Sydney Catchment Authority

Submission to the Independent Pricing and Regulatory Tribunal

Review of the Operating Licence and Prices for the Sydney Catchment Authority 2011

NSW GOVERNMENT

SYDNEY CATCHMENT AUTHORITY

Contents

Executive Summary

The Independent Pricing and Review Tribunal's (IPART's) end of term review of the operating licence and the price determination is timely given the significant changes that have occurred in the three years since the last price determination. IPART regulates the SCA for water supply services under a monopoly services order[1]. To properly understand SCA's proposed changes for the upcoming price path, it's critical to understand the fundamental changes in SCA's operating environment in recent year.

Key changes that have occurred such as the operation of the Sydney Desalination Plant (SDP) and the commencement of the Greater Metropolitan Water Sharing Plan along with the implementation of environmental flows, impact on how the SCA meets its commitment to supply high quality water to Greater Sydney.

Organisational Achievements

As part of preparing for the changed operating environment, in its 2008 submission to IPART, the SCA undertook to reduce its operating expenses from $86 million to $80 million per year and maintain this expenditure in real terms throughout the determination period. This strategy provided the SCA with the ability to manage within the reduced sales environment with the desalination plant's entry into the bulk water supply market. The SCA has achieved this by optimising cost through outsourcing where appropriate, benchmarking with similar organisations, applying best practice procurement procedures, reviewing all business systems whilst still meeting its service delivery requirements.

These approaches have delivered real cost reductions and allowed the SCA to manage within its IPART expenditure targets and maintain dividends to the NSW Government despite reduced water sales compared to those forecast for the price path. These efficiencies have been delivered whilst reliably delivering high quality water and meeting all statutory responsibilities. Key strategies and achievements over the current price path that have contributed to these outcomes are detailed below.

Organisational Review

The SCA commenced a comprehensive organisational review of its functions, structures, systems and strategic directions in late 2008. This review focussed on the SCA's core business responsibilities and how these could best be delivered. The review culminated in a new Corporate Sustainability Strategy 2010-2015 with six key focus areas: engaged people, stakeholder relationships, business viability, industry excellence, reliable water and resource optimisation. The strategy sets the directions for the SCA over the next five years and in conjunction with the SCA's Enterprise Risk Management Framework drives the business planning and budget process. Section 6.3.1 provides more detail on the Strategy.

People

In determining how best to achieve the efficiency outcomes in the current price path the SCA examined how changed systems and processes would lead to a more streamlined organisation. This resulted in the SCA achieving an 11% reduction in employee related cost from 2009 to 2010 financial years. This has been achieved against employee

[1] Independent Pricing and Regulatory Tribunal (Water Supply Services) Order 11 February 2000. The order also lists "other services for which no alternative supply exists and which relate to the supply of those water services", but IPART has not currently set any prices under this category.

award salary increases of 4% per annum over the past three years compared to average CPI over the same time of 2.8%.

Concurrently, the SCA developed a new workforce strategy *Capturing Knowledge, Growing our Future* to address the issues of an ageing workforce and to ensure staff skills match the future needs of the organisation. Twenty-five new staff or about 10% of the staff have been recruited in the last twelve months to meet this need.

A particular focus over the past three years has been on improving the organisation's safety performance. The organisation has been successful in reducing the number of Lost Time Injuries from 9 in 2007-08 to 2 in 2010-11.

Reliable Water

The SCA has delivered on its core responsibilities of delivering quality water suitable for treatment. Over the past three years the SCA has provided an uninterrupted supply of water to its customers. Over the same period, it has met health related compliance with the Australian Drinking Water Guidelines despite supplying raw rather than drinking water. The SCA has complied with both the NSW Dams Safety Committee requirements and the Australian National Committee on large dams guidelines.

The SCA has undertaken a comprehensive review of its water monitoring program that considers the SCA/Sydney Water/NSW Health catchment to tap risk assessment, the Catchment Decision Support System (CDSS), and results from long term analysis. The review has identified a number of sites that can be removed from the program and additional sites that will better inform the SCA in relation to catchment water quality.

A significant outcome was the development and implementation of the first Healthy Catchments Strategy (HCS). This approach integrated the SCA's regulatory approach and actions in the catchment into the one strategy. The catchment actions in the HCS were developed from the CDSS which integrates the latest science around catchment risks to identify priority locations and work to be undertaken.

The SCA has developed a new Science Strategic Plan which is focused on meeting business needs with a particular emphasis on evaluating catchment actions and reservoir dynamics.

Business systems

A range of business systems, processes and tools have been reviewed and updated to ensure they support management, monitoring and reporting throughout the organisation. SCA staff were engaged to define the business improvement opportunities and then involved in re-engineering the systems and processes.

The finance and business systems review has resulted in new budgeting and monitoring systems, the introduction of a time recording system to accurately allocate staff costs to projects and activities, and new procedures to improve business efficiency.

Underpinning these improvements was a need to assess and ensure sound governance, business and budget planning, financial delegations, and systems that support peer and Board review, with transparent reporting formats. A range of tools, systems and processes were evaluated and updated to ensure they met the SCA's needs.

For example, a new Capital Expenditure Program Manual was developed to provide guidance on the process, roles, responsibilities, and delegations in preparation to the development of the SCA's capital program.

The success of the SCA's work over the past three years was recognised in a performance review conducted by NSW Treasury. In November 2010, NSW Treasury engaged KPMG to conduct a strategic performance review of the SCA. The review found the SCA was operating efficiently with sound practices in relation to governance. It found the SCA review of its functions, structure and processes over the past three years had delivered substantial productivity outcomes, reduced costs and improved the ability of the SCA to operate in the new competitive environment with the construction of the desalination plant. The review also noted that for the SCA as an efficiently run organisation, the identification of further significant productivity gains and cost reductions was difficult.

The SCA is committed to continuing organisational improvement while investing in systems, assets, science, and staff to upgrade the capacity of the organisation.

Drivers for the future

Over the next five to ten years the drivers and directions for the SCA fall into five key areas.

Supply of Water

Ensuring the SCA meets its service delivery requirements in relation to supplying water of the right quantity and quality sets some fundamental actions for the organisation. The SCA has to maintain a robust water monitoring program for both quantity and quality. The SCA also maintains a strong water modelling capability which has been critical to the analysis of supply sufficiency for the Metropolitan Water Plans. This role will continue.

Underpinning the continued supply of water the SCA must understand the dynamics of the catchment and reservoirs. The SCA's new Science Strategic Plan 2010-2015 establishes the direction for the organisation's science effort for the coming price path.

Catchment Activity

The SCA is developing the next HCS for 2012-2016 using the CDSS and best available Science. The HCS 2012-2016 will outline the risks and priorities for action that underpin our investment in protecting the catchment. The level of expenditure will reduce over the new price path with the conclusion of the Accelerated Sewerage Program.

Another area of focus will be on reviewing opportunities for improved service delivery such as how catchment actions may be more efficiently delivered in conjunction with the Catchment Management Authorities (CMAs).

Asset Maintenance and Management

With over $1.3 billion in assets, maintaining and managing assets is critical. The SCA is improving its approach to asset management, in particular, looking to align with international standards. The maintenance and management of assets is a significant part of the SCA's costs, being around $10 million per annum. Over the current price path, a new civil, mechanical and electrical contract was established which delivered cost savings over the previous arrangements. This has enabled the SCA to maintain its

asset maintenance and management expenditure at similar levels, despite bringing in to operation and significant number of new assets.

One key activity to be completed over the new price path that will further enhance the ability of the SCA to manage its water supply assets is the SCADA project. This project has commenced and it will alter the skill set of water system operational staff and drive future training and recruitment strategies.

Regulation

The SCA's regulatory role for developments in the catchment is underpinned by the principle of developments having to have a neutral or beneficial effect on water quality (NorBE). The SCA applies this principle in its concurrence role and also in its consideration of major developments. A particular focus in the future will be to better understand the potential impacts on surface and groundwater of mining and coal seam gas.

People

The SCA's employee and employee related costs make up nearly 40% of the SCA's operating expenditure. Developing the staff and ensuring the skills and expertise meet the organisation needs is critical. The SCA has taken steps to address the ageing of its workforce and this focus will continue.

Proposed approach to pricing

The SCA's approach to the upcoming price path is driven by changes in the operating environment and possible continuing volatility in water demand. The entry of the Sydney Desalination Plant (SDP) to the market has magnified the traditional demand risks faced by the SCA. On top of drought risk, there is a risk of demand falling lower, as new water sources are developed under the *Water Industry Competition Act 2006* (WIC Act). Demand is also more volatile, as the desalination plant operating rules reduce or expand the share of supply from SCA as storage levels vary.

The SCA could be exposed to a significant loss in revenue in the new operating environment if the current price structure is maintained. Accordingly, the SCA is seeking to change its price structure to a fixed/variable ratio of 80:20. This arrangement will protect the SCA from downside revenue risk and minimise over recovery should water sales be higher than forecast.

Operating expenditure

The SCA will maintain its operating expenditure at its 2008-09 level through further efficiency savings. In 2011-12 dollars this amount is equivalent to $87.2 million. This operating expenditure total will include the additional $1 million in licence fees from the NSW Office of Water (NOW) as a result of NOW's most recent IPART determination. In addition to the $87.2 million core operating expenditure, the SCA will seek to include $2 million for the proposed self insurance scheme premium to cover the expected cost of Shoalhaven water transfers. The outcome of this approach using a 7.0% Weighted Average Cost of Capital (WACC) is shown below.

	Current Period	Proposed 2012 Determination Price Path				Future Price Path
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Operating Expenditure ($M, 2011-12)	99.6	91.0	90.7	90.7	90.7	90.7
Depreciation ($M, 2011-12)	24.7	24.5	24.6	24.7	24.3	24.2
Return on Assets ($M, 2011-12)	78.7	91.6	95.9	100.6	106.0	105.6
Revenue ($M, 2011-12)	202.7	207.1	211.2	216.0	221.0	220.7

* Operating expenditure in 2011-12 includes $9.4 M of expenditure to finalise the Accelerated Sewerage Program, a program which IPART was directed to include in its 2009 Determination, and which thus falls outside of the SCA core expenditure commitment.

Capital expenditure

The SCA is proposing a Capital Expenditure program of $146.2 million over the price path.

	Current Period	Proposed 2012 Determination Price Path				Future Price Path
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Projected Capital Expenditure ($M, 2011-12)	18.7	31.3	32.7	36.5	45.7	60.6

Prices to Sydney Water

The SCA is proposing a move to a higher fixed component in its charges to Sydney Water. It is proposed that fixed charges should recover 80% of expected revenue, rather than 40% as is currently the case. The overall price increases are modest at 2.2% per annum, reflecting the efficiencies the SCA has, and will continue to achieve in operating expenditure, along with its modest capital program.

Prices to SWC $11-12	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Fixed Charge ($M/month)	7.17	13.48	13.78	14.08	14.39	14.35
Variable (volumetric) Charge ($/ML)	284.38	102.81	105.07	107.38	109.75	109.43

Prices to Councils and other customers

SCA prices to Council customers are proposed to move from having a zero fixed charge to one that should recover 25% of revenue. This structure was requested by Councils, and aligns with Council retail price structures.

Prices for SCA's other customers (unfiltered and raw water) are not proposed to change in structure or level.

Prices to Councils $11-12	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Fixed Charge $/Month (Wingecarribee Council)		22,966	22,966	22,966	22,966	22,966
Fixed Charge $/Month (Shoalhaven Council)		560	560	560	560	560
Fixed Charge $/Month (Goulburn Council)		2,801	2,801	2,801	2,801	2,801
Variable (volumetric) Charge ($/ML)	268.87	201.65	201.65	201.65	201.65	201.65

The SCA's proposed prices will have negligible impact in real terms to Sydney Water's customers over the period of the next price path. The typical bill of an individually metered residential property with a 20mm connection and consuming 200 kL per year will increase by 0.3% per annum as a result of SCA's price proposal. The annual bill amount for such a customer is $1,087 in 2011-12 terms. In the future there are a number of major projects the SCA will need to fund, and the SCA recommends that IPART determine prices at a rate of return such that sufficient equity be retained in the medium term to maintain the SCA's financial viability.

Key operating licence issues

The SCA supports the majority of IPART's the proposed licence amendments. IPART identified a set of regulatory principles that the SCA used to assess opportunities to enhance the licence. The two key areas in this review are:

Adoption of standards - The SCA proposes to move toward aligning business practices with ISO standards but not be required to seek certification until a full cost benefit shows this is beneficial and IPART describes how this will translate into reduced compliance obligations currently associated with the traditional licence audit.

Yield estimation **-** The SCA is recommending yield and WATHNET obligations remain in the licence as these underpin the long term water supply planning calculations for the metropolitan water plan.

Industry structure

In the submission the SCA identifies key changes in the sector that are providing challenges such as: the desalination plant operation and rules for dispatch; the implications of the Greater Metropolitan Water Sharing Plan and the implementation of environmental flows and the significant impacts on available drinking water supply. The submission discusses the implications for metropolitan water supply planning given the likely increased competition with the advent of the *Water Industry Competition Act 2006* (WIC Act).

The SCA notes that it is well placed to undertake long and short term water supply and demand planning and dispatch.

Part 1

Organisational Overview and Changing Operating Environment

1. Introduction

The urban water sector has changed significantly in the time since the Independent Pricing and Regulatory Tribunal's (IPART's) last price determination for the Sydney Catchment Authority (SCA) in 2009. The Sydney Desalination Plant (SDP) commenced operation in April 2010, and later the same year the 2010 Metropolitan Water Plan announced the operating rules for the plant. The plant subsequently sought and received a licence to operate under the *Water Industry Competition Act 2006*.

These changes were expected to occur during the current price path and licence period for the SCA. The organisation made plans to manage its operations in light of these changes, including the two year commissioning of the SDP, which would see SCA water sales fall substantially. A range of business initiatives were planned and have been implemented over the past three years to ensure the SCA could operate sustainably during this period and into the future.

IPART asks whether, in light of the evolving regulatory framework, the current regulation delivers economic efficiency, as well as social and environmental objectives. It also asks should the licence contain detailed arrangements for governing the water supply market. The SCA has sought to respond to these questions in the submission.

IPART's price determination and end of term review of the SCA Operating Licence provides an opportunity to reflect upon our performance and, for the first time, to consider the implications of the licence in the context of the price determination. The SCA welcomes this opportunity to be able to integrate licensing and price outcomes.

1.1. Legislative context

The SCA is constituted under the *Sydney Water Catchment Management Act 1998* (SWCM Act). Its role is to protect 16,000 square kilometres of drinking water catchments, and to manage dams, pipelines and other infrastructure that are used to supply customers with quality raw water. The SCA is responsible for supplying water for treatment and then consumption by Sydney, Illawarra, Blue Mountains, Southern Highlands and Shoalhaven communities. Its customers include Sydney Water, Wingecarribee Shire Council, Shoalhaven City Council, and some 60 other smaller customers.

The SCA collects water from five catchments into 21 dams which collectively hold more than 2.6 million megalitres of water. Approximately 4.5 million people or about 60 percent of the NSW population use water supplied by the SCA.

The SWCM Act defines the roles, functions and objectives of the SCA. The functions are to manage and protect the catchment areas and infrastructure works; supply raw water; and regulate certain activities in the catchment area. The SCA's functions were amended to include the supply of water to licensed network operators or licensed retail suppliers under the WIC Act, allowing the SCA to supply other retail authorities.

The SCA's objectives are to ensure the catchment areas and infrastructure are managed to promote water quality; the protection of public health and public safety; and the protection of the environment. The SCA must also ensure water supplied is of appropriate quality and must conduct its activities in compliance with the principles of ecologically sustainable development; managing infrastructure works efficiently and economically; and in accordance with sound commercial principles.

The Act enables the SCA to exercise certain powers under the *Protection of the Environment Operations Act 1997* (POEO Act) in relation to pollution sources that impact on water quality in the catchment areas. These powers may be exercised for the purposes of protecting catchment areas or protecting and enhancing the quality of water in catchment areas.

The operating licence gives effect to the SCA's operations and must include terms or conditions under which the SCA is required:

- to provide, construct, operate, manage and maintain efficient and co-ordinated viable systems and services for supplying water
- to ensure that the systems and services meet the quality and performance standards specified in the operating licence in relation to water quality, service interruptions and other matters determined by the Governor, and
- to compile indicators of the direct impact of the SCA's activities (including, but not limited to, the impact of energy used and waste generated) on the environment.

There are a range of instruments required under the SWCM Act that grant regulatory powers or direct SCA operations.

1.1.1. SCA's regulatory powers

The State of Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 provides the SCA with regulatory powers that require Councils to only grant approval to developments that demonstrate a neutral or beneficial effect on water quality.

As a regulator the SCA enforces the Sydney Water Catchment Management Regulation 2008 which allows the SCA to protect water quality and manage the catchments by exercising certain regulatory functions over non-scheduled premises and activities under the POEO Act.

In relation to oversight of the SCA's regulatory functions there are well developed mechanisms for judicial review. The powers vested in the SCA are not unique and review by appeal is available as is the case with such regulatory powers. IPART need not seek to regulate the SCA's exercise of its regulatory functions.

1.1.2. Catchment audit

Under the SWCM Act an audit of the state of the health of the catchment is to be undertaken every three years. Audit outcomes are influenced by natural factors such as drought, bush fires and floods which all impact on the state of the catchment in addition to any human actions occurring in the catchment. The audits explore causes of the state of the health of the catchment and recommend actions agencies and others might take to improve catchment health.

Following the review of the SWCM Act in 2004, provisions were introduced to formalise catchment indicators which were previously determined prior to each catchment audit. These indicators were to replace those environmental indicators listed in Schedule 2 of the Operating Licence. The catchment audits must assess the state of the catchment areas having regard to catchment health indicators that were subsequently developed and gazetted in 2008 by the then Department of Water and Energy.

The indicators are supported by a technical report that describes how the indicators were selected and the methods used for the collection of data, and the agencies responsible for collecting those data.

Following the 2004 review, the Act was amended to also require the SCA to incorporate the findings of a catchment audit, to the extent to which they relate to the activities of the SCA and water quality, into its risk framework and programs and activities relating to catchment management. The SCA's progress in implementing the catchment audit findings are documented in its annual Catchment Activities Report required under the Operating Licence.

1.1.3. Memoranda of Understanding

Under the SWCM Act the SCA is required to establish Memoranda of Understanding (MoU) with certain regulatory agencies including NSW Health and the Environment Protection Authority. The MoUs establish strategic and operational forums for the agencies to share information and liaise on matters of shared interest.

1.1.4. Supply arrangements

Section 22 of the SWCM Act requires the SCA to enter into arrangements with Sydney Water regarding the supply of water. The Operating Licence places similar obligations on the SCA to enter into arrangements with its other customers although this is not a requirement of the Act.

The Water Supply Agreement outlines the arrangements between the SCA and Sydney Water for the supply of water. The SCA also has agreements for the supply of water with Wingecarribee Shire Council and Shoalhaven City Council and is planning similar arrangements for Goulburn Mulwaree Council when the Council commences drawing water from Wingecarribee Reservoir.

The SCA has arrangements in place for the supply of water to a further 60 customers who draw water from its storages and infrastructure.

1.2. Regulatory arrangements

Apart from the requirements under the operating licence the SCA is also regulated by NSW Health for water quality. All water quality requirements in the Operating Licence are subject to the approval of NSW Health and all water quality reporting obligations on the SCA include reporting to NSW Health.

The SCA must manage the dams in compliance with NSW Dam Safety Committee requirements and the Australian National Committee on Large Dams guidelines. Dam safety emergency plans are prepared for all dams prescribed by the NSW Dam Safety Committee.

The Greater Metropolitan Water Sharing Plan commenced on 1 July 2011. The plan outlines the extractions and releases the SCA is allowed to make from its infrastructure works. The approvals under the plan detail the nature of the SCA's infrastructure. As IPART states in its discussion paper, implementation of the plan places obligations on the SCA for the release of water stored for drinking, for environmental flows and, most recently, for the drinking water supply for North Richmond. It also places different reporting obligations on the SCA than those previously in place under licence arrangements with NOW. The potential cost impacts of these obligations will be addressed later in the pricing submission.

1.3. Policy context

The Metropolitan Water Plan describes how the NSW Government secures the drinking water supply for the longer term and during drought. The Plan details water supply availability from surface water supplies such as dams and also desalinated water. The Plan also outlines the water efficiency strategies that are planned to reduce demand such as recycling and water conservation.

The Metropolitan Water Plan process draws on the expertise and resources of a range of agencies across Government. There is no overarching regulatory body for enforcing the Plan outcomes. The Metropolitan Water Directorate reports progress to an independent panel of experts who provide advice to Government on the efficacy of the Plan.

Future infrastructure works for the SCA identified in the Plan include rehabilitation/replacement of the upper canal; environmental flow infrastructure for Warragamba Dam; and upgrades to the Shoalhaven transfer system.

