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Review of bulk water procurement options in Western Australia

A report for the Economic Regulation Authority

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1. Introduction

NERA Economic Consulting (NERA) has been asked by the Economic Regulation Authority (ERA) to consider alternative institutional and regulatory approaches to the procurement of bulk water for urban water supplies in Western Australia. The focus of this paper is therefore on alternative options that promote the competitive provision of bulk water supplies. We understand that this paper will be used to assist the ERA in its inquiry into competition in the water and wastewater services sector of Western Australia.

Managing the balance between water supply and demand is a critical long-term challenge facing the WA water industry. In recent years, it has become increasingly apparent that the traditional approach to meeting demand for water resources by simply investing in additional dam storage capacity is no longer feasible. Managing the water supply and demand balance is therefore an increasing challenging because:

- there are fewer suitable locations for the building of additional dam storage capacity;
- there is an increased risk of sustained droughts due to climate change, which itself compromises the efficiency of storage based supply options; and
- population growth coupled with demographic changes mean that demand for water continues to rise, despite its increased scarcity of traditional sources of supply.

The key challenge moving forward is how to strike an appropriate balance between various potential initiatives aimed at 'closing the gap'.

The ERA's inquiry is occurring at a critical time for the water industry in Western Australia. There is considerable uncertainty surrounding the sustainability of water sourced from deep underground aquifers that supply 60 per cent of Perth's water needs, while water demand continues to grow in light of WA's significant economic boom. Securing water supplies is therefore a critical concern for the government, as exemplified by its recent approval for the construction of a second desalination plant to supply approximately 45 gigalitres of water per annum, in addition to its existing plant at Kwinana.

The Water Corporation and the WA government have a present and continuing need to make decisions as between further expansions in desalination capacity, or investing in one or more alternative supply options that may emerge. Ensuring that the water industry is well placed to make these decisions is therefore critical for the future.

Our approach has been to consider alternative bulk water procurement options that promote efficiency and competition in the provision of bulk water, including the use of alternative water sources. In our view, there is considerable merit in encouraging the private sector to participate in finding solutions to WA's water needs. Importantly any solution should provide scope for both large and small scale supply options to be considered, in addition to demand management solutions. The most cost effective mix of strategies is likely to be a combination of all of these options.

In developing the discussion set out in this paper, we have considered the proposal made by the Water Corporation in its submission to the ERA's inquiry, and work being undertaken for

the ERA on the scope for the development of a competitive water market. In addition, we have had the opportunity to consider an early draft of a paper being prepared by ACILTasman exploring the applicability of options-based approaches to bulk water procurement. There are important linkages between the ACILTasman report and this report, and where relevant we have endeavoured to draw out these linkages.

The focus of our review has therefore been on bulk water procurement options that promote:

- efficient investment in bulk water supply sources; and
- efficient use of existing water sources.

In addition, it is important to recognise that any option for bulk water procurement is able to accommodate different degrees of demand management, since some form of demand side response is likely to represent a more cost effective or efficient alternative to water supply augmentation investments. It is necessary therefore to ensure that any bulk water procurement option provides sufficient decision making flexibility to ensure the water demand and supply balance strategy is undertaken in an efficient manner.

Our analysis commences by reviewing the current approaches to bulk water procurement and planning by the Water Corporation, and assesses the extent to which these create impediments to the competitive provision of new water supplies or demand management alternatives by outside parties. In making this assessment, we have been mindful of the benefits that can develop by creating an environment for private innovation in the development of water supply options to be encouraged. To do so, we believe there is considerable merit in re-examining the current roles and responsibilities for bulk water procurement, to provide an environment for greater private sector competitive innovation to address Perth's water needs.

A key consideration in any bulk water procurement model is the decision process for choosing between alternative investment options. The ACILTasman paper discusses the benefits that could be achieved through the introduction of an options-based approach to water supply development. This would involve a process that is sufficiently flexible so as to accommodate new information about current water inflows and demand expectations, and make investment decisions based on this information. We agree that there are potentially significant benefits arising from a decision process that includes new information on demand and supply conditions. It is therefore important that the framework for bulk water procurement is able to accommodate new information and provide appropriate incentives for assessing and balancing the risks associated with decisions to be made.

The remainder of this discussion paper sets out our analysis in detail and is structured as follows:

- Chapter 2 provides a brief discussion of the water industry in Western Australia, focusing on the background and context relevant to bulk water procurement options - this includes our characterisation of water management decisions as a complex risk management problem;
- Chapter 3 assesses current approaches to bulk water procurement, and those proposed by the Water Corporation.

- Chapter 4 outlines a number of institutional options for the procurement of bulk water, with these seeking to addresses deficiencies with the current formulation presented by the Water Corporation; and
- Chapter 5 provides concluding thoughts and further issues for consideration.

2. Background and context

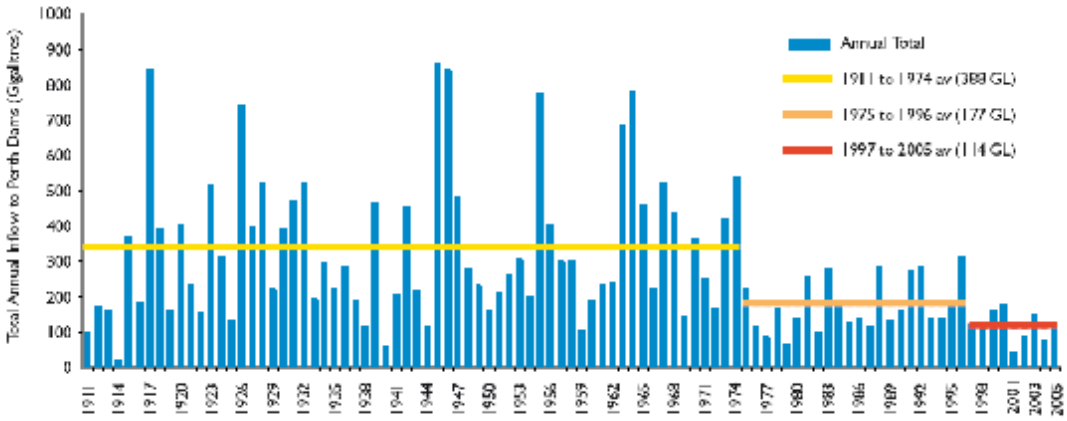
2.1. Water demand and supply in Western Australia

The water industry across Australia, and particularly Western Australia, is being challenged by the task of how best to manage water demand and supply options in the future, particularly given that existing and emerging water supplies may have very different economic characteristics.

Historically, Perth's water has been supplied from two main sources – surface water captured in dams, supplemented by groundwater, particularly during periods of lower than average dam water inflows. With the commissioning of a desalination plant in Kwinana, the contribution of each main water source to demand is as follows: 31 per cent dam water; 54 per cent groundwater and the remaining 15 per cent from desalination.

Current evidence suggests that Perth is in the midst of a sustained and possibly permanent change to dam water inflows, such that new water supplies are required to meet demand – Figure 2.1. Average annual water inflow to Perth dams over the 8 years prior to 2005 is almost 71 per cent below the longer term historical average.

Figure 2.1
Historical inflows to Perth's public water supply dams[1]



Streamflows to Perth's public water supply dams to 2005

Water is currently drawn from three main sources – Table 2.1. The incremental financial cost of supplying water from each source varies considerably, from a low of around 10c/kl for dam water, to 60c/kl for desalinated water. In addition, each of these water supply options has very different cost and risk profiles. For example, the opportunity cost of water drawn from dams when supplies are low may be considerably higher than water produced through desalination (assuming there is insufficient capacity to supply all water), for which its availability is independent of rainfall. These sources therefore differ both in terms of their financial costs and the opportunity costs associated with their use.

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[1] State Water Plan 2007 – Summary, page 2.

Table 2.1
Main water supply sources – 2006/07

Source	Volume used (ML)	Operating costs* ($/kl)
Surface water	110,570	0.14
Groundwater	168,199	0.19
Desalination	18,159	0.16**
Recycling	3,590	0.42

Source: Information provided by Water Corporation to the ERA
* Operating costs are total operations and maintenance costs provided by the Water Corporation for the 2006/07 year.
** The Kwinana seawater desalination plant commenced operation in November 2006 and the operating costs for 2006/07 reflect an incomplete year of operation, where the plant did not operate at full capacity. The Water Corporation estimates that the operating costs for desalination are $0.51/kl if the plant operates at its full capacity of 45 GL.

The Water Corporation has identified a number of potential future water sources in addition to its recent decision to proceed with the construction of the second desalination plant near Binningup. These include:[2]

- accessing further groundwater sources;
- water trading arrangements with irrigation districts;
- improving demand side water efficiency;
- water recycling schemes; and
- changes to existing catchment management.

