avoided costs in potable water and wastewater services.

10 IPART, *Pricing arrangements for recycled water and sewer mining,* September 2006

These calculations are complex and can provide only a guide to action. Essentially it is necessary to balance the risk of running out of water with the cost of undertaking augmentation (including the loss of the option value). Community concerns about running out of water during a period of drought are highly relevant here. In the case of the Sydney Water desalination plant there were a number of additional considerations. Construction of desalination plants is an international business and there is limited supply capacity, with a large number of overseas projects under consideration. Delaying the decision to build the Sydney desalination plant would have greatly increased the risk of running out of water and would also have significantly increased the costs of construction.

To apply the real options approach the demand and supply projections for the community and the estimates of the cost of augmentation should be updated periodically. Lead time for augmentation options also need to be calculated. As noted elsewhere in this submission, this emphasises the importance of providing accurate and up to date information to the market.

3.6 Recommendations

1. COAG's National Urban Water pricing principles provide useful guidance on balancing the supply and demand for urban water.
2. An important task for government is to periodically inform the community about the projected demand and supply of water and the cost of augmentation options.
3. Water agencies (such as Sydney Water) should be required to obtain additional supplies of water competitively. This would be supported by a requirement that the water agencies must purchase water in the most efficient manner possible, having regard to the long-run costs.
4. Drinking water and effluent discharge standards should be subject to rigorous cost/benefit analysis prior to adoption.
5. Clear asset management obligations should be placed on all water and sewerage service providers.
6. Impediments to urban-rural trade should be identified and removed.

4 Consumption and pricing

All efficient capital and operating costs including the costs of meeting environmental standards (which IPART accepts as a proxy for externality costs) should be fully recovered through water and sewerage prices.

More particularly, a market rate of return on the capital invested and a return on the capital consumed (depreciation) should form part of the revenue businesses can recover in prices. Part of the capital and operating costs that comprise this revenue requirement will necessarily be incurred to mitigate or avoid environmental externalities.

The COAG 1994 strategic water reform framework, the 2004 National Water Initiative (NWI) and the 2010 NWI Pricing Principles provide a sound framework for progressing the establishment of efficient pricing regimes. Attention needs to be given to ensuring that these reforms are effectively implemented in all jurisdictions.

4.1 Environmental and other Externalities

IPART includes the cost of a water agency's compliance with environmental requirements in the total amount of costs that are to be recovered through prices. We also allow water extractors including urban bulk water providers to recover the costs of natural resource management activities from customers. Provided that environmental standards and water management activities are undertaken at the right levels for meeting the environmental concerns, the efficient costs of expenditure by water agencies to meet environmental requirements will be included in prices [11].

However, the environmental costs that result from the abstraction of water from rivers are not included in prices. These costs do not represent an expenditure by a water agency. Inclusion of a water abstraction charge in water prices therefore forms part of taxation policy and is a decision for government.

Economic regulators do not have the expertise to determine drinking water quality standards, or the assimilative capacity of receiving waterways to receive treated effluent discharges. In both cases they rely on the expertise of others.

In the case of drinking water standards, IPART allows the full efficient costs of meeting these standards into the annual revenue requirement of the water utilities that it regulates.

[11] However that water management activities are undertaken to provide benefits to users as well as the environment.

In the case of wastewater discharges, the situation is similar but distinguishable. IPART is of the view that any change in standards should be subjected to rigorous cost-benefit analysis by the responsible agency and that these standards should also be achieved at least cost. For example, the environmental regulator in NSW (DECCW) has the expertise available to determine the assimilative capacity of receiving waterways to accept effluent. In the case of the Hawkesbury-Nepean river system, IPART plans to work with DECCW to ensure that water quality outcomes are achieved at least cost to the community and the costs and benefits of the full range of options are examined.

4.2 Efficient Pricing

4.2.1 Location-specific versus postage-stamp pricing

A balance needs to be struck between achieving cost reflectivity and minimising administrative costs associated with calculating and implementing prices. Pricing that varies according to location is likely to reflect more accurately the costs of servicing different groups of customers than pricing that is uniform across the area of operators of the supplying authority. However, the administrative costs of calculating and implementing location specific charges for small and medium sized customers, are likely to be considerable.

The main benefit of moving from postage stamp pricing comes from the supply side. That is, new suppliers can respond to prices that reflect the actual cost of supply and not some averaged (and, in outer areas) likely lower prices that could preclude more efficient arrangements.

On the demand side it is very difficult for customers to respond to locational price signals after they have bought houses and established links in a community. These consumers have limited opportunity to respond to price signals and may well consider that to move away from uniform pricing would be unfair.

These arguments are less strong for new than for existing customers. While we have set uniform periodic charges within a water utility's area of operation for water and wastewater we have developed other mechanisms that signal to customers the costs of augmentation. These costs vary by location.

Developer charges are a useful mechanism for providing cost signals that vary by location (ie, upfront charges that are paid by developers). Developer charges work in combination with the periodic charges that are charged once people move into new housing to recover the excess of costs above the average cost for the system as a whole of servicing particular developments. However, in December 2008, the NSW Government set the maximum developer charge for water and sewerage for Sydney Water and Hunter Water at zero. Local Government water authorities are still permitted to levy developer charges.