Other key decision making in the Plan that impacts on the SCA includes the operating rules for the desalination plant and the water restriction rules which alter the use of water in drought and hence slow depletion of the storages.

1.4. Structure of the SCA's submission

The submission reflects the structure and approach of the IPART discussion paper. The submission outlines the SCA's legislative and regulatory context, including the impact of the desalination plant and the WIC Act on its operations. It then covers:

- The form of the licence
- Specific licence issues
- Review of the current price path
- Upcoming price path
- Proposed prices
- Customer impacts
- Emerging issues

Suggested changes to the licence and a summary of responses to IPART's questions are provided as appendices.

2. The Evolving Regulatory Framework

Since the last major review of the SCA's operating licence the water market in Sydney has undergone a fundamental shift with both the introduction of the *Water Industry Competition Act 2006* and the construction by Sydney Water of the desalination plant. The SCA is no longer the sole water supplier to Sydney Water's operating area. The SCA has undertaken a range of initiatives to manage costs and revenues over the last three years that were foreshadowed in the previous price submission to ensure that it was well placed to continue to provide essential services to Greater Sydney.

IPART is seeking comment on whether the licence is the appropriate instrument to contain detailed arrangements for the governance of the water supply market. Whilst the SCA is not the sole supplier, it is responsible for the largest source of supply for Greater Sydney.

In 2004, the Metropolitan Water Plan was a policy initiative introduced to ensure a sustainable and secure supply of water was available during drought and over the longer term. Three plans have been released outlining the strategies to secure Greater Sydney's drinking water supply.

The desalination plant has been an important initiative under the Metropolitan Water Plan as it provides additional security to the water supplies for Greater Sydney. As the SCA has raised in previous submissions, it is important to confirm that industry structural and institutional arrangements reflect the changes that have occurred recently and that the underpinning assumptions in relation to the SCA's operating environment, which were established when the SCA was a sole supplier, remain valid.

Whilst broad operating rules have been determined for supply of desalinated water, there are no formal arrangements in place between the wholesale suppliers to ensure adequate reserves are available for all supply nodes on a day to day basis. The Metropolitan Water Plan looks over the very long term and forecasts, with the current operating rules, that there will be adequate supplies available in totality. Unlike other jurisdictions where there are a number of wholesale and retail suppliers, there are no formal dispatch arrangements in place for the metropolitan water supplies for Sydney.

Under its legislation and reiterated in the operating licence is the requirement for the SCA to provide viable and co-ordinated services for supplying water. It is the SCA's view that this can be maintained without new institutional arrangements but some adjustment may be necessary to the current regulatory settings.

2.1. Long term planning

Under the Metropolitan Water Plan options and planning regarding long term supply and demand involves a whole of government approach. New plans will need to acknowledge private sector interests in water and recycled water services so as to understand future impacts on total available supply and demand and to ensure that supply is never less than demand over the longer term.

The SCA essentially operates its own water supply grid, with most areas in Sydney Water's area of operations being able to be supplied from more than one dam. Water can be transferred from the Shoalhaven system to either the Warragamba system or the Upper Nepean system. For example, the Prospect Filtration Plant can receive water from Warragamba Dam, the Metropolitan dams or from Prospect reservoir. In order to balance and determine the best supply source the SCA has developed a

computer model that can assess and inform decision making to optimise the sources of supply and achieve maximum yield from the supply system. The model has been used extensively to test scenarios and develop the options in each of the three Metropolitan Water Plans.

For this reason, the modelling and other tools the SCA uses to determine yield and long term supply sufficiency already cater for third party sources such as the desalination plant. These supplies are treated by the model as another source of water. The model (WATHNET) was independently peer reviewed in 2010 and it was concluded that the updated WATHNET model of the Sydney water supply system provides an accurate representation of the system and provides a sound basis for estimating yield.

The SCA is uniquely placed and has the capability and resources to do long term supply and demand planning for all sources of water to meet the needs for metropolitan water planning. It is also well placed to manage dispatch. Ideally this would be underpinned by appropriate arrangements between the desalination plant, Sydney Water and the SCA.

2.2. Water supply operations

The Metropolitan Water Plan uses an adaptive process for achieving a secure water supply. The Metropolitan Water Plan includes a set of operating rules for the desalination plant. The rules see the SCA as the sole supplier of water whenever the water supply storages are above 70%. When storages fall below 70%, the desalination plant is used to 'top up' the dams by meeting some 15 per cent of Sydney's demand.

The rules have been set mindful that the desalination plant should not operate in such a way that the dams spill too frequently. The operating rules function so that the desalination plant as a non-rainfall dependent source supports the base surface water supply.

The operating rules set broad parameters for supply security and in practice there are a range of other matters at an operational level that need to be managed to allow the rules to be implemented. For example, how the plant is ramped up and shut down, how supply interruptions are managed and the opportunity to access greater volumes of water should these be needed.

There needs to be a high level of transparency in demand and supply volume arrangements to enable the efficient operation of the supply system and allow for appropriate long and short term planning. This will ensure the community's investment in costly water supply assets is efficient and the assets are appropriately utilised (no stranding of assets).

2.3. Institutional arrangements

Water supply planning in the past has largely been centralised, with the introduction of the Metropolitan Water Plan. The commencement of the *Water Industry Competition Act 2006* (WIC Act) triggered opportunities for greater decentralisation, small scale supply opportunities and non-traditional schemes to be introduced. This wider range of options increases the complexity of decision making and there will be challenges to ensuring an inclusive, robust planning framework. Any future arrangements must still deliver public health (water quality) and continuity of supply (security and reliability)

outcomes at least cost to the consumer and make best use of existing assets and systems.

It is important that the evolving institutional arrangements ensure:

- Sound governance – policy, regulatory and operational roles clearly delineated
- Transparency and accountability – clear and transparent decision making and ownership
- Competition – efficient resource allocation with least cost to consumers
- Customer considerations – price, quality, volume and continuity of supply

Currently the desalination plant has a direct commercial relationship with Sydney Water and no link to the SCA. The dispatch of water is broadly established by the Sydney Desalination Plant operating rules in the Metropolitan Water Plan. There are provisions for Sydney Water to underwrite supply to customers in the event that the desalination plant cannot meet agreed supply. For Sydney Water to provide a guarantee of supply it must source the water from the SCA as the only other current supplier in the market. It is implicit that the SCA will make water available for any shortfall from the desalination plant.

There are no current contractual or regulatory arrangements in place to ensure that the SCA is keeping adequate supplies available for this purpose, or arrangements to alert the SCA when the call on this water may occur. Given under the WIC Act there is further opportunity for licensed operators it is vital that the SCA understands what other calls on its supplies Sydney Water or others might make to meet commercial obligations.

Another change in 2011, was the commencement of the Greater Metropolitan Water Sharing Plan. The plan sets out the amount of water the SCA can take for drinking water supplies. From the waters stored for drinking the SCA is also required to release water for riparian and river health purposes. Releases for river health are generally a proportion of the inflows to a dam that are required to be released downstream to mimic the flow upstream.

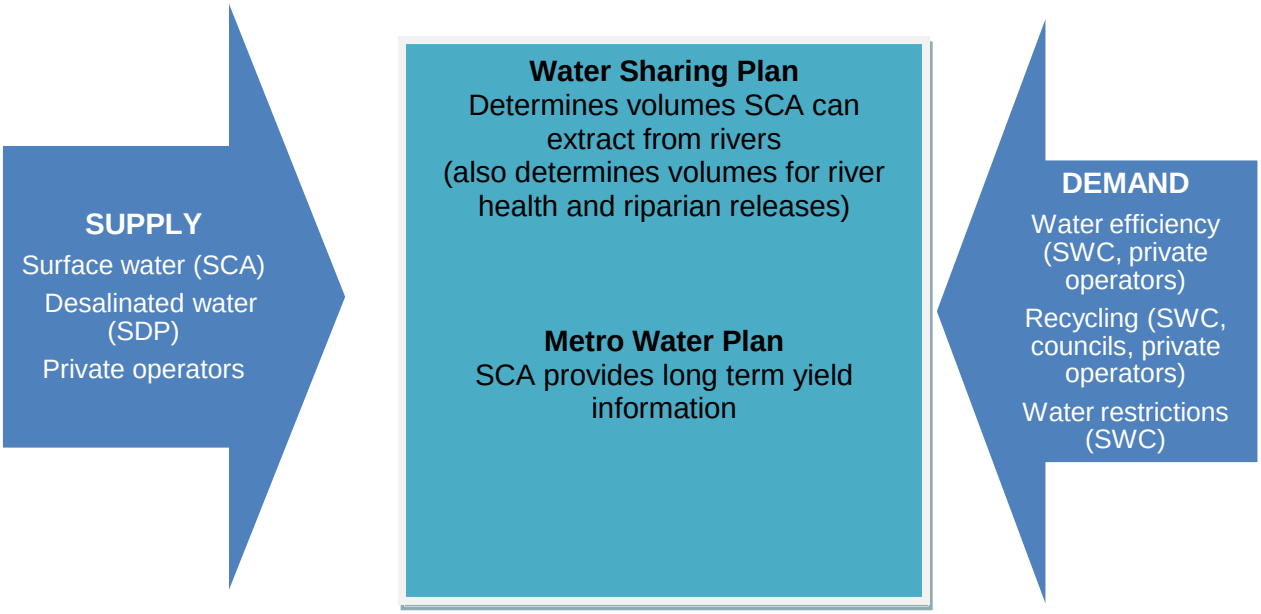
Environmental flows have been determined for all the SCA's major dams with the exception of Warragamba Dam. Environmental flows can represent a substantial volume of water that is no longer available for drinking. The loss of this water from available supply brings forward the timing for the next tranche of water required to supplement the drinking water supply. For example, the SCA is currently required to release from the Upper Nepean dams on average, the same volume of water that the desalination plant is currently producing annually. Environmental flows can have a significant impact on the SCA's available drinking water supply. There is a fine balance between water available for drinking and water available for river health and other uses.

The question is whether the current settings provide appropriate governance to allow the competition the WIC Act envisages to emerge and to deliver a cost effective and sustainable supply and demand balance. The institutional arrangements see a close nexus between water sharing arrangements and metropolitan water planning (see diagram below) as the water sharing plans determine how much surface water is available for supply for drinking. The uptake of WIC licences (private operators) will see changes in both supply and demand for water that have not previously had to be accommodated.

Other jurisdictions have adopted a range of strategies to ensure supply security. In Queensland a water grid manager has been introduced to improve efficiency of the urban water sector by optimising the operation of the water grid. In Melbourne retail and distribution has been separated with a number of retail utilities. This arrangement also has some characteristics of a grid manager. By separating dispatch of water from the retail/distribution of the water, there is potential to provide both benchmark competition (Melbourne, where retailers compete in offering standards of service), and sourcing competition – retailers buy water through the dispatch controller from a mixture of sources to their own specifications (eg desalination, recycling, dam water)[2].

The current settings for urban water in relation to planning would benefit from a clear process that supports the high level objectives of the Metropolitan Water Plan but that deliver on medium to long term planning, operation and co-ordination of water supply (identifying supply requirements and opportunities). This would translate broad policy objectives into on ground plans and processes for delivery of supply. The creation of a single point of dispatch would ensure supply availability, co-ordination and long term planning for the wholesale water supply for Greater Sydney.

There is a case to be made that dispatch and long term supply and demand planning take on a new dimension with the advent of alternate owners of supply sources. The SCA is uniquely placed and has the capability and resources to undertake the role for all sources of water to meet the needs for metropolitan water planning. This could be achieved through regulatory and commercial arrangements without significant change to the current statutory arrangements.



[2] Productivity Commission, Draft Report on Urban Water, April, 2011, Pg. 354

Part 2
Operating Licence Review

3. Form of the Licence

The SWCM Act outlines the terms and conditions for the Operating Licence. The SCA has been able to demonstrate high levels of compliance in the annual Operating Licence audits.

3.1. Principles for better practice regulation

The SCA supports the principles for better practice regulation that IPART has outlined in its discussion paper and detailed below:

- The need for action should be established
- The objectives of the licence should be clear
- The impact of the licence should be properly understood by considering the costs and benefits of a range of options, including non-regulatory options
- The licence should be effective and proportional
- Consultation with the regulated entity and the community should inform the licence review
- Simplification, minimisation or regulatory overlap and avoidance of regulatory inconsistency should be considered
- The licence should be enforceable, and reviewed periodically to ensure continued efficiency and effectiveness.

There is scope in the review to apply these principles to determine whether there are opportunities to deliver improvements to the licence. For example, IPART has proposed that the SCA adopt systems and standards in its management of assets and its environmental obligations. The use of standards should be based on clear objectives to improve organisational, environmental and asset outcomes. It may not be necessary to implement various standards to a level requiring third party certification; it may be more efficient to implement standards and systems to internal compliance that are reported to IPART as part of a licence requirement. This may be more effective and proportional in terms of regulation.

3.2. Costs and benefits

The SCA supports many of the proposed amendments outlined by IPART in the discussion paper as these should result in a more streamlined licence that is clearer and more outcomes oriented. While many of the changes do not lead to substantial cost savings, they will make the licence more accessible and flexible for people seeking to deliver its outcomes. In responding to the IPART discussion paper on potential changes to the licence, where the SCA has been able to make a reasonable estimate of cost implications, it has done so.

3.2.1. System standards

The SCA supports simple unambiguous compliance requirements. The SCA favours outcomes based conditions over prescriptive standards as they are more adaptable over the licence term should the operating environment change. For example, the specific requirement that the water quality framework can only be amended following community consultation has meant that the agency has been reluctant to make

changes that may have kept the framework contemporary but would have triggered a costly full exhibition process to do so.

The SCA's preference would be for an adaptive approach that requires consultation to formulate frameworks or plans but following this that the SCA liaise with IPART to consider whether proposed changes over the term of the licence required further public consultation.

3.2.2. Water quality

The SCA supports the removal of provisions in the licence relating to water quality standards, monitoring and reporting that are duplicative. The SCA has outlined in appendix 3 how the licence could be modified to simplify compliance with the licence.

The licence requirement for a water quality management framework and for the SCA to comply with the Australian Drinking Water Guidelines is an example of overlapping conditions in the licence. Whilst the SCA supports using the Guidelines it would point out that it provides raw water suitable for treatment - not drinking water.

Provisions in the operating licence relating to water supplied for water treatment require the SCA to comply with the concentration or level of health related water quality characteristics which must not exceed the Australian Drinking Water Guidelines 2004. Whilst it is important for there to be alert triggers for water quality that might be based on these or some other guidelines it is important to note that it is not practical for the SCA to have to comply with the concentration levels included in the guidelines in the supply of raw water.

3.2.3. Catchment management

The SCA agrees with IPART's approach to maintain a goal setting standard, and for provisions in relation to catchment management to be closely linked to other water quality objectives by assessing performance in terms of the Australian Drinking Water Guidelines which consider water quality management from the catchment to the tap. However, in considering river health it may not be appropriate to use ANZECC guideline levels as triggers for action as barriers such as the dams may provide effective attenuation of water quality for some analytes. There needs to be flexibility to determine where in the water supply system a water risk is most cost effectively managed.

The SCA and Sydney Water work closely on reviewing risks to water quality as part of the catchment tap risk review undertaken every five years. This review underpins the approaches both agencies take to managing water quality and ensures that there is a high level of understanding of how and where risks are managed.

Seamless integration of the opportunities to optimise raw water quality and associated treatment costs and savings is essential to understanding how to efficiently manage these risks.

3.2.4. Environmental management

The SCA requested, in the last licence review, that environmental management requirements be less prescriptive, as the arrangements in the previous licence for an environment plan constrained how the SCA might wish to implement sustainability strategies. The SCA's Corporate Sustainability Strategy forms the basis of its business plan, and a requirement for a separate environment plan in the previous licence hindered integration of environmental management outcomes being considered as part

of 'how we do business around here' by placing environmental considerations into a discrete plan.

IPART consequently included a broader provision in the current licence but has asked that the SCA explore opportunities to move to a standards based approach. The SCA's dam safety consulting services are certified for environmental management to AS/NZ ISO 14001:2004 and for quality management systems to AS/NZ 9001:2008. There are significant costs in securing and maintaining certification and the SCA, whilst it can see some benefits to a standards approach in terms of business consistency, recognises that this will involve significant up-front costs to the business.

An analysis of the SCA's costs in meeting the requirement of a quality and environmental management system has identified the cost to certify its activities would be $500,000 inclusive of internal staff costs as part of the SCA's commitment to business improvement. Once established there would be a cost in the order of $278,000 per annum for maintenance cost of certification. Currently, servicing the IPART audit approach costs around $280,000 per annum.

The SCA acknowledges that management systems can assist integration across all components of an organisation. The question is whether certification of a management system is necessary and whether it may be more cost effective for the SCA to implement management systems that reflect the standard or are equivalent to the standard without pursuing certification.

3.2.5. Asset management

The SCA intends aligning its asset management processes to the International Standard (ISO 55001) that is being developed from the British standard BSI PAS55:2008. It is in the process of modifying its systems to reflect the PAS55 requirements as these will most likely reflect the international standard which is due in 2013. It has not decided whether it will proceed to certification and this will be subject to appropriate cost benefit analysis.

The SCA used the Water Services Association of Australia benchmarking tool Aquamark in 2004 and again in 2008 when it participated in an international benchmarking process conducted by Water Services Association of Australia in conjunction with the International Water Association. A total of 42 utilities participated across seven countries. The focus was on benchmarking management of assets directly related to water supply functions. The SCA was assessed as having an advanced phase of asset management development and had improved across all asset management functions from 2004. The SCA intends to continue to benchmark its asset management performance using the Aquamark tool, the next being in 2012.

3.3. IPART's proposed amendments regarding standards

The SCA's position in relation to the introduction and certification within a specified timeframe for environmental management and quality assurance, is that the SCA be required to adopt systems that are consistent with particular standards rather than require certification to the standard.

The SCA supports managing raw water quality in accordance with the Australian Drinking Water Guidelines principles of water quality management from source to the consumer. Any operating licence condition should clearly describe what is under the SCA's care and control, and place no obligation upon the SCA to regulate a third party. The SCA should take into account planning and risk management across the water

supply system from catchment to tap. The SCA already manages risks to water quality mindful of the whole of system impacts and supports the adoption of a catchment to tap approach.

The SCA supports the proposed amendment to the licence for alignment of the SCA asset management framework to recognised industry practice such as PAS55 or its equivalent.

3.4. Reporting

IPART has proposed introducing a reporting manual similar to that required by Sydney Water under its operating licence. This is also consistent with requirements on licences under the WIC Act. The SCA supports the adoption of a reporting manual as it will streamline the licence particularly as reporting requirements are not found within one section of the current licence. As IPART notes, this will be particularly useful in streamlining reporting obligations in relation to water quality monitoring which currently are included in three sections in the licence: in requirements to meet the drinking water guidelines, as part of the water quality management framework and as part of the water monitoring program and the indicator reporting.

The SCA supports the reporting manual being a publicly available document on IPART and the SCA's web site.

The licence contains reporting obligations in relation to the regional plan. This requires the SCA to provide information to IPART on SCA's compliance with the regional plan. As a regulator, the SCA should not be required to report its regulatory performance to another regulator. In the same way, the licence should not contain requirements to report to IPART on functions the SCA performs that are regulated by another regulator. The SCA agrees that the licence should be amended so that it complements and is consistent with the SCA's regulatory framework and the regulatory requirements imposed upon the SCA so that the licence does not duplicate or place additional regulatory burden.

3.5. IPART's proposed amendments

The SCA supports IPART's proposed amendments including adopting the reporting manual, removing the references to legislation and streamlining regulatory reporting so that it is efficient.

3.6. Performance indicators

The SCA's environmental indicators are currently being reviewed by IPART. They comprise a set of indicators that relate to catchment health that have been superseded by the gazetted catchment health indicators for use in the catchment audit. There are also indicators that relate to environmental management by the SCA. These indicators are largely common to the indicators the SCA is required to report to the National Water Commission. Others are required under state Government policy to be reported in the SCA's annual report.

The SCA agrees with IPART's proposal to retain water quality indicators to be reported in the SCA annual water quality monitoring report. In terms of regulatory best practice and avoiding duplication, the other indicators no longer need to be included in the

operating licence as they are requirements under the SWCM Act for the catchment audit or are already required for annual reporting either to the National Water Commission, or form part of the Government's annual reporting requirements.

4. Specific Licence Issues

4.1. Water supply management

The SCA has a requirement in the SWCM Act which is mirrored in the operating licence to provide co-ordinated, viable systems and services for supplying raw water. Whilst the SCA is now no longer the sole supplier of water to the network it still calculates the availability of water over the longer term (yield) for all sources of water. It is the SCA's view that it remains a legislative requirement for it to do so.

Water supply systems planning around the world is based on an assessment of how much water can be extracted annually given the amount of water available in the system over the longer term and the demands for water being placed on the system (these may be for consumption, releases to rivers for environmental benefits or for irrigation).

