Frameworks for Centralised Water Source Procurement in WA

Institutional arrangements and planning & assessment processes for future water needs

Prepared for the
Economic Regulation Authority of Western Australia

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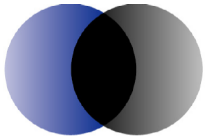

ACIL Tasman

Economics Policy Strategy

ACIL Tasman Pty Ltd

ABN 68 102 652 148
Internet www.aciltasman.com.au

Melbourne (Head Office)
Level 6, 224-236 Queen Street
Melbourne VIC 3000

Telephone (+61 3) 9600 3144
Facsimile (+61 3) 9600 3155
Email melbourne@aciltasman.com.au

Brisbane
Level 15, 127 Creek Street
Brisbane QLD 4000
GPO Box 32
Brisbane QLD 4001

Telephone (+61 7) 3009 8700
Facsimile (+61 7) 3009 8799
Email brisbane@aciltasman.com.au

Canberra
Level 1, 33 Ainslie Avenue
Canberra City ACT 2600
GPO Box 1322
Canberra ACT 2601

Telephone (+61 2) 6103 8200
Facsimile (+61 2) 6103 8233
Email canberra@aciltasman.com.au

Darwin
Suite G1, Paspalis Centrepoint
48-50 Smith Street
Darwin NT 0800
GPO Box 908
Darwin NT 0801

Telephone (+61 8) 8943 0643
Facsimile (+61 8) 8941 0848
Email darwin@aciltasman.com.au

Perth
Centa Building C2, 118 Railway Street
West Perth WA 6005

Telephone (+61 8) 9449 9600
Facsimile (+61 8) 9322 3955
Email perth@aciltasman.com.au

Sydney
PO Box 170
Northbridge NSW 1560

Telephone (+61 2) 9958 6644
Facsimile (+61 2) 8080 8142
Email sydney@aciltasman.com.au

For information on this report

Please contact:

David Campbell
Telephone (02) 9958 6644
Mobile 0419 584 824
Email d.campbell@aciltasman.com.au

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Purpose

This paper has been prepared at the request of the Economic Regulation Authority ("the Authority") as input to its current inquiry into competition in the WA water sector. It is directed specifically at considering a feasible structure or structures for a centralised model of water procurement for WA, recognising that such a model has received support from Water Corporation and from NERA, in its commissioned report. It draws heavily on previous work undertaken for the Inquiry, including the original issues paper and subsequent papers on procurement issues prepared by ACIL Tasman, NERA and Water Corporation.

The paper is not designed to provided a detailed blueprint for a set of institutional arrangements – but is intended to provided sufficient form to allow the centralised procurement approach to be weighed by the Inquiry, with an understanding of its implications.

Centralised procurement

Decisions on both where to draw water for immediate supply sources, and how and when to invest in new capacity to supply water in the major populations areas of WA are now largely determined centrally. Water Corporation undertakes primary planning and the development of options within wider water resource management and environmental guidance. Actual decisions involve deliberation across a range of Government agencies and with the Government itself, given the importance the community attaches now to water strategy.

Water Corporation has proposed an extension of this model to include more active competitive tendering for projects to deliver dispatch to the system. A key emphasis would be less prescription as to means – providing incentives for greater market innovation in project design, though Water Corporation would offer substantial guidance to the market. In this model, Water Corporation would withdraw from project delivery – to avoid conflict – but would discharge responsibility as the procurer of its needs. Given its responsibilities for system security, this would translate into it having responsibility for procuring adequate supplies to secure the system.

Separation of procurement from Water Corporation?

NERA has proposed an alternative centralised procurement model, in which the procurement function would be formally separated from Water Corporation. The entity would contract for dispatch and/or capacity over a period likely to be of the order of 10 years, to ensure the capacity to safely meet demand.

We see logical merit in the separation of the procurement function from the operation of the distribution and retail (and possibly transmission) systems, but recognise very close synergies between the planning needs for procurement and operation. If the objective is to deliver the most cost effective solution to system supply and security demands, this will not flow from a sequential process that secures supply and then operates the system. There will be an essential need for joint planning – especially in view of the way that decisions taken on where to draw water from existing sources for operation reasons can have quite different implications for future procurement needs. Other stakeholders need to be part of the joint, as opposed to sequential, planning process and this includes the resource management function discharged by the Department of Water.

The basis for comparing alternative sources

Earlier work for this Inquiry by ACIL Tasman, developed further in this report, has stressed:

- The importance of whole-of-system procurement planning within an options framework, if serious risks of excessive, high cost investment are to be avoided.
- The fact that this planning paradigm cuts across more traditional methods of assessing project proposals in a 'merit order' framework that emphasises unit costs of water delivered into the system.
- The fact that nominal unit costs of water from projects can be very seriously biased downwards relative to an appropriate whole-of-system assessment of the effective cost of the extra supply capacity.
- The fact that flexibility in the form of small size increments, scalability, deferability of major costs etc can support the competitiveness of supply and demand management sources against large projects with low nominal unit costs.

We see as a key requirement of a central procurement process that it be capable of moving to implement procurement planning that correctly reflects these options-based principles. We expect that this will have significant implications for the shape of actual procurement investments. We see it as crucial that efforts to open up competitive access to the procurement market

not be done via institutional arrangements that may lock in more traditional planning methods at a time when the need for the new methods is growing.

Functions of a procurement entity

Against this background and assuming a central procurement model is to be used, we recommend a procurement entity with several clear functions, that are developed in some detail in the paper:

1. The entity to have as its primary responsibility ensuring that the system's capacity to match demand for water services with *adequate supply is protected at all times*.
2. Subject to ensuring that this capability is sustained, the entity is responsible for working with the system operators, with the Department of Water, with end users and with environmental and economic regulation processes to encourage a *whole of system evolution* of the system over time that is *as cost effective as is practically achievable*. 'Cost effective' is to be interpreted broadly, to include social and environmental values and user costs, as well as supplier costs.
3. In support of 1 and 2 above, the entity should have responsibility for periodically advising the Government and Government processes as to an appropriate interpretation of security and reliability of service supply.
4. The entity should be responsible for ensuring that the system has access to a *rolling portfolio of options for water supply* sufficient to meet the security and reliability requirements as specified by the Government processes.
   - In support of this function, it should have the powers to enter into a range of types of contract for access to water supply and capability to supply – with expectations that the major form of contract will involve *call options over future supply*, with a range of specifications in relation to volume, lead time and duration of supply if triggered.
   - This approach allows for contracts for both firm dispatch and capacity as traditionally viewed and as developed in the NERA paper. However, it is substantially more versatile, allowing for contracts for security services based around readiness options that exploit the cost efficiencies recognised in the options paradigm.
5. However, the entity's primary responsibility will be to ensure that the total system and the set of available options available to the system meet security and reliability needs cost effectively – not necessarily to own the system or all of the call options.
6. In support of 1-5 above, the entity should be responsible for ensuring the development and maintenance of a system modelling capability that can:
   - Support soundly based identification of competitive portfolio strategies for maintaining security and reliability of services;

- Provide guidance as to how these strategies could be further developed – including beneficial features in the design and performance of individual projects – to improve the performance of the strategies.
- Provide a basis for assessing whether individual project proposals add to the overall value of the portfolio of options and, if so, provide an indication of the value, to the portfolio, of their inclusion.

7. The entity should be responsible for the development and management of suitable arrangements for ready market access to the models and modelling capability – to any parties with an interest in contributing the overall strategy through project development and/or other means.
8. Both as an input to the modelling and analysis that will need to be undertaken by the procurement entity and as a basis for more efficient valuation of potential call options (and therefore stimulus to innovation), the entity should be responsible for regularly documenting its assessment of forward uncertainties and opportunities. This should include documentation of assumptions regarding the likelihood of alternative developments of forward rainfall patterns, alongside demand forecasts (developed jointly with Water Corporation) and assessments of uncertainties in those forecasts. It should also set out the basis on which robust planning is to be undertaken.

Procurement of demand management is given equal status with source procurement. Within the proposed options framework, accelerated demand management and the bidding of interruptibility into the market can make sense, even where the unit costs of these sources are well above nominal costs from major new supply projects. An important function for the procurement entity will be to build market understanding of the economics of procurement in this complex supply system. This is seen as critical if the full dynamic efficiency gains from innovation are to be gained. It may also provide a basis for future devolution of the procurement model, away from the centralised arrangement.

The paper examines processes relevant to governance, including the access regime to apply to existing transmission and distribution infrastructure, pricing arrangements and some aspects of organisation, accountability and dispute resolution.

1 Purpose

This paper has been prepared at the request of the Economic Regulation Authority ("the Authority") as input to its current inquiry into competition in the WA water sector. It is directed specifically at considering a feasible structure or structures for a centralised model of water procurement for WA, recognising that such a model has received support from Water Corporation and from NERA, in its commissioned report.

This paper is particularly concerned with the way that the issues identified in ACIL Tasman's earlier discussion paper on issues in procurement frameworks might be meshed with a centralised procurement planning institutional model, along the lines flagged in the recent NERA review of bulk water procurement options in WA (which was a variant on the procurement model recommended by Water Corporation in its submission). Both these papers link back to the original ERA Issues Paper that recognised one of the key issues being whether procurement decisions need to be made centrally. The emphasis in this paper is on central procurement, while recognising that both the ACIL Tasman and NERA papers recognised merit in an arrangement that might be able to evolve safely towards a less centralised procurement structure in the future.

2 Centralised procurement

Decisions on both where to draw water for immediate supply through the piped potable supply networks, and how and when to invest in new capacity to supply piped potable water in the major populations areas of WA, are now largely determined centrally – and have been for many years. Water Corporation undertakes primary planning and the development of options within wider water resource management and environmental guidance. Actual decisions involve deliberation across a range of Government agencies and with the Government itself, given the importance the community attaches now to water strategy – and the range of relatively intangible, but still highly important, environmental and social dimensions involved in water use decisions.

This does not mean that the full wherewithal to meet demand for water in WA is determined centrally – though clearly the above processes do have a major role. Contributors to the demand-supply balance vary across the state and across classes of use, but the wide use of private groundwater (within a centrally determined access arrangement); markets and incentives for the use of water saving technologies; pricing decisions; and regulation and social pressures for conservation all play important roles and involve markets of one form or another.

2.1 Water Corporation proposal

Historically, Water Corporation and its predecessors have played a major role in both the planning for and the delivery of supply seen as necessary to meet demand and in the management of the water use restrictions regime. However, Water Corporation's initial submission to the current ERA Inquiry has recommended a procurement model in which it would withdraw from delivery of new source supply. This is seen as allowing greater neutrality in cultivating *competition for the market* in relation to new supply projects. Water Corporation would continue with a major role in guiding the development of proposals for source supply, in assessing those proposals within the context of the planning for source augmentation – and, ultimately, in operating the available system and system capacity to meet the demands for piped potable supply.

The Water Corporation model appears to be predicated in determination of additional system volume requirements – presumably in the form of increases in some measure of annual availability or sustainable yield (appropriately interpreted inclusive of groundwater and water factory components in the system). The thinking appears to be firmly embedded in the setting of acquiring volumes of water which could be typified by tendering for supply of X GL/annum starting 5 years out – with the view that the volumes would be acquired from the successful tenderer and either used to supply immediate demand or, if not then needed, stored in the system to allow supply of future demand.

2.2 NERA central procurement option

NERA developed a centralised procurement option (Option 1) with several features in common with the Water Corporation proposal – but recommended that responsibility for the procurement planning be formally separated from Water Corporation as the system operator. The NERA option was seen as likely to include contracting for dispatch from existing sources, as well as (and as a means of) posting incentives for investment in new sources and supply capacity over time.

NERA also recognised the possibility that this procurement market might, instead of contracting for firm volumes in the future as proposed by Water Corporation, contract for the delivery of *capacity to deliver volumes* in the future. This approach was not developed in detail, but it does represent an important distinction – that ties into the discussion of *flexibility* and option value that underpins the main points developed in the ACIL Tasman discussion paper – in that it could allow for the possibility of avoiding operating costs where the demands for extra system water were low.