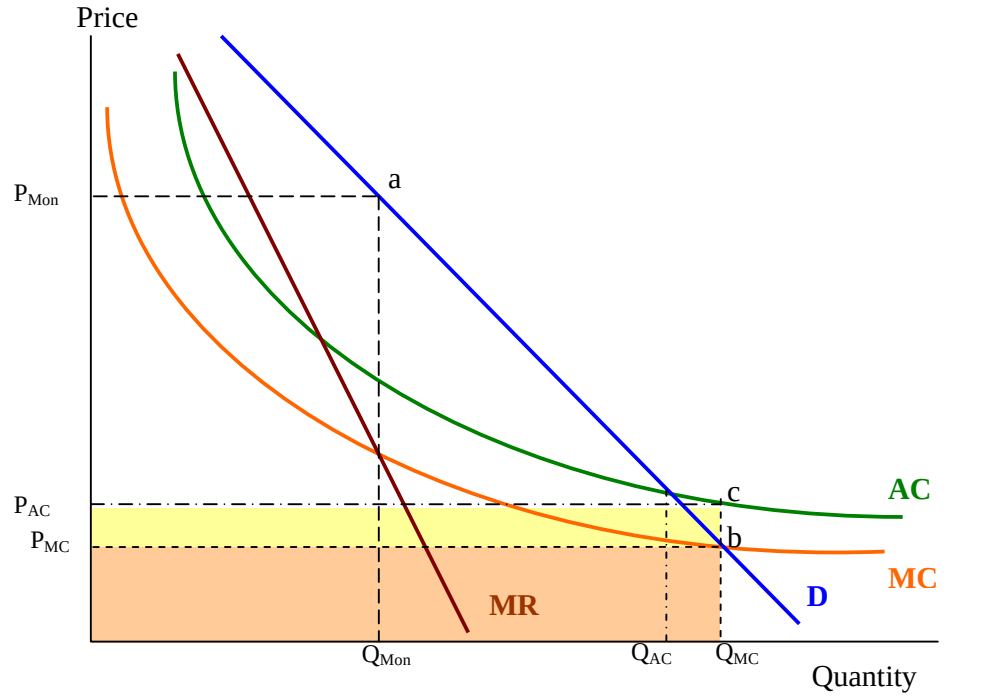
Our arrangements for recycled water allow the costs of providing this new service to vary by location.

4.2.2 Two-Part Tariff

Once the total annual revenue requirement of a water utility has been decided upon, economic theory indicates that the usage price should be set equal to the marginal cost of supply. However, this is unlikely to recover the revenue requirement due to the large fixed cost components associated with water and sewerage services. In Figure 4.1 below the average cost curve is above the marginal cost curve for the whole of the output range illustrated. This means that marginal cost pricing alone will, at no stage, recover total costs. Theory suggests that to recover all the efficient costs the usage charge should be set equal to marginal cost and a service (fixed) charge set to recover fixed costs. The attraction of this approach is:

- Full cost recovery.
- No revenue volatility as costs change in direct proportion with sales.

Table 4.1 Two-part tariff (usage charge = marginal cost)



Note: A profit maximising monopolist would have a strong incentive to restrict supply (to QMon) and increase price to (PMon) in the absence of regulation. The water businesses have complex objectives and, while they are expected to behave commercially, are not simply concerned to maximise profits. In this context an important objective of regulation is to assure the community that the agency is achieving Society's objectives at minimum costs.

Two part tariff arrangements for urban water are consistent with the 1994 COAG endorsed Strategic Water Reform Framework, the 2004 National Water Initiative and the 2010 NWI Water Pricing Principles.

4.2.3 Long-run marginal cost (LRMC)

We have often found it useful to set the usage component of the price equal to the LRMC of the next increment of supply. This is to signal to customers the costs of consuming an extra unit of water. If demand still exceeds supply when the usage charge is set to LRMC then augmentation of supply is a superior choice to further restricting supply either by price or restrictions on use. It indicates that consumers desire the augmentation and are willing to pay for it.

IPART's approach to calculating long-run marginal cost is to divide the present value of the life cycle costs, including capital and operational expenditure, by the discounted value of the benefits, measured in kilolitres. There is always judgement to be exercised in selecting the discount rates that apply to the costs and the benefits, and in choosing between expected quantities of supply as opposed to increases in supply capacity or increases in safe system yield (sustainable yield).

4.2.4 Inclining Block Tariffs (IBT)

From time to time regulators have adopted inclining block tariffs. The intention is generally to supply non-discretionary demand at the first tier price and discretionary demand at the second or higher tier prices. IPART has used inclining block tariffs for a relatively short period of time prior to the NSW Government contracting to build the 250ML/d desalination plant at Kurnell. This was done as part of a concerted effort by government to show that all viable options had been explored to save water prior to contracting construction. There are a number of shortcomings and disadvantages with inclining block tariffs, including:

- They are not cost-reflective.
- If there are augmentation options available, there is no justification for setting the usage charge above LRMC.
- IBTs tend to discriminate against large families.

We phased out the IBT for Sydney Water at the 2008 Determination.[12]

[12] IPART, Review of Prices for Sydney Water Corporation's Water, Sewerage, Stormwater and other Services, June 2008.

4.2.5 Scarcity pricing

Under scarcity pricing the usage component of the charge for water depends inversely on the quantity of water in the storage. The usage price would be high when the amount of water in the dam is low, and vice versa. Scarcity pricing is seen as an alternative to water restrictions aimed at managing short-term water scarcity due to drought.

During IPART's inquiry for the 2008 Sydney Water Determination we were made aware of work in the area of scarcity pricing by Grafton and Ward.[13] IPART staff undertook significant analysis of the issue before IPART made its decision to not adopt scarcity pricing for retail customers. Subsequently we have followed the debate and have considered the more detailed models that have been developed by authors at ABARE and the Productivity Commission.

Benefits of scarcity pricing

One benefit of scarcity pricing is that it avoids (or perhaps reduces) reliance on water restrictions during periods of drought. This is important because water restrictions may become less effective if they are continued for too long. In addition, water restrictions cause a loss of economic efficiency because water use that consumers value in excess of the cost of production is not allowed to take place. Grafton and Ward have estimated that there is a loss to the community of $235 million per annum because restrictions and not price is used to restrict water demand in Sydney.

Some more recent work emphasises the relationship between scarcity pricing for water and the water agency's investment plans. Scarcity pricing provides a useful signal as to where investment to augment water supplies is required. If investment takes place, however, the extent of scarcity in future will be reduced. If an optimal investment plan takes place, however, a very high price will be unusual even under a scarcity pricing approach. Pricing based on LRMC may be a reasonable approximation to scarcity pricing most of the time if investment plans are broadly optimal.