Yield is different to volume. Yield is an average over the longer term not an absolute figure because it is about making sure there will always be sufficient supplies and that the water supply system will never run out of water. Yield takes into account how much water is flowing into the system and how water is transported around the system to various supply points.

The calculation of the water supply system yield is undertaken by the SCA through the use of a computer model called WATHNET. Both the calculation and the model are required under the operating licence to be independently reviewed during the life of the licence. The most recent review was completed in 2010-11 and found that the updated WATHNET model of the Sydney water supply system provides an accurate representation of the system and provides a sound basis for estimating yield.

The report noted WATHNET is a state of the art water resource planning model that has been developed in Australia specifically for complex urban water supply systems with multiple storages and supply paths. Whilst there are a number of alternative water resource planning models on the market, it was concluded by the Yield Assessment Expert Panel that WATHNET provides the required functionality for modelling the Sydney water supply system and there are no models currently on the market that offer any significant advantages over WATHNET.

The WATHNET model is used extensively for metropolitan water planning in other jurisdictions as well as for Sydney. Its calculations underpin the estimates of available water in the longer term for Sydney, including the desalination plant operations. It can calculate spill volumes from dams, environmental flow releases and the impacts on yield of these and any groundwater contributions to supply. It can also simulate the behaviour of storages, calculate transfers between storages and be used to optimise the performance and management of the water supply system. In doing so, it can take demand (including water restrictions and climate change) and local demographics into account.

The challenge with a growing and more diversified market is ensuring access to data to be able to continue to estimate the yield from the system. For these reasons the SCA has raised through various submissions how critical it is to have sound regulatory and institutional arrangements. These need to allow for access to information relating to overall supply, any changes to supply and system demand. There must be measures in place to oversee overall long term supply availability, reliability and security and

dispatch of low cost water to the community, and to have a high level of assurance that the systems and processes used to assess availability, reliability and security of supply are sound.

4.2. Review of the monitoring program

The SCA's water monitoring program is a mix of routine monitoring to understand water quality at various points in the supply system, and event and investigative monitoring that is focussed on rainfall and water quality incidents and science and research activities to better understand catchment and reservoir dynamics.

Cryptosporidium and *Giardia* monitoring undertaken by the SCA and Sydney Water was reviewed by Sydney Water, NSW Health and the SCA in 2010 to explore opportunities to reduce the frequency of routine monitoring based on risk. The review identified opportunities for the SCA to change the balance of investigative (or event based) and routine monitoring for the raw water supply.

The SCA reviewed the entire monitoring program during 2010-11 taking into consideration the location of monitoring sites, frequency of monitoring and analytes. These were assessed based on risk to water supplied for treatment by each water supply system. The review included the outcomes of the 2010 catchment to tap risk assessment undertaken with Sydney Water and NSW Health and outputs of the SCA's Catchment Decision Support System. Additional catchment monitoring, closer to identified contaminant sources, has been proposed to better assess the extent of water quality from inflows from those at risk drainage units. Other changes include documenting monitoring relating to large inflows, lake turnover and algal blooms.

A recent 2011 review of catchment monitoring data has found that the levels used to report compliance for water quality in catchment streams may not be the most useful representation of water supplied for treatment as they are typically based on local ecological or recreational requirements, and are confounded by infrequent large rainfall events. A preferred approach would be to develop concentration thresholds for selected pollutants in waterways which better reflect their potential to impact on water supplied for treatment. These values would recognise the buffering capacity of the water supply storages based on their size and residence times, and therefore each water supply dam would be considered separately in terms of water quality risk.

Review of the monitoring program requires consultation with NSW Health, Office of Environment and Heritage and Sydney Water along with a broader public consultation process if significant change is likely. The SCA has just completed a review of the monitoring program which was approved by NSW Health, Office of Environment and Heritage and Sydney Water and is now being implemented.

There would need to be a clear basis for any further review and IPART should seek the views of the community before including the requirement for the review in the operating licence.

4.3. Customer service

4.3.1. Complaints

The SCA welcomes the opportunity to review the provisions in the licence relating to customer service. This is consistent with the SCA's sustainability strategy in that it recognises that the SCA stakeholders extend beyond its water supply customers. The

SCA supplies 99% of its water to Sydney Water which is by far its largest customer. It supplies two councils and around 60 other customers who draw raw water from the SCA's works. The SCA has formal arrangements with various agencies and landholders in the catchment. In this context it is necessary that a complaints register is maintained.

The licence requirement to have arrangements in place with all customers is appropriate and the SCA has these in place. Requirements to report the number and type of complaints, how they were resolved or not resolved, and how effectively they were resolved are more onerous given the small number of complaints received each year.

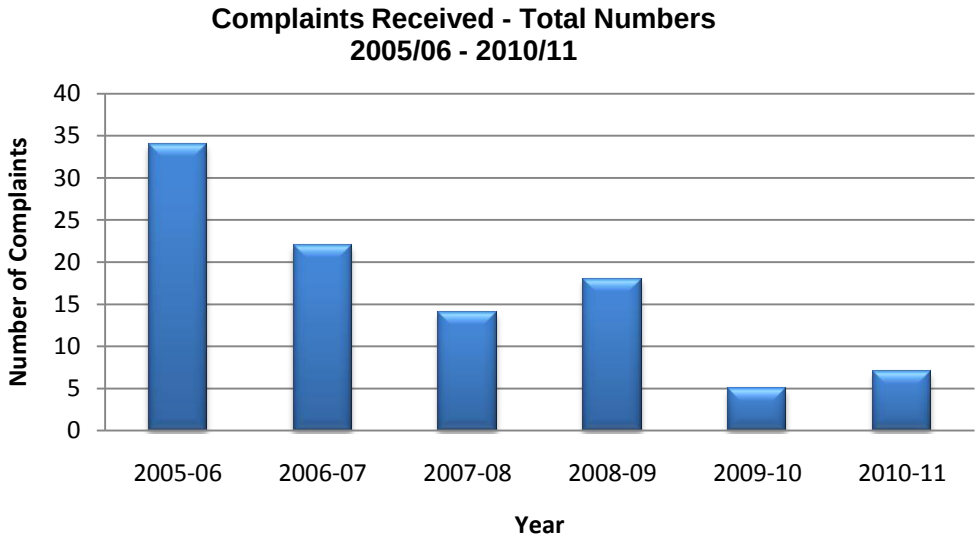


Figure 4-1 Total complaints received 2005/06 - 2010/11

It is the SCA's view that where there should be provisions for a complaints system with reporting, there are significant numbers of complaints about any one matter. The SCA reports monthly to its Board on all complaints. To meet better practice regulation principles the regulatory requirement should be in proportion to the function being regulated.

The SCA recognises the importance of maintaining its customer complaints handling processes and systems. However, given the small customer base and limited number of complaints would recommend removing the requirement for formal annual reporting to IPART on the nature of complaints, how they were resolved, and how effectively they were resolved.

4.3.2. Consultation

Consultation obligations are duplicated in the licence. There are provisions with general reporting as part of the SCA's operational functions and a specific set of requirements under clause 8.4. The SCA's view is that consultation requirements are generally detailed in the operational parts of the licence and the SCA should be required to demonstrate compliance with these conditions without an additional discrete reporting requirement.

4.4. Water conservation

4.4.1. Leakage and loss

As IPART details in the discussion paper, the SCA does not have extensive underground pipe network. It has the dual pipeline from Warragamba Dam to Prospect Reservoir and the Upper Canal which are visible and accessible and any leaks from these pipelines are easily detected and remedied.

The SCA has completed all actions from the previous licence in relation to leakage and loss and there is very little opportunity to reduce this further. Below is a graph showing the SCA's level of leakage, that includes evaporation and groundwater losses which are unavoidable. The SCA's losses are much lower than businesses with extensive underground pipe networks even where these businesses are at best practice.

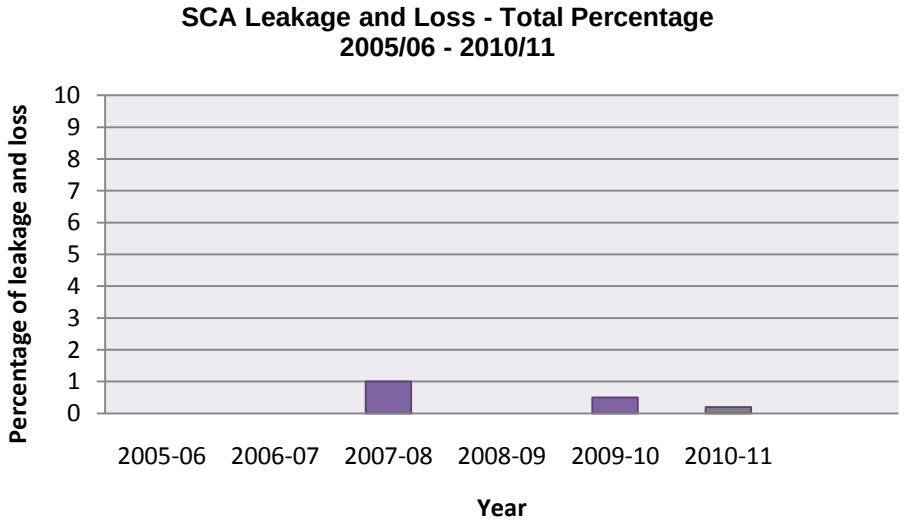


Figure 4-2 SCA leakage and loss percentage 2005/06 – 2010/11

4.4.2. Water balance

The SCA's Operating Licence (clause 6.4.2(b)) requires the SCA to provide an annual water balance as per the methodology set out in the report by Sinclair Knight Merz (October 2005) for the catchment infrastructure works and for each water supply system. The methodology aims to represent movements of water into and out of each water supply system, in a similar format to a statement of financial accounts. The purpose of providing the water balance is to ensure transparency in the availability and distribution of water resources across the SCA's various catchments, consistent with reforms under the Council of Australian Governments' National Water Initiative.

To give effect to the National Water Initiative, the *Water Act 2007* (Cwlth) tasked the Bureau of Meteorology (BoM) with collecting, holding and analysing Australia's water information and preparing standardised National Water Accounts (NWA). All agencies are required to provide all relevant water information to BoM. The first NWA, published in 2011 for the 2009-10 year, includes the water balance information provided by the SCA, but presented in a different format, based on different accounting principles to standardise reporting across all water sources within Australia.

Due to the different assumptions used (such as the inclusion of deep storage, and accounting for the water source entitlements under Water Sharing Plans), there are

apparent inconsistencies between the figures published in the NWA and SCA's water balance required by the Operating Licence. For consistency, and to eliminate duplication of effort, it would be preferable to remove the licence requirement for the SCA to prepare a separate annual water balance, noting that the SCA is already required to provide the information to BoM for publication through the NWA.

4.5. Catchment health

As IPART noted in the discussion paper, regulatory objectives should be clear and measurable. It is important when determining licence provisions for the SCA in relation to catchment management that the regulation can be effectively implemented and that the obligations it creates are within the SCA's care and control.

For example, the SCA monitors catchment condition in order to be able to meet its statutory function of protecting the quality and quantity of water in the catchment area. There are many other organisations with roles and responsibilities in relation to managing catchment health such as the Department of Planning and Infrastructure and local government in relation to urban development; the Office of Environment and Heritage, and the NSW Office of Water in relation to water quality and river health.

The SCA should only be held accountable for its activities and the effectiveness and efficiency of those activities in delivering catchment outcomes. Quite rightly, the catchment audit (which is independent of the SCA and undertaken by a person appointed by the Minister) explores more broadly the state of the health of the catchment as does the Office of Environment and Heritage and local government through their state of environment reporting.

The SCA should not be required to report on the activities of third parties if the SCA has no powers to regulate those activities. It is the SCA's view that any obligation must be enforceable. For these reasons the current requirements for the catchment audit and SCA's annual reporting of its performance in relation to its catchment activities are considered adequate.

Part 3
Price Review

SYDNEY CATCHMENT AUTHORITY

5. Review of Current Price Path

The current price determination period commenced in July 2009 and is the fourth pricing determination since the SCA's inception in 1999 (2001, 2003 mid term, 2005, 2009). SCA implemented this determination as it was set down, and did not charge any prices below of the prescribed maxima. During this determination period, favourable weather conditions meant that dam storage levels recovered. However, as outlined in Section 1, the SCA faced significant new challenges with the changing operating environment. This chapter provides a discussion of SCA's achievements and performance against output measures during the current price determination period. It will also discuss the SCA's revenue and expenditure compared to the IPART allowance.

5.1. Organisational Achievements

As part of preparing for the changed operating environment, in its 2008 submission to IPART, the SCA undertook to reduce its operating expenses from $86 million to $80 million per year and maintain this expenditure in real terms throughout the determination period. This strategy provided the SCA with the ability to manage within the reduced sales environment with Sydney Desalination Plant's entry into the bulk water supply market. The SCA has achieved this by optimising cost through outsourcing where appropriate, benchmarking with similar organisations, applying best practice procurement procedures, reviewing all business systems whilst still meeting its service delivery requirements.

These approaches have delivered real cost reductions and allowed the SCA to manage within its IPART expenditure targets and maintain dividends to the NSW Government despite reduced water sales compared to those forecast for the price path. These efficiencies have been delivered whilst reliably delivering high quality water and meeting all statutory responsibilities. Key strategies and achievements over the current price path that have contributed to these outcomes are detailed below.

5.1.1. Organisational Review

The SCA commenced a comprehensive organisational review of its functions, structures, systems and strategic directions in late 2008. This review focussed on the SCA's core business responsibilities and how these could best be delivered. This review culminated in a new Corporate Sustainability Strategy 2010-2015 with six Key Focus Areas - engaged people, stakeholder relationships, business viability, industry excellence, reliable water and resource optimisation. The strategy sets the directions for the SCA over the next five years and in conjunction with the SCA's Enterprise Risk Management Framework drives the business planning and budget processes. Section 6.3.1 provides more detail on the Strategy.

5.1.2. People

In determining how best to achieve the efficiency outcomes in the current price path the SCA examined how changed systems and processes would lead to a more streamlined organisation. This resulted in the SCA achieving an 11% reduction in employee related cost from 2009 to 2010 financial years. This has been achieved against employee award salary increases of 4% per annum over the past three years compared to average CPI over the same time of 2.8%.

Concurrently, the SCA developed a new workforce strategy *Capturing Knowledge, Growing our Future* to address the issues of an ageing workforce and to ensure staff

skills match the future needs of the organisation. Twenty-five new staff or about 10% of the staff have been recruited in the last twelve months to meet this need.

A particular focus over the past three years has been on improving the organisation's safety performance. The organisation has been successful in reducing the number of Lost Time Injuries from 9 in 2007-08 to 2 in 2010-11.

5.1.3. Reliable Water

The SCA has delivered on its core responsibilities of delivering quality water suitable for treatment. Over the past three years the SCA has provided an uninterrupted supply of water to its customers. Over the same period, it has met health related compliance with the Australian Drinking Water Guidelines despite supplying raw rather than drinking water. The SCA has sought to meet all NSW Dams Safety Committee requirements and the Australian National Committee on Large Dams guidelines.

The SCA has undertaken a comprehensive review of its water monitoring program that considers the SCA/Sydney Water/NSW Health catchment to tap risk assessment, the Catchment Decision Support System (CDSS), and results from long term analysis. The review has identified a number of sites that can be removed from the program and additional sites that will better inform the SCA in relation to catchment water quality.

A significant outcome was the development and implementation of the first Healthy Catchments Strategy (HCS). This approach integrated the SCA's regulatory approach and actions in the catchment into the one strategy. The catchment actions in the HCS were developed from the CDSS which integrates the latest science around catchment risks to identify priority locations and work to be undertaken.

The SCA has developed a new Science Strategic Plan which is focused on meeting business needs with a particular emphasis on evaluating catchment actions and reservoir dynamics.

5.1.4. Business systems

A range of business systems, processes and tools have been reviewed and updated to ensure they support management, monitoring and reporting throughout the organisation. SCA staff were engaged to define the business improvement opportunities and then involved in re-engineering the systems and processes.

The finance and business systems review has resulted in new budgeting and monitoring systems, the introduction of a time recording system to accurately allocate staff costs to projects and activities, and new procedures to improve business efficiency.

Underpinning these improvements was a need to assess and ensure sound governance, business and budget planning, financial delegations, and systems that support peer and Board review with transparent reporting formats. A range of tools, systems and process were evaluated and updated to ensure they met the SCA's needs.

For example, a new Capital Expenditure Program Manual was developed to provide guidance on the process, roles, responsibilities, and delegations in preparation to the development of the SCA's capital program.

The success of the SCA's work over the past three years was recognised in a performance review conducted by NSW Treasury. In November 2010, NSW Treasury

engaged KPMG to conduct a strategic performance review of the SCA. The review found the SCA was operating efficiently with sound practices in relation to governance. It found the SCA review of its functions, structure and processes over the past three years has delivered substantial productivity outcomes, reduced costs and improved the ability to operate in the new competitive environment with the construction of the desalination plant. The review also noted that as an efficiently run organisation, the identification of further significant productivity gains and cost reductions was difficult.

The SCA is committed to continuing organisational improvement while investing in systems, assets, science, and staff to upgrade the capacity of the organisation.

5.2. Performance against output measures

In the current determination, IPART decided to continue the use of output measures to measure the SCA's performance in its capital expenditure. These output measures are based on the SCA's expenditure program as submitted during the price determination process. The table below provides a snapshot on SCA's progress on the output measures. Further details are included in the sections below.

Output measures	Status
Deliver a strategy for the future of the Upper Canal by June 2013	On Track
Complete the Prospect Reservoir upstream embankment stabilisation upgrade by 2013	Delayed
Complete the Warragamba Dam crest gates construction project by June 2011	To be completed
Complete the Wingecarribee Dam safety upgrade project by June 2013	On Track
Complete the Upper Nepean environmental flows works by April 2010	Completed
Complete the Metropolitan Dams electrical systems upgrade project by April 2013	Rescheduled

5.2.1. Upper Canal strategy

The Upper Canal (Upper Nepean transfer scheme) is a series of tunnels, open canals and aqueducts built over 120 years ago. It currently transfers approximately 20 percent of Sydney's water from the Upper Nepean dams. The canal's design and age introduces risks to water quality, limits the volume of water that can be transferred and poses safety risks to the public and operators of the canal. These risks are currently satisfactorily managed by the SCA. However, in the medium to long term, a strategy needs to be implemented to ensure the Upper Nepean transfer scheme provides continual reliable service.

The SCA has completed initial feasibility options studies. A range of refurbishment works have been scoped and provisions have been made for expenditure to ensure the integrity of the canal is maintained. A large component of the replacement works on the canal has been deferred in order to allow further investigation to occur. This approach will also enable the NSW Government to consider the replacement of the Upper Canal as part of its broader infrastructure priorities.

5.2.2. Prospect Reservoir upstream embankment stabilisation

The dam safety risks for Prospect Reservoir have been re-examined. These include the risk of piping failure and upstream embankment stabilisation in the event of a drawdown.

Additional detailed investigative work has been undertaken following the various internal and external technical panel reviews. The enhanced stability analysis and stabilisation options for the upstream embankment are to be presented for internal and external technical review in late 2011. It is anticipated that the preferred option for improvement works on Prospect Dam will be approved-in-principle by the SCA Board by the end of 2011, with the NSW Treasury Gateway Review process, the NSW Dams Safety Committee (DSC) endorsement and SCA Implementation business case finalised by March 2012.

5.2.3. Warragamba Dam crest gate construction

The Warragamba crest gate construction project improves the safety and reliability of Warragamba Dam under all conditions, and especially during a probable maximum flood event. The project includes the upgrade of the drum and radial gates as well as upgrade to gate controls and associated electrical works.

All construction works have been completed and the project is now in its defects liability period, which will conclude in June 2012.

5.2.4. Wingecarribee Dam safety upgrade

The Wingecarribee Dam safety upgrade addresses two dam safety risks: the potential of erosion of dam material during flood events and overtopping of the dam crest which could occur due to blockage of the spillway and radial gate by floating peat. The completed works will ensure the Wingecarribee Dam meets NSW Dam Safety Regulations.

The DSC has endorsed SCA's dam safety risk assessment and proposed upgrade option for Wingecarribee dam. The SCA Board approved the business case in March 2011 and a contract was awarded in mid 2011 for the embankment improvement works. It is anticipated that this work will commence in October 2011 and be completed by April 2012. The detailed design, technical specifications and construction for the peat barrier works component will be finalised by December 2012.

5.2.5. Upper Nepean environmental flows

The environmental flows requirement for the dams in the Upper Nepean was contained in the 2004 Metropolitan Water Plan and in the 2006 Metropolitan Water Plan. These works are now complete with environmental releases commenced from Avon Dam in March 2008 and from the remaining Upper Nepean dams in June 2011.