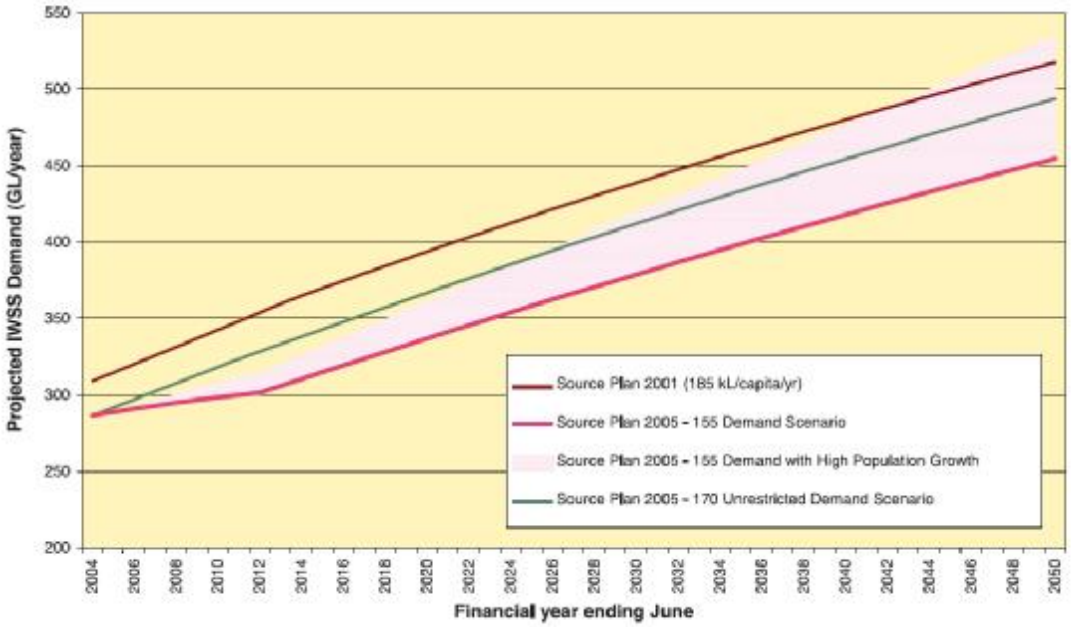
In addition, there is also scope to purchase water from current water extraction licence holders drawing from the Gnangara mounds.

To help manage the balance between water demand and supply, Perth has had water restrictions in place since 1998. These restrictions limit the outdoor watering of lawns and gardens by reticulation systems to once (in the morning or evening) on two allocated days each week. In addition, the use of water to clean paved surfaces or buildings is not allowed, except in certain circumstances.

Finally, water demand continues to grow, led in part by considerable economic growth in recent years – Figure 2.2. It is expected that this will continue over the medium term, requiring the augmentation of future water supplies.

[2] Integrated Water Supply Scheme Source Development Plan 2005. We understand that a new source development plan is currently being finalised such that new options are likely to be considered by the Water Corporation.

Figure 2.2
Projected Integrated Water Supply Scheme demand - 2005[3]



2.2. Bulk water procurement is a risk management problem

Optimising the balance of water supplied from different sources as well as across options for the curtailment of demand can be characterised as a risk management problem. Most of Perth's water is supplied from either dam storages or underground aquifers (which can be considered as another form of water storage), which can be described as relatively 'cheap' sources of water in operating cost terms. However, the opportunity costs of these water sources can be very high, particularly when the amount held of dam storage reaches low levels and where there is considerable uncertainty as to the amount of groundwater available for extraction each year. For every kilolitre of water taken from dam or groundwater storages, there is a lost opportunity associated with not being able to use that water in a future period (or the cost of not being able to meet future demand), requiring either the dam to be replenished, an alternative source found, or demand to be curtailed.

In contrast, desalination plants offer a reliable source of water that is independent of future rainfall; however such plants involve large capital and ongoing operating costs. The optimal development of new sources of water and their integration with the existing rainfall dependent sources increases the complexity of procurement decisions.

The introduction of desalination can also be characterised as a form of insurance, implying that once a decision to invest in such capability has been made, day to day management of the water supply system can continue largely as before. However, this does not obviate the ongoing need to manage future costs and risks. Taking the insurance analogy further, there

[3] Integrated Water Supply Scheme Source Development Plan 2005, page 7.

will always remain the question of how much risk to bear, and so insurance to buy either in the form of additional installed desalination capacity and/or the intensity with which the plant is used. Such decisions manifest themselves as the need to establish 'operating rules' to govern the management of the existing storage infrastructure, such as the trigger levels for the imposition of more stringent water restrictions, and for more intensive use of desalination capacity. In addition, the volume of desalination capacity necessary will depend on the uncertainty associated with dam inflows and total volume of existing water storage capacity.

References to the capability of existing storage infrastructure for meeting current and future demand are often presented in terms of 'sustainable yield'. However, such references implicitly assume that current storage levels are at their long term average level, and so tend to overstate the medium term supply capability of the current system when storages are low. The sustainable yield of a system of multi-year storages has very limited relevance to decisions about the management of near to medium-term water supply issues when storages are significantly below their long-term average, unless one can confidently predict higher than average rainfall.

The optimal portfolio of water sources with different operating costs and risk profiles therefore depends on the extent of the uncertainties faced as to rainfall and associated dam water inflows. For example, cities such as Tokyo and London store approximately six months supply of water in dams, largely due to the relative reliability of rainfall that mitigates the risks associated with dam storage. In contrast, Sydney and Melbourne both have very large dam storages which are capable of storing several years worth of those cities water needs.

In principle, for a given degree of uncertainty as to expected rainfall patterns there is a relationship between the capacity of dam storage and the volume of water that can be expected to be delivered from it, and the volume that can be supplied with certainty, through desalination. As dam storage capacity increases, the volume of desalination needed to supply a particular expected demand will decrease, and vice versa. Importantly this relationship will not be constant through time, since changes in dam inflows and expected demand requirements will affect the optimal balance between these two supply sources.

The risk management problem associated with managing the use of existing water sources is further complicated when there is a need to invest in new water sources. Not only is it necessary to consider the cost of such new water sources, but also the underlying risk profile and so its affect on the risk of the overall portfolio of water supply options should be considered. Approaches such as the options-based model outlined by ACILTasman provide a decision framework that balances the risk profile within the existing system, against uncertainty about dam inflows and demand into the future. These options may be appropriate in a centrally planned or competitive procurement tendering process. These same tradeoffs can alternatively or additionally be made by reference to a market price of bulk water that fluctuates in accordance with expectations about dam inflows, the availability of alternative water sources and demand. We consider this in greater detail in section 4.4 below.

2.3. Competitive provision of bulk water is becoming feasible

Traditionally water supplies have been expanded through planning processes to meet the difference between existing supply capacity and growing water needs. This has reflected in

part the large capital costs associated with building dams, and the need to integrate a water source within the existing water supply system. Within such a planned water supply augmentation framework, there is little scope for competitive procurement of alternative supply options, or the involvement of the private sector.

Increasingly however, technological improvements are resulting in competition in the provision of bulk water becoming more feasible. In the eastern states for example, Services Sydney has been granted access to the wastewater infrastructure of Sydney Water, for the purpose of harvesting wastewater to then sell as recycled water to customers. In addition, technology is creating greater scope for stormwater harvesting, portable desalination, recycled water, grey water reuse as a replacement for potable supplies, amongst other options. These options have the potential, in combination, to contribute significantly to both supply and water use efficiency, helping to maintain the balance between supply and demand in the near and long term.

This means that the future mix of options for balancing supply and demand is less likely to be dominated by periodic, large scale water supply augmentations. More gradual and diverse options can be achieved, so long as the decision framework is able to accommodate them. This means that bulk water supply can no longer be considered a natural monopoly, dominated by a single provider.

2.4. Scope for water trading

Trading water between its alternative uses provides an opportunity for the value of water use to be maximised. Currently within the WA water industry, only 13 per cent of water is used for residential consumption, with the remainder being used for irrigated agriculture (40 per cent) including horticulture, winegrapes and orchards; mining (24 per cent); and for industry, services, gardens via bores and stock water (24 per cent).[4]

While in many instances it is unlikely to be feasible to trade water between all potential uses given the high costs of transporting water from its source, in a separate report to the ERA the Resource Economics Unit has assessed the suitability of water trading within each region in WA.[5] For the Integrated Water Supply Scheme, they conclude that there is considerable scope for water trading to occur, particularly between users that source water from the Gnangara Mound and from other irrigation districts in the south west.

Importantly, the WA government is progressing on a program of water reforms that are in part designed to facilitate greater water trading. In its advice on the implementation of water reforms, the Water Reform Implementation Committee made a number of recommendations. Critical to water trading is the unbundling of water rights into an access component, use component and water works component, allowing water entitlements to be traded separately from the use of the infrastructure necessary for its supply. These reforms are anticipated to increase the scope for water to be traded between alternative uses, particularly for domestic

[4] Page 28, Water Corporation submission to ERA inquiry.