Conditions for scarcity pricing to be effective

For scarcity pricing to be effective the following conditions must occur:

- People must be able to respond to changes in price. For essential water use the price elasticity of demand may be close to zero.
- There should be broad community acceptance of scarcity pricing in preference to water restrictions.
- The transaction/administrative costs should not outweigh the benefits.

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[13] Grafton, R.Q. and Ward M., Prices Versus Rationing: Marshallian Surplus and Mandatory Water Restrictions, October 2007.

Ability of customers to respond to price

There are few good substitutes for essential water use and demand elasticities are likely to be low. However, rainwater tanks provide an alternative for garden use. We understand that the costs of rainwater tanks are around $5.50 a kilolitre. This may provide a ceiling on the cost to which water prices can be raised for a substantial period of time.

Estimates of Commercial/Industrial demand responsiveness

Estimates of the price elasticity of demand for water for businesses are highly inelastic and in the order of only -0.05[14]. This is most likely due to commercial and industrial demand for water being a derived demand related to the demand for final goods. For most business water use is only a small part of the costs of production. Therefore little demand response will be seen from commercial/industrial customers.

Estimates of residential demand responsiveness

Table 4.1 presents some research on the price elasticity of demand for water. These estimates have been drawn from a publication by the OECD in 1999 and some more recent studies. Most of the estimates of elasticity of demand are in the range of - 0.1 ~ -0.3.

[14] O'Dea, G., and Cooper, J., Water Scarcity: Does it Exist and can Price Help Solve the Problem?, IPART, January 2008 p 16.

4.2.6 Elasticity of demand for water

Table 4.1 Estimates of Residential Demand Responsiveness

Country	City	Method	Period	Elasticity	Reference
Australia	Sydney	TS/OLS	1959-94	AR: -0.13	Warner (1995)
Australia	Canberra	OLS		-0.22	Graham and Scott (1997)
Australia	Sydney	OLS	2001-2005	-0.35	Grafton & Kompas (2007)
Australia	Sydney		1994-2005	-0.17	Grafton & Ward (2007)
Australia	Perth	CV	1988	All uses -0.18	Thomas and Syme (1988)
				Indoor -0.05	
Denmark	Copenhagen	TS/OLS		-0.1	Hansen (1996)
France	116 Eastern Communities	CS-TS/Panel	1988-93	AP s/r -0.22	Nauges and Thomas(1998)
				AP l/r - 0.26	
				MP s/r -0.18	
France	Gironde	CS/OLS		-0.17	Point (1993)
Italy		CS	Mid 1990's	-0.24	Critelli (1998)
New Zealand	Auckland	TS		-0.08	Law (1986)
New Zealand	Auckland	CS	1976	-0.2	Law (1986)
New Zealand	Auckland	CS	1981	-0.24	Law (1986)
New Zealand	Christchurch	CS/CBS	1980-92	-0.29	Welsh (1991)
Various	Various	Meta		Median = -0.35	Dalhuisen et al (2003)
Korea		TS	1998	-0.29	Kim (1998)
Sweden		CS/TS/Panel	1980-92	AP l/r -0.20	Hoglund (1997)
				MP l/r -0.10	
US	Wisconsin	CS/OLS		-0.12	
US	Illonois	CS/SE		(-0.27ap:-0.42mp)	Chicoine et al (1986)
US	Tucson	SE	1974-1980	AP l/r -0.25	Agthe et al (1986)
				M/P l/r -0.62	
US	Illonois	CS/TS OLS		0.48	Chicoine & Ramamurthy (1986)
US	Texas	CS/TS		IBR -0.86	Nieswiadomy & Molina (1989)
				DBR -0.36	
US	Tucson	CS/TS		-0.72	Billings and Day (1989)
US	Massachusetts	CS		-0.40/-0.45	Stevens, Milan & Willis (1992)
US	Santa Barbara	CS-TS/2SLS		-0.33	Renwick & Archibald (1997)
US	Numerous	Meta	Various	90% in Range 0.00 to -0.75	Espey, Espey & Shaw (1997)
US	7 South Western Cities	CS/TS	1984-95	Annual -0.15	Michelsen et al (1998)
				Summer -0.23	
				Spring -0.13	
				Autumn -0.18	
				Winter 0.02	

Legend			
TS	Time Series	**l/r**	Long-run
CS	Cross-sectional	**s/r**	short-run
Panel	Panel Data Techniques	**AR**	Average Revenue
CBS	Contingent Behaviour Survey	**AP**	Average Price
Ses	Simultaneous Equations	**MP**	Marginal Price
IV	Instrumental Variable	**IBR**	Increasing-block rate
2SLS	Two-stage Least Squares	**DBR**	Decreasing-block rate
OLS	Ordinary Least Squares	**CV**	Contigent Valuation
Meta	Meta Analysis		

Data source: (1) OECD (1999) *The Price of Water-Trends in OECD Countries*, OECD, Paris, p 134; IPART research.

(2) Cited Works.

The difference between the U.S. results and the European, Australian, Korean, Scandinavian and New Zealand results is interesting but it may be possible to reconcile these results. In Agthe et al (1986) the results of the regression analysis for consumer reactions were Long Run Average Price $\varepsilon_{Q,P}$ = -0.25 and Long Run Marginal Price $\varepsilon_{Q,P}$ =-0.62.

Theory would suggest that consumers maximise their utility by buying water up to the point where the marginal cost equals the marginal benefit. However, the R^2 (closeness of fit) were similar for equations to explore both marginal and average price. Michelsen et al (1998) found that people were responding to neither marginal price nor average price but a combination of both. Michelsen et al (1998) also found a relatively low price elasticity of demand where $\varepsilon_{Q,P} \leq -0.20$ in summer and $\varepsilon_{Q,P} \leq -0.10$ on an annual basis. The Billings and Day outlier result of $\varepsilon_{Q,P}$ = -0.72 needs to be viewed in the context of average annual water consumption in Arizona of approximately 700kL per annum.

Typical water price elasticities in California have been found to be approximately -0.2 for single dwellings, -0.1 for multi dwelling units and -0.25 for non residential properties (Gleick et al. 2005). For Seattle the same elasticities estimates were obtained for single dwellings and units while the non-residential sector exhibited elasticity of -0.23 (Seattle Public Utilities 2006).