5.2.6. Metropolitan dams electrical systems upgrade

The majority of the metropolitan dams electrical systems were installed when the dams were constructed and are now in need of upgrade to meet current Australian Standards. The upgrade of the dam's electrical systems will provide improved communications infrastructure, allow more efficient security monitoring, and improve service reliability.

Commencement of the project was deferred to ensure the electrical systems upgrade can be integrated with the SCADA upgrade project (due for completion in June 2013).

A business case is currently under development and it is due to be completed by November 2011. Works on the upgrade are therefore not expected to commence until 2012. The project is expected to finish in June 2013.

5.2.7. Other significant projects

Financial and business systems consolidation and upgrade

At the beginning of the current price path, the SCA was operating a number of business and financial systems that were not integrated and resulted in a complex array of processes and data flows. There were also overlaps in system functionality and a significant amount of manual work and duplication. In late 2009 the SCA conducted a review into its business with a view to streamlining its business processes. The outcome of the review was a consolidation of the SCA's business systems into four core products:

- **SUN** - accounting, budgeting and forecasting
- **MAXIMO** - asset, contracts and resource management
- **eTRIM** - records management
- **CHRIS** - human resources and performance management, including the development of a time recording system.

Some of the key achievements of this project are:

- **Reduction of software licence cost -** The consolidation of the business systems provide single points of entry for each of the core business areas and allow the SCA to significantly reduce software licence costs
- **Introduction of electronic time recording system -** The introduction of an electronic time management systems allow the SCA to capture staff costs by activity. This system replaced the previously manual entry system and significantly streamlines and improves the SCA's reporting processes
- **Introduction of electronic document management -** The implementation of the eTRIM system significantly improved business efficiencies and information sharing across the organisation.

SCA's Program and Project Management Framework

A robust Program and Project Management Framework has been developed and implemented to ensure all capital and operating projects and programs in the SCA are delivered effectively, provide value for money, and meet the strategic objectives of the organisation's Corporate Sustainability Strategy.

5.3. Service standards

The SCA Operating Licence sets out requirements to be met in relation to quality standards for raw water, catchment management and water supply. To date, the SCA has been able to demonstrate high levels of compliance in the annual Operating Licence audit.

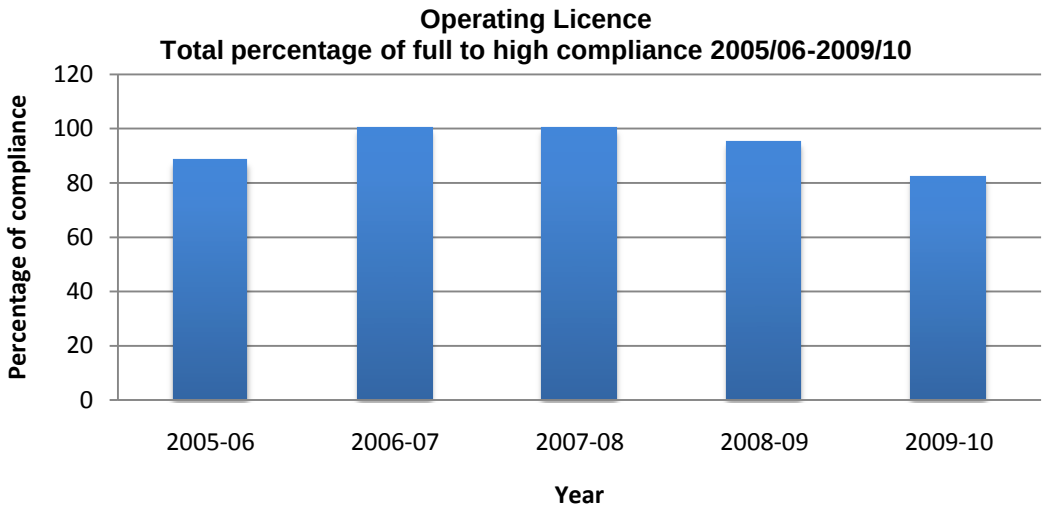


Figure 5-1 SCA Operating Licence compliance

Apart from meeting Operating Licence conditions, the SCA has achieved the following:

- A consistently high level of conformance, with water quality standards.
- Provision of reliable supply of raw water and meeting 100% of quantity requirements without interruption during the previous licence period.
- Compliance with NSW Dams Safety Committee requirements so that the community has a high level of assurance in the safety of the major critical water supply infrastructure servicing the region.
- Development of leading edge tools such as SCARMs to monitor and predict reservoir behaviour in response to inflows. The SCA has successfully completed a range of projects, to meet the Metropolitan Water Plan objectives to manage water supplies during drought, and has implemented major capital works on its dams to improve downstream river health in time to meet the Plan's objectives.

The SCA has also sought to protect water at the source by implementing the Regional Plan and more recently the SEPP. This requires all new development to have a neutral or beneficial effect on water quality thereby preventing pollution. It has also, through its Healthy Catchment Strategy developed tools to identify pollutant sources and key pollutants and map their occurrence and impact in the 16,000km^2 catchment so that it can target the highest source pollutants for remediation. It has invested some $20 million annually to protect and manage the catchments, often through partnering arrangements with others in the catchments.

Longer term water quantity reliability standards are determined by the Metropolitan Water Plan, using a portfolio investment approach. Standards of supply reliability have been significantly raised in the 2010 plan, through co-ordinating the investment in the Sydney Desalination Plant and recycling initiatives under the *Water Industry Competition Action 2006* (WIC Act).

SCA also provides a small number of services financed by unregulated revenue, largely services which are a consequence of its water activities. These include leasing of agricultural and residential properties, where SCA holds properties for future or current water services, and defrays the holding cost of these properties by leasing them at tendered rates. SCA maintains a conference centre for its own business use,

but makes this available at commercial rates when it is not being used for SCA purposes. SCA also undertakes rehabilitation and preventative works of its assets caused by mine subsidence. This work is the financial responsibility of the mining companies causing the subsidence, thus generating an unregulated income stream. Overall, unregulated revenue comprises only about 1% of total revenue.

5.4. Water sales and revenue variation

Despite the breaking of the drought, total water sales to the SCA's customers were below the forecast adopted by IPART in the 2009 determination. The shortfall in sales volume over the determination period is approximately 7%, with almost all of the shortfall due to reduction in sales to Sydney Water, although other customers showed similar sales trends. The breakdown in SCA water sales to its main customers by volume is detailed in the following table.

Customer	2009-10 (Actual ML)	2010-11 (Actual ML)	2011-12 (Forecast ML)	Total (ML)
Total Water Sales				
Sydney Water	478,222	413,192	393,443	1,288,014
Local Councils	3,739	3,548	3,980	11,267
Other Raw Water Users	27	18	30	75
Other Unfiltered Water Users	181	186	220	587
Total Water Sales	**482,169**	**416,944**	**397,673**	**1,299,943**
IPART Forecast Demand				
Sydney Water	497,700	449,000	438,000	1,384,700
Local Councils	4,180	4,222	4,757	13,159
Other Raw Water Users	20	20	20	60
Other Unfiltered Water Users	180	180	180	540
IPART's Forecast Demand	**502,080**	**453,422**	**442,957**	**1,398,459**
Difference – IPART Forecast vs Sales				
Sydney Water	-19,478	-35,808	-44,557	-99,843
Local Councils	-441	-674	-777	-1,892
Other Raw Water Users	7	-2	10	15
Other Unfiltered Water Users	1	6	40	47
Difference	**-19,911**	**-36,478**	**-45,284**	**-101,673**

The shortfall in sales extended beyond the lifting of restrictions in Sydney at the beginning of the 2009-10 financial year. The failure of demand to rebound may be related to the persistence of water management practices from the drought, combined with a price effect on demand from the increases in retail price over the past few years. Sales were forecast to fall by 10% over the price path, driven by the full time operation of the desalination plant during its two year proving period to June 2012 reduced SCA sales. In reality, demand fell by 18%, on top of the 13% fall over the previous price path.

Sydney Water provides SCA with water demand forecasts. These forecasts have been not as accurate as either SCA or SWC would prefer. It is understood Sydney Water has recently changed its forecasting methodology, and expects improvement in future

forecasts. By way of example on the difficulties in forecasting demand one relates to industrial use of water. Rapid structural change in this sector is most recently seen with the dropping by Bluescope Steel of 4GL of water demand as part of its shutdown of a blast furnace will mean that demand will continue to be difficult to forecast.

As a result of reduced sales, the shortfall in SCA's revenue is $27 million across the determination period. The breakdown of the shortfall in dollars by financial years is detailed in the following table.

	2009-10	2010-11	2011-12	NPV (7.0%)
Shortfall in sales ($million of the year)	-4.9	-9.5	-12.6	-30.4

The table above calculates the difference in the SCA's revenue against that allowed by IPART in the 2009 determination. In present value terms, the $26 million nominal shortfall is equivalent in today's dollars to $30 million or about 6% of the allowed revenue in the IPART Determination. This is proportionally slightly less than the volume shortfall, due to the influence of the 40% fixed charge. This illustrates the potential for fixed charges to mitigate revenue risk.

The implication of such a shortfall in revenue is that it puts pressure on SCA to reduce expenditure to maintain returns. Although this is a normal part of business management, sustained reductions in revenue, or highly volatile revenue may result in a reduction in service outcomes.

5.5. Operating expenditure

The table below compares the SCA's operating expenditure against that allowed by IPART in the 2009 determination.

($2008-09)	2009-10 (Actual)	2010-11 (Actual)	2011-12 (Forecast)	Total
Regulated Operating expenditure				
IPART Allowance	80	80	80	240
SCA Regulatory expenditure *	74.4	75.6	80	230
Difference	-5.6	-4.4	-	-10.0
Accelerated Sewerage Program				
IPART Allowance	17.3			17.3
SCA Expenditure	4.4	3.5	9.4	17.3
Difference	-12.9	3.5	9.4	-

As discussed in Section 5.1, the SCA undertook to reduce its operating expenses to $80 million per year (in real 2008-09 dollars) over the period of the determination. The table above presents the year by year variances in the same terms as the original determination (i.e. $ 2008-09). It separately accounts for the Accelerated Sewerage Program expenditure, which IPART was directed to include under Section 15.1 of the IPART Act, and so is not part of normal operating expenditure.

This table shows that the SCA is likely to better the $80 million ($240 million total) target by $10 million. The major driver of this achievement as noted under Section 5.1 organisational change has been reducing employee related costs. The SCA has reduced its EFT from around 290 in 2008, to 250 over the past three years. Further, salary increases of 4% per year for the first two years of the price path which are 1.2% above CPI over the same period have been absorbed.

In relation to the variance over the price path, the changes are largely as a result of progress of the Accelerated Sewerage Program. IPART allowed $17.3 million in 2009-10 for this program, but the expenditure has occurred over the three years of the price path due to the construction progress by the councils.

The table below is a similar reconciliation, but includes SCA's unregulated income from mining, leasing and other non-monopoly businesses (See Section 5.3 for details). IPART deducted approximately $0.4 million from SCA's regulatory expenditure in each year of the price path, on the expectation that this would be 50% of unregulated income. In the event, unregulated income averaged about $1.2 million higher than this. Nevertheless, because of the relatively low margin on these businesses (16%), the SCA's view is that the IPART deduction should be frozen in *nominal* terms in the next price path, if SCA is to make a reasonable return.

(M $2008-09)	2009-10 Actual	2009-10 IPART Budget	Variance	2010-11 Actual	2010-11 IPART Budget	Variance	2011-12 Actual	2011-12 IPART Budget	Variance	Total Actual/ Forecast	Total IPART Allowance	Variance
Regulated Operating Expenditure	74.4	80	-5.6	75.6	80	-4.4	80	80	0	230.0	240.0	-10.0
Unregulated Income/ Recoverable expenditure*	3.0	0.8	2.2	2.0	0.6	1.4	2.3	0.8	1.5	7.3	2.2	5.1
IPART deducted unregulated income	-0.4	-0.4		-0.3	-0.3		-0.4	-0.4		-1.1	-1.1	-
Accelerated Sewerage Program	4.4	17.3	-12.9	3.5	0	3.5	9.4	0	9.4	17.3	17.3	0.0
Total Operating Expenditure	**81.5**	**97.7**	**-16.2**	**80.7**	**80.3**	**0.4**	**91.3**	**80.4**	**10.9**	**253.5**	**258.4**	**-4.9**
Total Operating Expenditure ($million of the year)	**84.6**	**101.5**	**-16.9**	**85.5**	**85**	**0.5**	**99.6**	**87.7**	**11.9**	**269.7**	**274.2**	**-4.5**

*Excludes loss on sale of assets

$M 2008-09	2009-10 Actual	2009-10 IPART Budget	Variance	2010-11 Actual	2010-11 IPART Budget	Variance	2011-12 Forecast	2011-12 IPART Budget	Variance
OPERATING EXPENDITURE BY RESOURCE									
Employee related	29.7	31.7	(2.0)	31.3	30.7	0.6	31.4	31.4	
Administration	4.1	5.5	(1.4)	4.0	4.6	(0.6)	4.3	4.3	
Contractors	27.8	28.5	(0.8)	27.2	29.2	(2.1)	29.3	28.9	0.4
Accelerated Sewerage Program	4.4	17.3	(12.9)	3.5	0.0	3.5	9.4	0.0	9.4
Property	4.6	3.1	1.5	4.7	3.5	1.2	4.2	3.4	0.8
Materials	1.7	1.4	0.3	2.1	2.3	(0.2)	3.3	2.9	0.4
Insurance	3.6	3.8	(0.2)	2.8	3.5	(0.7)	3.0	3.0	
Energy	1.8	1.3	0.5	1.8	2.0	(0.1)	1.7	1.7	
License Fees	1.6	1.9	(0.2)	1.6	1.6		2.5	2.5	
Grants	0.4	0.5	(0.1)	0.5	0.7	(0.2)	0.5	0.5	
Other expenses	1.7	2.6	(0.9)	1.3	2.2	(0.9)	1.9	1.9	
Total Operating Expenditure	**81.5**	**97.7**	**(16.2)**	**80.7**	**80.3**	**0.5**	**91.3**	**80.4**	**10.9**

The following sections provide more detail on the drivers of operating expenditure across the price path, and the explanation of key variances.

5.5.1. Operating Expenditure Variances

This section contains explanations for the variances given in the above tables between the determined and actual operating expenditure over the price path.

The table above provides a more detailed breakdown of operating expenditure for each of the price path years, which helps to illustrate the sources of the variance. Budget consistent with the IPART Determination and Actual are compared for each of the first two years of the price path, and for the remaining year, the current forecast is compared to the original budget. The data is provided on a resource basis, for each year of the price path.

2009-10

In 2009-10 operating expenditure for the year was $81.5 million in $08-09 compared to the IPART target of $97.7 million, which is $16.2 million underspent.

Of the underspend $12.9 million was due to the Accelerated Sewerage program being phased over the 3 years due to the construction plans of Councils, $4.4 million was spent in 2009-10 compared to IPART target of $17.3 million for the first year.

Operating expenditure of $5.6 million was underspent during the year for the following reasons:

- In employee related costs the majority of the reduced expenditure is due to the SCA having longer staff vacancies as a result of the NSW State Government staff freeze requirements. Further, a reduction in Long Service Leave cost provision occurred due to changed discount rates, impact of staff redundancies and changes in SCA demographic profile.

- Within the Administration resource the reduced expenditure was due to delays or savings in a number of projects, including cyanobacteria research, Braidwood Lands, and the Metropolitan Dams Electrical Assessment project.

- Contractors were also underspent primarily in Water Quality Monitoring and Reporting as less non routine analysis, non routine sampling and hydrometric work was required over the year.

- The Warragamba 50th Anniversary project had a change in scope resulting in savings.

- Some other minor cost savings associated with modelling and Wingecarribee Swamp Remediation.

- SCA incurred additional recoverable expenditure offset by additional income of $2.2 million primarily due to mining consulting and in kind work on the Braidwood properties being brought to account as both income and expenditure.

2010-11

In 2010-11 operating expenditure for the year was $80.8 million compared to the IPART target of $80.3 million. $3.5 million was spent on the Accelerated Sewerage Program, compared to nil in the IPART estimate.

The operating expenditure underspend during the year of $4.4 million was made up of the following variances:

- For contractors and other expenses there was an underspend in Science projects during the year including Integrated surface/groundwater model, Sewerage treatment plant evaluation study, cyanobacteria research and climate change research.

- Similar to 2009-10 water monitoring expenses were under budget for the year, because the amount of testing required was less due to weather conditions experienced.

- Contract modelling was unspent with some work done internally and some delays experienced in Bathymetry works, catchment modelling and dam break studies.

- Savings were also achieved in the insurance premiums for the year.

- SCA incurred additional recoverable expenditure offset by additional income of $1.4 million primarily due to mining consulting and in kind work on the Braidwood properties being brought to account as both income and expenditure.

2011-12

SCA has forecast to spend $9.4 million to finalise the Accelerated Sewerage Program for the three years (see Section 5.5.2 for further detail).

Other income is expected to be $1.5 million higher than the IPART estimate with equal recoverable expenditure to be incurred

The remaining operating expenditure is expected to be on target ($80 million in 2008/09 dollars + CPI) with no major changes compared to IPART forecast.

5.5.2. Accelerated Sewerage Program

In the current price path the SCA was allocated $17.3 million to complete the construction or upgrade of nine sewerage schemes, Goulburn, Bowral, Taralga, Bundanoon, Kangaroo Valley, Robertson, Lithgow, Wallerawang and Braidwood. As at

7 September 2011 five projects have been completed (Goulburn, Taralga, Braidwood, Bundanoon and Bowral) and the remaining four are in construction. Lithgow is 98% complete, Wallerawang is 82% complete, Robertson reticulation system is 18% complete and Kangaroo Valley has just commenced. All projects are scheduled to achieve substantial completion of construction by the end of June 2012 although some testing and commissioning will extend beyond that date.

The key outcome of the ASP will be the annual reduction in nitrogen (33.3 tonnes) and phosphorus (14.7 tonnes) loads resulting from the upgrades. These modelled reductions will be verified by actual measurements over a two year period following the completion of construction.

5.5.3. Outcomes by Service

During the price path the SCA implemented business planning processes that identified specific activities and outcomes to be achieved. The following is an assessment of achievements against the business plan. During this period, the SCA also adopted a new Corporate Sustainability Strategy (CSS) that focuses on embedding the commitment to sustainability into the SCA's governance and structure and incorporates the principles of sustainability into the business and operation plans. With the development of a new CSS the achievements have been grouped into three areas that best align with the SCA's previous corporate Plan. Specifically Catchment Actions are included in the Reliable Water Area.

Reliable Water

During the current determination the SCA supplied raw water to its customers without interruption. Raw water supplied to bulk water customers was 100% compliant with health related Australian Drinking Water Guidelines and was 99.6 % compliant with bulk water supply agreements. The SCA also achieved 1005 compliance with the requirements of the Water Management Licence conforming with the environmental flow requirements contained in the licence.

To provide a continual supply of quality water the SCA conducted the following:

- Exhibited and finalised the Healthy Catchments Strategy 2009-2012 which uses a robust decision support system to underpin the SCA's future direction in the catchment.
- Implemented new integrated Water monitoring Program 2010-2015 approved by NSW Health and NSW Office of Water. A full review of water monitoring undertaken by the SCA was completed in December 2009.
- Commenced development of Water Supply 2100 project to examine potential water demand patterns over the next 90 years, identify the drivers for system yield, and identify emerging challenges and gaps.
- Completed rehabilitation of Oakdale and Tuglow derelict mine sites to improve water quality.
- Provided grazier education and training programs with a focus on sustainability and water quality to over 700 graziers.
- Actions to address relevant recommendations of the 2010 audit of the Sydney Drinking Water Catchment, incorporated into workplans.
- Developed of the SCA's mining and coal seam gas principles.

Stakeholder Relationships

The SCA actively engaged with its stakeholders during the current determination. Activities undertaken include:

- Finalising the water supply agreement with Wingecarribee Shire Council
- Completing the Catchment to Tap water quality risk assessment with Sydney Water and Councils.
- Working collaboratively with catchment councils to implement key elements of the 'Regional Plan for the drinking water catchments of Sydney and adjacent regional centres' and sewerage incentives.
- Partnering with the Catchment Management Authorities to deliver the Catchment Program Scheme, and grazier incentives program.
- Participating in multiagency development of 2010 Metropolitan Water Plan by providing all hydraulic and hydrological modelling.
- Launched a new exhibition centre and interpretive signage at Warragamba Dam.

The SCA supported local councils through the implementation of an updated online neutral or beneficial effect (NorBE) on water quality assessment tool, wastewater effulent model (WEM, Strategic Land and Water Capability Assessment (SLWCA) data, maps, draft guidelines and ongoing advice in the preparation of planning proposals.