NERA also developed a second option, Option 2, that would develop a primary market solely for water dispatch over time – and that would rely on this market to deliver price incentives to users and prospective suppliers of new capacity to enter the market to ensure adequacy of supply capacity. Formal source procurement planning would effectively be decentralised

This mechanism would parallel the approach used in the National Electricity Market to encourage new investment – but would depart from the WA electricity market approach in which new capacity is contracted for explicitly. NERA argued against this approach in the short term at least.

The paper acknowledges the potentially valuable role of options principles to procurement planning, but does not incorporate guidance as to how in practice they could be built into the procurement models presented by NERA.

2.3 Points from ACIL Tasman discussion paper

The ACIL Tasman discussion paper highlighted the complex, whole of supply-demand system *risk management task* that needs to be discharged if a cost effective response to the pressures and uncertainties that currently apply to WA water supply is to be delivered. In particular it stressed the potential for a major divergence between:

- the apparent economics of new project proposals, assessed on a traditional basis such as levelised cost of production; and
- the associated implications for risk-weighted system costs, assessed factoring in key uncertainties associated with the timing of demand for the additional water.

That work mapped out the key features of an options-based approach to procurement planning, and demonstrated how this could offer much greater flexibility than have traditional planning methods to balance two 'competing' risks in a cost-effective way:

- The risks of shortage of water, in the technical sense of reaching a point where there is a technical inability to meet demand; and
- The risks of looking back on the investment decisions made, only to see that:
  - with the benefit of hindsight, there was a lot of expenditure that proved unnecessary, too early or a less than ideal form; and/or
  - that much of these costs could have been avoided had a more flexible approach to risk management been adopted.

These risks compete in the sense that efforts directed at reducing one risk will tend to increase to increase the other. Spending more on supply capacity will lower the risk of shortage – but increase the risks of excessive expenditure. A

key question then is whether there are strategies that limit the severity of this trade-off and allow greater security to be obtained without necessarily spending at levels and in ways that might later be 'regretted'.

Water Corporation appears to be taking the view that demand growth is rapid enough that there will be little need to 'regret' excessive investment in capacity – if not needed at the time targeted, then demand growth is likely to mean it will be needed soon after. For reasons developed below, based on Water Corporation modelling, we do question this line of argument – but the questioning is empirical only. I.e., we question (and present some evidence below) whether demand growth is fast enough to mean that the growth effectively eliminates the need to worry about the costs of investing too early. Clearly a supply system in which demand is growing very rapidly, will offer a level of 'hedging' against the consequences of investing too early in capacity. The question is one of degree.

2.4 Options/market compatibility

One of the challenges in developing a market for source procurement will be that of better aligning the *incentives seen by project proponents* with the *objectives of a sound procurement process* (whether centralised or not; whether explicit or implicit) – which we assume will relate far more to whole-of-system costs and benefits than to individual project costs and benefits.

The discussion of these matters in the ACIL Tasman Discussion Paper was not designed to argue against greater use of competitive markets in procurement. The evidence provided in the discussion paper that the current procurement processes are also likely to be delivering unnecessarily expensive procurement strategies tends, if anything, to argue for greater engagement with markets to tap into more innovation in procurement planning. We believe that this is likely to be the case – and in principle both the Water Corporation and the NERA proposals could be used to do just this. Both models would look to new suppliers for proposals and could be used to encourage innovation in proposals as a means of competing.

However, the same arguments and evidence do suggest strongly that great care will be needed to ensure that reasonably good incentives are posted for that *innovation being directed in ways likely to discover and implement more cost effective solutions* to the concerns for future water supply. The scope for superficially attractive proposals pushing up costs unnecessarily (or sustaining current unnecessarily high costs) is substantial.

These risks would exist in a quite fundamental way if the competitive outcomes were based on a framework which is seriously biased in the way it assesses and compares alternatives. We are *strongly* of the view that avoiding

such bias requires an *adaptive, options-based paradigm* that can take a *whole of portfolio* view *forward over time*; that it cannot be driven primarily by comparisons of *project levelised (unit) costs of water production* or demand avoidance. Instead, it will necessarily be concerned with the expected impact on whole-of-system costs (supplier and user) – with some measure of impact on expected present value of forward costs being most relevant, subject to delivery adequate quality and reliability of services.

Even in the presence of a sound assessment framework, there are still risks that innovation would be inadequate or wasteful if key potential suppliers do not adequately understand the way that ideas will be assessed and selected for implementation. Misunderstanding – including continuation of widely held but quite misleading concept that unit costs of production or demand reduction are the key – could still result in poor outcomes even in the presence of a sound assessment framework.

This is, in fact, a key reason why we argue below for an early priority within any centralised procurement framework being not just the development but also the effective communication of the assessment process – and industry access to it as a planning tool. Potential suppliers need access to the ability to test their ideas for competitiveness – with enough flexibility in the access arrangements to encourage progressive design evolution to further increase the competitiveness of the ideas. They also need confidence that the access arrangements provide adequate protection of proponent 'intellectual property' in innovative strategies during this development phase. We see this access, flexibility and security as keys to both an *efficient central procurement process* and to any reasonable *prospects for later evolution of the market to a much less centralised one.*

That said, the options perspective on an efficient process for developing the water supply system over time is more unconventional, more complex and harder to understand than the superficial economics of a project that currently appears to stand centre stage. This becomes especially true when consideration is given to 'readiness strategies' – to *possible* future projects rather than firm projects, with the very possibility of these projects proceeding, if and when needed, delivering system security now alongside of a dramatic reduction in expected costs.

Beyond the questions of complexity are the questions of commercial attraction if the emphasis shifts towards less tightly scripted, and less certain of commitment and commitment timing, projects. A water factory as a stand-alone entity, running in accordance with an agreed operating schedule fits well into established commercial models. The services can be tightly specified and priced, the project risks can be allocated and the costs can be assessed. The portfolio risks – of overinvestment in unnecessary capacity, for example, tend to be overlooked, though they do not go away – and can be heightened by

commercial arrangements that limit the scope or incentives for flexible adaptation to changed needs or assessments of needs.

For example, an outsourced contract for desalination water, based on an assumption of full time operation and funded under a take or pay contract, could start to look unfortunately inflexible in the event of a rerun of a few of the wetter years not seen since 1974. The same plant owned by a Government business may well offer greater scope for implementing an economically sound altered operating regime. This is not an argument against the outsourcing, but does stress the need – in an options-based planning environment – to be careful about contracting away flexibility. This might involve either avoiding such contracting, or making sure that the true cost of the loss of flexibility is reflected into the value of the contract. In an options setting, the portfolio risks need to be allocated as well as the project risks.

There is, therefore, a natural concern with the options approach – that it does require a good systematic understanding of the whole of system operations and opportunities, rather than just a good focus on projects and project costs and performance. It may also require some novel commercial arrangements. This suggests that requiring a focus on options-based planning may cut across the scope for engaging with competitive markets – at least by adding to the transaction costs of making such a process work.

In effect, recognition that the best solution to the whole of system problem may be very different from the aggregation of the individually best project solutions for incremental supply sets the problem of market design in a portfolio setting. Many of the ideas that have emerged from the New Institutional Economics school of thinking become relevant. This includes the emphasis on transaction costs in driving appropriate institutional arrangements and in aligning individual and institutional objectives and links into the circumstances where in-house provision of services may be cost effective relative to outsourcing. It also brings in a clear distinction between the 'institution' – covering the collective 'rules of the game' – and the organization.

We recognise a legitimate concern here and make two observations:

- Given the magnitude of the strategy differences suggested by portfolio- vs project-based planning, this would probably suggest that – should this conflict prove incapable of being adequately controlled – then the arguments would probably pose a greater challenge to the case for proceeding to competitive markets in procurement than a case for settling for project-oriented planning methods.
  - A competitive market that locked in project-based merit orders as the primary mechanism for determining procurement investments would appear very costly.

  - At the same time, it is important to realise that there is a need for the current non-market procurement planning processes to develop substantially if they are to realise the potential benefits offered by the options methods.
- We believe that the conflict can be largely, and at least progressively over time, removed through adaptation of one of the key recommendations in the Water Corporation proposal.
  - We seek below to set out the key elements of an approach that should allow for this, while providing access to competitive markets to support greater innovation in delivering on-going management of water supply-demand balance and security.

3 Markets for water vs water security

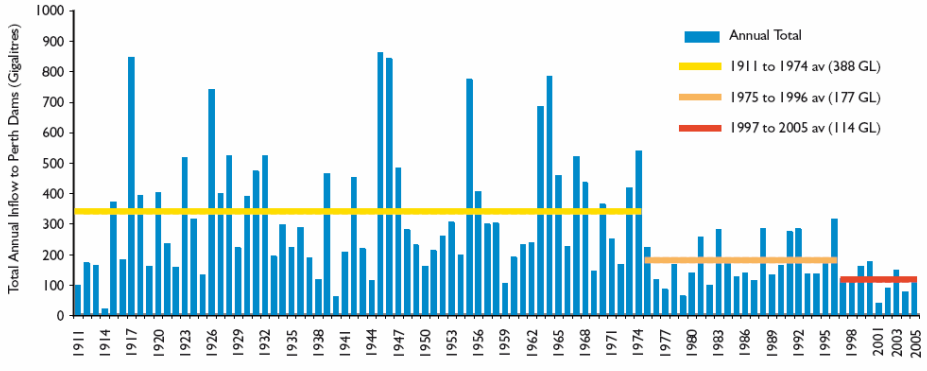
A key feature of the arguments developed for the use of these improved risk management methodologies – and especially the use of options-based planning methods that work with risk-weighted portfolio costs and benefits – lay in the systematic distinction between demand for water and demand for water supply system security.

3.1 Forward climate uncertainty

Much of the policy debate regarding water is predicated on the assumption of a shortage of supply, where the actual drivers of the response strategy have been principally concerns about possible threats to supply.

To illustrate this, consider the following charts.

Figure 1 **IWSS run-off patterns since 1911**



Data source: State Water Plan, 2007, based on Water Corporation modelling

The first chart, also reproduced in the NERA paper, shows Water Corporation modelling of inflows to the current IWSS supply system, based on the rainfall record since 1911.

The chart is strongly suggestive of a change in pattern from the mid-1970s, and the chart clearly shows the more recent extremely dry run of years. Reflecting this pattern , and a very substantial investment in building an understanding of pressures on climate in SW WA, current Water Corporation modelling recognises (as stylized representatives of a range of possibilities) and works with two 'plausible' future worlds, in terms of the underlying propensity to generate rainfall and run-off:

- A pessimistic version, in which the last 7-10 years are considered representative of future patterns.
  - In effect, this version assumes that the recent run of years with unprecedented low rainfall has not been as a result of a bad drought, but rather reflects the new climate for SW WA. There has been, from the mid- to late-1990s a structural shift in climate change relative to the earlier history, and it is now dramatically drier.
- A more optimistic (if still somewhat depressing) version that recognises a climate shift, with a substantial drying in typical conditions, from the mid-1970s, but that recognises the last several years as being attributable also to a very severe drought superimposed on this changed climate.
  - In this version, the relatively frequent rainfall 'peaks' seen through the first three quarters of the 20th century are gone completely, but there remains a reasonable propensity for years with rainfall close to the earlier 'average'.
  - However, there is also a significant probability of very dry years and runs of dry years, such as has been seen over the past several years.
  - The net result is a substantially lower average rainfall than the average implied by the full hydrology record and an even more substantial drop in run-off – but also a substantially higher probability of obtaining a reasonable rainfall year than is implied by the very recent history of them last 7-10 years.