Warner (1995) and Graham and Scott (1997) for Sydney and Canberra respectively are within the expected range based on international estimates[15]. It is possible that the variation between Sydney and Canberra is due to the relatively low average rainfall in Canberra. Canberra has a higher proportion of discretionary[16] outdoor sprinkler use and price in Canberra is therefore more sensitive to usage.

It has been suggested that consumers react to average price of water. This is because unlike petrol or ice cream, customers do not receive a price signal at the time of purchase, rather it can be up to 3 months before they receive a bill for that purchase. It is doubtful whether this would change if bills were sent on a more regular basis.

It has also been suggested that people react to average price because they look at changes in their total bill over successive billing cycles rather than changes in the constituent parts.

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15 IPART is awaiting completion of Demand Elasticity estimates from Sydney Water based on detailed temperature and rainfall adjustments. Sydney Water has advised IPART that the preliminary finding are showing highly inelastic demand with results of between $\varepsilon_{Q,P} \leq -0.10$

16 Non-discretionary demand is considered to be essential use of water for human consumption, cooking, bathing and washing clothes. Discretionary demand is all other forms of consumption such as washing cars, watering lawns and gardens, long showers and filling swimming pools.

Finally, in any discussion on elasticity it is important to remember that the findings of a study in one jurisdiction should not be applied more widely to others.

This points to the need for more empirical work to be undertaken into the price and income elasticities of water demands in urban water jurisdictions.

The importance of metering.

Results from around the world show that installing meters and charging by volume has significant impact on water consumption. Whilst the annual reductions vary between approximately 12% to 35%, the reductions in peak summer demand have been in the order of 30% to 60%[17]. These results are provided in (Table 4.2) below. In the absence of metering, water cannot be charged for on the basis of use. It is not surprising, therefore that the introduction of metering and billing on the basis of use has an important effect on the amount of water that is used.

[17] OECD (1999) Household Water Prices in OECD Countries, OECD, Paris. p 131.

Table 4.2 Impact of installing meters and volumetric charging on consumption

Type	Location	Country	Period	Comparision	Savings from Metering		Reference
Savings from Metering Individual Households							
TS	Ontario	Canada	1986-90		Summer Peak	37.0%	Anon (1992)
TS	Washington	USA	1998-91		Summer Peak	61.0%	Anon (1993)
CS	Various	UK	1988-92	7000 homes	Average	11.9%	Herrington (1997)
TS	Ilse of Wight	UK	1988-92	Metered Population rose from 1%-97%	Annual	21.3%	Dept of Energy (1993)
CS	Metering Trials	UK	1988-92		Hot Dry Summer	35.0%	Herrington (1997)
			1988-94		Wet Summer	19.0%	Herrington (1997)
TS & CS	Mataro	Spain	1983-93	25694 hh (M 29%-1983) with 39952 hh in 1993 M90%)	Annual	35.0%	Sanclemente (undated)
CS	Terrassa	Spain	1994-95	23400 UM hh - 34038 M hh	Annual	12.7%	Sanclemente (undated)
TS	Barcelona	Spain	1990-94	2927 connections	Annual	12.8%	Sanclemente (undated)
TS	East Anglia	UK	1990-		Annual	15-20%	Edwards (1996)
					Summer Peak	25-35%	
TS	Portland	USA	1993-94		Annual	10-12%	Dietz & Ranton (1995)
TS	New York	USA	1991-95		Annual	7%	Environment Agency (1996)
TS	Oaks Park	UK	1993-96	61 houses	Annual	28%	Mid Kent (1997)
					Summer Peak	~50%	
TS	St Peters	UK	1993-96	160houses	Annual	14%	Mid Kent (1997)
					Summer Peak	32%	
Savings from Metering Individual Apartments							
TS	Nancy	France	1980-82	220kL-120kL		45%	Roseberg (1994)
TS	Paris	France	1986-87	160kL-120kL		25%	Roseberg (1994)
TS	Rennes	France	1987-89	115kL-83kL		28%	Roseberg (1994)
TS	Copenhagen	Denmark	1990's			30-35%	Sanclemente (undated)
TS	Hamburg	Germany	-			15%	Kraemer & Nowell-Smith (1997)

Legend

CS Cross Sectional Study
TS Time Series Study
M Metered
UM Unmetered
hh Households

Data source: OECD (1999) Household Water Prices in OECD Countries, OECD, Paris. p 131.

Community Acceptance

Research by Sydney Water and the NSW Office of Water has consistently shown that people support water restrictions in preference to price as a way of rationing water.[18] Broadly, the community considers restrictions are an equitable way of sharing a temporarily scarce resource. They see it as a challenge for the whole community to shoulder together.

The popularity of water restrictions in the community generally is a relevant factor to consider when we face water shortages in the future.

18 NSW Government "*Updating the Metropolitan Water Plan, community Views – summary of findings from Phase 1 of consultation*",p 2.

Administrative and Compliance costs

It is sometimes suggested that, under the scarcity pricing approach, consumers should be given a limited "lifeline allowance" for non-discretionary purposes at a low price. Such a "lifeline allowance", to be equitable, has to be calculated on a per person rather than per property basis'. This would, however, require the water agency to keep track of how many people are in each dwelling.

Currently billing cycles are 3-4 months in duration meaning that the price signal arrives on average 6-8 weeks after consumption has occurred. Billing cycles would need to shortened considerably to establish a clear link between price and usage. It is unclear how often the price signal would be changed in response to storage levels. It has been suggested by proponents[19] that prices should only be adjusted once a year.

With the construction of the Kurnell desalination plant and the reassessment of inflows into Sydney's storages in light of the worst drought on record the sustainable yield of the Sydney supply system is such that supply will exceed demand for some time to come. Modelling shows that restrictions will only be in place in 3 years in 100. Level 3 water restrictions would only be in place less than 6 months in 100 years [20]. In considering scarcity pricing as an option, it would be necessary to assess whether the benefits adjusted by the probabilities just discussed outweigh the transaction costs.