[5] Reference to REU report.

consumption.[6] However, to support these initiatives it will be necessary to create an appropriate environment for water trading to occur. The approach to bulk water procurement will have an important influence on how water trading develops in the future.

2.5. Future challenges

The above discussion highlights a number of challenges facing the Western Australian water industry, and in particular:

- ongoing water scarcity means that new alternative water supplies are likely to be needed to meet Perth's growing water demands into the future;
- efficiently managing the use of existing water supplies with differing operating cost and risk characteristics is a complex risk management problem;
- the introduction of new types of water source, such as desalination, complicate the risk management problem and affect future choices as to both the operation of and investment in new water supply options;
- demand management options need to be considered in conjunction with alternative water supply options, and any bulk water procurement framework should accommodate all possible options for balancing demand and supply;
- changes in technology mean that providing bulk and/or retail water supply through competitive means is becoming increasingly realistic;
- there are a number of future alternative water supply options including scope to increase water trading, groundwater sources, recycling and demand side water efficiency measures - there may also be further alternatives that have not as yet been identified, given the current approach to bulk water procurement; and
- the approach to bulk water procurement will itself have an affect on the development of water trading between users.

Before considering options for bulk water procurement we consider the current and proposed approaches to bulk water procurement.

[6] We acknowledge, as do the Resource Economics Unit that water trading has occurred in the absence of these reforms through private negotiations between individuals, and with the Water Corporation. However, reforms to the current arrangements should increase the potential for more water trading to occur in the future, since transactions costs should be reduced.

3. Current and proposed approaches to bulk water procurement in Western Australia

Perth's water needs are currently managed by the Water Corporation, in consultation with the Department of Water and the WA government. The existing water planning and management processes are outlined below, followed by a brief summary of the bulk water procurement model proposed by the Water Corporation. Both of these approaches are assessed in terms of their scope to promote efficient investment in, and use of, bulk water supplies to meet Perth's future water demands.

3.1. Water planning and management in WA

The Water Corporation has primary responsibility for the planning and management of water supplies within Western Australia. This clarity of purpose within a single entity is a particular strength of the WA water planning system, as compared with its equivalent water supply businesses in other jurisdictions. For example, water supply planning in Sydney is undertaken in combination between the Sydney Catchment Authority, Sydney Water Corporation and the Department of Energy and Water Resources. While the Sydney Catchment Authority is responsible for managing existing water catchments and bulk water supplies from those catchments, Sydney Water is proceeding to build the desalination plant at Kurnell and is also engaged in demand management activities. The Metropolitan Water Plan is the instrument used to coordinate these water supply management efforts.

A key feature of the current process in WA is the approach to water source planning, where considerable and ongoing analysis of expected demand, dam inflows and alternative water supply augmentations is undertaken by the Water Corporation. From this analysis, options are developed for supply augmentation investment given expectations about water needs and the aim of maintaining supply security.

The Department of Water (DoW) has overall responsibility for managing water resources in WA, particularly through its licensing of water extractors from groundwater sources, such as the Gnangara mounds, and within irrigation districts.

The DoW limits the extractions by the Water Corporation from the Gnangara mounds according to the amount of water available from dam sources. Where dam water availability is low, then the Water Corporation is able to extract more water from the Gnangara mound compared to periods where dam water has been high. In recent years as drought conditions have continued, there has been concern about the sustainability of the current water extractions from the Gnangara mound.

3.2. Water Corporation proposal for bulk water procurement

In its submission to the ERA's inquiry into competitive provision of bulk water services, the Water Corporation has presented a model for bulk water procurement into the future.[7] The

[7] Water Corporation, (2007), Submission to the Economic Regulation Authority's Inquiry on Competition in the Water and Wastewater Services Sector, August.

model extends the existing process whilst centralising responsibility for bulk water procurement and decision making within the Water Corporation. The proposal expands the role of the private sector through a system of competitive tendering for the provision of new water supplies, and for the submission of alternative proposals for water supply development.

The key features of the proposal include:

- the Water Corporation is proposed to continue to undertake comprehensive planning for new water sources and forecasting of demand requirements, with all information being made publicly available;
- a process for proponents of alternative water sourcing proposals to the Water Corporation to be assessed based on technical and financial capacity and viability of the alternative proposal;
- assessment of the costs of the Water Corporation's first ranked planning option, as a comparator for alternative proposals;
- a trigger point for proceeding with the next water source or wastewater treatment plant;
- registration of interest and subsequent tender to supply the next water source, either based on the Water Corporation's first ranked planning option, or alternative proposals whether pre-qualified or not; and
- the entering into a water supply agreement on terms and conditions associated with delivery of the new water source.

The proposed model has the potential to promote competitive provision of water sources, whilst maintaining a planning and information role for the Water Corporation. The Water Corporation had originally intended to act as a competitor to private providers as part of the competitive tendering process, although it has since indicated that it will not compete with the private sector for the supply of all new water augmentations. This is a critical part of the model and clarifies that the Water Corporation is the customer in the process, responsible for deciding between alternative water supply augmentation proposals that arise through the process of discovering options and subsequently tendering for them.

The Water Corporation maintains that its involvement in water source procurement is essential given its responsibility for ensuring potable water supply. This in part reflects its concern about the ability of the private sector to deliver sufficient water sources in the absence of active management from the Water Corporation. For this reason, the proposed model maintains the involvement of the Water Corporation in the development of a preferred water source option, against which all alternative options are assessed.

This approach is not dissimilar to the requirements on electricity transmission businesses in relation to proposed capital expenditure projects in the National Electricity Market, as provided for in the National Electricity Rules.[8] Where a transmission investment is required,

[8] All capital expenditure projects by transmission companies are required to satisfy the Regulatory Test, provided in Rule 5.6.5A. Where an alternative option arises through the request for information process that is more cost effective, then

a transmission business is required to seek alternative demand side or supply side options from the market and, where it is cheaper than its own proposal, is obliged to substitute its proposal for the alternative option.

An important feature of a competitive tendering process for water is to ensure that there is clarity around the water supply security requirements that the procuring entity is seeking to achieve. In the absence of clear water security requirements, it is difficult to assess the efficiency of particular water supply augmentation options that are being considered, in terms of their contribution to maintaining the required supply security given changing dam inflows and demand conditions. The Water Corporation proposed 'trigger point' is effectively being proposed as a substitute for an otherwise clear obligation to maintain a certain level of water supply security.

3.3. Assessment of current and proposed approaches

In our view, the current approach to water supply procurement and the Water Corporation proposal both give rise to a number of concerns. The Water Corporation proposal for a formal process of seeking outside providers of new water sources is a significant improvement over the current approach. However, a number of aspects of the proposal are likely to mean this is much less effective at promoting the competitive provision of water supply options than would be the case with more significant reform.

Specifically, our concerns include:

- decisions on investment in alternative water supplies are being made by the Water Corporation in a centralised manner that, despite opportunities for the private sector to propose alternative options, provides only limited incentives for private sector involvement in the development of supply options. These incentives are limited because:
  - the Water Corporation has an inherent conflict of interest between the financial benefit to it of relying more heavily on existing water sources, and the competitive threat that arises from inviting and accepting proposed alternative supply sources.
  - the prequalification of alternative options provides substantial flexibility to the Water Corporation to reject options or suppliers that it does not prefer. It is not clear from the current proposal what criteria the Water Corporation will apply to alternative options, and there is no recourse by means of appeal of any Water Corporation decision;
  - by developing a preferred water supply option, signals are created in the market that this is the option that is most likely to be accepted by the Water Corporation. The onus is then placed on the private sector to demonstrate how an alternative option is superior to this option. Such a hurdle is likely to create a significant barrier to entry for alternative options, thereby establishing a presumption in favour of the Water Corporation proceeding with its own preferred option;

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the original proposal does not satisfy the Regulatory Test requirements. All capital expenditure projects must satisfy the Regulatory Test prior to being rolled into the Regulatory Asset Base for the purpose of setting regulated revenue requirements.

  - alternative options may be combinations of demand side responses and/or small scale augmentations that provide a different risk profile as compared with a single, large and preferred Water Corporation model. The assessment criteria and framework would need to be sufficiently flexible to allow for these alternative risk characteristics and their attendant scope to delay large augmentation investment;

- the competitive tendering process, and particularly the trigger point for investment decisions, is not clearly linked to decisions on the use of existing water sources, such as desalination or drawing from existing dam or underground storages. In any given period it may be cost effective to substitute alternative water supply and demand management options for less intensive operation of the desalination plant or a choice to take greater security of supply risks by drawing more on existing storages. Improving transparency around the decision as to when to use existing (storage based or desalination) sources and when to procure alternatives is a critical element of the bulk water procurement framework that the Water Corporation proposal does not provide;

- there is no guidance as to how the trigger point for new supply augmentations will be specified or its level determined - this decision point needs to be informed by the demand, supply and risk characteristics of existing and future supplies at each point in time;

- proponents for new alternative water supplies must satisfy the Water Corporation of their capability to supply water through a prequalification process.[9] There is a need to make criteria for prequalification transparent and independent of the Water Corporation; and

- the current cost and security of supply risks associated with providing water from existing sources is not available to the private sector as a comparator for developing alternative options.