The former might be viewed as representing a 'worst case scenario' and appears to be being used essentially in this capacity in the current planning process. The precise status of the latter is harder to pin down, and is certainly subjective – but it does appear reasonably plausible. For convenience in what follows, I refer to the two scenarios as 'Pessimistic' and 'Post-75'

3.2 Implications for capacity needed

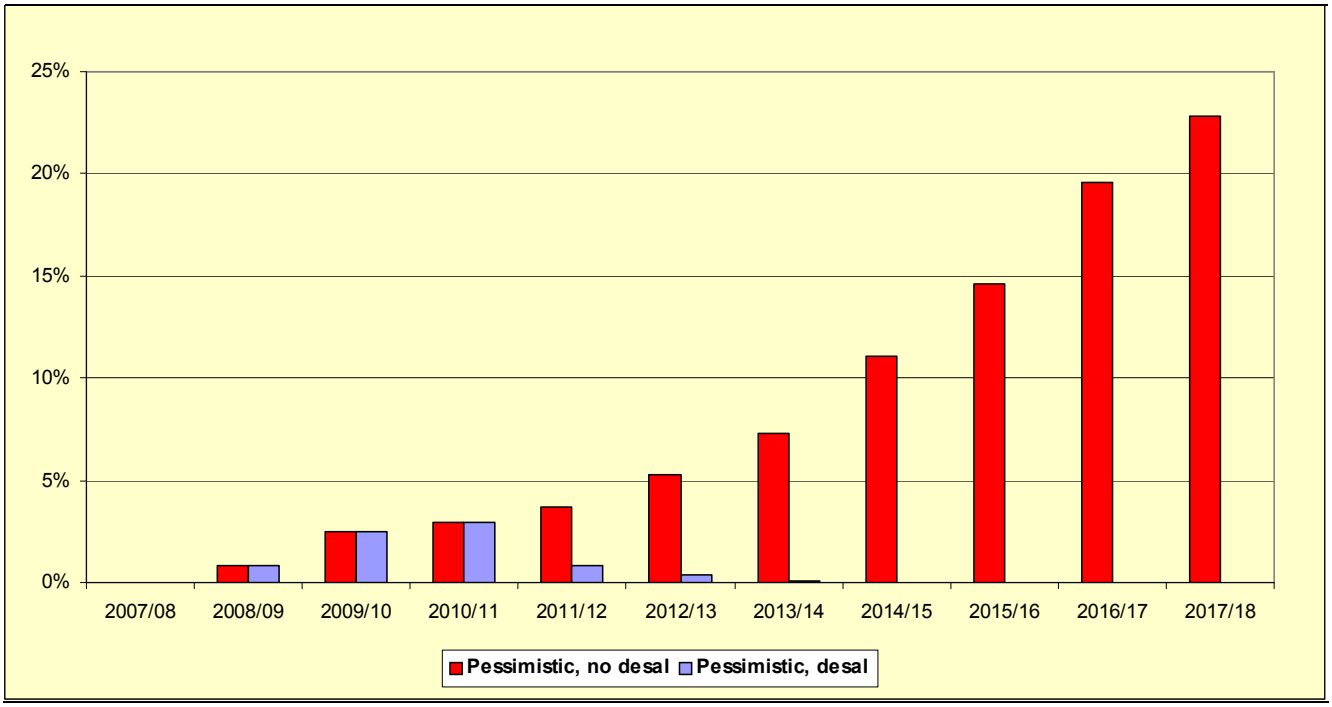
The next two charts have been developed using Water Corporation's modelling of risks of needing to invoke a total sprinkler ban in Perth – as an indicator of

severe stress on supply ability. In saying this, we understand that the bans would be triggered ahead of any physical constraints on the ability to supply current demand – so the restrictions regimes, as is usual, is precautionary. We do recognise the social and political dimensions of this form of deep restriction.

This modelling incorporates demand trends (a 16 per cent rise in the next 10 years), and associated increasing pressure on supply capacity over time in the absence of additional procurement. However, it also illustrates a stark difference in the magnitude of these pressures depending on what is assumed regarding the future pattern of rainfall.

Figure 2 illustrates how pressures might be expected to rise under the Pessimistic Scenario, without further additions to supply capacity:

Figure 2 **Comparison of sprinkler ban likelihood, Pessimistic Scenario, with & without second desalination plant**

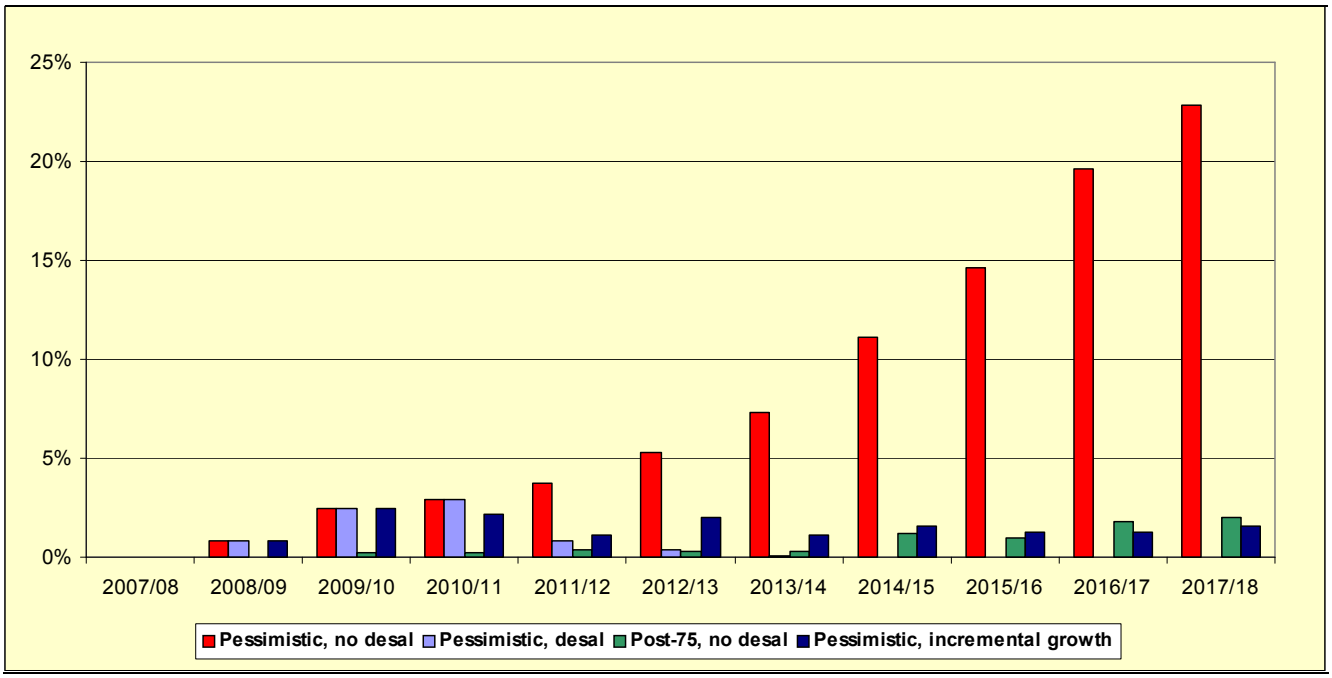


Data source: ACIL Tasman calculations using Water Corporation model

Based on this chart, the appeal in committing to the second desalination plant – or to some alternative procurement – is apparent. The implied reduction in risk appears very substantial. Indeed, it is likely to be even greater than is indicated here. Once it is clear that the desalination plant will be available from around 2011, there should be substantial scope for adapting the restrictions regime to further lower the need for sprinkler bans in advance of the commissioning date. This point was made in our earlier discussion paper.

Figure 3 provides a wider range of simulations, based around choice of rainfall scenario and decisions on the supply augmentation.

Figure 3 **Likelihood of sprinkler bans, alternative scenarios & responses**



Data source: Data source: ACIL Tasman calculations using Water Corporation model

The first two columns in this figure simply reproduce the pattern in Figure 2. The third column shows the likelihood of sprinkler bans under the less pessimistic Post-75 Scenario. The last column again assumes the pessimistic scenario, but instead of building the second desalination plant, of around 50GL/annum, in 2011, introduces progressive increments of either extra supply or additional conservation from 2011, with these rising by 5GL/annum. We return below to how these might be delivered, but for the moment focus on the impact.

The first column stands as potentially 'scarey'. While the concept of a probability of a total sprinkler ban being less than 25 per cent would be a pleasant change in many Australian urban areas, the fact is that the nature of the soils and climate in SW WA means that such a ban would be a significant concern and it is understandable that there would be some willingness to pay to cap the risk.

However, it is notable that none of the other columns appears anywhere near as worrying. Indeed, none involves, beyond 2011 and within the next 10 years, a probability of bans as high as is now locked in for 2009 and 2010, even with commitment to the second desalination plant. Two of these other three do not involve construction of the second desalination plant.

None of this is meant to argue against the second desalination plant. It will, based on these analyses, deliver a very high level of system security for a long time to come. However, the following observations are highly relevant to planning for procurement beyond that point:

- With commitment to the second desalination plant, the likelihood of there being demand for additional capacity within the next 10 years appears negligible – and likely to remain that way for some time beyond those 10 years.
  - Eventually demand growth is likely to rise to trigger additional need.
    - ⋯ Under the Post-75 scenario that could be very many years.
    - ⋯ Even under the pessimistic scenario, there is no sign of these pressures mounting, even at the very end of the 10-year period modelled. This is not in itself surprising – with demand assumed to grow at around 5GL/annum, adding in an extra 50GL of capacity should buy 10 year's breathing space.
    - ⋯ It seems probable that a modest level of tolerance for risk of sprinkler bans – perhaps less than 3 per cent – could mean that the need for additional procurement would be deferred well beyond this time period for both scenarios.
- The third column does not involve building the second desalination plant – it simply follows through on the consequences of the Post-75 scenario proving realistic.
  - In this world, the probability of a total sprinkler ban remains below 2% every year.
  - If it were known that the Post-75 Scenario is realistic, the proposed $1b in capital (plus operating costs) for the second desalination plant might seem pretty expensive for the risk reduction offered. This is consistent with advice from Water Corporation that, in this world, they would not have sought to proceed with the second desalination plant.
    - ⋯ In a very real sense, this highlights the fact that the second desalination plant is insurance whose justification rests with risk reduction rather than with clear need for the extra water to service demand.
- The fourth column relates to the Pessimistic Scenario but flags the possibility of another way forward, as an alternative to early building of the second desalination plant.
  - Some combination of tolerance for a small annual risk of sprinkler bans and modest annual growth in either or both of supply and conservation might also deliver a sound outcome.
  - Such an approach, especially if accompanied by the flexibility to ease back on the higher cost elements in the supply/conservation measures

in the event of reasonable rainfall and inflows, could conceivably have a very large impact on system costs.

- Such a strategy would exploit *both*:
  - ⋯ the gains to had from deferring most of the costs of augmentation/conservation well beyond 2011 (delivering savings via the opportunity cost of the funds involved); and
  - ⋯ the non-zero possibility that the Pessimistic scenario will prove to have been just that – more pessimistic than actually emerged.

3.3 Misalignment of costs and demands

Much of the coverage in our Discussion Paper related to strategies for exploiting these opportunities – to safely defer costs and to adapt the form and timing of the costs to actual circumstances as they emerge. The case studies provided there pointed to potentially very large cost savings from such a strategy, relative to one predicated on dealing as cost effectively as possible with an assumed worst case scenario.