The nature of inflows into Sydney's water storages is such that they deplete gradually and fill rapidly with major rain events. Scarcity pricing may be introduced one week when storages levels fall below 60% but storages may increase by more than 20% the following week. This can see scarcity prices in place for nearly 12 months when there is no scarcity, thus producing significant deadweight losses.

Cost recovery implications

Utilities typically expect to recover their costs either each year or on average over a fairly short price determination period. In the absence of such an expectation these businesses would rightly argue for significantly increased risk premiums in their rate of return.[21]

Under scarcity pricing the usage component of price would vary considerably depending on the level of storage in the dams. The fixed component would be changed in compensation but it is not practical to reduce the usage component below zero. If so the businesses would over recover their costs. This raises the issue of

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19 R.Q. Grafton presentation to AARES Conference, Sydney, 30 September 2010.
This modelling relates to the draft restrictions regime include in the 2006 Metropolitan Water Plan. A new regime was announced in the 2010 Metropolitan Water Plan. However, insufficient information is currently available about the new regime to replicate this analysis

20 Grafton and Ward's estimated efficiency loss of $235m per annum of level 3 restrictions needs to be adjusted for the probability of restrictions. This lowers the efficiency loss to $1.2m per annum.

21 *Review of Bulk Water Charges for State Water Corporation - Final Report*, June 2010, p 50.

what should happen to the excess revenue that the businesses earns because it is over-recovering its costs.

4.2.7 IPART's Modelling of Scarcity Prices

In 2008 we released a staff working paper that examined the need for and quantum of a scarcity price that would replicate restrictions. This modelling relates to the draft restrictions. This modelling relates to the draft restrictions regime included in the 2006 Metropolitan Water Plan. A new regime was announced in the 2010 Metropolitan Water Plan. However, insufficient information is currently available about the new regime to replicate this analysis.

This paper modelled demand elasticities ranging from -0.13 to -0.3 and lifeline allowances (not subject to scarcity price) of zero, 155 lcd and 220 lcd. The authors considered that a scarcity price should not be applied to demand that is not discretionary. 155[22] lcd is the estimate of the minimum required per capita consumption for Sydney[23] (220 lcd is average consumption).

Level 3 water restrictions were expected to achieve demand reductions of 20%[24]. The restrictions actually achieved reductions very close to this level at 17%.[25] The working paper found that with a lifeline allowance of 155 lcd and a demand elasticity of -0.13 the scarcity price necessary to replicate restrictions was $6.28 ($2007/2008). At the time of writing, the usage price was $1.34 kL ($2007/2008)[26]. A summary of the findings is presented below in Table 4.3.

22 It is possible that over time this level of 155 lcd for essential demand will reduce with the development of more water efficient technology.

23 O'Dea, G., and Cooper, J., Water Scarcity: Does it Exist and can Price Help Solve the Problem?, IPART, January 2008.

24 Sydney Catchment Authority Operating Licence, April 2000, p 48.

25 Sydney Water estimates that for 2008/09 water restrictions induced a 17% reduction in consumption. Sourced from http://www.sydneywater.com.au/AnnualReport/sustainability/water_efficiency.html accessed 21-10-2010

26 The calculated percentage increase in price to replicate level three restrictions was estimated at 369%.

Table 4.3 IPART's modelling of scarcity pricing

	Demand reduction (% of residential demand) [a]	Price elasticity of demand (PED)	Price increase (P_0= $1.34)					
			No entitlement		Entitlement = 155 litres/day [b]		Entitlement = 220 litres/day [c]	
Voluntary restrictions	2%	-0.3	7%	($1.43)	17%	($1.57)	52%	($2.04)
		-0.17	12%	($1.50)	31%	($1.76)	92%	($2.57)
		-0.13	16%	($1.55)	40%	($1.88)	120%	($2.95)
Level 1 restrictions	10 %	-0.3	35%	($1.81)	90%	($2.55)	269%	($4.94)
		-0.17	61%	($2.16)	159%	($3.47)	475%	($7.71)
		-0.13	80%	($2.41)	208%	($4.13)	622%	($9.67)
Level 2 restrictions	15%	-0.3	50%	($2.01)	130%	($3.08)	390%	($6.57)
		-0.17	89%	($2.53)	230%	($4.42)	688%	($10.56)
		-0.13	116%	($2.89)	301%	($5.37)	899%	($13.39)
Level 3 restrictions	19%	-0.3	62%	($2.17)	160%	($3.48)	478%	($7.75)
		-0.17	109%	($2.80)	282%	($5.12)	844%	($12.65)
		-0.13	143%	($3.26)	369%	($6.28)	1104%	($16.13)

[a] Assumes the entire residential demand reduction achieved since the introduction of water restrictions is due to those water restrictions. Demand reductions were calculated using the year ending 30 June 2001 as a base year.

[b] Entitlement based on a Sydney Water estimate of the consumption of a typical water efficient household with 3 occupants, during water restrictions. Specified on a per occupant basis (ie, 465 litres/3).

[c] Entitlement based on the current tier 1 allocation of 100 kL/ quarter (1100 litres/day) which was set to meet the non-discretionary needs of a 5 occupant household. Specified on a per occupant basis (ie, 1100 litres/5).

Summary of IPART's views on retail scarcity pricing

The following issues are likely to limit the practical reliance on scarcity pricing in balancing the supply and demand for water in the Sydney region.

- Recent modelling suggests that the supply of water in Sydney is expected to exceed demand until approximately 2030. Level 1 restrictions are expected be in place for no more than 8 months and level 3 restrictions for no more than 6 weeks in the next 20 years.[27]
- Residential demand elasticities for water mean that a scarcity price would need to be more than 350% higher than it currently is to replicate consumption reductions from level 3 restrictions.
- There would be significant transaction costs to implement and manage this regime that need to be considered prior to implementation.

[27] Gosford and Wyong Council's joint water authority will have supply exceeding demand until approximately 2050 with the completion of the Mardi-to-Mangrove link. The case is less certain currently for Hunter Water, however if Tillegra Dam is completed supply will exceed demand for approximately 70 years.