In developing an alternative bulk water procurement model we have considered each of these concerns and have sought to provide incentives for the efficient use of existing water sources, reflecting each supply sources' individual contribution to water supply security and the supply of water in a given period. The principles we have considered include:

- first, providing transparency about the price of water from each existing source, taking into consideration the risks associated with its delivery;

- second, developing a wholesale 'market' platform to allow proponents of new alternative water supplies an opportunity to sell water, subject to meeting terms and conditions of supply (relating to health, environmental quality etc), and based on criteria applied in an independent way; and

- third, providing clear responsibility to an independent third party to manage decisions about the use of water from each source - this ensures that there is no bias between existing sources and new potentially cheaper sources in any given year; and ensures that

[9] While the Water Corporation proposal allows for proponents who have not prequalified to submit proposals as part of the tendering process, it seems unlikely that proponents who were not prequalified would be successful, unless a particularly standout submission was received.

the use of existing sources continues to be efficiently managed as new sourcing options develop.

Each of these requirements is considered as part of the bulk water procurement options outlined in the following chapter.

4. Frameworks for bulk water procurement

Having briefly considered the current and proposed models for bulk water procurement, this chapter outlines alternative institutional frameworks for bulk water procurement that promote efficient investment in, and use of, bulk water supplies in Western Australia. Each of these frameworks is presented at a high level for further discussion and detailed development. Many of the features would require further development in order to provide a comprehensive model for bulk water procurement.

The key elements of the frameworks include:

- providing a transparent 'value' for all bulk water, to provide incentives for competitive provision of alternative water sources;
- establishment of an independent bulk water market operator, to provide a platform for innovation in bulk water supply options, and to manage the development of competition between new supplies and existing supplies (such as desalination); and
- clarifying responsibilities for managing the risks associated with bulk water supply.

The alternative frameworks developed below each contain many of the features of the Water Corporation proposed approach. For instance, we agree with the Water Corporation that there are considerable benefits from bulk water procurement being centralised within an entity that has sole responsibility for the task. This responsibility needs to be accompanied by a clear objective, to provide the basis for assessing alternative supply and demand options. The objective could be specified as achieving a particular security requirement or as a statement requiring the responsible entity to maintain sufficient water supply to meet the medium to long term demands of consumers.

Where our frameworks differ from the Water Corporation proposal is that we believe there are also considerable advantages from the entity responsible for bulk water procurement being independent from the Water Corporation. This would allow the entity to be responsible for both procuring additional supplies through competitive arrangements ***and*** managing existing water supplies taking into consideration their cost and risk characteristics, as well as changes in supply and demand conditions. This allows for appraisal of the least cost/risk options for delivering water from existing and new supplies, and the need for new investment, at each point in time, untainted by the interests of an entity that is itself a significant provider using one or more particular sources.

We recognise that the Water Corporation has much of the current expertise in this area, and it follows that there would be a need to consider how that expertise was transferred to the new market operator. However, we envisage the process involving the transfer of existing skills within a different institutional framework, rather than the duplication or replication of those skills.

Before outlining a proposed alternative institutional framework for bulk water procurement, we first discuss the underlying objectives for reforming bulk water procurement. All of the options outlined in this paper are presented for further consideration and consultation, given the particular circumstances within the WA water industry.

4.1. Objectives for reform to bulk water procurement

It is well acknowledged that, wherever feasible, competition is likely to provide the best incentives for the efficient provision of a good or service. As businesses compete they look for competitive advantages either by reducing costs or distinguishing their product characteristics compared with their competitors.

However, in some circumstances competition is not feasible. This can occur when it is most cost effective for a good or service to be provided by a single producer, often in light of the potential economies of scale associated with production of the good or service. Such circumstances give rise to the existence of a natural monopoly, and some form of regulatory incentives to ensure services are provided cost efficiently is often required.

The supply of water and wastewater services is often taken to be a natural monopoly, and particularly that component involving the reticulation of treated water to residential customers and the transport of sewage, by means of piped water networks and sewerage infrastructure respectively. Historically, bulk water supply has also been regarded as largely a natural monopoly, since there were significant economies of scale associated with the building of dams, such that there was limited scope for a number of competing businesses to provide bulk water supplies.

However, as the scope for the building of new dams has diminished, and the technology for 'producing' water has improved, the natural monopoly characteristics of bulk water supply have also diminished. New emerging bulk water supply sources tend to be smaller in scale, or are scalable in nature, such that there is the potential for new water sources to compete for the supply of water. In addition, water demand management programs are emerging as a recognised substitute for supply investments. In combination these developments mean that bulk water supply should no longer be regarded as a natural monopoly. If follows that there is likely to be considerable merit in a bulk water procurement model that promotes the competitive sourcing of bulk water as well as its alternatives in the form of demand management.

The main objective governing reform of bulk water procurement should be:

> *to promote efficient investment in, and use of, bulk water sources through enhanced competition where feasible.*

The bulk water procurement frameworks outlined below seek to provide for this objective to be achieved.

4.2. Centralised bulk water procurement

The key feature of the proposed bulk water procurement frameworks is ensuring that responsibility for managing the balance between water supply and demand rests with a single entity. This entity's principal role would be to secure sufficient supplies of water to meet consumer demand over the medium to long run, through the sourcing of water supplies and where appropriate, demand management alternatives.

The importance of ensuring that a single entity has this responsibility cannot be understated. There is a need for considerable coordination of the choices between the use of existing bulk

water supplies and decisions about new supply investments, such that these decisions should be placed with a single entity. Such a necessity arises from the need to coordinate water supply and demand. If a market for bulk water supply and demand was present, then this decision making responsibility would become redundant, since the optimal choices of supply and demand would be resolved through market forces.

There are two options that can be used by the responsible entity for sourcing water supplies or demand management alternatives, specifically:

- through a competitive tendering process, similar to that proposed by the Water Corporation (Option 1); or
- through an arrangement that involves a commitment to purchase all bulk water made available at a posted price (Option 2).

Under the first option, it is necessary to consider whether the responsible entity should remain the Water Corporation, or whether there are benefits associated with giving the responsibility to a new independent entity. In section 4.3.5 below we outline the model and then discuss the advantages and disadvantages of both approaches. Option 1 requires consideration of the decision framework in which alternative options are evaluated, and the 'trigger point' for decisions on the timing and magnitude of new investments.

Option 2 could similarly be undertaken by the Water Corporation or an independent market operator. It is distinguished from Option 1 through the exclusive use of price as the market based 'trigger mechanism' for new water supply augmentation.

In the remainder of this section we discuss how each of these options could operate in practice. In so doing we explain:

- the process for procuring water supplies or demand management alternatives;
- how existing water supplies fit within the framework;
- the process for determining the price for new water sources;
- the process for determining non-price terms and conditions and their regulation; and
- the relationship between the cost of bulk water and the prices charged to consumers.

4.3. Option 1 - A competitive tendering model

Under a competitive tendering model, the main task for the responsible entity is to procure water supplies (or demand management alternatives) through a competitive tendering process. The roles and responsibilities for the responsible entity would therefore include:

- forecasting and publishing total water demand on an annual basis for each year up to a period of ten years;
- forecasting and publishing expected available supply from existing sources and contracted sources for each year up to a period of ten years, taking into consideration

expectations surrounding stream inflows to dam sources and the operation of other water sources such as desalination;

- administering a competitive tendering process to procure additional water supplies and demand management alternatives;
- developing and publishing rules for the operation of desalination, which includes developing the contractual conditions for supply of desalinated water;
- developing and publishing rules for the recommendation of the introduction of each stage of water restrictions to the relevant Minister;
- selling of water to the Water Corporation (in the case where the responsible entity is not also the Water Corporation); and
- determining the contractual conditions for the supply of all new and existing water by all contracted parties.

These roles and responsibilities seek to provide information to the market on expectations about water demand and supply and the operation of existing water sources and water restrictions. This information is critical to understanding opportunities for water supply alternatives that private sector parties may be seeking to develop. The remaining responsibilities relate to the operation of the competitive tendering process and negotiation of the price and non-price terms and conditions.

4.3.1. The process of competitive tendering

The competitive tendering process would be the principal task of the responsible entity. Whilst it is beyond the scope of this brief discussion paper to set out a competitive tendering process in detail, its features should include:

- clear specification of what is being tendered, with the choices including:
  - a volume of water delivered in each of a number of years in the future with contractual penalties for failure to deliver the contracted volumes;[10] and/or
  - some form of water supply capability, (such as a dam with an expected annual yield), but with little or no risk imposed on the supplier as to the volume of actual water supplied;
- a transparent and fair process;
- opportunities for appeal; and
- clear criteria for the assessment of proposals.