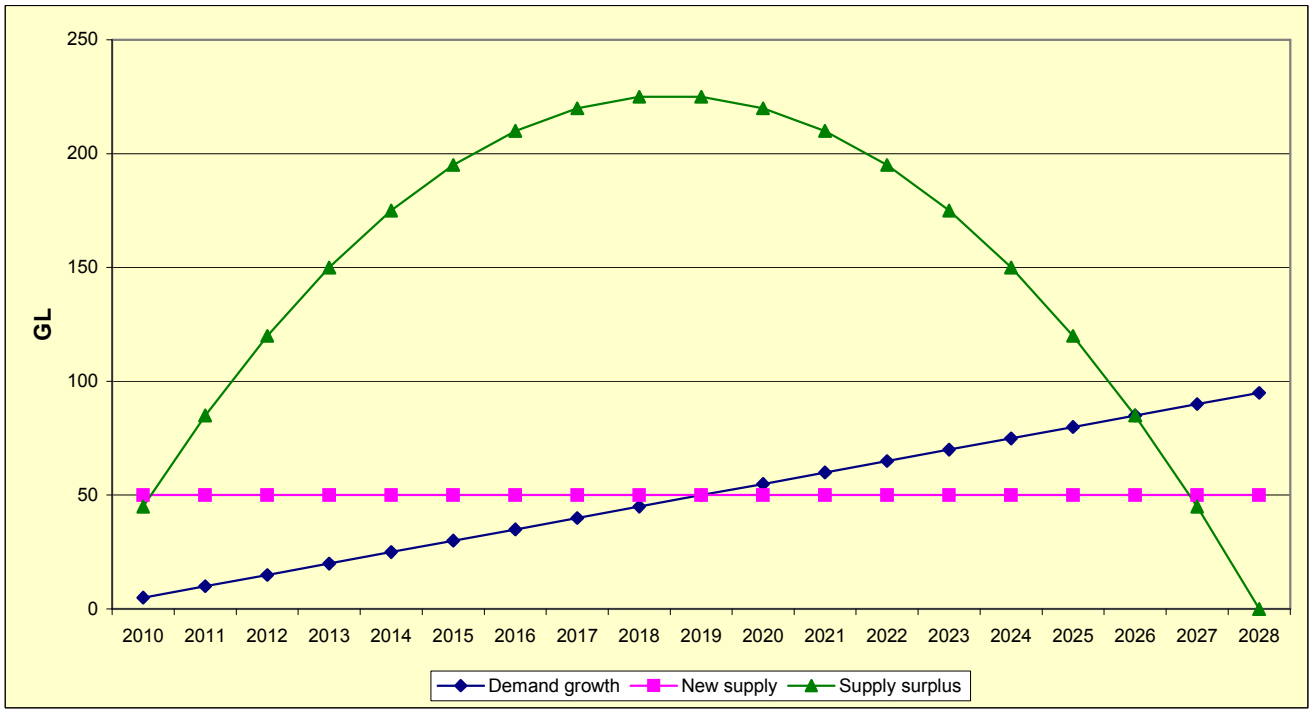
The same case studies also highlighted the way that access to the ability to progressively build supply capacity to meet actual demand growth could be highly cost effective – relative to lumpy investments in larger new plants, even where the size of these plants supports large size economies.

To further reinforce this reasoning in a WA context, consider the nature of the demand trends the IWSS – with demand rising roughly 5GL/annum. In this world, a 50GL/annum desalination plant, delivers approximately 10-years of demand growth in a single project. It must do this pre-emptively – the project needs to be available to meet the first year demand, not just the tenth year's cumulative demand growth. If operated flat out from the start, it will have resulted in a build-up of reserves in the system during its life, meaning that the next plant can be delayed beyond those 10 years – and will desirably be delayed.

If we ignore incremental evaporation and other losses (including dam spillage), it turns out that a 50GL plant can just cover demand growth for 20 years.

This pattern is illustrated in Figure 4. The chart clearly shows, under this deterministic scenario, the 20-year surplus of system capacity that builds up over the first 10 years and that is then drawn down over the following 20 years. This would appear a perfectly rational strategy for utilising such a lumpy increment to capacity to meet demand growth. The effect is to delay the next increment of capacity – instead using the much lower avoidable cost strategy of tapping the greater system reserves.

Figure 4 **Stylized illustration of through life operation of desalination plant**



Based around this pattern of operation, we developed a simple financial model, again illustrative only, of the desalination plant over the 20 years, with an up-front capital cost of $1b, an annual operating cost of 12.5% of capital cost and a resultant *levelised cost of water produced* over the 20 years of $1.87, based on a Water Corporation weighted average cost of capital as a discount rate of 6%. The capital cost and levelised production cost have been deliberately set to mimic the second desalination plant to make the broad cost structure relevant to the WA setting – but we are not suggesting that this model fully reflects the real finances of that plant.

Then, using the same data, we estimated the *levelised cost of water supplied* from the plant, including later supply of water stored in the system – but ignoring any storage costs. The revised figure is $2.17 – or 16 per cent higher. Any incremental losses – especially any heightened risks of incremental spillage of dams or water from groundwater systems over the next 20 years – could imply an effective increase of substantially more than this 16 per cent. At the extreme, where there is not effective extra storage of water, the cost becomes $2.62.

These figures – effective costs per kilolitre of extra system demand met from the scheme – are far more realistic as indicators of the unit cost of water from

the scheme assessed from a system perspective. Users would have to pay over $2.17 per kilolitre of extra demand met as a result of having the scheme in order to cover the financing costs of the scheme. Charging $1.87 would not cover these costs. The reason for this lies in the time difference between needing to finance costs and the receiving the revenues for water delivered – and the need to finance the working capital of the system between these time periods at an assumed cost of capital of 6 per cent.

Even this $2.17 should be viewed as biased downwards. At the end of the 20 years, the system would again need augmentation to keep up with the demand growth – only then, in contrast to now, that augmentation is needed for catch-up as well as to meet further demand growth.

If the augmentation is to take the form of increments of about 50GL/annum, the next increment would need to be not another 50GL project but one or more projects totalling 100GL/annum. The first 50GL of extra capacity is needed immediately. This simply replace the capacity, that is exhausted in 2028 in Figure 4, to draw down from the system surplus, enough water to meet the demand growth since 2019. The remaining 50GL would perform from 2028 forwards, the same function as did the initial 50GL capacity from 2010.

In effect, a consequence of working with 'lumpy' increments to capacity in this way is that the draw down of system surplus, while efficient, progressively accumulates a growing contingent liability to replace these system surpluses with greater system capacity by 2028. These contingent liabilities are legitimately recognised in weighing the competitiveness of such schemes. The effect is to further raise the effective cost of water per unit of demand satisfied. The process of satisfying further demand growth from 2019 with system drawdown that is no longer being adequately replaced implies an opportunity cost.

The reasoning is analogous to that set out in Section 9 of the ACIL Tasman Discussion Paper, in which current consumption of water was seen as imposing a rising cost, in the form of declining option value, on the system – by increasing the expected forward costs of further augmentation. Again we stress that we are not saying this is inefficient – but we are saying that this decay in the value of the system options needs to be factored into the assessment of the augmentation strategy.

There is no analogous build-up of contingent liabilities if demand growth is met (as is discussed below) through a sequence of increments to supply/reductions in demand timed to align with the changing overall demand pattern – because there is no accumulation of surplus in system. The effect of these contingent liabilities would generally be to push the effective levelised

cost of water supplied from the project up even further above the nominal cost, assessed on a production rather than supply basis.

This reasoning and these calculations apply under the *worst case scenario*, treated as deterministic – a scenario that minimises the effective unit cost of the water supplied from the scheme by maximising utilisation of the investment[1]. Introducing a distinct possibility that there will be no additional demand to be met from the scheme for several years would push the effective unit cost of the water much higher – and plausible assumptions could well imply an effective cost that is much higher. In analogous settings in other jurisdictions, we have calculated from a similar nominal cost base effective unit costs of well over $5/kL.

3.4 Merit orders

This spread of figures – and the implied spread of system costs of meeting demand – has crucial implications in weighing alternative supply opportunities. Suppose, as an alternative to the single large desalination scheme, it were possible to access a sequence of much smaller increments to supply or reductions in demand, implying a net impact of 5GL/annum – ideally with the flexibility to ramp up or ramp down in response to plausible variations in either the demand growth or other system inflows.

Under the above assumptions, the project-level unit costs of such schemes could be well over $2, and arguably even in excess of $5/kL, and these increments would still be competitive against the desalination strategy – in the sense that it could be cost effective to implement the small schemes and delay the desalination strategy.

We are arguing that the procurement framework needs to be capable of identifying – and posting incentives to discover – such strategy options. It could prove costly to have someone 'bury' the concept of a $4/kL supply or DM project with a high level of flexibility to adapt the scale and timing of the project to actual demand patterns on the grounds that it is uncompetitive against water factory possibilities.

The same logic of course applies in determining strategy where alternatives include other forms of 'lumpy' investment. This type of reasoning will favour

[1] It is important not to misinterpret this. The worst case scenario minimises the project's unit costs while maximising the systems total costs. Minimising unit costs is not a sensible objective in its own right, the moment that we entertain the possibility of demand or system inflow volatility – it only works in a deterministic setting where total volume is fixed. We are arguing that this assumption ignores what should be the major driver of efficient procurement policy – the management of demand and inflow uncertainty.

less lumpy, shorter lead-time, more flexibly deployed and interrupted strategies – even at an apparently high unit cost penalty.

However, care is again needed to 'overshoot' with this style of reasoning. If we knew there had recently been a major climate change structural shift, creating a system deficit of the order of 50GL/annum of safe yield, then the above calculations would be quite incorrect. If there was a need to restore system capacity to a safe level through a substantial adjustment to capacity, rather than to maintain a safe level in line with demand growth or a downwards trend in inflows, then the desalination plant would probably be better judged on the basis of its unit cost of filling that deficit fast. In this world, the appropriate unit cost estimate might well be close to $1.87.

The fact is, that the relevant measure of costs when examining and comparing projects depends fundamentally on the *system context* within which those comparisons are being made – and that will apply to any roll-out decisions. This includes characterisation of trends, of any current shortfalls and, especially, of the nature of the key uncertainties on both the demand and the supply side. Characterisation of the uncertainties by focusing on the worst case scenario risks very large bias, and unnecessarily high costs, in developing strategy.

Indeed, it is not possibly to usefully label projects in terms of their system costs, independent of a clear understanding of the nature of that system. As the system changes, or our knowledge of the system changes, the relevant cost measures will change – *as will the ranking of projects based on these cost measures.*

This reasoning poses a significant (though not fundamental) challenge for traditional 'merit order' perspectives on forward planning. The idea of ranking forward project possibilities based on project unit costs – and choosing or shortlisting for next investment based principally on these costs (inclusive of course of environmental and other regulatory constraints) and technical constraints, such as project lead times in relation to need – does need to be placed on a broader footing if serious risks of overinvestment are to be managed effectively. In our opinion, this reasoning also lowers substantially the strategic significance of the merit order as a planning tool.

Water projects are not independent. Reflecting the discussion in Section 4.6 of the ACIL Tasman Discussion Paper, we see the requirement as being delivery of a rolling investment process that offer a cost effective solution to the demand-supply management over time. The right sequence of investments will not usually involve starting with the least unit cost project and working up. It *might* approximate starting with the project that delivers the greatest whole-of-system unit cost increment in whole-of-system supply over time and then adding the next project to satisfy this requirement etc. However, even this

sequential approach could miss out on a package response that offers a lower overall system cost over time.

Ideally, what is needed is the ability to probe the set of feasible packages for responding to the supply-demand balance, and selecting the decision rules for investment that approximate delivering the lowest expected cost (on a present value basis) over time. This could imply a 'most likely' merit order, as the sequence of projects most likely to be triggered, but this should be seen as an output of the planning process, not a central input. It can only determined after the problem has been solved, not as an input to solving the problem. In any case, the next serious rainfall event, or change in knowledge regarding the system, could well lead to substantial modification to this inferred 'most likely' sequence.

This simply reflects the widely appreciated fact that many optimisation problems are not safely solved using a sequential approach. Anyone seeking to climb to the top of a mountain by, at each step, moving up the steepest route is prone to being stranded on a lower 'local peak' – a more global approach to planning the route is needed. This does not mean that every possible route has to be worked through in great detail – it is usually possible to quickly cull a very high proportion of the possibilities. It does, however, mean that the set of possible approaches – including ones that sometimes involve walking downhill for a short distance to reach a more promising rise – do need to be formally addressed. In the same way, some *high nominal project unit cost* schemes can be an integral part of the water procurement strategy that best manages the dual threats to security and of overinvestment.