4.2.8 Scarcity Pricing and Bulk Water

Scarcity pricing may play a much larger role in the bulk water sector of the market. In this market scarcity pricing could be used to signal emerging supply shortages and signal the need for resources to be brought forth to increase supply. As noted earlier, this is particularly important where there are a range of supply sources with varying costs and benefits that may be available. At present decisions on how much of each available water source to use are made administratively.

.Questions that need to be considered are:

1. Will the price signal itself be sufficient to induce other market players to invest in supply augmentation, particularly if the additional supply augmentation is large enough to forestall the scarcity resulting in a drop in price?
2. Will such a scheme result in optimum sized investments and supply augmentations given the threat of price reductions implied by large scale augmentations?
3. Whether retailers would be able to contract directly with the bulk water supplier, as is the case in electricity, or whether there would be a single desk buyer co-ordinating water purchases and averaging prices to retailers?
4. Whether pricing should supplement or replace the allocation of water by administrative means?

IPART has indicated that it will be considering the issue of scarcity pricing at the bulk water level when it next reviews prices and pricing arrangements for the Sydney Catchment Authority. This review is expected to commence in July 2011.

4.3 Other Matters

4.3.1 Individual metering and tenant billing

IPART has supported steps to make renters rather than property owners directly responsible for water bills, and individual metering of multi-dwelling properties. Property developers claim that individual metering of properties requires substantial changes to plumbing and drainage layouts in multi-dwelling buildings which will considerably add to construction costs. Sydney Water is testing this proposition with a pilot scheme.

4.3.2 Smart Metering

The major part of the costs of water services are driven by maximum day and average day water demands rather than instantaneous demands. It is therefore doubtful whether the benefits of smart metering for water alone will outweigh the costs. Before such a proposal is adopted for widespread use carefully controlled pilot studies should be considered to fully evaluate the costs and benefits.

4.3.3 National Vs State Based Regulation

At first, regulation of water and electricity utilities was State based. This recognised the way these industries had been organised and the heavy responsibility of State Government for these industries.

The Australian Energy Regulator has taken over responsibility for the regulation of electricity and gas distribution, and will in the future assume responsibility for retail regulation. This has occurred to provide harmonised regulation within the national electricity market.

By contrast, water markets are more regionally based. This is especially true in Metropolitan New South Wales. This is largely due to the high cost of transport of water and wastewater across catchments.

Maintaining regulation at the State level is consistent with the regional nature of the market. It also permits a degree of diversity between states which encourages experimentation and innovation and has proved useful to date.

4.3.4 Social Welfare Initiatives

Under the model adopted for the major urban water utilities in NSW the cost of social welfare initiatives such as pensioner rebates, payment assistance vouchers etc are reimbursed by the NSW Government. For local government the cost of pensioner rebates is shared between the council and the NSW and Federal Governments.

Although there is concern about the level of rebates in some cases, in principle these arrangements appear to be satisfactory.

4.4 Recommendations

1. The full efficient costs of meeting drinking water and environmental standards that are incurred by water agencies should be included in the prices that economic regulators determine.
2. The costs and benefits of achieving alternatives for environmental standards should be calculated and compared when deciding on standards In addition, governments may wish to add, as part of their taxation policies, an abstraction charge to recover the loss of environment quality that occurs when water is extracted from rivers.
3. Water tariffs should be set in a manner consistent with the 1994 Strategic Water Reform Framework, the 2004 National Water Initiative and the 2010 NWI Water Pricing Principles.

4. Water usage prices should be set consistent with the Long Run Marginal Cost of water[28].
5. More work needs to be undertaken into the price and income elasticity of water demands in all urban jurisdictions.
6. The following factors should be considered when making decisions about price structures:
   - community concerns and acceptance
   - administration and transaction costs
   - cost recovery implications.
7. Smart metering should be subject to carefully controlled pilot studies to fully evaluate costs and benefits.

[28] Where there are no capacity constraints long-run marginal cost (LRMC) approximates short-run marginal cost (SRMC).

5 Scope for competition and contestability

Competition is used extensively in the NSW water industry as a means of sourcing services. Sydney Water has contracted out the provision and operation of water filtration and desalination plants. Most major civil construction work is also undertaken by the private sector including main laying in new subdivisions. While the private sector is keen and willing to participate in the design, construction and operation of works, there is a marked reluctance to assume demand risk, particularly where this means competing with an incumbent water agency.

5.1 Competition for the market

The provision of reticulated water and sewerage systems is a natural monopoly. Direct competition would result in duplication of services and increased costs to customers. It is however, possible to have competition for the market where organisations tender to the government to either operate the whole service, lease the whole of the network, or buy the network.

The organisation that leases or operates the network is likely to be from the private sector. Careful attention would need to be paid to developing a regulatory framework that makes pursuit of private interests by the lessee or operator consistent with pursuit of the public interest.

One consequence of selling or leasing the network is that the lessee or operator may oppose changes that expose them to additional competition. This may make reform more difficult in the future.

5.2 Scope for Competition

Although the water and wastewater transport networks are likely to remain natural monopolies, other parts of the industry are potentially competitive.

These include:

- bulk water
- water treatment
- sewage treatment
- retail and customer service functions.

There are a number of ways in which competition can be introduced into the potentially competitive areas of the industry. The best choice is likely to depend on the circumstances in a particular area. For example, as we have discussed earlier in this submission, competitive arrangements could be entered into to obtain additional supplies of bulk water. The water agency itself (or the government) could call for

tenders for the augmentation option or suite of options. The least cost suite would be awarded supply contracts with the purchaser. This type of single purchaser agreements may be an important transitional step in developing a market in bulk water. Such agreements would enable the private sector to avoid assuming demand risk, if necessary, through take or pay arrangements. They would enable the different costs of different sources of water to be averaged. Continuing government oversight of water quality is needed, irrespective of ownership.