Business Viability

The SCA undertook a number of initiatives to ensure its business viability. Initiatives include:

- Achieved significant insurance premium cost savings following the appointment of a new insurance broker, together with improvements in coverage and reduced levels of excess.
- Achieved on average 88% high to full compliance with operating licence conditions.
- Enhanced Project and Program Management processes, including Implementation of new corporate project management information system.
- Integrated business systems across the organisation and improve the way SCA use processes, systems and tools.
- Implemented a new consolidated organisational structure.
- Finalised a comprehensive climate change risk assessment.
- Awarded new water monitoring contracts for field services and laboratory services.
- Improved productivity and efficiency gains from the new Civil, Mechanical and Electrical contract.
- Developed the Asset Management System 2011-12 and future years.

5.6. Capital expenditure

The table below compares the SCA's capital expenditure against that allowed by IPART in the 2009 determination.

	2009-10 (Actual)	2010-11 (Actual)	2011-12 (Forecast)	Total
IPART Allowance ($million, 2008-09)	61.6	33.4	31.8	126.8
IPART Allowance ($million of the year)	64.1	35.3	34.7	134.1
SCA Expenditure ($million of the year)	51.0	26.3	18.7	96.0
Difference ($million of the year)	-13.1	-9.1	-16	-38.1

The above table shows that the SCA is likely to underspend its capital allowance by $38.1 million. The main reasons for the underspending of capital are:

- A large component of the underspend has been due to the deferral of replacement works on the Upper Canal ($30m) as this will be subject to further investigation to fit within the government's broader infrastructure priorities. The other large project that has not progressed as planned is the upgrade works for the Bendeela Campground ($2.9 million).
- With the delay in the progress of the SCADA project, the projects for electrical upgrades on the Warragamba pipelines and at the Metropolitan dams have been moved outside the current price path ($12 million). Similarly the delay in completion of the Sydney Water hydro plant on the Warragamba pipelines delayed the Warragamba Pipelines Valves and Controls Upgrade ($4.8 million).
- Offsetting some of this underspend are projects that have carried forward from the previous price path, and over expenditure (against IPART estimate) in some projects such as the Upper Nepean weirs.

5.6.1. Capital Expenditure by Service

The following outlines the key outcomes by service for capital expenditure.

Reliable Water

Capital expenditure enhanced reliable water service by making the water system more robust. Outcomes included:

- Completed work on upgrading drum and radial gates at Warragamba Dam
- Completed work for upgrading scour outlets at Prospect Reservoir to continue to meet dam safety standards.
- Delivered a program program to determine options to rehabilitate and/or replace the Upper Canal.
- Warragamba ladders and platforms upgrade works completed.
- Expansion into Shoalhaven of the Sydney Catchment Authority Reservoir Management System (SCARMS)
- Wingecarribee Dam safety upgrade commenced following approval by the SCA Board in May 2010.

- The Asset Renewals program included work on Warragamba Pipeline as part of the annual programs.
- Completed infrastructure upgrades at Upper Nepean Dams and water supply weirs to enable release of new environmental flows from 1 July 2010
- Completed upgrade work on seven weirs in Hawkesbury-Nepean River to pass environmental flows and allow movement of fish up and downstream.
- New environmental flows commenced from Tallowa Dam after successful commissioning of new infrastructure in July 2009.

6. The Upcoming Price Path

6.1. Service Standards

SCA has clearly set service standards for reliability of supply and water quality, set down in SCA's operating licence and individual water supply agreements with major customers. Section 5 summarises these for the previous price path. In addition, a number of activities are regulated by technical regulators for safety (eg. Dam Safety) and environmental protection.

In addition, long term water planning is undertaken through the Metropolitan Water Plan, most recently the 2010 Plan released in October of that year. The 2010 Metropolitan Water Plan optimised a range of water supply and demand options, including the operation of the desalination plant, which benefit "the community by reducing the likelihood of spending time in drought restrictions, reducing the probability of having to further supplement the water supply system, and providing increased water security.[3] SCA plays a key role in this integrated approach, by providing storage and transmission (pipeline or canal) services which allow the full benefits of the other measures to be realised. This has resulted in a significant rise in yield across the system since the previous assessment. Arguably, the water network, including the SCA is now operating to higher reliability and service standards.

6.2. Regulatory period

In its 2008 submission, the SCA recommended a three year regulatory period. The recommendation was based on the uncertainty surrounding the SCA's operating environment and the effect it would have on its capital expenditure decisions. Another major driver for a three year price path was to align SCA and Sydney Water's future determination periods.

For the upcoming determination, the SCA is recommending a four year price path. The SCA believes a four year price path provides the right balance between providing a stable and certain operating environment while allowing sufficient flexibility to respond to changes in the water industry. The SCA also recommends that its regulatory period is aligned with that of Sydney Water to minimise regulatory uncertainty for both parties.

In accordance with IPART's request, the SCA has provided information about its future expenditure for the next five years.

6.3. SCA's Corporate Sustainability Strategy

The SCA is now in its second decade of operation. In its first decade the organisation successfully met the challenge of delivering high quality water to the people of Sydney, Illawarra and the Southern Highlands.

This second decade brings with it challenges to the SCA's operating environment that will require the organisation to evolve and respond to change and embed its commitment to sustainability. It acknowledges that sustainability is not a program or a

[3] Pg. 36, 2010 Metropolitan Water Plan, NSW Office of Water, August

set of priorities, but rather requires changes to our way of thinking, decision-making and to our acting.

The SCA's operating and capital expenditure requirements are driven by its Corporate Sustainability Strategy. This ensures project delivery is aligned with identified needs and commitments of the organisation. The SCA has in place robust processes to ensure its operating and capital expenditure is prudent and delivered efficiently. The following sections provide an outline of the SCA's strategic framework, operating and capital expenditure, project and program management and revenue requirement for the upcoming determination period.

The Corporate Sustainability Strategy 2010-2015 takes account of the need to influence what we do on a day-to-day basis, and incorporate the principles of sustainability into the business and operational plans of the SCA. It defines key focus areas, objectives, strategies and priorities for the next five years and also describes the key performance indicators which will be used to measure the success of our work. The Strategy will assist us respond to challenges and to meet our objectives.

The Strategy concentrates on embedding the commitment to sustainability into the SCA's governance and structures, establishing systems to evaluate and report on performance and increasing participation and ownership of the change towards sustainability amongst its employees.

The SCA's business is to ensure reliable, quality water to meet the needs of our stakeholders and the community, now and into the future, and the new Corporate Sustainability Strategy and its associated Business Plan are key mechanisms to making this shift.

The six key focus areas for the SCA under the Strategy and Business Plan are:

- **Engaged people**: Employees are committed, trusted, valued, safe and accountable in supporting SCA's long-term success.
- **Stakeholder relationships**: The SCA has excellent partnerships with stakeholders, customers and the community.
- **Business viability**: The SCA is a viable, commercially successful organization that is able to adapt to changing business environments and meet customer needs and seek new services and markets.
- **Industry excellence**: The SCA is recognised as a leader within the Australian water sector for its organisational practices.
- **Reliable Water**: The SCA provides reliable water of agreed quality and quantity to customers to minimise risk to public health.
- **Resource optimisation**: The SCA achieves sustainable outcomes through the optimisation of its resources and innovative use of assets.

A copy of the 2010-2015 Corporate Sustainability Strategy is included in Appendix 1.

6.3.1. SCA's Program and Project Management Framework

The Project Management Framework is a robust, flexible process that is based on industry standard and aligned with project management best practice. Each project must go through six distinct phases: concept, initiation, implementation, transition and

closure as well as meeting the requirements of review gates throughout the project lifecycle.

A peer review process is undertaken at the review gates via the Project Review Panel. The Panel undertakes independent review and assessment of project briefs, business cases, project and program changes, project closure reports, project portfolio status and implications for both the capital and operating project portfolios.

The Panel critically reviews all programs and projects and has the capacity to recommend the proposed program or project be suspended, reworked, continued or withdrawn. Projects can only be placed on the Annual or Forward Operating and Capital Programs after their project briefs and business cases have received endorsement from the Project Review Panel. The SCA Board through its Standing Committee Asset Management then reviews and approves the overall Forward Program.

This process ensures the SCA selects and delivers programs and projects that are financially viable, align with the Corporate Sustainability Strategy and deliver clear business benefits. These processes provide the SCA Board and management with the confidence that we will continue to improve our ability to effectively deliver our programs and projects.

6.4. Future Capital expenditure

SCA's capital expenditure program has been developed according to the Project Management Framework and aligns with SCA's asset management framework and strategy. As noted in Section 3.2.5, SCA has performed well in asset management benchmarking, having been assessed as having an advanced phase of asset management development. SCA is now aligning its asset management systems to the International Standard (ISO 55001) that is being developed.

Within the SCA's integrated Asset Management System, a Capital Investment Program with a one, three and ten year planning horizon is made up of capital expenditure projects identified by the SCA as needed to ensure that infrastructure complies with contemporary service delivery and asset management standards. It also includes renewals programs for various asset categories (information technology, hydrometric and general civil, mechanical and electrical assets).

6.4.1. Projected expenditure

SCA's proposed capital expenditure for the next four years is shown in the table below. Figure 6-1 and Figure 6-2 provide analysis of both driver and asset purpose of SCA's projected future expenditure.

SCA's capital expenditure program will be relatively modest, with a gradual ramping up over the price path. The program has been rigorously tested for deliverability, and the delivery process will be managed more effectively using SCA's newly developed project management system.

	Current Period	Proposed 2012 Determination Price Path				Future Price Path
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Projected Capital Expenditure ($M, 2011-12)	18.7	31.3	32.7	36.5	45.7	60.8

CAPITAL EXPENDITURE BY SERVICE $ 11-12 million	2012-13	2013-14	2014-15	2015-16	2016-17
Business Viability	2.5	1.5	1.3	0.7	1.2
Reliable Water - Healthy Catchments Strategy	0.9	1.6	1.5	0.9	2.7
Reliable Water - Manage Assets	26.9	29.1	32.4	28.8	26.6
Resource Optimisation	1.0	0.5	1.3	15.3	30.3
	31.3	32.7	36.5	45.7	60.8

SCA's capital expenditure program will be dominated by bulk water asset management services, though there is a significant resource management expense in the final two years, around Warragamba environmental flows.

6.4.2. Drivers for capital expenditure

The SCA's capital program is primarily aimed at the construction and renewal of assets that are used to collect, store and deliver raw water to customers. As shown in Figure 6-1, the bulk of the SCA's capital expenditure is driven by the requirement to meet standards (both discretionary and mandatory) to ensure the SCA's customers have a safe and reliable supply.

CAPITAL EXPENDITURE BY DRIVER $ 11-12 million	2012-13	2013-14	2014-15	2015-16	2016-17
Mandatory Standards	17.3	13.6	16.3	21.8	23.8
Discretionary Standards	8.7	14.9	15.3	5.5	5.1
Business Efficiency	4.3	2.8	2.8	2.9	1.9
Government Program	1.0	1.4	2.1	15.5	30.0
	31.3	32.7	36.5	45.7	60.8

SCA has reported its capital program under the drivers that IPART specifies for regulatory purposes (see the accompanying Annual and Special Information Returns). SCA's capital expenditure continues to be dominated by work required to meet mandatory standards, particularly dam safety work. SCA completed a series of works for the Metropolitan Water Plan within the previous price determination, with a high proportion of works driven by broader Government program requirements. After three years of more internally focussed business driven programs, the emphasis on Government driven programs will re-emerge in the final two years of the next price path as works required under the Metropolitan Water Plan ramp up with construction for the Warragamba Environmental Flows project commencing.

Figure 6-1 gives an overview of expenditure drivers for the next five years. The main driver is mandatory standards, principally dam safety projects, followed by discretionary standards and Government programs. A smaller amount of expenditure is focused on business efficiencies, such as the introduction of modern SCADA technology which will allow remote operation of some assets, saving travel time and reducing the number of call outs.

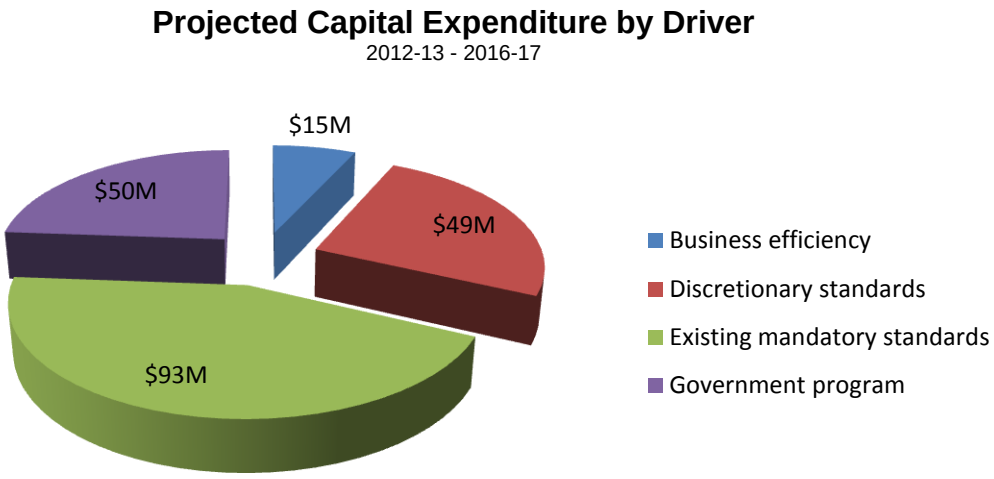


Figure 6-1 SCA projected capital expenditure by driver ($11-12)

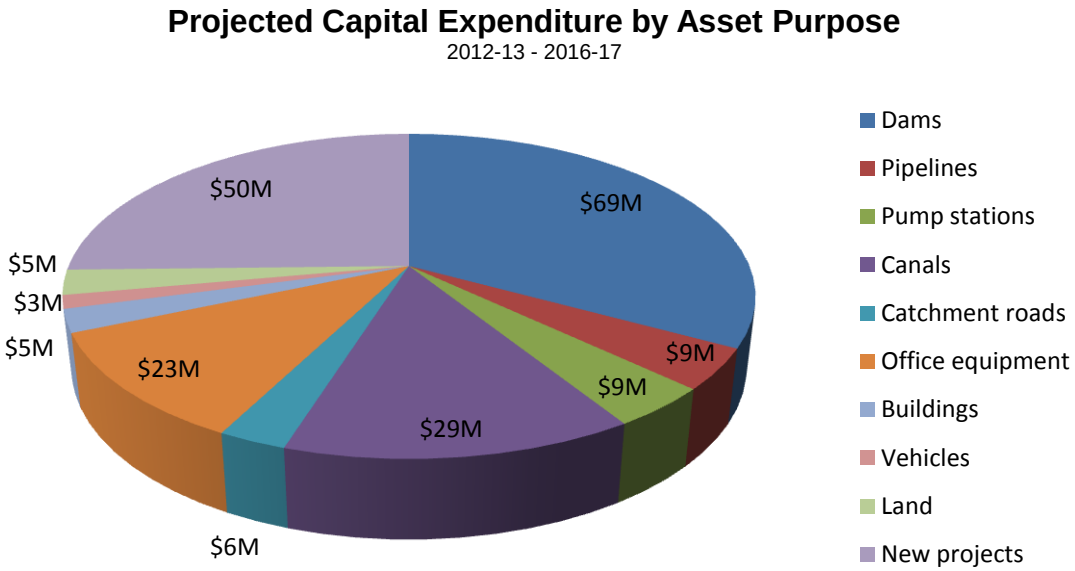


Figure 6-2 SCA projected capital expenditure by asset purpose ($11-12)

Figure 6-2 gives a snapshot of the asset purposes to which SCA capital expenditure will be put. Dams, pipelines and canals dominate SCA's asset base and capital expenditure to modify or extend the lives of these assets similarly dominate business as usual capital expenditure.

Some of the major projects that will be delivered in the upcoming determination are:

- **Renewal/refurbishment of infrastructure assets**. The SCA has a range of ageing assets that require renewal and refurbishment. The Upper Canal is one such asset that requires targeted refurbishment for the upcoming determination period and beyond to ensure its integrity and continued operation. The SCA will commence a major targeted refurbishment program of the canal from 2012-13 which will allow the Government to consider the replacement of the Upper Canal

as part of its broader infrastructure priorities. The SCA has also developed a rolling program to renew and refurbish minor assets as they reach the end of their useful life.

- **Upgrade of electrical, communications and monitoring systems.** The SCA has a number of projects to upgrade electrical, communications and monitoring systems. These projects will prevent prolonged electricity outages, improve safety to staff and the general public and improve system operations.

- **Replacement of support assets.** The SCA has a rolling program to renew and replace support assets such as IT equipment, motor vehicles and office equipment.

- **Works associated with the Metropolitan Water Plan.** The 2010 Metropolitan Water Plan requires investigation into the feasibility of environmental releases from Warragamba Dam. The outcome from the investigation will inform the decision in the 2014 Metropolitan Water Plan. The SCA will continue with investigation and development of the business case during the next price path.

6.5. Projected operating expenditure

6.5.1. Projected expenditure

SCA's proposed operating expenditure for the next four years is shown in Figure 6-2. In its 2008 submission, the SCA undertook to maintain its average operating expenditure to $80 million per year at real 2008-09 level. As discussed in section 5, the SCA has successfully achieved this goal.

For the upcoming determination period, the SCA will keep its core operating expenses at real 2008-09 levels ($87.2 million in 2011-12 dollars), including absorbing the $1 million increase in NSW Office of Water licence fees awarded by IPART in the recent Determination. This doubled the Bulk Water purchase cost from $1 million in 2010-11. In addition to existing core operating expenditure, the SCA also seeks to include an amount for a proposed self insurance scheme premium to cover the expected cost of Shoalhaven water transfer. This cost, though incurred by SCA at substantial levels in recent years, has not been allowed previously by IPART in SCA's recoverable costs.

Note that the Accelerated Sewerage Program will end in 2011-12.

	Current Price Path	Proposed 2012 determination price path				Future price pat
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Core Operating Expenditure ($million, 2011-12)	97.5	88.7	88.2	88.0	87.8	87.8
Bulk Water Purchases ($million, 2011-12)	2.1	2.3	2.5	2.7	2.9	2.9
Total ($million, 2011-12)	**99.6**	**91.0**	**90.7**	**90.7**	**90.7**	**90.7**

SCA's Business Plan, operating under the Corporate Sustainability Strategy (see Appendix 1) provides a logical framework within which to assess and monitor the success of strategies and projects. The strategy links its key focus areas to performance indicators.

The table below sets out SCA forecast operating expenditure by the six key focus areas and breaks down to the strategy level where appropriate. The SCA only delivers one "function", according to the definition described by IPART in the Annual Information Return. This function is the storage, abstraction and bulk purchase of water. The six key focus areas reflect the SCA's approach to the services within the organisation that deliver this overall function.

OPERATING EXPENDITURE BY SERVICE ($11-12 M)	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
KFA 1 - Engaged People	3.7	3.6	3.6	3.7	3.7	3.7
KFA 2 - Stakeholder Relationships	8.1	8.2	8.6	8.8	8.9	8.9
KFA 3 - Business Viability						
- Business Support & Services	12.5	12.3	12.1	12.4	12.6	12.6
- Corporate Accounts	4.0	3.9	3.9	4.0	4.0	4.0
- Information Technology	3.6	3.5	3.6	3.5	3.5	3.5
- Risk	1.0	0.9	0.9	0.9	0.9	0.9
KFA 4 - Industry Excellence	6.3	5.9	6.0	6.4	6.0	6.0
KFA 5 - Reliable Water						
- Healthy Catchment Strategy	17.8	19.6	19.9	19.9	19.6	19.6
- Accelerated Sewerage Program	10.2	0.0	0.0	0.0	0.0	0.0
- Asset Maintenance & Management	14.5	16.0	15.4	15.0	15.4	15.4
- Operate Water Supply	12.7	10.8	10.5	10.6	10.5	10.5
- Water Quality	4.3	4.3	4.3	3.8	3.8	3.8
KFA 6 - Resource Optimisation	0.7	1.9	1.8	1.7	1.7	1.7
Total Operating Expenditure	**99.6**	**91.0**	**90.7**	**90.7**	**90.7**	**90.7**

The table below sets out the same forecasts by resource.