The flip side of this perspective is to ask how a request for procurement would need to be worded in order to ensure:

- That an adequate 'smorgasbord' of procurement elements was identified and maintained on a rolling basis to provide the ability to meet system security requirements over time;
- That this includes, as fully as is possible, the range of potential elements in the future evolution of the supply-demand capacity that might prove legitimate inclusions in the most cost-effective development of the portfolio;
  - Reflecting the above logic, it would seem important that nominal project unit cost assume a fairly minor role in the perceptions of prospective tenderers, relative to lead-time, scalability and flexibility.
- That proponents formulating responses are well placed to ensure that justice can be done to their ideas, in terms of developing them to the point where their value to the overall system response to supply-demand pressures is clear;

  - This is likely to require access, and probably commercial-in-confidence access, to good system modelling capability that captures the key elements of the portfolio options view of the supply-demand challenges. Ideally, this would include an agreed set of assumptions characterising the trends and uncertainties for planning purposes, and a clear understanding of how the key uncertainties are to be addressed over time.

4 The challenge for procurement

Translating this into the present paper raises the important question of how a centralised procurement process that is seeking to tap competitive markets can identify strategies that may offer this sort of cost saving. Simply going out to market with a requirement, for example, for 50GL of extra supply by 2011 would certain not evoke responses of this type. The natural response to such a request would be a reasonably big project, offering relatively low unit cost supply.

Within the options framework, the most cost effective procurement strategy could well be one seeking to acquire either or both of:

- Much more modest volumes of water growing incrementally, even where these entail a very much higher unit cost of production.
  - Precisely analogous to the way that peaking power stations can be very much more cost competitive than new baseload stations in dealing with demand growth with high peaks. Power from a peaking station has substantially higher unit costs of production but can be dramatically more cost effective because of the flexibility offered to focus production on times of greatest need.
- The flexibility to introduce substantially greater volumes of water where the need is more established, while avoiding or deferring the investment where this is not a threat to system security.
  - As we further develop below, it may well be that this flexibility would be better obtained through a market in which the central procurement body seeks to *acquire and maintain a rolling portfolio of call options over water supply* – with the options reflecting a spectrum of lead time requirements and associated costs.
    - ⋯ Call options with very short lead times till delivery are likely yo be costly (though not as costly as firm commitments to volumes).

⋯ Call options with long lead times could be dramatically cheaper – as was reflected in ACIL Tasman's evaluation of desalination readiness options for Sydney.[2]

Box 1 **What is a call option?**

The holder of a call option has the right, but not a requirement, to insist on delivery of contract-specified services within contract-specified terms. The option may be unconditional, or only able to be exercised under agreed 'trigger conditions'. In financial markets, a call option over shares might take the form of the buyer of the call option being entitled to insist that the party that sold the call option agree to sell a parcel of shares at a pre-agreed price, any time in the next two years. In practice, the option would only be exercised if the actual price of the shares were to rise about the exercise price for the option.

Call options are being used increasingly by water users seeking to alter the effective nature of their access rights to water, to better suit their risk management requirements.

If an entity responsible for procurement were to acquire a call option from a potential supplier, the following points would typically apply:

- The seller of the option would have a contractual responsibility to deliver water or water infrastructure, within a specified lead time of the option being exercised. The lead time, the services to be delivered and the likelihood of the option being exercised would interact to determine the price in a competitive market.
- The purchaser of the call option would not need to specify each of these characteristics – there is viable scope for trading off between timing, potential volume and lead-time; what is important is that the market have a broad understanding of the risk management objectives that will underpin the demand for such options.
- Any call options with a very short lead time would needed to be backed up, or hedged, with a physical capacity to access and deliver the water. A right to require a substantial volume to be delivered within 6 months, for example, could require water in storage, a standing water factory almost ready to switch on, or a block of water usage that would be willing to be interrupted.
  - It would not be necessary that the seller of the call option own or operate these sources, but there would be a requirement for some form of contract or other form of secondary market operation, to secure the ability to supply. The procurer might, for example, secure rights to access a large call option portfolio, with differential lead times and volumes, where that portfolio had been assembled by another party through a sequence of contractual measures.
- The entity responsible for procurement would have an interest in the risk management capabilities and costs of the entire portfolio of options assembled from all sources. As with the discussion above, the value of in=dividual elements would be determined by the characteristics of the whole portfolio (in conjunction with the existing supply system and forward uncertainties).

Data source:

The significance of the call options lies in the *flexibility* they could offer to avoid costs where not needed. A process that seeks access to call options is inviting the market to explore flexibility, scope for cost deferral and innovative

[2] The reasoning and indicative valuations were set out in:
Institute for Sustainable Futures and ACIL Tasman (2006), *Review of the Metropolitan Water Plan, Final Report*. Report to the NSW Cabinet Office.

features of the product offering that contribute to whole of system performance.

An emphasis on call options very explicitly involves specification of the problem as one involving a *chance of needing more water*, rather than one requiring more water. It could offer a powerful way of stimulating commercial interest in the design of innovative approaches to support the delivery of more cost effective system security.

Individual call options could be structured to look a lot like capacity contracts, as envisaged in the NERA paper. As is flagged in Box 1, physical standing capacity may offer the only technically feasible approach to ensuring significant additional supply at short notice. The current dams and groundwater sources could be viewed in these terms – as call options over supply capacity with very short lead times and (usually) low exercise prices. However, a feature of exercising these options for supply is that they will sometimes involve an opportunity cost, through rundown in reserve levels, in the form of a heightened likelihood of needing to exercise a call option over a source with a substantially higher exercise price. This could be a risk of needing to build a desalination plant earlier, for example – or a need to trigger deep restrictions.

Call options with very short lead times that are not based on existing infrastructure are likely to be expensive. They will typically require new infrastructure investment to be done early and with certainty – removing the scope for lowering effective costs through the interaction of project deferral (with financial discounting) and of uncertainty as to need (with risk-weighting).

A possible exception to this, paralleling energy market experience, could be call options in the form of supply interruptibility. An electricity-powered smelter will commonly sell call options to have its electricity supply interrupted for a relatively short period of time – perhaps up to 2 hours. In an electricity market, such flexibility for fast reduction in demand can be extremely valuable where there is a peak in demand, or failure of a major generation unit. This can be long enough to allow the peak to subside, or another generation unit to ramp up to fill the gap – and a sequence of interruptibility contracts, each with maximum duration of two hours, could then be used to support pressures on the system extending over several hours.

It seems unlikely that such provisions can have the same impact in water where source supply is the concern – because of the much longer duration of the threats where there is an extreme drought or possible structural shift in climate. Restrictions offer some of these characteristics in a way that pushes the costs through to the suppliers of the call options – users who have restrictions imposed on them. Variable water tariffs that move in line with system status and threat levels could be seen as generalisations of restrictions that do in

effect source call options from users, by making it financially attractive to modify demand when the system is at risk.

Big industrial loads for water, whose plants entail high sunk costs, and who would happily contract for interruptibility over months or years (at a competitive price) may prove harder to find – unless of course those users had access to a feasible substitute. An example of this could be a mine using potable supply, but able to access local saline groundwater at a higher unit cost, after factoring in the costs of treatment etc. Mines with existing infrastructure for accessing groundwater could plausibly maintain a physical hedge in a cost effective manner – allowing a willingness to be interrupted to be 'bid into the procurement market'.

5 The procurement function

5.1 The NERA proposal revisited

The NERA paper on procurement frameworks sets out a centralized procurement model for water supply, with a procurement entity whose functions it envisages (Section 4.3) as follows:

> 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.
>
> …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; 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.

These proposals draw heavily on market experience in energy and incorporate some adjustments to particular features of water procurement. The arrangements envisage central contracting for a package of supply, supply capability and demand management, over an indicative planning horizon of 10 years. It recommends that contracting be for volumes each of a number of future years, with the time period "sufficiently long so as to provide incentives for investment in medium term water supply projects".

The report recognises the scope for capacity contracts, instead of or as well as volume contracts, but appears to strongly emphasise the use of volume contracts, for volumes over and above those available from existing infrastructure.

As with Water Corporation's proposal, NERA Option 1 envisages system storage providing necessary balancing of expected against actual outcomes – with the storage buffer then available in line with the discussion around Figure 4 above.

However, the proposal does recognise the value in looking at a good decision framework that reflects some of the options principles flagged above and in the ACIL Tasman Discussion Paper:

> 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.

5.2 Reassessment of function – options context

The specification of Option can, in our opinion, offer a good platform for adaptation to meet the needs we see of an efficient central procurement process. Access to volume and capacity contracts could, with a widened interpretation, take in the range of call options we envisage being needed for an efficient solution.

A key concern we have is with the need to set the options framework centre stage. We do not see this as inconsistent with the NERA proposal, but we do see it reflecting a different emphasis.

For the reasons set out earlier, we do not see the pressing need in the SW WA context being to secure substantial volumes of water running forward for some time. Under the worst case scenario, some additional supply appears desirable – but not so under other plausible scenarios, for many years. The central issue for the procurement entity, were it set up tomorrow, should in our opinion be that of ensuring the system security is adequately procured. With the second desalination plant, that is likely to be a fairly straightforward function for some years. *If* the entity were to be charged with responsibility for reviewing the need for and timing of the second desalination plant, as part of its overall risk management strategy, then the procurement questions become more

interesting and more pressing – but only because of the chance of a near worst case scenario emerging over the next few years.

Broadly reflecting the structure of the NERA proposal, we suggest the following as way of looking at the function of the procurement entity:

1. The entity has a primary responsibility for ensuring that the security of the system's capacity to match demand for water services with adequate supply is protected at all times.
2. Subject to ensuring that this capability is sustained, the entity is responsible for working with the system operators, with the Department of Water, with end users and with environmental and economic regulation processes to encourage a whole of system evolution of the system over time that is as cost effective as is practically achievable.
   - Cost effective is to be interpreted as affording the highest expected net value enabled by the water services, inclusive of the value of those water uses (economic, social and environmental) and net of the costs implied for the environment, for the supply system and for users.
     - … This will of course need to recognise, and involve processes to deal with, the intangibility of some of the costs and benefits associated with water systems and services.
   - The significance of *expected* net value lies in the fact that it will be necessary to consider forward costs across a range of plausible futures, not restricted to a worst case scenario.
3. In support of 1 and 2 above, the entity should have responsibility for periodically advising the Government and Government processes as to an appropriate interpretation of security and reliability of service supply.
   - This advice will need to adequately factor in the range of key uncertainties, including those in relation to: demand patterns; hydrology volatility, including deep droughts and floods; wider uncertainty regarding the hydrology and sustainability of water sources, especially in relation to groundwater; the structure of forward climate trends.
   - We envisage that this is likely to imply some form of worst case scenario for contingency planning purposes, but not a worst case scenario for purposes of optimising investment and procurement strategy.
   - We are not proposing that the entity be responsible for setting this standard – this could well involve some conflict – but it should be well-placed to advise on standards that can have practical application within an options-based procurement process. These standards will, in turn, have a fundamental impact on the portfolio of procurement services to be sourced, and the associated supply market.
   - Our experience in other jurisdictions has highlighted the sometimes extreme sensitivity of forward service supply costs to superficially

minor variations in these security and reliability standards. The entity, with the knowledge it should have of system costs and the ability to model; variations in these standards on costs should be well-placed to advise on alternatives and their implications.

4. The entity should be responsible for ensuring that the system has access to a rolling portfolio of options sufficient to meet the security and reliability requirements as specified by the Government processes.
   - It should be charged with responsibility for ensuring that the procurement process (as distinct from specific projects triggered by the process) is cost effective in the above sense.
   - In support of this function, it should have the powers to enter into a range of types of contract for access to water supply and capability to supply – with expectations that the major form of contract will involve call options with specifications in relation to volume, lead time and duration of supply if triggered.
5. However, its primary responsibility will be to ensure that the total system and the set of available options meets security and reliability needs cost effectively – not necessarily to own the system or all of the call options.
   - We do not envisage the existing assets being transferred to the procurement entity – though we do see the entity having a key role to play in relation to operating policies to ensure that the combined procurement and operating strategy is cost effective.
   - We clearly do not see the entity owning the demand management machinery – from large recycling schemes through to water efficient washing machines in households – even though these form an integral (and increasingly important) part of the system whose security and reliability is to be protected by the entity.
   - We see the entity as having a residual responsibility for security – identifying threats within the current arrangements and seeking to have these gaps filled cost effectively. This is likely to involve the entity in contracting directly for services – but this should not be required as the only instrument available.
6. In support of 1-5 above, the entity should be responsible for ensuring the development and maintenance of a system modelling capability that can:
   - Support soundly based identification of competitive portfolio strategies for maintaining security and reliability of services;
   - Provide guidance as to how these strategies could be further developed – including beneficial features in the design and performance of individual projects – to improve the performance of the strategies.
   - Provide a basis for assessing whether individual project proposals add to the overall value of the portfolio of options and, if so, provide an indication of the value, to the portfolio, of their inclusion.