Given the natural monopoly nature of the sector, it is unlikely that there will be direct competition in water and sewage treatment. Contracting out and competitive tendering would seem to offer benefits given that it is unlikely to be cost effective to have multiple treatment plants serving the same area. Having said that it is not always possible to predict the precise nature that competition and competitive solutions might take if there is greater freedom to explore the possibilities.

Another area of competition is through the provision of new and incremental services. In NSW in recent years there has been increasing interest in private sector provision of recycled water services and sewerage in some new developments.

IPART has previously undertaken studies into the scope for competition in the water industry in NSW. The first study was completed in 2005 and is an *"Investigation into Water and Wastewater Service Provision in the Greater Sydney Region"*. The second is a literature review into the costs and industry structures of metropolitan water industries across various countries. As these reports may be of use to the Commission they have been included as Appendix B and Appendix C. They have been referred to, where relevant, in this submission.

Over time the impediments to competition have lessened in NSW as construction and operating activities have been increasing outsourced and with the introduction of the *Water Industry Competition Act* (WICA).

There is a range of lessons that can be drawn from the application of WICA to date and it provides an interesting case study into the development of competition in one jurisdiction.

5.3 Competitive Water Market in NSW

The NSW Government introduced the *Water Industry Competition Act 2006* (WICA) as part of its strategy for a sustainable water future to harness the innovation and investment potential of the private sector in the water and wastewater industries. It is the first legislation of its kind in Australia which attempts to facilitate private sector participation and promote competition in water and sewerage services.

WICA establishes a third party access regime on major NSW water infrastructure; a licensing regime for private sector entrants to ensure the continued protection of public health, consumers and the environment; and provides for arbitration in sewer mining disputes.

In the first 2 years of operation 7 corporations were granted network operator's and retail supplier's licences. To date a total of 11 licences have been granted, and a further 9 licence applications are under consideration.

With the exception of Sydney's Desalination plant, none of the licensees has commenced operating infrastructure, or supplying water or providing sewerage services to customers. However, some licensees have commenced the construction of infrastructure.

Proponents of the following types of projects have been licensed or have submitted applications which are currently under consideration:

- sewer mining projects in multi storey buildings and golf courses
- dual reticulation systems in housing estates
- drinking water and sewerage systems in remote locations
- large recycling projects for industrial and commercial customers.

There have been some significant achievements under WICA to date. The licensing arrangements under WICA has provided a regulatory framework that has enabled private investment in recycled water plants, dual reticulation systems and sewer mining proposals in new buildings to proceed. It is true, of course, that there are other reasons why these projects have proceeded (eg, the NSW Government's BASIX (Building Sustainability Index) program, the voluntary national Green 4 Star environmental rating for buildings and the desire of developers to fast track residential developments in areas that are not fully serviced by the water authorities). Nevertheless, WICA has provided a regulatory framework that has enabled these developments to proceed.

The recent licensing of the Sydney Desalination Plant will enhance competition by enabling the plant to operate independently of Sydney Water.

To date sewer mining arrangements have been readily negotiated between Sydney Water and private entities without the need for arbitration by IPART. Although Part 3 of WICA facilitates third party access to Sydney Water's infrastructure to date IPART has not received any application for such access.

To date, the private sector has shown itself to be keen and willing to participate in the design, construction, operation and ownership of water and sewerage infrastructure. However, they have been reluctant to take on demand risks, particularly where this means competing with an incumbent water agency.

5.4 Compliance Costs

Licensing application and ongoing compliance costs for a licensee are not insignificant. However, the costs of such a scheme and the potential barriers to entry that may be present need to be balanced against the imperative to protect public

health and safety and to ensure no harm to the environment. In an effort to reduce any potential barriers to entry, we have recommended changes to the legislation to enable the introduction of a tiered licensing regime. In such a regime, low risk projects would either be exempt or subject to a lighter form of regulation.

5.5 Retailer of last resort (RoLR) and Operator of last resort (OLR)

In a newly competitive market, especially one with small as well as large market entrants, there is no guarantee of financial success. One of the key potential risks of developing the private sector market is the potential risk of a licensed corporate entity ceasing to operate as a result of financial or other failure.

It is therefore important for adequate arrangements to be in place to maintain essential water and sewerage services, particularly to small residential customers, in the event of such a failure. This can be achieved by enabling customers of a failed retailer to be transferred to another retailer (an appointed RoLR) and enabling customers of a failed network operator to continue to be supplied water or provided sewerage services through another network operator (an appointed OLR).

Currently, the NSW legislation establishes a basic framework for RoLR arrangements. However, the RoLR provisions lack much of the detail necessary to ensure effective operation. Further, the legislation does not address the possibility of a network operator failure.

Initially most licensees under the WICA will be bundled suppliers (i.e. both network and retail functions will be performed by the one licensee). It is therefore important that appropriate OLR arrangements should be developed to ensure the continued provision of essential services in the event of financial failure by a network operator or bundled supplier.

However, there are few relevant precedents to draw upon to develop appropriate OLR arrangements. As yet, no other OLR regime has been established in the utility sector in Australia and there are no strongly comparable regimes established overseas.

A number of licences and licence applications currently being considered involve the provision of essential sewerage services to residences in new housing estates. These schemes highlight the need of having appropriate RoLR/OLR arrangements in place.

In October 2009, IPART identified the need for this work and some possible regulatory responses for review and referred the matter to the NSW Office of Water (NOW) for consideration. NOW has subsequently convened a working group to further develop the RoLR/OLR arrangements. The working group (of which IPART is a member) has had some preliminary meetings to date. NOW and the working group are currently developing a Discussion Paper on the issues and possible regulatory options for public release and comment in 2010/11.

5.6 Recommendations

The best means of introducing competition in the potentially competitive parts of the water industry requires careful consideration and may differ between different parts of the industry. The more promising ideas at this stage include the following:

- The encouragement of multiple providers for bulk water.
- Competitive funding arrangements for the provision of bulk water.
- Competitive funding arrangements for the construction and operation of water treatment plans and sewerage treatment plants.
- The use of private sector investment to provide new and innovative services, especially in new developments.
- An effective access regime to monopoly facilities.