OPERATING EXPENDITURE BY RESOURCE ($11-12 M)	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Employee related	34.2	34.1	33.2	32.1	31.4	31.4
Administration	4.6	4.4	4.6	5.2	4.7	4.7
Contractors	31.9	33.1	33.5	33.8	34.9	34.9
Accelerated Sewerage Program	10.2	0.0	0.0	0.0	0.0	0.0
Property	4.6	4.1	3.6	3.7	3.5	3.5
Materials	3.6	3.4	3.7	3.9	4.1	4.1
Insurance	3.3	3.3	3.3	3.3	3.3	3.3
Energy	1.8	3.8	3.8	3.8	3.8	3.8
License Fees	2.8	2.8	2.9	2.9	2.9	2.9
Grants	0.5	0.5	0.5	0.5	0.5	0.5
Other expenses	2.0	1.5	1.5	1.6	1.5	1.5
Total Operating Expenditure	**99.6**	**91.0**	**90.7**	**90.7**	**90.7**	**90.7**
Unregulated Income*	2.5	2.2	1.9	1.9	1.9	1.9
IPART deducted unregulated income	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
Accelerated Sewerage Program	10.2					
Opex $80M ($08-09)	87.2	87.2	87.2	87.2	87.2	87.2
Pumping		2.0	2.0	2.0	2.0	2.0
Total Operating Expenditure	**99.6**	**91.0**	**90.7**	**90.7**	**90.7**	**90.7**

*excludes loss on sale of assets

6.5.2. Drivers for expenditure

Over the next five to ten years the drivers and directions for the SCA's operating fall into six key areas.

Supply of Water

Ensuring the SCA meets its service delivery requirements of supplying water of sufficient quantity and quality sets some fundamental actions for the organisation. The SCA has to maintain a robust Water Monitoring Program for both quantity and quality. This program was reviewed in the current price path against the Catchment to Tap risk assessment, analysis of Water Quality Data and the CDSS.

The program requires annual expenditure of around $7 million per annum in the collection and laboratory analysis of samples.

The SCA also maintains a strong water modelling capability which has been critical to the analysis of supply sufficiency for the Metropolitan Water Plans. This role will continue.

Underpinning the continued supply of water the SCA must understand the dynamics of the catchment and its reservoirs. The SCA has a new Science Strategic Plan 2010-2015 which establishes the direction for the organisation's science effort.

Catchment Activity

The development of the SCA's first Healthy Catchment Strategy (HCS) in the current price path has led to the integration of the SCA's regulatory role and catchment actions. The SCA is developing the next HCS for 2012-2016 using the CDSS and best available science. The HCS 2012-2016 will outline the risks and priorities for action that underpin investment in protecting the catchment. The level of expenditure will reduce over the new price path with the conclusion of the Accelerated Sewerage Program.

An area of focus in the future will be on reviewing some of the means of delivery such as how catchment actions are more efficiently delivered in conjunction with the Catchment Management Authorities (CMAs).

Asset Maintenance and Management

With over $1.3 billion in assets, maintaining and managing these assets is critical. The SCA is improving its asset management approach and in particular looking to align with international standards. The maintenance and management of assets is a significant part of the SCA's costs, being around $10 million per annum. Over the current price path, a new civil, mechanical and electrical contract was established which delivered cost savings over the previous arrangements. This has enabled the SCA to maintain its asset maintenance and management expenditure at similar levels, despite bringing in to operation and significant number of new assets.

One key activity over the new price path that will further enhance the ability of the SCA to manage its water supply assets is the SCADA project. This project, which has commenced, will alter the skill sets required of water system operational staff and thus drive future training and recruitment strategies.

Regulation

The SCA's regulatory role for developments in the catchment is underpinned by the principle of developments having to have a neutral or beneficial effect on water quality (NorBE).

The SCA applies this principle in its concurrence role and also in its consideration of major developments. A particular focus in the future will be to better understand the potential impacts on surface and groundwater of mining and coal seam gas.

People

The SCA's employee and employee related costs make up nearly 40% of the SCA's operating expenditure. Developing the staff and ensuring the skills and expertise meet the organisation's needs is critical. The SCA has taken steps to address the ageing of its workforce and this program will continue.

6.5.3. Emerging issues relating to operating expenditure

Shoalhaven pumping – proposed self insurance scheme

Under the 2010 Metropolitan Water Plan, transfers of water from the Shoalhaven system are to occur when Sydney's total dam storage level falls below 75%, and continue until total dam storage levels rises to 80%. The three year Ministerial moratorium on pumping from the Shoalhaven River also ends in November 2011. The combination of the operating rules and the lifting of the moratorium mean that there is a reasonable likelihood the SCA will be required to transfer water from the Shoalhaven system.

In the previous two determinations, IPART did not allow the SCA's proposal to recover Shoalhaven pumping cost when they were incurred, as the IPART Act does not allow pass-through of uncertain costs without reopening of the determination. For the upcoming determination period, the SCA is proposing the establishment of a self insurance approach to cover the cost of transferring water from the Shoalhaven River. The expected cost of Shoalhaven pumping and SCA's proposed insurance premium is in the table below.

	2012-13	2013-14	2014-15	2015-16	2016-17
Expected Cost					
Base Cost of Pumping ($M, 2011-12)	2.7	2.2	2.1	1.8	1.8
Carbon tax on Pumping ($M, 2011-12)	1.7	1.4	1.4	1.2	1.2
Total Expected Cost ($M, 2011-12)	**4.3**	**3.6**	**3.5**	**3.0**	3.1
Proposed Insured Cost					
Base Cost of Pumping ($M, 2011-12)	2.0	2.0	2.0	2.0	2.0
Carbon tax on Pumping ($M, 2011-12)	1.3	1.3	1.3	1.3	1.3
Total Insured Cost ($M, 2011-12)	**3.3**	**3.3**	**3.3**	**3.3**	**3.3**

The expected cost of pumping is calculated by using output from SCA's hydrology modelling. The WATHNET model provides a probability analysis on pumping and volume of water pumped given the current operating rules. The probability is then multiplied by the expected energy cost to arrive at the expected cost of pumping for the year.

The self insurance scheme represents a prudent risk management approach to a cost that is difficult to predict. The SCA is seeking to include the premium contribution to the self insurance scheme as part of its operating cost allowance as it is a regular contribution to a fund that is ring fenced and cannot be spent on other projects or returned to its shareholder as additional revenue. The insurance premium should be reassessed at each determination period to ensure the contribution is not excessive. As the scheme matures, the SCA may expand it to include other costs if this is cost effective.

Carbon tax

On 10 July 2011, the Federal Government announced a plan to legislate a carbon tax to commence on 1 July 2012. Under the base energy usage of around 23,600 MWh in 2012-13, the SCA would expect to generate carbon emissions equivalent to 23,500 tonnes using a typical emissions intensity of 0.9564 tonnes per MWh. Under a carbon price of $23/tonne, the SCA is expected to incur an additional $0.5 million in electricity cost in 2012-13. The table below shows the expected carbon cost, which increases in real terms over the duration of the determination.

	2012-13	2013-14	2014-15	2015-16	2016-17
Expected Carbon Cost* ($M, 2011-12)	0.5	0.5	0.5	0.6	0.6

* Based on a usage of 23.6 GWh per year

The base electricity cost does not include Shoalhaven pumping, other than for maintenance purposes.

As the carbon tax is not yet legislated, the SCA has not included the cost of carbon in its operating expenses. However, a carbon tax is likely to be introduced during the next determination period. Should the proposed carbon tax legislation be passed by the Federal Government, the SCA recommends IPART include an allowance for carbon tax in its draft determination. In the instance that the legislation is delayed, the SCA's preference is for a cost pass-through mechanism to enable the additional carbon cost to be passed through to its customers. As the SCA's base electricity usage is quite stable and the proposed carbon cost is relatively certain, the SCA believes it will be able to supply reasonably accurate information to IPART to allow it to determine the pass through cost.

SCA has not included any cost increases in its other costs (eg. material costs from transport cost increases) as a result of the carbon tax, but this will be a consideration that IPART will need to apply to a number the businesses that it regulates. SCA has a dedicated energy manager, and is confident that it is managing energy and green energy costs to best practice.

6.6. Asset Base

6.6.1. Asset life and depreciation

In 2010 the SCA commissioned a detailed independent review of its entire infrastructure assets, as per established processes used prior to the 2008 price submission. The methodology provides an assessment of the useful lives of assets. The outcome was only modest changes to those used in 2008.

For modelling purposes the SCA has estimated its depreciation based on the written down value of assets and average remaining lives. The remaining lives used are 65 years for facility assets, 20 years for building assets, and five years for plant and

equipment. These figures are derived from actual written down values and depreciation from the SCA's accounts. Analysis indicates that the SCA's actual average asset life continues to be around 60 years. Accordingly, modelling for this submission is based on depreciating the SCA's whole regulatory asset base on a straight line basis by 1.67 percent per annum.

6.6.2. Regulatory asset base

The SCA has followed IPART's methodology in establishing its regulatory asset base for the upcoming determination period. The previous period's regulatory asset base is rolled forward by adding an allowance for prudent capital expenditure and accounting for inflation and depreciation. The SCA's regulatory asset base for the upcoming determination is in the table below.

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Regulatory Asset Base ($M, 2011-12)	1,385.3	1,395.0	1,405.9	1,420.3	1,443.3	1,480.2

Values in this table are for the closing value of the regulatory asset base

6.6.3. Rate of return

IPART applied a mean WACC of 6.5% to SCA in the current determination. SCA proposes that a real pre-tax Weighted Average Cost of Capital (WACC) of 7.0% be applied by IPART for the coming price path. This is rate is appropriate for the level of market risk that SCA faces in its new competitive environment and will allow SCA to build up an appropriate capital structure to undertake the major capital projects that it will commence in the next price path, while providing financial sustainability. Section 6.7 includes a discussion of how SCA's revenue risk has changed and what are the appropriate combination of mitigating measures to address this, including an appropriate return for the residual risk after pricing treatments.

A detailed analysis by Deloitte of the range of WACC values appropriate for SCA's situation is at Appendix 9 – Weighted Average Cost of Capital Report. The report concludes that a WACC in the range of 6.1% to 7.2% is appropriate. The table below provides a summary of the key components of the WACC.

	Low	High
Cost of equity capital[1]	12.06%	13.61%
Cost of debt capital[2]	7.00%	8.00%
Debt to enterprise value ratio	60.00%	60.00%
Nominal WACC (pre-tax)	9.02%	10.24%
Real WACC (pre-tax)	6.05%	7.24%
Selected WACC	**6.10%**	**7.20%**

Source: Deloitte analysis
Notes:
1. Cost of equity capital is pre-tax and includes the impact of dividend imputation credits
2. Cost of debt is pre-tax

The table below provides a summary of each of the required revenue building blocks developed above viz: operating expenditure, return of capital at the given asset live on the regulatory asset base, and return on capital at the proposed WACC rate of 7.0%.

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Operating Expenditure ($M, 2011-12)	99.6	91.0	90.7	90.7	90.7	90.7
Depreciation ($M, 2011-12)	24.4	24.5	24.6	24.7	24.3	24.2
Return on Assets ($M, 2011-12)	78.7	91.6	95.9	100.6	106.0	105.8
Revenue ($M, 2011-12)	**202.7**	**207.1**	**211.2**	**216.0**	**221.0**	**220.7**

6.6.4. Projected revenue

The building block model above sums to the required revenue for SCA. For the upcoming determination period, the SCA has sought to minimise price increase in real terms. The SCA is projecting a revenue increase of $18.3 million in total over the four year period of the determination. Figure 6-3 shows the breakdown of the projected revenue.

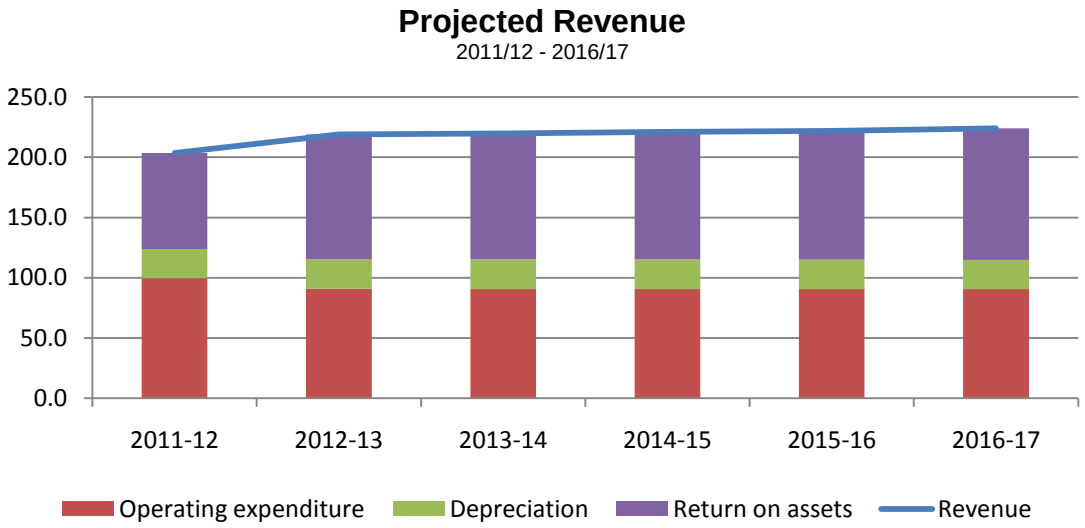


Figure 6-3 Projected revenue 2011-12 – 2016-17 in ($'M, 2011-12)

The proposed prices to achieve the above revenue outcome are detailed in the following chapter.

6.7. Revenue Variation

Although the above revenue is proposed, its actual achievement will be dependant on a range of stochastic factors, leading to a significant amount of risk. This section, as requested by IPART, deals with the major drivers of revenue risk, and how SCA proposes to mitigate that risk.

Sydney Desalination Plant (SDP) operates under rules set out in the Metropolitan Water Plan. When SDP is in production, the amount of water produced is a direct deduction from SCA's volumetric revenue. The rules thus increase revenue risk to SCA in the short term. In the longer term, the operation of the plan may reduce risk, by reducing the length and severity of water restrictions. As noted in Section 5.4 Water sales and revenue variation, SCA's sales are expected to be around 10% lower than forecast in the final year of the current price path. In addition to the rules, there is a risk that the construction of the second stage of the desalination plant could be triggered with a prolonged dry spell. If the second stage of the plant was operated in a similar way, it would have substantial negative impact on SCA's revenue.

The desalination plant and the Shoalhaven Transfers operating rules interact to have the effect of simulating a commodity market where different water suppliers have comparative advantage at different times. However, since the rules are not price based, the higher value of supplies implicit in the rules at lower storage levels is not reflected in the revenues that suppliers receive. Section 9.2 outlines options for incorporating this scarcity value through administered pricing. However, as is pointed out, there is limited benefit to scarcity pricing where the signalling effect of prices is negated by fixed water sourcing rules.

Nevertheless, if such a market did exist, you would expect to see high volatility in water prices over the cycle of storage depletion and refilling. Suppliers with infrequent but high revenue sales, and retailers with infrequent but substantial cost spikes would be expected to engage in forward contracting of supplies at mutually agreed fixed or hedged prices to manage the price risks that such volatility would bring to profits. This is the kind of behaviour that we see in the national electricity market.

Without flexible prices, such as scarcity pricing, the scope to invest to benefit from higher revenues in times of scarcity, and the incentive to then mutually forward contract with counter-parties to provide revenue certainty is removed. Bulk water suppliers under the Metropolitan Water Plan operating rules thus face potential substantial impacts on profits, even if, an administered volumetric price is set such that in the long term, costs are fully recovered. For the SCA, modelling suggests that the standard deviation of desalination volumes under the operating rules for the price path is three times the mean. This high degree of variation can be illustrated, by saying that even where IPART set a four year price path using mean demand, there would a greater than 10% chance that revenue would fall short by $23 million in any year (approximately half of SCA's expected profit) at the current pricing structure. A sequence of drought years would produce much more substantial impact.

Given the available instruments, a move to a higher fixed component to the price is recommended, as it simulates to some extent the forward contracting that would occur in a market with flexible prices.

6.7.1. Sydney Desalination Plant Price Structure

SCA has made two submissions to IPART in regard response to SDP's price proposal. SCA's overall approach is that pricing should be set so that competitive neutrality between SDP, SCA and third party Water Industry Competition participants is maintained as much as is possible.

The SCA did, however, make clear that in interpreting the Government's direction, IPART should take care to ensure that the variable component in the price structure "should reflect all efficient costs that vary with output"[4]. Specifically, with regard to "costs that vary with output", the variable component of the price should include Renewable Energy Certificates, which although purchased on a fixed basis, will only be used when required for water production, with the excess available for sale.

With regard to the impacts of the price structure, there is no scope for price to have any impact on water sourcing while ever fixed operating rules determine whether raw water or desalinated water is procured by Sydney Water (see comments on scarcity pricing in section 9.2). For any future water supply outside of the operating rules, it is important that pricing be as cost reflective as possible, using the suggestion above. It is also important for efficient sourcing that any users of SDP Ltd's supply, including direct

4 Pricing principle 6. in, Pearce, G (2011) Terms of Reference for Referral of Sydney Desalination Plant Pty Ltd to IPART under Section 52 of the Water Industry Competition Act, 2 May, Sydney

customers of SDP, pay SDP's fixed charges in proportion to their share of metropolitan demand.

The SCA's primary objective, in line with COAG microeconomic reform targets, is to obtain full recovery of our efficient costs. Efficient costs include the cost of mitigating operational business risks at least at the expected value of those risks. In addition, our owners expect that they will receive a return that would compensate them for the market risks that they bear in holding ownership of the business. These risks include general changes in interest rates on debt and in the underlying value of the commodity, the water, that the SCA trades.

6.8. Outstanding Issues

IPART requested in its 2009 Determination that SCA provide detailed costings for supply to its Council and Other customers. SCA has completed this work and supplied it to IPART. The outcomes are outlined in Section 7.3, 7.5, 7.7 and 7.8. A costings paper is provided at appendix 11. Scarcity pricing and Shoalhaven pumping requirement are discussed in section 9 Emerging Issues.

7. Proposed Prices

7.1. Demand forecasts

The prices proposed by the SCA for the upcoming price path are based on demand projections listed in the table below. All demand projections are supplied by the SCA's customers during consultation. Sydney Water's demand projection assumes the SDP will be operating at full capacity for the duration of the upcoming price path. It also includes 5.5 GL of water releases per year for the North Richmond plant. Based on hydrology modelling, the probability of water restriction is negligible in the first year of the upcoming price path. Across the remaining year, there is a less than five percent probability of a loss of sales up to 10 GL per annum from restrictions.

	2011-12	2012-13	2013-14	2014-15	201-/16	2016-17
Sydney Water (ML)	393,443	391,688	390,603	392,370	395,811	399,295
Sydney Water (North Richmond) (ML)	0	5,453	5,441	5,461	5,500	5,539
Goulburn-Mulwaree Council (ML)	0	500	500	500	500	500
Shoalhaven City Council (ML)	80	100	100	100	100	100
Wingecarribee Shire Council (ML)	4100	4,100	4,100	4,100	4,100	4,100
Other raw and unfiltered water customers (ML)	200	200	200	200	200	200

7.2. Proposed change in overall pricing methodology

The cost of supplying water can be viewed in terms of Short Run Marginal Cost (SRMC) and Long Run Marginal Cost (LRMC). The SRMC of water supply is the cost of supplying an extra unit of water when infrastructure capacity is fixed while the LRMC of supply is the cost of providing a unit of water when it is possible to vary infrastructure capacity. Currently, the SCA's water charges are set with reference to its LRMC. Since 2005, the variable component has been set to recover 60% of the SCA's required revenue and the fixed component set to recover the remaining 40%. IPART indicated in the 2009 determination that this structure would send a price signal to Sydney Water to help achieve the Government's demand management objectives.

While a high variable component may send a strong price signal for conservation to Sydney Water, this may not be appropriate in an environment where there are multiple water sources. A high volumetric price for raw water when storages are high sends a signal to Sydney Water to use alternative sources which may, in fact, not be cost effective.

As SCA noted in 2008, it is important that the price signal relates to the marginal cost of getting an extra unit of water into the system as it exists, not the marginal cost of needing to augment the system to increase supply. That is, in times of relative water abundance, the aim is to optimise the available water resource allocation, not the long term investment. A high volumetric price also exposes the SCA to a significant amount of revenue risks over which the SCA has little or no control. Some of these risks include reduction in demand due to water restrictions, and the operation of Sydney Desalination Plant (SDP). Equally, a high volumetric component may give SCA a significant revenue windfall, if demand is higher than expected.

The SCA's demand risk is also magnified by the entry of SDP into the bulk water market and the operating rules governing its operation. The 2010 Metropolitan Water

Plan requires the SDP to operate when Sydney's total dam level falls to 70% and continue to operate until total dam level reaches 80%. Under this operating regime and current price settings, the sale of water by the SCA will be reduced and the SCA could suffer significant revenue loss. In the 2005-2008 regulatory period, the SCA incurred a cumulative revenue shortfall of approximately $57 million as sales were 12% lower than the forecast adopted at the beginning of the 2005 determination. For the upcoming determination period, a 50 GL variance in sales (12.5%) would affect SCA's revenue by $16 million. Figure 7-1 shows the revenue outcome of various sales scenarios.

In the current determination the revenue shortfall is $30.4 million as sales have been lower than forecast.