- We see no need to require that this capability be developed and maintained within the entity. It may well be a function that lends itself to competitive outsourcing and it is inevitable that expertise currently resident within Water Corporation and a range of engineering firms with good knowledge of the WA water systems will need to be tapped for the function to be discharged efficiently.
- We suspect that the initial requirement for developing a sound options layer – and certainly for developing key parameter estimates in relation to the major risks – will lie strongly within the entity, while drawing on outside expertise.

7. The entity should be responsible for the development and management of suitable arrangements for ready market access to the models and modelling capability – to any parties with an interest in contributing the overall strategy through project development and/or other means.
   - As a minimum, this will require a capability of having ideas tested for portfolio impact and potential value, with enough detail to help guide further development of the ideas – and for high standards of confidentiality in relation to the ideas being tested.
   - We suspect that a version of the modelling capability that could, in time, be made directly available to individual firms for in-house testing would provide a better basis for encourage innovation that is well-targeted at overall system value for money. Such an approach would be more consistent with corporate approaches to the development of strategies, and would offer greater protection of IP, supporting a greater willingness to invest in innovation.
8. Both as an input to the modelling and analysis that will need to be undertaken by the procurement entity and as a basis for more efficient valuation of potential call options (and therefore stimulus to innovation), the entity should be responsible for regularly documenting its assessment of forward uncertainties and opportunities. This should include documentation of assumptions regarding the likelihood of alternative developments of forward rainfall patterns, alongside demand forecasts (developed jointly with Water Corporation) and assessments of uncertainties in those forecasts.
   - We recognise that precision in respect of these uncertainties is not possible, but we do not believe that an adequate response to these difficulties is to largely ignore the uncertainties. The earlier analysis strongly suggests that the costs of doing so would be very high.
   - In our experience, a policy of emphasising strategy options that are robust across a wide range of plausible futures, rather than one that is optimised around controversial point estimates is of great value here.
     - ⋯ In this setting, documenting considered views as to possible upper and lower bounds on key parameters – and extensive use in modelling of stress testing to explore the implications for strategy –

has a vital role to play and this should be clearly understood by the market.

6 Implications of the function

6.1 Relationship to Water Corporation

The NERA paper addresses the question of whether this procurement function could be discharged by Water Corporation, possibly within some form of 'ring-fenced' arrangement for procurement. NERA concludes that there would be some conflict of interest and sees a risk of introducing bias in the signals transmitted to potential tenderers and strongly favours a clearly separated entity.

At ERA's request, we have separately provided additional advice to ERA on this matter. While we argued that there need not be a *logical conflict* of interest, the conditions needing to be met to avoid this would be demanding and the track record of ring-fenced arrangements in analogous areas has not been good. We endorsed the NERA concerns with possible suppression of incentives for innovation. Against this background, we clearly see a separation of the function of procurement from system operation as being desirable.

We do, however, recognise the substantial synergies that exist between procurement planning and system operations planning. The whole-of-system problem needing to be addressed to deliver cost effective services involves *joint optimisation* of procurement (including DM) and operation of the system. Very strong information flows between the operator and the procurer are therefore essential – and care would be needed to again prevent perverse incentives to favour one instrument over another, or for the two entities to 'compete' beyond an efficient point in emphasising the role of the instruments they control in delivering the overall system outcome.

There will, for related reasons, be very substantial overlap in the system modelling capability that needs to be developed and maintained. The modelling that guides procurement should also guide system operation and there needs to be strong feedback between the two. This seems likely to imply a need for joint representation of the procurement and system operation functions in the model development activity. The procurement function will need to emphasise the support the models offer to procurement planning, and the system operator would emphasise the operation of the system assets – but the reality is that these are different faces of the same problem.

These arguments suggest some pragmatic reasons for not separating the procurement function totally from Water Corporation, which need to be set

against the arguments raised in favour. There is a plausible *trade-off* between transparency and efficient market incentives on the one hand, and efficiency in dealing with the complex system interactions between procurement and operation on the other.

However, we expect that this trade-off could be minimised through a process in which the separated entities took on *joint responsibility* for the development and maintenance of a system modelling capability well-suited to the needs of both. This would involve joint staffing of the activity – and/or joint involvement in the specification and outsourcing of the function.

Irrespective of the detail of the approach taken, very close on-going communication and joint strategic planning, at least to the point of identifying and assessing strategic options for system evolution and operation, would seem essential. Water Corporation, assuming it remains the dominant system operator, will have a key role to play in advising on the operational implications of alternative procurement proposals being assessed by the procurement entity.

So will agencies responsible for other aspects of the total system – such as the Department of Water, which has a key concern for the natural resource management aspects of both procurement and operation. Keeping the procurement function within Water Corporation will not avoid the need for detailed cross-agency and stakeholder consultation in procurement planning.

More generally, there will be a need to have broad agreement or at least understanding on the way the whole system – procurement and operation – will be operated to deliver the most effective overall outcome. Importantly, operational decisions on the balance between desalination, groundwater and dam supply will effect the efficient procurement portfolio – because they will have different implications for forward availability of water from the existing system assets. Heavy use of the desalination plant would entail higher short-run marginal costs than would drawing down dams – but a lower impact on the value of forward reserves, which are call options for future dispatch.

The processes needed to guide sound procurement strategy could also act as a check on any perverse incentives Water Corporation may face in relation to decisions on whether to draw on its assets or third party supply assets at any point in time. The NERA paper saw the presence of these incentives as a reason for ensuring separation of procurement planning from Water Corporation as the system operator. It is not clear that the system operator can sensibly be freed of all discretion in relation to patterns of operation that would have implications for procurement strategy. Transparency, and the building of assumed operating patterns into the modelling of procurement options, would seem to provide some protection.

6.1.1 Implications for Water Corporation Function

Water Corporation has argued to us that it sees water supply as *the* key input to its business operations – and that this brings with it a strong case for it having control over the process that determines the supply. However, we do see two counterarguments this, over and above the discussion above:

- Water Corporation is not the only 'client' of the procurement process, particularly given the emphasis we see on DM as well as new source development.
  - The procurement entity is likely to be procuring, through its portfolio of call options, access to water supply as and when needed by Water Corporation and contracting supply to Water Corporation – or facilitating direct contracting between Water Corporation and a water provider.
  - It may also be procuring supply capability that then allows for direct contracting between suppliers and end users where by-passing the Water Corporation distribution system offers efficiencies.
  - It may be procuring supply capability that then allows direct contracting between suppliers and end users where delivery will involve Water Corporation assets under a new access regime.
  - It may be securing system demand reductions, through DM measures ranging from on-site industrial recycling schemes through to rebates on water efficient appliances under, for example, an accelerated DM program. Such programs can be justified, despite high unit costs of demand reductions, in an options setting by the deferral of major, irreversible infrastructure costs.
  - It may be securing options to lower stress on natural resource systems – such as pressures on the Gnangara mound – where the Department of Water, as agent for the community interest in the associated ecosystems, may be the more natural client than Water Corporation.

On this last point, we understand that Water Corporation's view would be that the Department of Water would have responsibility for the resource planning, and that Water Corporation should plan for procurement within the constraints created by that planning function. This is, broadly, the current arrangement.

However, a lot of the preceding discussion strongly suggests that such a sequential approach to planning is unlikely to be efficient. There really is a joint optimisation problem to be addressed – with dimensions of consumptive supply, environmental use and security for both these use categories. It is arguable that an independent entity – working jointly with the Department of Water, Water Corporation and, of course, other distributors and end users – could offer a more balanced approach, better suited to weighing the key trade-

offs and developing a sounder strategy assessed across the range of legitimate interests and concerns.

In effect, joint optimisation rather than sequential optimisation is needed. This can be expected to deliver a better outcome and could be best delivered through an entity separate from the two major agencies with quite different perspectives on their 'customer bases'. Location of the weighing and balancing function within one of the two entities may involve bias and seems more likely to involve perceptions of bias. Even without systematic bias within the agency processes, there remains the question of whether the processes designed to procure innovation from the market place would be biased by these perceptions.

Of course, this reasoning does raise the possibility that the function might instead be located in the Department of Water. There is certainly not the same inherent emphasis on one class of water use (consumption) in the Department of Water that there is in a corporatised Water Corporation. However, the envisaged procurement entity will need to conduct a quite sophisticated commercial operation, assembling, maintaining and rolling over a complex portfolio of call options.

Perceptions that the Department of Water would be 'biased' in favour of resource protection rather than balancing across uses seem likely to persist, and could influence market behaviour and innovation. We do see an important distinction between water resource management planning and consumptive use planning – and clear differences in the skill sets and cultures that might best support these functions. These considerations again favour an independent entity operating across the two planning functions – rather than having the function located within one of the entities, with its own culture.

Against this background, we suspect that Water Corporation's role would best change substantially under a centralised, competitive procurement process – if the full potential of this approach is to be realised.

Responsibility for source procurement would, we believe, transfer to the independent procurement entity. With this transfer would go responsibility for system source adequacy and security – but Water Corporation would remain responsible for the security of the distribution system, for optimising the distribution function in terms of its contribution to overall system operation, security and reliability, and for resourcing and supporting an appropriate level of involvement in the overall planning process.

This is likely to involve joint participation in the options-based system modelling function, where we see Water Corporation as being uniquely well-placed to bring to that process the major components of the hydrology

modelling system, and great depth in assessing and planning for climate uncertainty.

It also brings great established depth in demand modelling. Water Corporation would retain responsibility for forecasting of demands in its distribution system – and demands for expansion in that system (other than those triggered by third party access applications). There is clear overlap between the needs of this function and the requirement of the central procurement entity for demand forecasting to underpin its planning for new source security. We would expect that Water Corporation would develop its system demand forecasts – and that these would be the means by which Water Corporation would feed into the procurement process indications of its anticipated future demands, to support more efficient procurement planning.

The procurement entity would need to slot these into a broader demand planning framework. The needs of its options-based planning and options portfolio management would require assessment of the range of plausible demand trends, not just most likely trend. While uncertainty in trend would be a concern also of Water Corporation, it may have access to better instruments for managing this uncertainty through incremental development of the distribution system than would a procurement entity considering very large infrastructure projects whose justification may depend on trends over many years. Responsibility for layers of demand assessment and modelling greater than would be justified by Water Corporation for its own purposes would fall to the procurement entity.

6.2 The nature of the options portfolio

We see no reason to artificially constrain the commercial instruments available to the water procurement entity to deliver on its function – other than a view that the entity should not be building and owning supply assets of its own. Were it to emerge that demand and inflow trends settled to highly stable and predictable patterns, it may well prove to be the case that substantial contracting for volumes of water over time could offer the most cost effective solution to the procurement problem.

In reality, we do not expect this to happen, at least for many years. High levels of volatility and uncertainty appear inevitable, hence the emphasis on an options-based approach to planning for procurement. For the same reason, we then see options-based instruments for securing access to future supply as and when needed will make more sense, most of the time, than take or pay contracts.

In line with the NERA paper, this *could* be based largely on purchase of capacity, with volume charges that approximate marginal cost of supply. However, we do see a need to guard against two key risks:

- The risks that systematic contracting for capacity, at least cost of delivering each increment to capacity, could result in a system that is progressively biased towards high operating costs.
  - This is, of course, the flipside of the concerns implicit in much of the ACIL Tasman Discussion Paper on Procurement Issues, with the risks of excessive investment in large schemes with low operating costs but inadequate demand for the capacity.
  - Our point is that a balance is needed and that does require options-based planning for a portfolio of measures. The conflict can be reduced where there are opportunities for incorporating relatively low-cost scalability into projects, but in reality a spread of measures with different attributes will almost certainly be needed – and this requires recognition of a process that is designed to secure capacity and access to a statistical distribution of volumes.
- The risk that an emphasis on tendering for capacity will encourage an emphasis in innovation and proposals on building supply infrastructure – when better methods may be available.
  - We believe that the optimal package at any point in time will involve a spread of capabilities to deliver water with a wide spread of lead times, and mixes of capital to operating costs.
  - Readiness options, as discussed further in Section 6.3, could have a key role to play with little if any 'bricks and mortar infrastructure' being committed up front.