6 Options for achieving reform

Governance of water agencies in NSW generally takes one of two forms. They are either government/council owned corporations overseen by a board, or a business unit with various degrees of autonomy overseen by a local council.

Water supply planning is often undertaken as part of a central planning function of government bureaucracies. Recent experiences suggests that such planning functions are less than open and transparent and it is not evident that all proposals have been subjected to rigorous cost benefit analysis before being adopted. Governance arrangements should be varied to provide for an open, transparent and public process undertaken by an independent party.

There is likely to be scope for greater use of competition and markets to improve the efficiency of the provision of water and wastewater services. Governance arrangements, including the legislative and regulatory requirements placed on water agencies should be reviewed as part of any move to increase competitive outcomes. This review should also consider the powers of governments to direct both water suppliers and regulators. For example, there is a provision in the IPART Act (Section 16A) for a portfolio minister to direct the Tribunal to include in prices the efficient cost of complying with specified requirements. These requirements are understandable to the extent that may allow a government to give effect to a political agenda that is important to it. However, overuse of such provisions in less important areas may weaken incentives for efficiency by requiring investments to take place for which the costs exceed the benefits.

New and revised standards set by other government agencies can be major cost drivers for the water industry. These standards often are not subject to a cost/benefit analysis but can impose significant additional cost on the industry. Similarly, new Operating Licence conditions can impose significant cost burdens on water utilities (eg, priority sewerage programs). Mechanisms need to be developed that will see drinking water, environmental, and dam safety requirements evaluated by means of open and transparent processes in a cost benefit framework.

Regulatory instruments, such as operating licenses, should require that assets are managed effectively and efficiently. Asset management requirements should include processes that link risk assessed service requirements and infrastructure operation.

There is also a need to improve the ring fencing of costs (and accounting separation) of the natural monopoly elements of vertically integrated water authorities from those that are potentially competitive if actual separation does not take place.

This becomes particularly relevant if competition is going to be encouraged in those areas exhibiting the potential for competition. Potential entrants are likely to resist or at least baulk at entry if scope for cross subsidisation of potentially competitive activities by incumbents is evident. For similar reasons the structural separation of

potentially competitive functions from the natural monopoly functions of incumbents may need to be considered.

IPART currently regulates the larger of the urban water utilities, including the two largest local government suppliers. As well as regulating the larger metropolitan urban water utilities IPART also regulates the Sydney Catchment Authority and State Water Corporation. The Authority provides bulk water to Sydney Water and two local catchment councils (Wingecarribee Shire and Shoalhaven City). State Water provides bulk water to a number of council operated water supply systems in the Murray-Darling basin as well as irrigation water to entitlement holders.

There are approximately 100 water supply businesses operated by local government. Apart from Gosford City and Wyong Shire councils the largest of these have less than 50,000 connected properties. Many have less than 10,000 properties. Some of these local government areas are growing quite rapidly, other less so; some are stagnating and others contracting. Many are geographically remote from each other. Local government water agencies are expected to conduct their affairs and set prices in conformity with guidelines issued by the NSW Office of Water. The Office also monitors compliance.

Some of the smaller inland councils are experiencing slow but steady population decline. These councils are faced with maintaining and renewing infrastructure and retaining the skills necessary to operate systems. They also face difficulties in complying with developments in drinking water and environmental standards. Consideration of amalgamation, in one form or another, of smaller Councils may be necessary to allow scale to be obtained.

There would appear to be no pressing need to extend direct economic price regulation to encompass these smaller local government water agencies. There may be a case for IPART to more formally review the NOW pricing guidelines, particularly given recent criticisms voiced at the last local government conference on NOW's requirement that 75% of water revenues be derived from usage charges. This has meant that in drought conditions water agencies have fallen short on revenue.

IPART sees advantages in extending the application of the WICA Act to local water supplies to provide a consistent regulatory framework for both government and private water suppliers.

6.1 Recommendations

1. Governance arrangements relating to water supply planning should be varied to provide for an open, transparent and public process undertaken by an independent party.
2. Governance arrangements, including the legislative and regulatory requirements placed on water agencies should be reviewed as part of any moves to increase competitive outcomes to ensure competitive neutrality for all market participants.
3. The natural monopoly and potentially competitive elements of incumbent water agencies should be appropriately ring-fenced (with accounting separation) if actual separation does not take place.
4. Consideration should be given to amalgamating, in one form of another, the smaller local council water businesses to allow scale to be obtained.
5. The financial affairs of local council water businesses should be ring-fenced from general council functions and this ring-fencing should be subject to audit.

Appendices

A Role of IPART

IPART is the principal economic regulator of water utilities in NSW. It determines water, sewerage and stormwater prices for regulated water agencies in NSW. Its price setting functions cover:

- Sydney Water Corporation
- Hunter Water Corporation
- Gosford City Council
- Wyong Shire Council
- Country Energy (for services supplied at Broken Hill)
- State Water Corporation
- The NSW Office of Water.

Overall IPART regulates the water and sewerage prices for 78% of the population of NSW.[29]

IPART administers operating licenses for Sydney Water Corporation, Hunter Water Corporation, State Water Corporation and Sydney Catchment Authority. The administration of operating licenses is designed to:

- Maintain and improve service quality and the reliability of supply
- Protect consumers
- Assess the impact of the industry on the environment
- Encourage compliance through ongoing auditing of performance

It achieves these objectives through regular review of the operating licenses and annual audits of performance.

There are approximately 100 water supply businesses operated by local government in NSW. Apart from Gosford City and Wyong Shire Councils the largest of these have less than 50,000 connected properties. Many have less than 10,000 properties. The NSW Office of Water regulates and monitors the conduct and operations of these water supply agencies.

[29] ABS 2006 census data and information provided to IPART by regulated water agencies.

B Investigations into Water and Wastewater Service Provision in the Greater Sydney Region

C Literature Review – Underlying costs and industry structures of metropolitan water industries.

D Water Scarcity: Does it Exist and Price Help Solve the Problem?