[10] The period of years should be sufficiently long so as to provide incentives for investment in medium term water supply projects.

We believe that the tender process should be for the supply of a volume of water in each year for a defined number of years into the future (say up to five). Specifying a delivery requirement in this way allocates the risks associated with not delivering the specified volumes of water to the contracted supplier, with penalties being applied if the supplier fails to deliver the specified volume of water.

These contracted volumes would be for supplies over and above water supplied by means of the existing dam water and groundwater sources. Water from desalination plants would be contracted through this same competitive tendering process, as explained in further detail below. Where dam water inflows are greater than expected, the additional water purchased would therefore result in dam levels rising. In effect dam supplies would become the balancing source for the procurement process. While the responsible entity is likely to develop its own approach to determining the volumes of water to contract in future years, there may be merit in contracting smaller amounts in more distant years, and increasing the contracted volumes as certainty improves about dam levels as the year approaches.

The effect of contracting for additional water in volumes rather than capacity terms is that the risk of not delivering the volumes of water contracted for delivery is transferred to the contracted party. These risks provide incentives for contracted parties to develop risk management approaches to minimise risk (including by means of contracts or trading in order to balance different obligations with other potential suppliers). The strength of the incentives for such secondary market activity would of course depend on the size of the penalties associated with not supplying contracted water. The appropriate penalty would be the cost of the Water Corporation meeting a supply deficiency at short notice, or the cost of water restrictions to customers, whichever was lower.

Whilst contracting for volumes has the benefit of allocating risks to water suppliers, the contracting period would need to be sufficient to provide certainty to water supply investors that they will be able to recoup the costs of the investment, plus a sufficient return in compensation for the risks borne. However, this does not imply that the contracting period must extend to the full economic life of the relevant asset since, just as for electricity generators or gas producers, a potential supplier of water can always take comfort that the end-market for its product can be expected to exist for the long term.

Where there are concerns that there may be insufficient offers of contracted supply to meet water needs, then two options can be considered, either:

- increasing the number of years for which water is contracted for at a specified price, to provide increased certainty around the expected returns for a given bulk water supply investment; or
- to procure water supply capacity directly.

The first approach has the effect of transferring some of the risks associated with the uncertainty as to the volume of new water supply that will be required in the future, back to the contracting entity. By locking into long-term contracts for water supply, the potential benefit from having the option of changing procurement decisions in the future in response to new information on dam inflows and water demand would be reduced. This risk can also be managed by allowing the price applying to longer term procurement commitments to be

reviewed at agreed intervals as typically takes place, for example, under long term gas supply contracts.

The second approach has a similar affect to the first. However, in addition to transferring some of the risk associated with the uncertainty as to the volume of water required from new water supplies in the future to the contracting entity, some of the risk associated with the new water supply investment delivering its expected water yield is also transferred to the contracting entity.

The new bulk water procurement framework therefore needs to strike the right balance between the risks borne by the contracting entity and the competitive private sector water suppliers.

In our view, there would be merit, particularly during a transitioning period as the water supply market develops, for some form of contracting for water supply capacity to be developed, ie to allow new providers to share some of the supply risks with the procuring entity. This would allow the responsible entity to contract for the capital investment costs associated with providing increased water supply capacity to the bulk water market, where it believed there was insufficient bulk water supply capacity in the market. This approach would therefore be similar to that operating in the context of the WA electricity market.

The important element of any such water supply capacity mechanism would be method for choosing between alternative water supply capacity options given their differing risk profiles. We would recommend that significant emphasis be given to developing this decision framework, since it has the potential to affect the long term efficiency of the water supply capacity mechanism. There would also be considerable merit in the decision framework for water supply capacity being sufficiently flexible so as to allow for an options-based assessment of capacity alternatives. This might mean that, at least initially, the least cost solution could include investing in developing a series of options to meet water supply deficiencies in the future, delaying a decision to commit to a particular investment option to allow new information on dam inflows and demand to be considered as part of the decision making process. As ACILTasman describes, there are potential significant cost savings that can be delivered through this approach.

In summary the competitive tendering approach would involve contracting for the delivery of a volume of water in each year for a specified period. This approach has the principal benefit of providing strong incentives for the emergence of innovative bulk water supply and demand management alternative options, to meet WA's water requirements into the future. This competitive tendering for water supply would include arrangements for the supply of capacity as well as water itself, where the responsible entity could contract for water supply capacity where it believed there was insufficient bulk water supply capacity in the market to meeting likely water demand.

4.3.2. Existing water supplies within the framework

In addition to responsibility for the procurement of new water capacity (as appropriate), the contracting approach would determine the volumes to be sourced from desalination and new water sources, with remaining dam and groundwater sources acting as a balancing residual.

This allows for the balancing of risks associated with each supply source and also ensures that tradeoffs between new emerging water supplies and existing supplies occur efficiently.

To ensure that appropriate information is provided to the wider market, it would be necessary to develop operating rules that would forecast anticipated volumes of water to be taken from each source to meet demand in each year. These rules would provide information on an annual basis and actual volumes sourced could be published on a monthly basis. Importantly these rules would not detract from the role of the Water Corporation in managing water supplies on a day-to-day basis.

In developing these operating rules, the responsible entity would need to take into consideration interactions between sources as it seeks to optimise the balance between cost and risk in supplying water to consumers. In this way, it is likely not always to source as much water as possible from the operationally least cost source, but also to source water from desalination or other sources as it manages the risks in the system, and balances these risks against likely new water supply investments.

Finally, given that water restrictions are an important part of managing the balance between supply and demand, it would be necessary to develop operating rules for when water restrictions are implemented, lifted or the stages of restrictions change. These rules would provide guidance for recommendations to the Minister on their implementation. This allows the responsible entity to integrate the approach to water restrictions, managing existing water supplies and new investments in an integrated way.

4.3.3. Determining the price for bulk water

Under a competitive tendering model, the price for water is determined through the interaction of competitive forces amongst a number of alternative options that are revealed through the tendering process. For this to deliver an efficient outcome a sufficient number of competitors are required, such that no one competitor is able to exert substantial market power.

Given the scarcity of water supply options currently available and the need to find new additional supply sources, it is likely that there will not be sufficient competition for a pure competitive tender process to deliver incentives to water producers to minimise the costs of providing water. This is particularly true once a water provider becomes dominant, such that its supply becomes critically important for meeting customer demands.

To ensure that market power is not exerted there are a number of options for settling on the price for bulk water supplies including:

- contractual negotiations between the responsible entity and the bulk water supplier in line with the competitive proposal, with access to binding dispute resolution, possibly with the ERA as arbitrator; or
- direct control of bulk water prices by the ERA.

Given the importance of desalination in the overall supply mix, it would be appropriate for the ERA to have a direct price setting role. This ensures that there is no scope for market power to be exerted in the supply of desalination water. Similarly, if any future water source

provided by a private provider became dominant (given the volumes of water supplied) then it would also be appropriate for the ERA to take on a price setting role.

For all other water supply proposals, the price should be determined through contractual negotiation between the responsible entity and the bulk water supplier. The price may vary depending on the particular terms and conditions necessary for the inclusion of the water supply in the overall supply mix.

Finally, to improve transparency in the market, it would be appropriate for the price of water obtained from successful tenders to be made publicly available. This would improve the scope for other water providers to gauge future opportunities in the market.

4.3.4. Determining the price paid for water by consumers

The price that the responsible entity would charge consumers for bulk water supplies would need to recover the costs of purchasing water from a variety of sources. This requires an understanding of the likely mix of water used by each source and the setting of a fee to recover the volume weighted average of the costs of each source.

Where the actual mix of water sources differed from the expected mix, then the overall cost of bulk water would differ from that charged to consumers. It would be necessary therefore for an adjustment to be made in subsequent years in the event that the actual revenue exceeded the costs, or vice versa.

In addition, it would be necessary for the responsible entity to determine the structure of these charges to be paid by the Water Corporation (in its capacity as the user of bulk water to supply its customers), in the event that it was not also the responsible entity. Where a higher proportion of bulk water costs are recovered from a fixed charge to the Water Corporation, then this would have the effect of transferring to the responsible entity the risk of actual water demand differing from forecast demands, and the risk of the mix of sources differing from expectations.[11] Similarly, if a higher proportion of costs is recovered by means of a variable charge then the risks associated with actual demand differing from forecast demands is transferred to the Water Corporation and therefore customers.

An alternative approach to the setting of fixed and variable charges based on forecasts would be to require the Water Corporation to pay the actual costs of bulk water supplies as negotiated by the responsible entity, as they are incurred. This would be equivalent to having an entirely variable charge, and has the effect of transferring forecasting risks to the Water Corporation.