Jointly managing these risks cannot, in our opinion, be efficiently achieved through a sequential decision rule. It also cannot be achieved through application of long-run marginal cost (LRMC) minimisation, under an expected or worst case scenario. The system is non-linear. At times it will make sense to bring in large blocks of capacity (ideally on a scalable basis), even where this means displacing some existing capacity for a period. At other times it will mean implementing possibly high unit cost measures to allow deferral of large capacity increments. At many other times it is likely to require minimal investment in new capacity, but possible reconfiguration of existing options as they mature – to better reflect new knowledge of the system and its trends.

We see the soundest way of lining supply capability against modeled need, and uncertainty about need and timing, will be through a portfolio of measures that incorporates substantial diversity. This will be in part because the opportunities are diverse. More fundamentally, it will be because this very diversity will add strength and cost effectiveness to the overall portfolio.

This concept of pursuing source diversity and flexibility in contracting arrangements is not new outside of water. More recently, it has received considerable attention in the supply chain literature, particularly using real options methods applied to the design of a supply portfolio that incorporates the option to switch between suppliers with different characteristics – effectively call options – to deliver better management of demand risks[3]. We consider that water source procurement in a location with the hydrology uncertainty of SW WA is a near perfect candidate for the application of these methods to secure greater value.

Some of this diversity will involve the established trend away from rain fed sources – indeed we believe the approach that we are recommending will probably trigger strong interest in measures that are negatively correlated with rainfall patterns and inflow levels. This would, we expect, include a more soundly based (in options principles) restrictions regime, but may well extend to desalination that is operated intermittently, somewhat akin to a peaking power station; possible demand management bidding into the market; and, were pricing to evolve to a point where the structure of tariffs incorporated some recognition of the current (options-based) scarcity value of water, active 'competition' for effective demand management from a wider user base. The possible evolution of pricing is discussed further in Section 6.6, and was the subject of Section 9 in ACIL Tasman's Discussion paper on Procurement Issues.

By incorporating into the contracting arrangements scope for specifying lead times, upper bounds on volumes and volume durations, there is scope for compiling an extremely diverse portfolio. Capacity becomes redefined – especially in relation to readiness options and DM as discussed below. Market understanding of the procurement entity's perceptions of risk becomes a key input to the valuation of potential options and to the incentives to develop such options.

A key consequence of the options paradigm in planning, and its translation into the economics of the portfolio of call options for supply, is the emphasis given to small projects, to scalable projects and to flexibly operable projects – relative to large, rigid projects even if they offer low nominal unit costs.

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[3] In the electricity sector, see for example:
Shmuel S. Oren, "Generation adequacy via call options obligations: Safe passage to the promised land", *The Electricity Journal*, 2005. Available at: http://www.ieor.berkeley.edu/~oren/pubs/EJ-Promised%20land%20(85).pdf
Hung-po Chao and Robert Wilson, *Resource adequacy and market power management*. Paper published by the Electric Power Research Institute, 2004. Available at: http://stoft.com/metaPage/lib/Chao-Wilson-2003-04-resource-adequacy-options.pdf

6.3 The role of readiness strategies

Readiness strategies fit like gloves into an options-based planning paradigm. Where there is a desire to manage, at least unnecessary cost, risks of both overinvestment and system inadequacy, there is a natural bias in favour of effective strategies with modest irreversible up-front costs but real ability to deliver extra water within a time scale sufficient to respond to emerging drought pressures or demand growth. This is the essence of a readiness strategy – to get in place a mix of measures that collectively is capable of dealing with worst case scenario pressures, while limiting up-front exposure to costs that will plausibly prove unnecessary or too early.

Readiness strategies are explicitly about buying system insurance and typically involve low premium insurance, accompanied by an 'excess' payable in the event that the insurance is needed. The lower, or later, the likelihood of needing to trigger the insurance, the higher the excess payment can be while still being cost effective.

Established desalination that operates intermittently – when the need for and value of the water produced is greatest – can be part of a readiness strategy. Could Desalination 1 be shifted to intermittent operation in the event of significant recovery in the system? Should desalination 2 be designed to allow this at lower cost? Current reverse osmosis desalination 'prefers' full-time operation but it is not essential and the earlier analyses highlight how it can be very costly. Planning for Sydney's desalination plant moved early (in 2005) to an assumption of intermittent operation, following the initial options-modelling done by ACIL Tasman.

There are costs involved in starting up and shutting down, unit costs of production are heightened. Both these arguments applies to peaking power stations also – but this does not prevent them from being operated intermittently for sound commercial reasons. Furthermore, it does not prevent the owners of peaking power stations from selling insurance products into the electricity market even when the plants are not operating.

More radically, a desalination plant that has yet to be built, but that could safely be built and commissioned within a specified time frame – say, 2 years in line with recent WA experience – is perfectly viable as a strategy for dealing with possible needs more than 2 years out. What is needed is a strategy to establish, and then safely sustain, the ability to deliver such a facility to the system within a specified time frame. As long as this can be done – and this will typically involve some up-front and some on-going investment – then the holder of this capability could sell insurance services into the water market. It can be a sound part of procurement strategy.

Drought restrictions are a long established form of readiness strategy. In the absence of a drought and pressures on supply, actual restrictions may not be in place. However, an agreed restrictions regime – a willingness and capacity to drop usage under specified trigger conditions – can offer security to the system in advance of a drought. It can interact with other readiness options – for example, knowledge that drought restrictions can be triggered temporarily, may allow for a longer lead-time to be attached to desalination delivery. In an options setting, the reduction in expected costs that flow from this could prove very substantial, by lowering the likelihood of triggering the major build, only to have the drought break before commissioning.

Rationing, such as was used in Gladstone and has effectively been implemented in SE Queensland has some of the same readiness features as drought restrictions. Economists recognise scope for lowering the net user costs of the reduced usage – because rationing allows for greater user choice and substitution in determining how to absorb a usage reduction across all uses, not just specified outdoor uses, for example. A user can opt for shorter showers to allow a garden to be sustained, for example. Rationing is, of course, a central feature of the drought management of water entitlements in many rural and mining settings.

Access to temporary and permanent trading in water rights (and in water use options and other derivatives) – which has occurred widely across Australia in response to drought pressures – is a device for lowering the effective cost of rationing when it needs to be implemented. This can increase its attraction as a readiness strategy, relative to investment in expanded capacity (which in many cases is effectively not possible). In the presence of rationing, the marginal value of remaining water supply changes differentially across the different uses of the water – encouraging temporary movements of the remaining supply to highest value in-drought uses.

DM bidding into the market, by an industrial/mining water use with alternative water or non-water technologies available (or capable of being established quickly and at modest cost), could also serve as a sound readiness option. Again the earlier reasoning is highly relevant – it may well make sense for the procurement agency to secure call options over such interruptibility, even if the unit price of the demand reduction is high.

A key feature of a market that encourages the design of valuable readiness options will be an understanding of the nature the nature of the uncertainties being managed, and of the way the whole portfolio is likely to operate in addressing those uncertainties. This places strong emphasis on market access to the options-based modelling that we see as being a responsibility of the procurement entity – inclusive of the characterisation of the hydrology and demand uncertainties. This access will support much more confident

processes for valuing the options – and may encourage a greater share of risks being accepted by suppliers to the market.

6.4 Demand management strategy

The earlier discussion highlights the way that the procurement entity should reassess the role of DEM in the procurement strategy. We strongly suspect that, in a drought situation (or when where there is uncertainty about whether the pressures are drought-based or structural climate change-based, or a combination) investment in higher unit cost DM measures will make sense – because of the control this offers for limiting the risks of large over-investment.

In this sense, and reflecting the discussion of readiness options, consideration of the economic merit of *accelerated demand management* as a drought response measure belongs logically within the responsibilities of the procurement entity, alongside possible tapping into willingness of major users to bid their interruptibility into the market. It can and should be considered as a call option over procurement of DM when DM has an elevated system value.

6.5 Evolutions of restrictions regime

The restrictions regime does involve a package of call options over demand reductions, with triggers linked to capacity in storage. As the system diversifies, with less reliance on rainfall and with storage in system having relatively less of a role to play in meeting, the optimal settings for the restrictions regime will change.

In the ACIL Tasman Discussion paper on procurement issues (Section 6) we flagged the way that commitment to building a second desalination plant implies a change in the cost effective restrictions regime, even before the second plant is available. In the same way establishment of readiness options, commitment to a program of accelerated DM etc should translate into changes in the restrictions regime.

We would recommend that, as an early activity, the procurement entity establish and disseminate a clear set of principles to underscore the evolution of the restrictions regime. It should also document the way that the restrictions regime is likely to interact with source procurement and other DM options in shaping the portfolio to be assembled and managed by the entity.

6.6 Evolution of pricing instruments

WA already applies a reasonably aggressive rising multi-tiered (inclined block) pricing regime to water use. This is seen as a device for imposing a greater (more than proportionate) share of system costs on heavy water users, and posting some incentives for moderating heavy use, without the need to confront more moderate users of water with high water bills.

These objectives are, essentially, equity-based. The rate of increase in the marginal cost of water used by an individual consumer, as that users consumption rises, bears no significant relationship to the rise in marginal costs implied for the system. Furthermore, the marginal value of water to high water users is not necessarily less than the marginal value to lower water users. In this sense, it should not be interpreted as posting cost-reflective price signals.

It is probably that these pricing arrangements have some impact on total demand for water – but are unlikely to influence greatly change in demand as the system becomes increasingly stressed and perhaps insecure.

Chapter 9 of the ACIL Tasman Discussion Paper on Water Source Procurement Issues sets out a way of looking at the scarcity value of water that will emerge naturally from systematic options-based modelling. It recognises that current consumption of water translates into heightened likelihood of needing to bring additional supply into the system early. It also recognises that the magnitude of this impact tends to rise dramatically as the system becomes increasingly stressed.

This does flag a *potential* source of both drought-reflective DM and much clearer price signals at to the marginal value of water to users. Drought pricing, with some signals based in the value of the future supply options extinguished by current consumption, could constitute a roiling call option as part of the overall procurement portfolio. In principle, it could play an extremely valuable function in guiding the best balance that is inclusive of all user costs – direct engineering costs of DM, but also the deprival value of reduced availability. In these circumstances, end user demand patterns could be 'competed' into the procurement market in a valuable way.

That said, as we recognised in the Discussion Paper, there are substantial social and political sensitivities tied into water pricing and we have tended to assume that any movement in this direction will be modest and/or slow to come.

Nonetheless, on-going monitoring of the potential value of such instruments might reasonably be a responsibility of the procurement entity – that could then feed this information into the policy processes.

Of course, there are important pricing issues to be addressed within the procurement model – and these are discussed in Section 7.2.1 below.

6.7 Access regimes & impacts on options

We have earlier flagged the need for some form of access being provided to the procurement entity's modelling and portfolio assessment processes. We also flagged the possibility of third party access to Water Corporation distribution infrastructure – a possibility also raised in the initial Water Corporation submission to this ERA Inquiry.

We do not see the former as needing great sophistication. All stakeholders' interests should be served by early and free access to assumptions, modelling capability and, as feasible, actual models.

Infrastructure access regimes are discussed further in Section 7.2.1 below. The presence of such arrangements could alter the nature of the commercial arrangements being entered into by the procurement entity. In line with the discussion in Section 5.2, we do not see the procurement entity being required to contract – but rather being required to ensure adequate supply can be made available, with direct contracting being one means.

If third party access emerges in the system, this can be expected to broaden the scope for direct contracting between new suppliers and end users – with these contracts influencing the size and form of the efficient portfolio of call options held by the procurement entity.