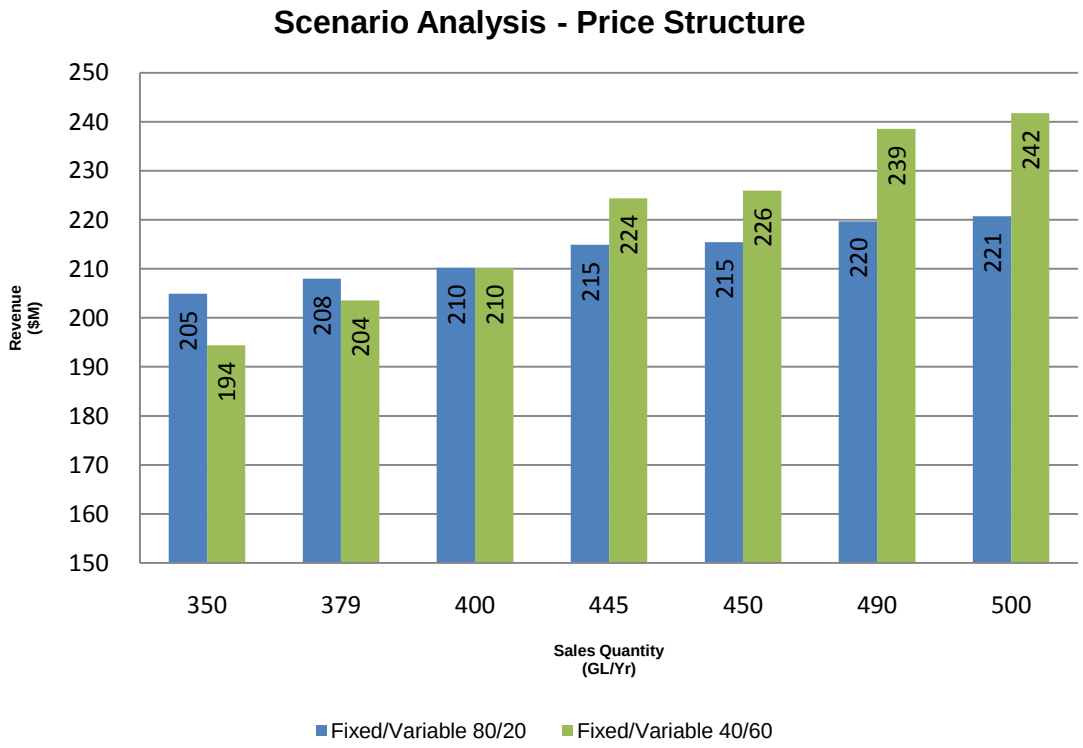


Figure 7-1 Scenario Analysis – Price Structure ($million 2011-12)

Based on the above analysis, the SCA proposes a change in pricing methodology where the price structure is based on SRMC for the upcoming price path. The SCA proposes to set its volumetric charge to reflect its short run operating costs (cost of pumping from the Shoalhaven), and the fixed charge would be set to recover any revenue shortfall. Under this proposal, the SCA variable (volumetric) charge would recover only 20% of its required revenue while the fixed charge would recover the remaining 80%.

This arrangement would sufficiently protect the SCA with revenue certainty and protect it from downside revenue risk. This structure would also minimise the risk of over recovery should water sales be significantly higher than forecast. This scenario could develop if the SDP is not operating due to high storage levels.

The above pricing methodology is also consistent with a possible future approach to wholesale scarcity pricing. The SCA's comments on scarcity pricing are in section 9.2.

7.3. Pricing methodology for councils

In the 2009 determination, IPART asked the SCA to conduct further investigation into the cost structure of the SCA's council customers. The outcome of the investigation would help inform IPART's pricing decision in the upcoming determination. Effectively, IPART has asked the SCA to allocate cost to council customers based on their location in the SCA's network. The SCA has completed this investigation and has derived costs for each council based on their usage share of the SCA's assets.

In August 2011, the SCA met with representatives from the councils and presented its cost allocation and pricing methodology. The councils provided the SCA with feedback on the proposed methodology and advice on their preferred price structure and projected demand. The SCA's final methodology and outcomes reflects the feedback provided by the councils.

7.4. Pricing methodology for North Richmond

Under the Greater Metropolitan Water Sharing Plan for the Hawkesbury-Nepean which commenced on 1 July 2011, the SCA is required to release water for the use of Sydney Water's North Richmond plant. The water released is protected under licensing controls from extraction until it reaches the North Richmond offtake. The decision taken under the water sharing plan to require "regulated" releases to North Richmond effectively incorporates North Richmond in the SCA network of "regulated" supply for the first time. Previously, the SCA made releases for general river purposes, which were not tied to Sydney Water's North Richmond demand. As such, the cost of supplying North Richmond will become identical with that of suppling Sydney Water at the other offtakes in the supply zone.

As IPART notes in its Issues Paper, the quantity allocated for release under the water sharing plan is 7.7GL per annum, with the actual daily quantity to be released varying by season, and Sydney Water holds a licence allocation of 20.075 GL per annum for extraction. However, Sydney Water's demand forecasts currently include a lesser quantity, 5.5 GL per annum, for North Richmond, and this amount is incorporated in the SCA's revenue forecasts for this submission. Sydney Water will pay Office of Water fixed licensing charges for 20.075 GL per annum, plus a variable charge per ML for the actual water extracted.

As Sydney Water already pays a fixed charge to the SCA that covers the balance of the costs of the system (after offsetting revenue from the variable charge), the SCA would therefore propose that a fixed charge not be applied for North Richmond. Therefore, the SCA proposes that the variable charge that is applicable to other Metropolitan Sydney offtakes be applied to North Richmond. Further, the SCA proposes that no fixed charge be applied specifically to North Richmond.

7.5. Pricing for other customers

The SCA has 56 unfiltered water customers and 8 raw water customers. Unfiltered customers are supplied with water from SCA transmission mains, while raw water customers access water from storages directly. Collectively, these customers take just over 200 ML per annum or 0.06% of SCA sales. A cost of supply analysis similar to the council analysis was conducted and the outcomes are discussed below.

7.5.1. Unfiltered customers

Unfiltered customers are positioned relatively low in the supply network. They are usually close to filtration plant and take water at various points along the transmission lines (pipeline and Upper Canal).

Customers on the SCA transmission pipelines (eg. Warragamba pipeline) are supplied on a different basis to customers on the Upper Canal. Pipeline customers are supplied by the SCA with a dedicated offtake point, and distribution line. Most are also given a duplicate connection to the second of the twin pipelines to provide reliable service when one pipeline is out for maintenance.

On the Upper Canal customers provide their own offtake and distribution infrastructure, and due to the age and operational mode of the Upper Canal, reliability of supply is variable, as the Canal is emptied for maintenance, breakdowns or operational reasons (e.g. vehicle accidents). Customers drawing supply from the Upper Canal are advised that SCA does not guarantee supply for these reasons. As a result, these customers often provide their own storage (e.g. water tank) to provide adequate reliability. The difference in cost between these customer types is significant, as distribution infrastructure costs from $6,000 to $10,000 per connection depending on whether it is an existing or new connection. Operating costs with piped connection are also significant in terms of meeting customer requests regarding pressure and reliability. Metering and billing for both is provided by Sydney Water. Meter reading of raw water customers in the Shoalhaven system is undertaken by the SCA, as Sydney Water does not operate in this area.

It could be argued that unfiltered customers should only be allocated the costs of the linear assets to the point of supply. However, this would create a large number of individual costs and prices. It is more practical to cost the class of customers supplied by the particular transmission asset. In addition, the SCA would argue that the standard of service for these customers relies upon having access to the network. Therefore, all transmission lines in the system form part of the assets supplying the individual. This effectively means that the unit cost of water supply to the offtake point would be identical to the cost of supplying Sydney Water. Thus, their costs would not vary from the average costs of supplying Sydney Water (ie. $0.47 per kL in 2010-11), except in regard to any incremental costs (offtake points, distribution pipes) to supply those customers uniquely.

Incremental costs of supplying these customers are estimated to be $0.25 to $0.55 per kL for Warragamba Pipeline customers and negligible for Upper Canal customers because the latter supply their own connection. Adding the water cost itself (the current SCA average supply cost of $0.47) Warragamba Pipeline customer cost based on a complete new connection, is close to the current price of $1.01 per kL. On the other hand, Upper Canal customers' costs at $0.60 per kL are close to half current prices.

7.5.2. Raw water customers

Raw water customers in contrast are relatively high in the system as they extract from dams. Cost allocation for these customers is difficult since the small number of customers is scattered over diverse parts of the SCA system (both Metropolitan dams and Shoalhaven). The cost allocation approach taken here was to allocate average costs according to the share of dams of total assets. Using this simple approach, the average costs per kL of the SCA supplying water from dams alone is estimated to be less than $0.25 per kL compared to the current charge of $0.59 per kL.

7.5.3. Pricing consideration

In previous determinations, the SCA submitted that prices for small customers should not provide incentives for customers to connect or disconnect from alternative supply. While most unfiltered and raw water customers are remote to water retailers at the moment, this may change over time as urban development continues. Once a residence is within a residential supply area it is required to be connected, but there is a grey area where connection may be optional.

For instance, residences currently sourcing water from Tallowa Dam, may at some point have access to treated water from Bendeela Pondage retailed by Shoalhaven Water. Currently, Shoalhaven Water charges $1.50 per kilolitre for usage up to 450 KL and $1.85 for usage greater than 450 KL. The Water Availability Charge (fixed charge) is $78.00 per quarter. Applying a cost reflective raw water charge of $0.25 per kL creates a wide gap between raw and potable water prices. However, alignment with potential retail prices is less relevant for large bulk raw water users such as mines, who would develop their own bulk sources as an alternative if SCA supply was not competitive.

For the upcoming determination, the SCA proposes aligning the price structure of small customers with the price structure of the retail network. This strategy ensures customers do not face a price shock if they connect to the distribution network and it is administratively efficient for the SCA.

7.6. Sydney Water prices

The table below shows the SCA's proposed prices to Sydney Water for the upcoming price path. The prices are structured so that 80% of revenue is recovered from the fixed charge component.

$11-12	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Fixed Charge ($M/month)	7.17	13.48	13.78	14.08	14.39	14.35
Variable (volumetric) Charge ($/ML)	284.38	102.81	105.07	107.38	109.75	109.43
Revenue from Fixed Charge ($M/Yr)	86.03	161.80	165.36	168.99	172.71	172.21
Revenue from Variable Charge ($M/Yr)	111.89	40.83	41.61	42.72	44.04	44.30
Total Revenue $M	**197.91**	**202.63**	**206.97**	**211.71**	**216.75**	**216.51**

7.7. Council prices

The table below shows the SCA's proposed prices to the councils for the upcoming price path. The SCA proposes that the same price be applied to all council customers.

Forecast Volume	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Forecast Volume Wingecarribee Council (ML)	3900	4100	4100	4100	4100	4100
Forecast Volume Shoalhaven Council (ML)	80	100	100	100	100	100
Forecast Volume Goulburn Council (ML)	0	500	500	500	500	500
Charging Component ($11-12)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**
Fixed Charge $/Month Wingecarribee Council		22,966	22,966	22,966	22,966	22,966
Fixed Charge $/Month Shoalhaven Council		560	560	560	560	560
Fixed Charge $/Month Goulburn Council		2,801	2,801	2,801	2,801	2,801
Variable (volumetric) Charge ($/ML)	268.87	201.65	201.65	201.65	201.65	201.65

7.8. Other customer prices

The table below shows the SCA's proposed prices to the other customers for the upcoming price path.

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Unfiltered						
Fixed Charge for 20mm Meter ($)	96.00	96.00	96.00	96.00	96.00	96.00
Variable (volumetric) Charge (c/kL)	101.00	101.00	101.00	101.00	101.00	101.00
Revenue from Fixed Charge ($M/Yr)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Revenue from Variable Charge ($M/Yr)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Raw water						
Fixed Charge ($/month)	0	0	0	0	0	0
Variable (volumetric) Charge ($/ML)	284.38	284.38	284.38	284.38	284.38	284.38
Revenue from Fixed Charge ($M/Yr)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Revenue from Variable Charge ($M/Yr)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

8. Customer Impact

In developing the prices detailed in section 7, the SCA has been mindful of the impact on its immediate and end use customers. For the upcoming price path, the SCA endeavoured to keep real prices the same without compromising water quality.

8.1. Impact on Sydney Water's customers

The table below shows that the SCA's proposed prices will have negligible impact in real terms to Sydney Water's customers over the period of the next price path. The calculation below is based on the bill of an individually metered residential property with a 20mm connection and consuming 200 kL per year. The annual bill amount for such a customer is $1,087 in 2011-12 terms.

	2012-13	2013-14	2014-15	2015-16	2016-17
Pass through to customers ($, 2011-12)	2.8	2.5	2.7	2.9	-0.1
% increase attributable to SCA	0.3	0.2	0.3	0.3	0.0

8.2. Impact on Councils and Other Customers

As discussed in section 7, the SCA consulted with councils and proposes aligning the price structure for councils with their preferred price structure as required by best practice guidelines. As a result of this alignment, the councils will now have a 25:75 fixed to variable charge. The table below shows the impact of SCA's proposed prices, in real terms.

The prices proposed for other customers result in nil real impact.

Charging Component	Revenue ($2011-12)					
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Revenue from Variable Charge	1,070,103	947,755	947,755	947,755	947,755	947,755
Revenue from Fixed Charge	-	315,922	315,922	315,922	315,922	315,922
Total revenue	1,070,103	1,263,677	1,263,677	1,263,677	1,263,677	1,263,677
Equivalent $/ML	268.87	268.87	268.87	268.87	268.87	268.87
% Change		0%	0%	0%	0%	0%

8.3. Impacts on the agency – credit ratings, financial viability

SCA's modelling of the price proposal suggests that SCA would maintain an investment grade credit rating under all scenarios in the price path. However, as SCA

moves to commence its Upper Canal project, there will be a rapidly increasing funding need, which could potentially impact on SCA's credit rating if debt levels were allowed to rise above IPART's benchmark 60% debt/equity ratio. SCA recommends that IPART determine prices at a rate of return such that sufficient equity could be retained in the medium term to maintain SCA's rating.

Appendix 8 provides a full financial forecast for the price path. Overall, SCA will be able to strengthen its balance sheet by paying down some debt and boost equity in preparation for the financing of its major capital projects in the subsequent price path. However, SCA may need to retain equity to strengthen its balance sheet to safely borrow funds for major capital works in the next and subsequent price paths. The proposed 7% WACC is prudent preparation for this event.

9. Emerging Issues

Chapter 6 of IPART's Issues Paper raises a number of outstanding and emerging issues that potentially affect the SCA's operation. This section details the SCA's response and comments in relation to those issues.

9.1. Price adjustment mechanism to address unforeseen costs

9.1.1. Shoalhaven water transfers

In section six, the SCA proposes establishing a self insurance scheme to cover the cost of transferring water from the Shoalhaven River, with the insurance premium included in the operating expenditure allowance. The 2010 Metropolitan Water Plan provides clear guidance on when water transfers are to commence and cease. Together with the SCA's own hydrological modelling, the SCA can model the expected amount of water transferred then establish an appropriate self insurance approach.

The SCA considers this approach as the most effective way to mitigate risks arising from Shoalhaven transfers. Furthermore, the premium contribution can be varied for each determination period to align with updated hydrological modelling and any changes in the Metropolitan Water Plan.

9.1.2. Adjustments for other unforeseen cost

One off cost pass-through

From time to time, the SCA may need to pass-through costs that are incurred due to uncontrollable external events that are related to regulatory, licence or government policy changes. The SCA understands IPART's caution in pass-through mechanisms that allow costs to be passed through without being reviewed by IPART or an external party.

The SCA recommends a pass-through mechanism that is assessed by IPART on an annual basis. Under this approach, the SCA would submit to IPART material costs that are expected to be incurred in the upcoming price year as a result of regulatory, licence or government policy change. If IPART is satisfied with proposal after examining the SCA's submission, then the additional cost past-through revenue can be included in the upcoming price year's revenue, and prices adjusted accordingly. This approach allows one off costs to be passed through without the need to reopen the determination.

Significant or ongoing cost

For significant cost or costs that will be incurred on an ongoing basis, the SCA prefers a reopening of the determination to ensure all issues surrounding the cost to be passed through are examined thoroughly and input received from stakeholders involved.

9.2. Wholesale scarcity pricing

IPART indicated in its 2009 SCA determination that it was potentially interested in developing and implementing a form of wholesale scarcity pricing in the 2012 determination. It asked the SCA to conduct further investigation into wholesale scarcity pricing and report on its progress and views as part of this submission.

The SCA engaged Frontier Economics to provide advice on wholesale scarcity pricing. Frontier Economics delivered a draft report in February 2011, outlining potential options, and also provided advice to the SCA in July 2011 on scarcity pricing as part of the SCA's overall pricing strategy.

In considering the development and implementation of a wholesale scarcity pricing regime, the SCA urges IPART to consider how a wholesale scarcity price will operate in conjunction with the operating rules under the current Metropolitan Water Plan. For example, if a scarcity price is triggered on low dam storage levels, then there is a risk of double counting the cost of consuming dam water as the current operating rules already include measures that are based on total dam storage levels.

Given the relatively low water scarcity in the near to medium term, the SCA does not recommend the introduction of scarcity pricing.

A potential scarcity pricing model that could be explored for the future is where a price signal on the scarcity of water is sent to customers without exposing the water supplier to excessive demand risks. Such a model would have the following characteristics:

- Aligning the SCA's volumetric price with its short run operating cost, with a fixed charge to address any revenue shortfall (this approach has been adopted by the SCA in its preferred price structure for this determination).

- Setting a separate volumetric price that reflects the estimated marginal value of water in storage. This charge would be in addition to the base infrastructure and would apply when predetermined triggers are reached. This arrangement could generate additional revenue that is not part of the SCA's assumed revenue. Further discussions are required on the impact of this approach.

9.3. Cost recovery of heritage asset obligations and non-commercial activities

The SCA manages a diverse range of heritage items such as dams and associated infrastructure, weirs, homesteads, mining infrastructure, bridges and significant indigenous sites. The diversity of such items comes from the long history of water supply and the purchase of former pastoral and mining lands. The SCA keeps a register of its heritage items in accordance with the requirements of section 170 of the *Heritage Act 1977*. The table below provides a summary of SCA heritage items currently listed on the register. Further details on these heritage items can be found on the SCA website www.sca.nsw.gov.au.

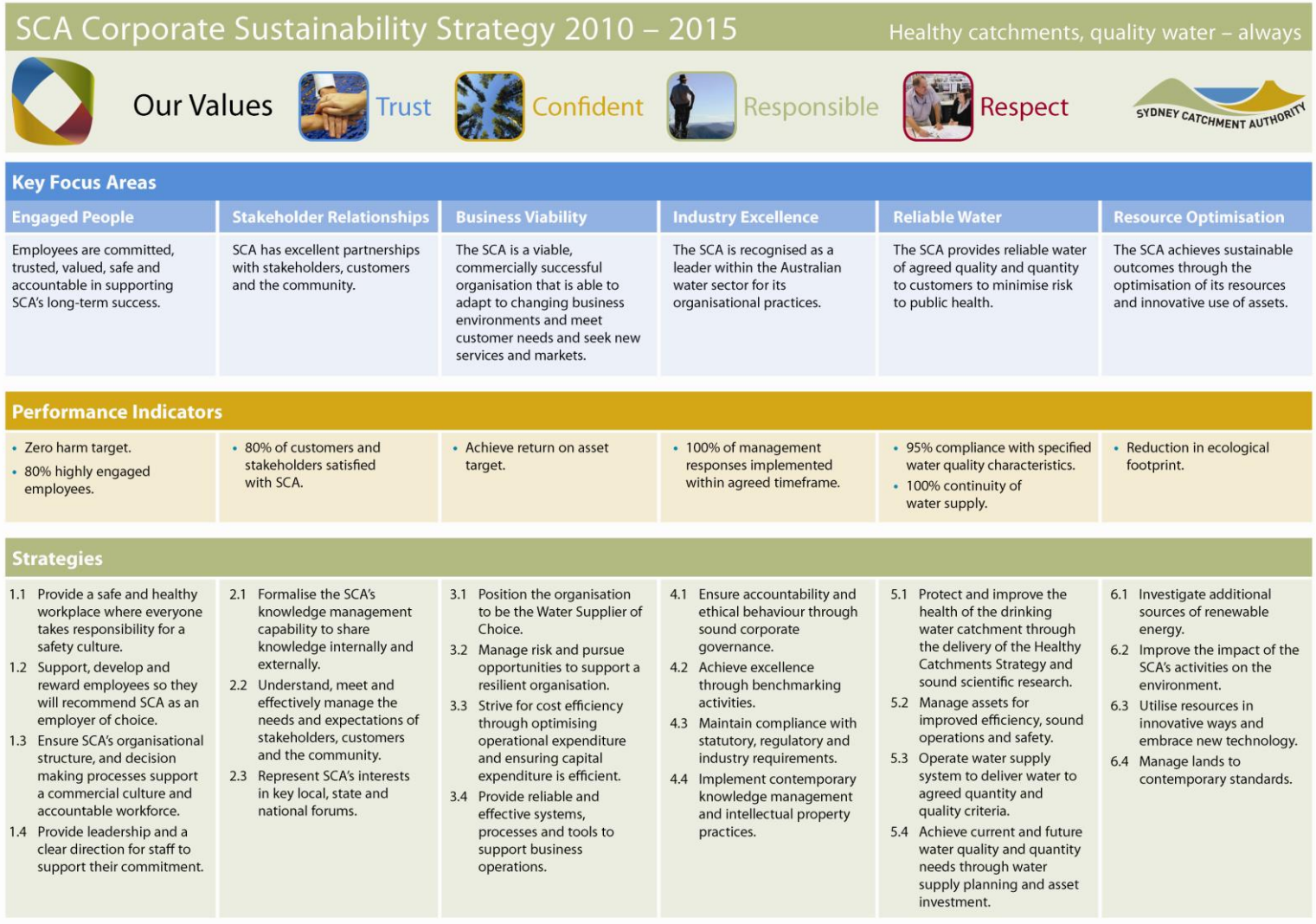
Category	Asset name
Water Supply Infrastructure – Dams	Avon Dam, Cataract Dam, Cordeux Dam, Medlow Dam, Nepean Dam, Warragamba Supply Scheme (Warragamba Dam), Woodford Dam, Woronora Dam
Water Supply Infrastructure – Canals and Pipelines	Upper Nepean Scheme (Upper Canal), Woronora-Penshurst Pipeline
Homesteads	Arnprior, Glen D'or, Khama Lea, La Vista, Mayfield, Ooranook, Virginia, Windmill Hill Group
Natural Heritage	Wingecarribee Swamp

The above table shows that the majority of the SCA's heritage items are also current working assets and are managed as part of the overall capital and operating program. The cost associated with the maintenance of non water infrastructure related heritage assets is currently managed through the SCA's overall maintenance program and is not accounted for separately. The management of heritage items is currently being moved into the Maximo asset management system. Once the migration is complete, the SCA will be able to track expenses that are related to the maintenance of heritage assets.