4.3.5. Should the Water Corporation be the responsible entity?

An important decision arises under the competitive tendering model for bulk water procurement as to who should have responsibility for the competitive tendering process. We noted above that the Water Corporation is proposing that it have responsibility for the competitive tendering process, including the assessment of alternative proposals from private

[11] This risk arises irrespective of whether the Water Corporation is the responsible entity or not.

sector suppliers. In our view there is no inherent reason why the Water Corporation should undertake this role, so long as:

- sole responsibility for managing water supplies and alternative demand management options is given to a single entity;
- the entity has the capacity to forecast water demand and supply from existing sources;
- there are clear and transparent processes for bulk water procurement, to provide a framework for eliciting private sector involvement; and
- there is an opportunity to appeal decisions against assessment criteria.

Given that it is possible to achieve the same competitive incentives irrespective of who is given the task for managing the competitive tendering process and information provision functions, the relevant question is what are the advantages and disadvantages of the Water Corporation having this role.

In our view the advantages are limited to the following:

- the Water Corporation has considerable experience in managing water supplies and an appreciation of the feasibility of proposed water supply proposals, ie, the existing skills already reside within its organisation;
- the Water Corporation currently forecasts water demand and supply from existing sources, and publishes this information at regular intervals, so there would be only incremental changes to existing information provision; and
- that it allows for new water supply options to be evaluated against the risk and cost characteristics of existing water supplies, about which the Water Corporation presently holds the most information.

However, these advantages need to be considered against the significant disadvantages, which include:

- the potential to stifle competitive innovation given that a proponent of an alternative water supply must convince the Water Corporation of its feasibility before being able to proceed;
- that the Water Corporation is unlikely to replace its more expensive water sources (such as desalination) for cheaper alternative sources that may emerge through a competitive tendering process - the Water Corporation can be presumed only to consider purchasing water supplies in addition to existing capacity;
- the value of water produced from Water Corporation sources such as desalination is not transparently available, yet the Water Corporation is also the decision maker regarding a competitive tendering process – this does not allow for new alternative supplies to be assessed against existing supplies; and

- the inherent conflict of objectives for the Water Corporation, as a corporation seeking to maximise the return to its shareholders.

Each of disadvantages arises from the inherent conflicts of interest that arise from the Water Corporation performing the dual roles of incumbent supplier as well as decision-maker on what new sources should be procured, when and from whom.. These inherent conflicts have a number of dimensions, only one of which is acknowledged by the Water Corporation in its proposal to the ERA.

Under the Water Corporation proposal, by committing not to compete against the private sector in the competitive tendering process, the potential conflict of interest associated with being both a proponent and decision maker on potential alternatives, is removed. However, additional conflicts of interest arise because:[12]

- new water supplies can and should compete with existing water supplies (apart from the residual supplies from dam and groundwater sources, which act as a water balancing account for the purposes of the competitive tendering model) and this creates a conflict where the Water Corporation is deciding between existing and new water supplies with different cost structures; and

- the Water Corporation is likely to have particular views about the feasibility of water supply options, such that more innovative and perhaps more risky (but also more flexible) alternative options may not be considered. The conflict arises from preconceived views as to the feasibility of alternative options, such that it might not be possible for a proponent to have a fair hearing.

The basic cause of this conflict of interest is the very different financial consequences for the Water Corporation of choosing alternative sources of water in preference to its own. This arises from the disconnection between the economic cost of drawing more water from storage-based sources, and the (much lower) incremental financial cost to the Water Corporation. As water levels in dam or underground storages fall, the economic or opportunity cost of drawing further water from such existing sources rises – because of the increasing risk that storage levels will not be replenished by future rainfall. The cost of this risk is the increased likelihood that either demand restrictions (or more severe demand restrictions) will need to be imposed, or additional supplies will need to be procured from alternative, more expensive sources. However, these economic costs are not borne by the Water Corporation, and so it will always have a tendency to favour drawing additional supplies from its own sources – for which it will receive explicit or implicit compensation that is greater than their incremental financial cost.

On the basis that the Water Corporation will find it difficult to advocate any options that do not maximise its financial position for the benefit of its shareholder, it is very difficult to reconcile having the Water Corporation as the entity responsible for making new water supply procurement decisions, when these decisions could be substituted for existing storage-based or desalination investments that were owned and operated by itself. Even if the group

[12] There may be a number of regulatory interventions that could be used to address these inherent conflict concerns, however in our view using competitive market pressures are likely to be more effective at providing incentives for efficient investment and usage decisions.

within the Water Corporation responsible for procurement were somehow 'ring fenced' from the rest of the organisation, the staff responsible would be making decisions that would be in conflict with the responsibilities of the Water Corporation's Board. In our view, this does not represent a workable governance arrangement.

Even if the Water Corporation believes that it is seeking to achieve a number of corporate objectives, with maximising returns to its shareholder being only one, it would still be inappropriate for the Water Corporation to be the responsible entity under our proposed framework. This is because the actions of the Water Corporation in terms of volumes of water sourced from dams and groundwater affects the potential returns to a private bulk water investment. Having the Water Corporation as the responsible entity will therefore give rise to significant perceived risks for private sector involvement in water supply investment, reducing the possible benefits that can be achieved.

The importance of allowing new water supplies to compete with existing supplies (particularly desalination) is critical to the development of competitive private provision of bulk water. It allows tradeoffs between new water supply investments and existing investments to be made, and provides incentives for efficient investment decisions to occur.

In addition, a particular concern is the Water Corporation's proposal to develop a 'benchmark' water sourcing option, against which all alternative proposals would be assessed against. This creates a barrier for competitive suppliers seeking to develop alternative proposals, because the costs and risks of such alternative proposals would reflect the need to demonstrate that it is 'superior' to the benchmark option. Faced with this, private sector participants are more likely to try and compete on the cost of delivering the Water Corporation's benchmark option.

These inherent conflicts of interest are likely to have the effect of stifling incentives for private sector participation in the provision of bulk water supplies. We believe there is therefore significant merit in the responsible entity being independent of the Water Corporation. However, for this independent entity to fulfil its informational responsibilities, a means of transferring existing expertise from the Water Corporation to the new entity would need to be established.

4.3.5.1. Analysis of the benefits and costs

The competitive tendering option is likely to be superior to current practice since it creates an environment where private sector innovation in the provision of water supplies and alternative demand management options can be harnessed. This is achieved through the regular tendering for the supply of water for periods of up to five years into the future.

The main benefits are that it:

- provides an opportunity for private water suppliers to sell water;
- creates a 'value' for water to inform prospective bidders, through successful prices being made publicly available; and
- it maintains responsibility for managing water supply and demand with a single entity.

However, there are significant costs associated with this option including:

- one-off set up costs associated with the creation of a new market administrator and the costs associated with any necessary regulatory and administrative changes; and
- additional costs arising from the ERA being required to investigate a price for the provision of desalinated water, separate from the current, bundled price of water.

In our view, the benefits are likely to be enhanced through the responsibility for water supply being with an independent market operator rather than the Water Corporation. This is mainly because of the inherent conflicts of interest that arise if the Water Corporation was given the responsibility of assessing alternative water supply proposals. These apply both because the Water Corporation's existing supplies (desalination, as well as drawing from existing storages) are an important reference point for evaluating new alternative supplies. The Water Corporation's proposal that it develop a preferred water supply option to use as a benchmark for assessing all other options amounts to one manifestation of this inherent conflict.

Whilst we believe that the responsible entity should be independent of the Water Corporation, to minimise the costs to establish this new entity, the responsibilities could be undertaken by an existing entity, such as the Department of Water, or the electricity Independent Market Operator.

We also note that one further option for housing this procurement entity in an existing organisation would be to place it with a separated 'network and retail only' incarnation of the Water Corporation. In other words, the inherent conflict arising between procurement of water from new and existing sources could alternatively be addressed through a complete structural separation of the existing bulk water provider functions of the Water Corporation. Of course, such an option would not avoid establishing a separate new entity (being the bulk water supplier).

Perhaps more importantly, unless established with a good deal of care, this option could give rise to impediments to the future development of competition at the retail level. To address this risk, an explicit set of price and non-price terms would need to be established for all bulk water supplied from the (now separated) existing Water Corporation facilities. Effectively, the procurement function would need to establish a contract for existing (as well as new) supplies. The reason for putting in place a transparent price at which the procurement entity was to on-sell all bulk water, whether to its affiliated distribution and retail arm or to other potential distributor/retailers, would be to ensure no artificial advantage arising between the procurement function and its affiliated distribution/retail entity.

The wisdom and potential for the development of retail competition in water is beyond the scope of this report other than to note that, under this option, careful attention would be required to ensure it did not introduce any impediments were to its development.

4.4. Option 2 – Purchasing all bulk water at a determined price

The principal alternative or extension to the competitive tendering model outlined above would be to require an independent market operator to stand in the market and purchase all water offered for sale at a determined price. Such a standing offer to buy and sell water

would be accompanied by standard conditions for sale associated with the delivery of water and its quality. In addition there would be scope to negotiate the price and terms and conditions for water that did not meet the standard conditions.