6.8 Residual regional supplier

Water Corporation has argued that it has a role to play in ensuring adequate water supply in regional areas, where the scale of the scheme would be too small to create commercial interest. It is not clear whether this reflects something more fundamental, that accurate costing of the true costs of supply and the scope for accessing a competitively determined CSO or analogous payment for the delivery of non-commercial services would not resolve. We can imagine that Water Corporation could be highly competitive in some regional locations because of the regional spread of its operations and capability.

If there is an issue of substance here, then it would seem capable of being quarantined from the main procurement process, with a focus on SW WA. The central procurement entity could assume responsibility for ensuring supply, seeking commercial interest and possibly turning to Water Corporation as a supplier of last resort. With a procurement entity separated from Water Corporation, there would be scope for Water Corporation being invited to bid

earlier in the process, were it likely that it could offer significant cost competitiveness.

It would also be possible to choose to focus the new central procurement function on the major supply systems and growth areas – and to leave a supply responsibility, or residual responsibility, in relation to other areas with Water Corporation.

6.9 Compatibility with future devolution

We have been focusing on a strongly centralised procurement process, with a fairly holistic process for assessing need and determining contracts. It would not involve monopoly control over procurement – DM measures, private supply schemes etc would ultimately be determined by others – but it would be a strongly hands-on market operation.

For the reasons mapped out earlier, we strongly suspect this will be needed, at least initially, if opening up competitive markets is not going to risk the delivery of severely inappropriate projects and sources. In saying this, we stress our view that present planning arrangements appear not to be immune from these problems also. However, moving to a competitive market model before the paradigm is well-established and understood could make it much harder in the future to move smoothly to a more soundly-based system.

However, the recommendations in relation to development and propagation of access to whole-of-system options-based modelling and clear understanding of the procurement paradigm could serve two purposes:

- Seizing the opportunity of moving to a new procurement model to establish a sounder procurement paradigm; and
- Laying the foundations for later devolution of these processes to a then much more informed market.

It is not clear how far devolution would sensibly go, but we do recommend that it post-date establishment of a sound framework and that it occur progressively to best minimise the potentially serious risks.

7 Governance issues

The key aspects of governance involve appropriate accountability mechanisms and the establishment of an appropriate regulatory framework.

7.1 Accountability mechanisms

A recent consultation paper on governance arrangements for the proposed Australian Energy Market Operator set out the key accountability mechanisms[4]. The paper suggests that accountability is a key principle of good governance, and requires the establishment of a framework of rules, relationships, systems and processes through which:

- Functions and roles are clearly defined
- Risks are monitored, assessed and managed
- Decision makers are held to account, and
- Performance is optimized and independently evaluated.

Key issues that need to be addressed in establishing accountability for a central procurement agency therefore include:

- Ensuring that the relevant legislation establishes clear objectives for the operation of the procurement entity, together with appropriate subsidiary rules which give detailed expression to the objectives.
  - This will involve ensuring that there is a suitable process for making changes to the rules
- Establishing appropriate accountability requirements for the board and management through the Establishment Act and other relevant legislation.
  - The form of accountability arrangement is likely to differ according to whether the entity is a statutory authority or a company limited by guarantee.
  - Issues to be addressed include:
    - The appointment of the Chair and directors
    - Remuneration of directors
    - Removal of directors and
    - Powers of the members in relation to amend the constitution and to allow the entity to undertake additional activities.
- Ensuring appropriate application of the Trade Practices Act.
  - If established as a statutory body, it is likely that certain activities of the central agency would not be subject to the TPA, on the basis that they did not constitute "conduct of a business". However it is reasonable to assume that the TPA would apply to at least some of the activities of the entity as a statutory body, given the assumptions that it will probably contract for some supply options and in some form trade them through to Water Corporation, other distributors and/or end users.

[4] Ministerial Council for Energy, Oct 2007, Public Consultation Paper on Governance Arrangements for the Proposed Australian Energy Market Operator.

7.2 Regulatory framework

Accountability also requires the establishment of an appropriate regulatory framework. This would involve:

- Regulatory oversight of pricing decisions with respect to the services provided by the agency and/or other agencies such as Water Corporation
  - Depending on the detail of the institutional arrangements put in place, this could include the pricing of wholesale water, the pricing of risk management services and the pricing of access services
- Review mechanisms for decisions made by the procurement entity
  - For example merits review by the Australian Competition Tribunal (ACT) and/or judicial review
- Dispute resolution

7.2.1 Pricing oversight

As was discussed above in Section 5.2, the function of the central procurement entity is to ensure that the reliability of the supply system is secured at all times. This could involve the agency entering into forward contracts for water supply or preparedness to supply under call options, or in some circumstances it could involve the agency ensuring that other players have entered into appropriate contracts.

In the absence of a competitive market (which might be introduced over time but is not envisaged to begin with), it will be important to ensure appropriate regulation of services that are supplied by entities that are in a position to exercise market power. Such services will include the provision of risk management services by the central procurement entity, and (where supply-side call options have been exercised) the provision of water, or contracts for the future supply of water, to the agency responsible for the delivery of water to final customers (typically, but not necessarily Water Corporation).

Given ERA's existing regulatory functions, it would appear most likely to be the appropriate responsible body for such price oversight functions. We would envisage ERA being responsible for overseeing:

- The fees charged by the central procurement entity to Water Corporation and possibly other 'customers' for its services
- The price of wholesale water provided to Water Corporation (as the retail supplier) by the procurement agency and/or other suppliers, and
- The price charged for forward contracts of water, envisaged as call options which may or may not be triggered at some point in the future.
  - Such contracts could involve the pass through of the expected costs of future supply, or could involve the pass through of costs as they are

incurred (which would involve significant jumps in price as new sources were actually triggered but would protect against the risk of preemptive over-recovery for services not actually needed). We suspect that the latter approach would be preferable from an accountability view.

- A middle path would allow for preemptive recovery of a reasonable assessment of growth-driven extra capacity, within a paradigm not dissimilar from the long-run marginal cost paradigm, but that would incorporate both corrections for 'overs' and 'unders' in these estimates and specific recovery, starting at the time of firm commitment, for additional investments required for security purposes.

In addition to regulation of the price of water/contracts to supply water and water security services, regulatory oversight of the access regime would also be required. The access regime would most likely need to be implemented and operated by the operator of the infrastructure to which access is being sought – in most cases Water Corporation. The procurement entity would have a strong interest in ensuring the regime was supportive of its objectives in respect of cost effective system security – and its view would need to be factored into the design of the regime.

The access regime would need to address the objectives of the regime, the scope of regulation, the form of regulation (including principles and criteria to be applied in selecting between alternative forms), regulatory procedures, pricing principles, information disclosure and the nature of appeal and review mechanisms.

In this case, we expect that specification of the regime would cover conditions and pricing of access to the trunk 'transmission' system, and probably the distribution system (based on the nature of the supply options being considered). Depending on the institutional arrangements put in place, the regime may also need to cover ring fencing arrangements.

Again ERA is likely to be the regulatory body best suited for overseeing the development of an access regime given its existing oversight role in the water industry. Part IIIA of the TPA provides a framework that could be adopted. Alternatively a State access regime could be developed, although it would need to be designated as an 'effective regime' to over-ride the jurisdiction of Part IIIA.

Under either regime, there is likely to be considerable advantage in adopting a regime which employs clear access pricing rules, rather than the negotiate-arbitrate approach which underpins Part IIIA. Only with published access pricing rules is sufficient certainty likely to be provided to potential suppliers to

enable them to assess the potential for their proposal to add value to the supply portfolio.

Water Corporation has suggested in its first submission to the Inquiry that an access regime might be modeled on the regime proposed by IPART for water services in NSW, most recently based on an ECPR approach.

However, we believe that both the procurement entity and the regulatory body responsible for development of the regime, would need to look carefully at adaptation designed to ensure compatibility with options-based planning. In a sense, access regimes can tend to post incentives for competitive early entry with new infrastructure to secure access to resources and currently spare network capacity. This could cut across the objectives of a sound options-based response to supply threats.

If the procurement entity has been separated from Water Corporation (or, arguably, even if ring-fenced) then Water Corporation operating an access regime will not be well placed to take into account the full opportunity costs of granting access. This includes implications for the forward value of wastewater and spare capacity in providing call options to the system – options that could be extinguished by the granting of access for what may appear a sound project, but not offer a cost effective enhancement to the whole system.

The assessment of any applications would need to be set in the whole-of-portfolio context – and would need to factor in the source security objectives as well as the objectives of Water Corporation in ensuring that its costs are adequately covered. This is likely to require a facility for the procurement entity to become a party to any deliberations over an access application, and it may create incentives for the procurement entity to secure call options over system resources that may be needed to support its system security management function. Alternatively, any provider of a call option to the procurement entity might be required to secure access to any needed infrastructure – also possibly through a call option – as part of the contract.

The access regime would need to address the objectives of the regime, the scope of regulation, the form of regulation (including principles and criteria to be applied in selecting between alternative forms), regulatory procedures, pricing principles, information disclosure and the nature of appeal and review mechanisms.

In this case, we expect that specification of the regime would cover conditions and pricing of access to the trunk 'transmission' system, and probably the distribution system (based on the nature of the supply options being considered). Depending on the institutional arrangements put in place, the regime may also need to cover ring fencing arrangements.

Again ERA is likely to be the regulatory body best suited for overseeing the development of an access regime given its existing oversight role in the water industry. Part IIIA of the TPA provides a framework that could be adopted. Alternatively a State access regime could be developed, although it would need to be designated as an 'effective regime' to over-ride the jurisdiction of Part IIIA.

Under either regime, there is likely to be considerable advantage in adopting a regime which employs clear access pricing rules, rather than the negotiate-arbitrate approach which underpins Part IIIA. Only with published access pricing rules is sufficient certainty likely to be provided to potential suppliers to enable them to assess the potential for their proposal to add value to the supply portfolio.

7.2.2 Review mechanisms

Appropriate review mechanisms are required to ensure accountability in decision making. The review options considered by the MCE for the proposed Australian Energy Market Operator included merits review by the Australian Competition Tribunal and judicial review in State or Territory courts.

Standard judicial review is directed at determining whether the decision maker has acted within the scope of its statutory powers, and whether the procedures followed were fair. Judicial review is a well established means of providing accountability, and it would be appropriate for the central procurement agency to be subject to judicial review.

Merits review can work alongside judicial review, and involves review of the material facts, policy and reasoning. Thus a merits review is intended to improve the quality and consistency of the decisions made by decision makers. The MCE decided that several decisions within the gas and electricity framework should be subject to merits review[5], and a similar assessment is likely to be appropriate for a central procurement agency in water.

7.2.3 Dispute resolution

It would also be necessary to designate an appropriate enforcement body, which would include responsibility for dispute resolution. In electricity, the AER as the national regulator is the body tasked with enforcing compliance with the Law, Regulations and Rules. Given ERA's responsibilities in enforcing the requirements on licensed water suppliers, ERA is likely to be the appropriate body for assuming the enforcement role.

[5] See MCE, May 2006, Review of Decision-Making in the Gas and electricity Regulatory Frameworks, Decision.

8 Implementation issues

Implementation of arrangements of this form, if they entail an entity separated from Water Corporation, will take time – in the finalisation of design, that would necessarily entail substantial consultation, and especially in the necessary processes to effect the transfer and build-up of capability within the procurement agency. The arrangements as proposed involve far more than a separation of the procurement function from Water Corporation. We see simple separation without making a substantial investment in improving the procurement model and assessment processes, as potentially dangerous.

Conversely, if the procurement function is to be discharged by Water Corporation, then we would strongly recommend that it be required to discharge the function broadly in line with the approach as mapped out here. This would support moving to a more soundly based framework for encouraging and weighing proposals; would encourage water Corporation to use more flexible contracting arrangements that should offer access to substantial cost savings; and would link into serious reassessment of the appropriate settings of the restrictions regime and demand management incentives.

It would clearly be easier to move to a Water Corporation administered model. However, we remain inclined to the view that separation offers a better long-term strategy, provided that the strong links back into Water Corporation planning and operation are established early and well.