Under this option, the market operator would be a not-for-profit entity required to purchase all water at the determined price, and to sell all water to the Water Corporation at the same price. The method for determining the price and its associated conditions would then become the principal mechanism for managing supply risks within the market.

The roles and responsibilities for the market operator under this option include:

- forecasting and publishing total water demand on an annual basis for each year up to a period of ten years;
- forecasting and publishing expected available supply from existing sources and contracted sources for each year up to a period of ten years, taking into consideration expectations surrounding stream inflows to dam sources and the operation of other water sources such as desalination;
- administering the bulk water market in accordance with market rules;
- purchasing all water at the determined price; and
- selling all water to the Water Corporation (and potentially to other end users) at the determined price.

The key feature of this option is the creation of a market, through an administered pricing mechanism, that simulates the value of bulk water to consumers, in the absence of multiple buyers of water. The method of determining the purchase price therefore becomes critical to the incentives created under this option.

4.4.1. Approach to determining the administrative bulk water purchase price

For this option to be effective, the administrative bulk water price should reflect the value of bulk water supplied to consumers at any point in time. Ideally, it should take into consideration existing water supply conditions (such as the level of water in dams and/or volumes available from groundwater pumping) and the cost of providing water at relatively short notice.

Rather than the price being set on a periodic basis, under this approach the price would be based on a mechanism that would be made transparently available to the market. It would be necessary therefore to determine:

- an upper bound for the price;
- a lower bound for the price; and
- a mechanism for changes to the price within these parameters, which would reflect supply and demand conditions at a point in time.

The upper price bound should reflect the cost of obtaining water from marginal supply sources, when existing water supplies are low. Ideally it should reflect the cost of building and operating the next increment of supply, in circumstances when existing supplies are insufficient to meet demand. It should also incorporate a time for delivering supply, since in some circumstances the cost of providing the next increment of supply might reflect the cost of shipping water from distant alternative sources as a temporary measure.

The lower bound for the price would reflect the marginal cost of providing water from the cheapest source. This is most likely to be the cost of providing water from least cost sources such as dam supplies.

The mechanism for changing the price would be based on supply and demand conditions. Where dam levels are dropping, then the price should increase towards the upper bound and, similarly, as dam levels rise, the price should decrease towards the lower bound. In this way the price at any point in time would reflect the opportunity cost of water at a point in time, given existing water demand and supply conditions.

In developing this option it will be important to consider the appropriate period in which the price would apply for. To avoid water suppliers waiting for changes to prices, then it would be appropriate for the price to change on, say, a weekly basis, ie, a period sufficiently short so as to reflect changes in conditions during that period, in accordance with the price mechanism.

In addition, under this option the posted bulk water price would be paid to all water offered for supply during the period. This would mean that during periods when dam levels are low and the opportunity cost of water is relatively high, the price paid for all supply (including dam water and groundwater supplies) would be the price necessary for desalination to operate, including an appropriate return on the capital investment. This would establish a significant incentive for alternative water providers, or demand management providers to seek to supply alternatives, providing the cost was less than that for operating desalination.

Given the critical nature of the administrative price setting mechanism, it would be appropriate for it to be developed through a consultation process and reviewed by the ERA on a periodic basis to ensure that it was delivering appropriate incentives for the provision of bulk water.

Finally, it would be possible to supplement this ‘water only’ market with a capacity market, similar to those operating in the United States for electricity generation capacity. This could operate by the market operator undertaking a competitive tendering process for the provision of water supply capacity. This capacity market could be funded by a direct charge from the Water Corporation.

One potential concern with the administrative pricing model outlined here is that the price of bulk water during periods of prolonged drought may rise significantly, giving rise to financial pressures for the Water Corporation. However, it is necessary to acknowledge that, even in the absence of a formal market approach, these financial risks already exist as the Water Corporation seeks to meet water demands during droughts through investment in emergency, and expensive, supply sources. The nature of the financial risk is therefore no different under this option, but rather is more transparent.

These financial risks could be managed as follows:

- through the use of water restrictions that reduce demand, which through the administrative price formula should also lower the administrative price; or
- through the passing on of these additional costs directly to retail customers.

These approaches are in effect identical to existing approaches to managing the financial risks that arise during periods of prolonged drought.

4.4.2. Analysis of the costs and benefits

In assessing the costs and benefits associated with the administrative price model, it is useful to consider the importance of the price mechanism for creating incentives for innovation in the provision of additional water supplies and/or demand management alternatives. By standing in the market to purchase all water at the determined price, there is a clear opportunity for any person who can satisfy the associated terms and conditions and is willing to supply at the administrative price.

The main benefits of the administrative pricing approach are therefore that it:

- creates a clear incentive for private innovation in water supplies;
- provides a simple mechanism for purchasing existing and new water supplies that can be easily understood by market participants;
- allows for the integration of water trading from other water users;
- provides a transparent value for both existing and new supplies, which allows for efficient signals for new investment and also efficient use of existing sources given the opportunity costs of drawing down dam water and ground water supplies;
- allows for the risks associated with supply to be shared between the Water Corporation and other private providers, with existing dam and groundwater supplies acting as the balancing item; and
- where no private sector participants offer to supply at the administrative price, allows the Water Corporation to bid into the market at the price, as the default supplier where necessary.

These benefits would need to be considered against the costs of introducing such a mechanism, including from the potential difficulties associated with developing an administrative pricing mechanism.

In our view, there are likely to be significant benefits arising from the development of a market mechanism for bulk water procurement, using an administrative pricing approach. We acknowledge that such an approach is innovative and so would suggest that trials be undertaken as part of its development and prior to its implementation. This would be particularly important to ensure that the pricing mechanism provided the necessary incentives for private participation.

4.5. Recovering the costs of the market operator

The market operator under these frameworks would operate as a not-for-profit entity. This means that it would be necessary to develop a funding mechanism for its operations.

The simplest approach would be to charge the Water Corporation and water suppliers a fee, similar in nature to fees charged by the National Electricity Market Management Company (NEMMCO) to electricity market participants. The operator fee would reflect its underlying costs for meeting its responsibilities.

To ensure that there is some cost restraint on the market operator, it would be appropriate for any market participant to dispute fees charged to the ERA for arbitration.

4.6. How does water trading fit within the procurement framework?

An important feature of the Perth water supply system is that current water sources are shared between the Water Corporation and other users such as market gardeners and irrigated agriculture. Limited water trading occurs within these groups, and there is scope to expand this trading so as to incorporate the Water Corporation. Indeed, it is not clear what the Water Corporation was not already move to utilise this potential source of supply.

Both of the options outlined above create an environment for water trading to occur between water users and the Water Corporation. Under a competitive tendering model, water users would be able to offer to forego the use of their water entitlement in any given season, for payment of an amount specified in such a proposal. This allows for the value of the water to an existing user to be weighed against its value to the Water Corporation, as part of the assessment of offers to supply. The potential disadvantage of relying on this approach is that the procurement process is confined to new supplies, and so does not provide clear information provided as to the likely value of existing Water Corporation sources, which may discourage such proposals. In addition, the task of putting a proposal together may itself represent a barrier to trading occurring for many users.

Under the administrative pricing option, the trading arrangements become considerably simpler. If an existing water user is happy to sell water at the administrative price, then the trade could occur. The posting of an administrative price provides clear information on the value of existing Water Corporation sources, and allows water users to decide whether water is better used for their own purposes, or to be sold for use by the Water Corporation's customers. In addition, it allows ongoing flexibility for the water user. If a water user chooses not to sell in any period, it knows that it can sell water in the future, at the then prevailing administrative price.

Facilitating greater water trading amongst water users and also with the Water Corporation therefore requires:

- a clear trading framework and process;
- clarity about the pricing arrangements (either a bidding mechanism, or an administrative price as described above); and

§ certainty as to the property rights regime.[13]

A competitive tendering approach to bulk water procurement would provide a process for the sale of water to the Water Corporation, although it would not provide explicit information on the value of the water to the Water Corporation, and hence does not give the same incentives to encourage efficient water trading. In contrast, the administrative water price option makes the value of water to the Water Corporation explicit, allowing for clearer decisions to be made on whether or not to sell water.

4.7. Separation of desalination from other water supply assets

A feature of both of these models is the scope for tradeoffs between the operation of the desalination plants and emerging alternative water supplies as well as demand management options. Optimising this trade-off is important for ensuring that bulk water supplies are delivered in the most cost effective manner into the future.

For the market operator to optimise the management of all bulk water supplies (as distinct from dam and groundwater sources alone), it would therefore be necessary to develop an implicit or explicit value or price for the delivery of water from desalination. This price should be based on the cost of delivering desalinated water into the bulk water delivery system, on equivalent standard terms and conditions applying to all additional water sources. Given the importance of desalination in the water supply mix, it would be necessary for this price to be determined by an independent entity. Given the role the ERA has in recommending water and wastewater service charges to the Minister, it would seem appropriate for this role also to be given to the ERA.

For a separate price to be determined for desalination, it would be necessary to determine the standalone costs associated with desalination. This would require the Water Corporation to ring fence the costs associated with providing desalinated water, including an appropriate return on the capital investment and allocation of fixed overheads, from other regulated service costs. So long as there were financial separation of the desalination assets from the other assets, this would be sufficient for the purpose of being managed within the frameworks developed in this chapter. This means there would be no need for formal legal separation of these assets.

4.8. Diagrammatical representation of the frameworks

The structure for each of the bulk water procurement frameworks developed in this chapter is summarised in figures 4.1 and 4.2 below.

[13] The current WA water reforms are addressing the property rights issue in detail.

Figure 4.1
Diagrammatical representation of competitive tendering framework structure

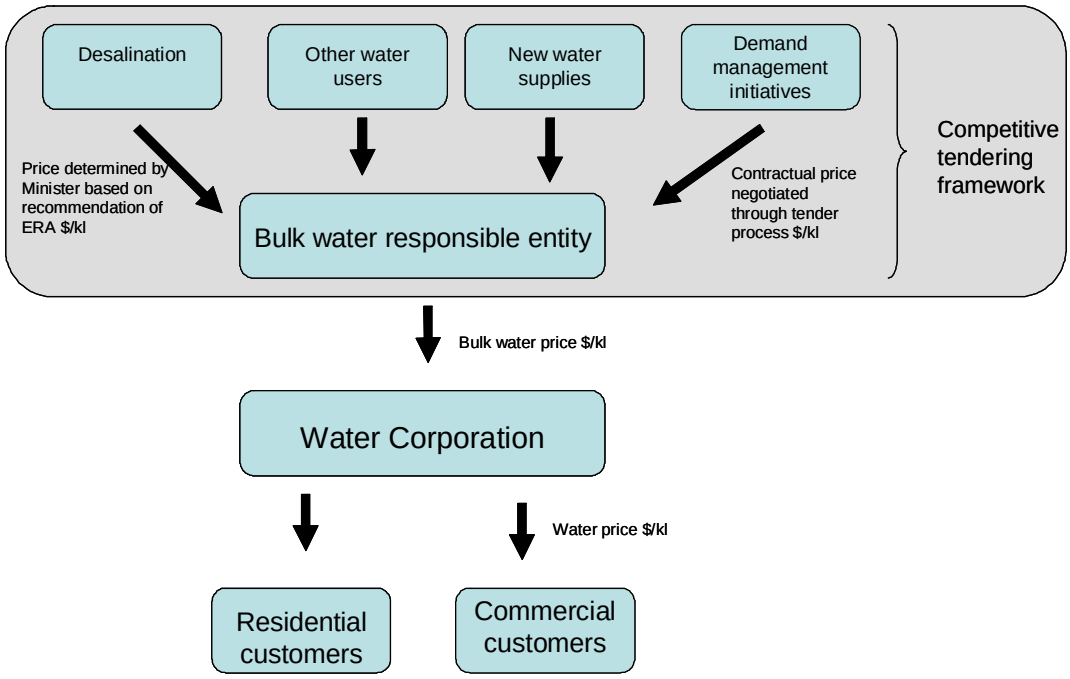
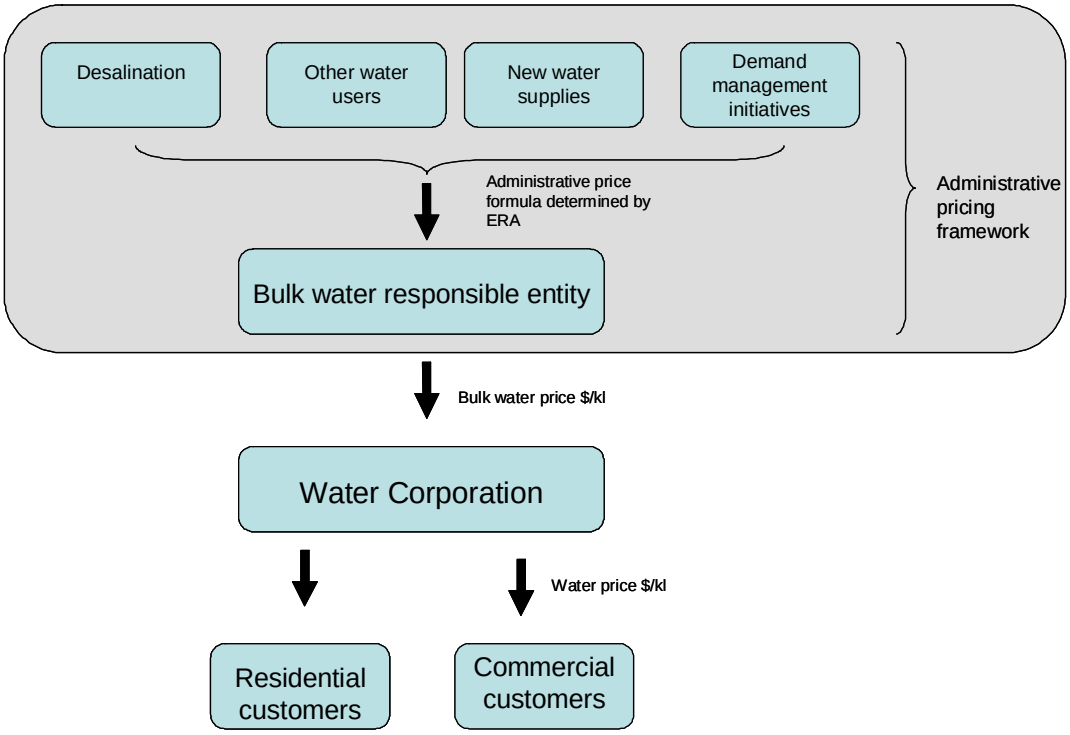


Figure 4.2
Diagrammatical representation of administrative pricing framework structure



5. Conclusions

Efficient management of the variety of options for balancing the supply and demand for bulk water in the medium to long term is emerging as a significant challenge for the water industry across Australia and particularly in Western Australia. Prolonged drought in combination with limited opportunities for expanding supplies through increased storage capacity means that new, alternative water supply options are necessary. Ensuring that bulk water investments - as well as potential demand side responses - are undertaken and managed efficiently will be critical to the future costs of the industry.

To this end, we have outlined two options for a bulk water procurement framework, for further consideration and discussion. In developing these frameworks we have sought to remove disincentives inherent in the existing bulk water procurement approach, and within the approach proposed by the Water Corporation. This has been achieved by ensuring that the frameworks include a transparent process for potential proponents of bulk water augmentations to develop proposals and have these proposals evaluated independently of interests associated with conflicting alternative sources. In addition, the frameworks provide incentives for the efficient use of existing sources, such as desalination, by ensuring that a value is placed on these existing sources to allow for their optimal use in light of alternative sources.

The first option amounts to an enhancement of the bulk water competitive tendering framework proposed by the Water Corporation. However, a key distinction arises from our conclusion that the competitive tendering should be administered by an entity independent of the Water Corporation. This entity would have responsibility for managing water supply procurement through the choices that need to be made between the volumes to be sourced from existing or new potential supplies to meet demand, and of more or less demand side management. This allows for potential conflicts between the operation of desalination and other new alternative water solutions to be avoided.

This option provides for a competitive tendering process to establish contracts for the supply of volumes of water in each year for a specified period into the future. If necessary, this would be supported by a competitive process to establish contracts for water supply capacity, in circumstances where the responsible entity believes (or has found) that there is likely to be insufficient water supplies available to meet demand at particular points in the future.

The second option involves the development of an administered, formulaic price for wholesale water that reflects prevailing water supply and demand conditions. As available water supplies from dam and groundwater sources fall, the wholesale water price should rise, providing signals for additional water supply investment to occur. Similarly, when water supplies were plentiful, the wholesale water price should fall to the marginal cost of providing water from its cheapest source. The formulaic price will therefore reflect the value of water given existing supply and demand conditions.

Having considered each of these options at a high level, we believe there is great merit in adopting the competitive bulk water procurement tendering approach, administered by an independent market operator. We recommend that this approach involve periodic tendering for water supplies for a specified future period including an arrangement where it can contract for supply in capacity terms. This would ensure that incentives are created both for

the efficient investment in new supply augmentation, and also for efficient use of existing supplies, such as desalination.

In the longer term, there would also be merit in developing the formulaic, price based approach so as to allow the private sector to take on more of the future rainfall-related risks associated with investments in alternative water supplies. This approach has the potential to reduce the need for a centralised and coordinated planning approach to supply augmentation. We acknowledge that considerable further work would be needed to develop this option to a point where there would be sufficient confidence amongst stakeholders for its adoption. It would also be important to ensure that the private sector was well placed to take on the risks that would arise from its implementation.

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