While the SCA agrees with IPART that the whole community benefits from the maintenance of heritage items and non commercial activities such as environmental flows, it also argues that the expenditure associated with such activities is part of the cost of having a reliable system of water supply in the Sydney region. The cost of this reliability should be borne by water users in the Sydney region who receive the benefit, and not subsidised by those who are not the SCA's direct customer or in Sydney Water's area of operations. This position is consistent with the submission put forward by the Sydney Desalination Plant on the cost of renewable energy in its price review which the SCA supported.

Appendices

Appendix 1 – SCA Corporate Sustainability Strategy



SCA Corporate Sustainability Strategy 2010 – 2015

Healthy catchments, quality water – always

Our Values: Trust; Confident; Responsible; Respect

SYDNEY CATCHMENT AUTHORITY

Key Focus Areas

Engaged People	Stakeholder Relationships	Business Viability	Industry Excellence	Reliable Water	Resource Optimisation
Employees are committed, trusted, valued, safe and accountable in supporting SCA's long-term success.	SCA has excellent partnerships with stakeholders, customers and the community.	The SCA is a viable, commercially successful organisation that is able to adapt to changing business environments and meet customer needs and seek new services and markets.	The SCA is recognised as a leader within the Australian water sector for its organisational practices.	The SCA provides reliable water of agreed quality and quantity to customers to minimise risk to public health.	The SCA achieves sustainable outcomes through the optimisation of its resources and innovative use of assets.

Performance Indicators

• Zero harm target. • 80% highly engaged employees.	• 80% of customers and stakeholders satisfied with SCA.	• Achieve return on asset target.	• 100% of management responses implemented within agreed timeframe.	• 95% compliance with specified water quality characteristics. • 100% continuity of water supply.	• Reduction in ecological footprint.

Strategies

1.1 Provide a safe and healthy workplace where everyone takes responsibility for a safety culture. 1.2 Support, develop and reward employees so they will recommend SCA as an employer of choice. 1.3 Ensure SCA's organisational structure, and decision making processes support a commercial culture and accountable workforce. 1.4 Provide leadership and a clear direction for staff to support their commitment.	2.1 Formalise the SCA's knowledge management capability to share knowledge internally and externally. 2.2 Understand, meet and effectively manage the needs and expectations of stakeholders, customers and the community. 2.3 Represent SCA's interests in key local, state and national forums.	3.1 Position the organisation to be the Water Supplier of Choice. 3.2 Manage risk and pursue opportunities to support a resilient organisation. 3.3 Strive for cost efficiency through optimising operational expenditure and ensuring capital expenditure is efficient. 3.4 Provide reliable and effective systems, processes and tools to support business operations.	4.1 Ensure accountability and ethical behaviour through sound corporate governance. 4.2 Achieve excellence through benchmarking activities. 4.3 Maintain compliance with statutory, regulatory and industry requirements. 4.4 Implement contemporary knowledge management and intellectual property practices.	5.1 Protect and improve the health of the drinking water catchment through the delivery of the Healthy Catchments Strategy and sound scientific research. 5.2 Manage assets for improved efficiency, sound operations and safety. 5.3 Operate water supply system to deliver water to agreed quantity and quality criteria. 5.4 Achieve current and future water quality and quantity needs through water supply planning and asset investment.	6.1 Investigate additional sources of renewable energy. 6.2 Improve the impact of the SCA's activities on the environment. 6.3 Utilise resources in innovative ways and embrace new technology. 6.4 Manage lands to contemporary standards.

Appendix 2 – SCA Response to Questions raised by IPART in the Issues Paper (Operating Licence)

QUESTION	COMMENT
1. What is the level of support for the proposed adoption of a systems or framework standard approach to the operational areas in the licence? If low, is there support for the existing provisions or an alternative approach or amendment?	The SCA supports simple unambiguous compliance requirements. The SCA favours outcomes based conditions over prescriptive standards as they are more adaptable over the licence term as the operating environment changes.
2. What are the quantifiable and qualitative costs and/or benefits of the existing licence provisions?	The 2008-09 operational audit cost in the order of $110,000 pa. Corporate compliance staff costs to support the ongoing compliance requirement are in the order of $145,000 pa. The cost associated with the staff across the business that are responsible for implementing the operating licence obligations would amount to approximately $25,000 pa. Total costs for administering the operating licence are in the order of $280,000 pa. The benefits of the existing licence provisions are a rigorous independent audit process, high level of transparency and accountability which provides the Minister and the community with a high level of confidence in the SCA's operation.
3. What are the quantifiable and qualitative costs and/or benefits of the proposed adoption of systems or framework standard approach to operational areas in the licence?	Developing management systems to a level for certification would be in the order of $500,000. There are also costs associated with the annual maintenance of certification which are estimated at $278,000 pa. The approach is process focussed as opposed to being outcome focussed which may mean a reluctance on the part of IPART to restrict operational audit scope. There would be some savings from the $110,000 pa in terms of audit costs charged by IPART and some savings to the ongoing annual compliance costs to the SCA of $145,000. Common systems provide consistency across the business and the sector for benchmarking purposes. A systems or framework standard will achieve consistent processes across the business and continual improvement is actively identified under these management systems.

QUESTION	COMMENT
4. Whether it is reasonable to reduce the scope of IPART's operating licence audits where suppliers are certified under third party arrangements such as ISO.	The Water Quality Monitoring Program uses ISO accredited samplers and the laboratories are NATA accredited. As such this process should not need to be audited by IPART under the operating licence. Environmental audits are undertaken through the SCA's internal auditors who are appropriately qualified. It should be reasonable to reduce the audit scope where suppliers are accredited.
5. Are there alternative approaches or amendment(s) to the operating licence? If so, are there examples and quantifiable and qualitative costs and/or benefits of these alternatives?	The SCA is recommending a range of amendments to streamline the licence and remove duplication which are included in attachment 3 as a clause by clause licence assessment. Most of the amendments streamline the licence and address the issue of clarity and duplication and minimise regulatory overlap. These do not always impose large cost burdens but mean that information is produced more than once often with slight differences in requirements but demonstrating similar functional outcomes. The need to report water balance to IPART and for the National Water Accounts is an example where similar information is being requested but to meet information outcomes on a different scale. This could cause confusion in the community and generates more work for the agency.
6. If there is support for the proposed adoption of a systems or framework standard approach to operational areas in the licence, which infrastructure management approach (PAS 55 or Aquamark) would be supported? Are there other approaches we should be considering?	If the SCA were to adopt a system or a standard approach it would maintain the obligations under the clauses relating to water quality and catchment management to meet the Australian Drinking Water Guidelines (ADWG) 12 elements and would be prepared to use the WSAA Aquality benchmarking tool to benchmark performance. In relation to environmental management the SCA uses AS14001 for its dam safety systems only. The SCA undertakes limited activities that require specific environmental management processes and many of these activities are through third parties who, where relevant, are required to demonstrate AS/NZS ISO 14001:2004 or AS/NZS ISO 9001:2008 accreditation or the equivalent. The remaining environmental obligations for the SCA under clause 5.1 in relation to green house gas emissions, water conservation and heritage are required under other legislation and are duplicated in the licence. There is limited benefit in these requirements being repeated in the operating licence. In relation to Asset Management the SCA is aligning its systems and processes to align with BSI PAS55:2008. As has occurred in the past in 2004 and 2008, the SCA

QUESTION	COMMENT
	will benchmark its performance using the WSSA Aquamark benchmarking tool
7. Are there any other considerations we have failed to take into account in proposing to adopt a systems or framework standard approach to operational areas in the licence?	No
8. What other issues and changes should we consider in identifying improvements to the structure of SCA's operating licence, to better meet the licensing objectives and principles?	Reporting obligations are throughout the licence and the SCA welcomes the move to a reporting manual to consolidate reporting requirements.
9. Are the proposed reporting manual arrangements adequate to consolidate and coordinate reporting requirements under the operating licence?	Yes
10. What are the quantifiable and qualitative costs and/or benefits of the proposed amendments addressing the structure of the licence?	With the exception of the adoption of certification and a standards based approach there are efficiency savings in simplifying and streamlining the licence with both the reporting manual and removal of some conditions that are duplicative. Conditions such as the water balance reporting which is now required by BoM but uses a slightly different method to that required by IPART, environmental requirements and water quality obligations that repeat compliance with the ADWG. The cost savings of some changes may not be substantial but are better business practice.
11. What alternative approach(es) or amendment(s) should be considered to address issues related to the structure of the licence? Please include a summary of the quantifiable and qualitative cost and/or benefits of any alternative approach or amendment.	The SCA supports IPART's proposed licence structure improvements.
12. Is the licence the appropriate instrument to contain detailed arrangements for governing the	The licence defines the terms and conditions under which the SCA is required to provide, construct, manage and maintain efficient and *co-ordinated* viable systems and

QUESTION	COMMENT
water supply market? Is the operating licence the appropriate regulatory instrument to clarify, monitor and enforce SCA's role in the water supply market?	services for supplying water. The co-ordination role is included in s26 of the *Sydney Water Catchment Management Act 1998*. Therefore some consideration of the nature of the co-ordination role should be included in the licence. This is currently through yield and the model used to determine available water for Sydney over the longer term. The portfolio approach used in the Metropolitan Water Plan process does not negate the need to understand total available long term supply. In order to effectively manage the water supplies for Greater Sydney it is critical that the relative contributions from various sources of supply are known and planned and the lowest cost water is offered to customers and overall supplies are managed in a way that maximises the available water for consumption without wasting water.
13. Is the scope of the review of the *Cryptosporidium* and *Giardia* monitoring program appropriate? Are there issues which should be added to the review for consideration?	The review is an opportunity to consider whether there is scope to further refine the monitoring program.
14. Is the proposed timing of the review of the *Cryptosporidium* and *Giardia* monitoring program appropriate?	Any review of the monitoring program requires close consultation with NSW Health, Office of Environment and Heritage and SWC along with a broader public consultation process if significant change is likely. The proposed timing for the review is adequate.
15. Are there other sources of publicly available reporting that provide information on catchment health for the Sydney drinking water catchment, other than the 3-year catchment audit?	State of Environment reporting provides information on catchment health as does the annual reporting by the Catchment Management Authorities. The SCA produces as a part of its licence obligations, an annual report against the activities it undertakes in the catchment. The tools used to develop the SCA catchment programs provide a sound basis for understanding catchment issues and priorities for water quality.
16. Is this amount of information on catchment health sufficient? Are there components of catchment health which are not reported on publicly and should be? Please include a summary of the quantifiable and qualitative cost	The SCA's primary interest in relation to catchment health is water quality. The SCA, over the life of the previous price path invested $20million pa on catchment activities, evaluation and monitoring and science and research. This investment is considered prudent and efficient to build knowledge and implement catchment management actions to protect catchment health.

QUESTION	COMMENT
and/or benefits of any additional reporting requirements.	
17. What customer-related obligations would be appropriate, given the balance required between regulatory burden on a small customer base compared with those receiving adequate customer protection? Please include a summary of the quantifiable and qualitative cost and/or benefits of the customer obligations.	The SCA has been required to report on all complaints related to its functions, not only those related to its customers. This requirement is broader than that of other water utilities licensed by IPART (Hunter Water and Sydney Water). The SCA is also required to report on the nature of the complaint, and how and how well it was resolved. The SCA receives very few complaints for example, in 2009-10 the SCA received 5 complaints, for the same period Sydney Water received 8,755.
18. Is there any value in retaining the specific water conservation obligations, rather than incorporating it into the environmental management system? Please include a summary of the quantifiable and qualitative cost and/or benefits of any recommended water conservation obligations.	As noted in IPART's report there is very little opportunity for the SCA to introduce water saving initiatives. Most of its office buildings are leased with the main building having achieved a 4.5 star rating. Its other activities are largely associated with dams rather than reticulation systems unlike other water utilities that have extensive pipe systems and leakage or sewerage services and there is very little opportunity for further water saving at the SCA. Water balance reporting is now required by BOM as part of the National Water Accounts and it is duplicative to retain these provisions in the licences.

Appendix 3 – Operating Licence Review – SCA Commentary on Conditions (Clause by Clause)

Clause	Title of Clause	Proposed Change
1	General Comment	
IPART is proposing reporting requirements and performance indicators be moved from the licence to a Reporting Manual to remove duplication and allow greater flexibility in reporting requirement. The SCA supports this proposal as it offers scope to change reporting requirements without amending the licence.		
2	SCA Responsibilities	
3	Raw Water Quality	
3.5	Catchment and system management	This clause should be reviewed as it duplicates 3.7 requirements. This will streamline the audit and reporting of compliance with the drinking water guidelines.
3.6	Water quality monitoring and reporting	IPART is recommending a review of the water monitoring program to explore whether there could be a greater emphasis on non routine monitoring. The SCA can investigate how the monitoring program could be modified to reduce the frequency of monitoring of sites that regularly show low risks to water quality from pollutants without the requirement for a condition in the licence. 3.6.7 – 3.6.11 These provisions should be included in the reporting manual.
3.7	Water quality planning	IPART is considering removing specific requirements in relation to the water quality management framework provided that the SCA demonstrates implementation of the elements in the Australian Drinking Water Guidelines (ADWG). The SCA supports the proposed changes as they will simplify the licence conditions and make clearer the SCA obligations
4	Catchment Management and protection	
4.1	SCA to manage and protect catchments	These provisions should be included in the reporting manual.
4.3	Regional Environmental Plan	The REP has been replaced by the SEPP. These are SCA regulatory functions and IPART need not regulate these functions.
5	Environment	
5.1	Environmental Management	Environmental management is embedded in the SCA Corporate Sustainability Strategy and reported through the SCA Annual Report. Clause 5.1.3 is unnecessary as there are various Government policy drivers for these activities.
5.2	Catchment and	Schedule 2 Environmental Indicators are under review by

Clause	Title of Clause	Proposed Change
	Environmental Performance Indicators	IPART. Most of the catchment indicators have been superseded by the Catchment Health Indicators gazetted in 2009. SCA's impacts on the environment are included in other regulator's reporting requirements and are duplicated in the Operating Licence and should be removed. 5.2.2 and 5.2.3 should be reviewed and if necessary moved to the Reporting Manual.
6	Management of Catchment Infrastructure Works and Water Conservation	
6.1	Management of Catchment Infrastructure Works	The Design Criteria from Schedule 2 of the 2000 Operating licence is still applicable and should remain in the Operating Licence as these determine the total available water over the longer term (including desalinated water). Effective supply demand balance cannot be known without a clear understanding of the water supply system design criteria and the models that underpin the calculation of yield.
6.2	Water Supply System Yield	
6.3	Review of the model	
6.4	Water Conservation	The SCA experiences minimal leakage and loss as it has very little pipe network only the Warragamba to Prospect pipe line which is above ground and the upper canal which is meant to seep water. Water balances are now required by the National Water Accounts and given there are difference methodologies it is duplicative to continue to require the water balances required under the operating licence
7	Asset Management	
7.2	Reporting on the management system of the Assets	Change definition of assets to reflect the Act. These provisions should be included in the reporting manual.
8	Customers	
8.3	Complaints	8.3.3 – 8.3.5 SCA should be required to maintain its customer complaints handling procedure and systems. However, given the small customer base and limited number of complaints the Operating licence should not impose reporting requirements in relation to complaints.
8.4	Consultation	The requirement to consult with regulators/stakeholders/community is currently embedded in clauses in the licence and these are individually audited and reported through the Annual Licence audit. This clause is duplicative.
9	Pricing	The SCA supports IPART's approach to streamlining these sections of the licence to remove conditions placing obligations on IPART
10	Liability issues	
11	Annual audit of the licence	

Appendix 4 – SCA Response to IPART Request for Information and Comments – Price Review

Issues Paper Reference Number	Information or Comment Request	Reference to SCA Response in Submission
1	The risks or uncertainties in SCA's operating environment over the upcoming determination period and beyond, including the nature of these risks or uncertainties and the likelihood of these impacting on specific costs. (for example electricity charges)	6.5.3 Emerging issues relating to operating expenditure
2	How SCA has ascertained the appropriate service levels that it plans to provide over the upcoming determination period, and how these service levels relate to forecast costs.	6.1 Service Standards (see also, under Operating Licence - 3.2.1 System standards & 3.2.5 Asset management)
3	SCA's preferred length for the determination period	6.2 Regulatory Period
4	SCA's capital expenditure over the current determination period, drivers of this expenditure, and service outcomes achieved.	Capital expenditure Capital expenditure
5	SCA's capital expenditure over the current determination period compared to expenditure allowed by IPART when it set prices in the 2009 Price Determination, and an explanation of variances	5.6 Capital Expenditure Appendix 6 – Comparison actual capital expenditure by project to IPART determined capital expenditure by project
6	SCA's projected capital expenditure program over the upcoming determination period and beyond, drivers of this expenditure, and expected service outcomes to be achieved	Section 6.4 Future Capital expenditure
7	SCA's asset management practices and plan, and the relationship between its asset management framework and its capital expenditure program	Section 6.4 Future Capital Expenditure
8	The value and timing of contributions (including contributed assets) to SCA from government and/or other sources	The SCA does not receive contributions from Government and/or other sources.
9	SCA's operating expenditure over the current determination period, drivers of this expenditure, and service outcomes achieved	5.5 Operating expenditure, 5.5.3Outcomes by Service
10	SCA's operating expenditure over the current determination period compared to expenditure allowed by IPART when it set prices in 2009, and an explanation of variances.	5.5 Operating expenditure
11	SCA's projected operating expenditure over the upcoming determination period, including drivers of this expenditure, expected service outcomes, specific efficiency programs and the potential for efficiency gains.	6.5 Projected operating expenditure, 6.5.2 Drivers for expenditure
12	SCA's proposed methodology for calculating depreciation and assessing asset lives, and the assumptions used to determine these.	6.6.1 Asset life and depreciation
13	SCA's performance against its output measures	5.2 Performance against output measures
14	Projects or activities that SCA plans to undertake over the upcoming determination period and expected outputs or outcomes of these projects.	6.4 Future Capital expenditure
15	SCA's forecast water sales, by customer, over the upcoming determination period, taking into account relevant impacts including those detailed above	7.1 Demand Forecasts
16	SCA's proposed prices (including pricing level and structure, and prices per customer) over the upcoming determination period, and the reasoning or justification behind these proposals	7 Proposed prices
17	The probability of it commencing transfers of water from Shoalhaven River	6.5.3 Emerging issues relating to operating expenditure
18	Whether the Desalination Plant Operating Rules increases revenue risks, and if so, its suggested mitigation tools	Section 6.7 Revenue Variation

19	The possible implications for the SCA of the price structure to be proposed by Sydney Desalination Plant Pty Ltd.	Section 6.7 Revenue Variation
20	The potential for imposing water restrictions and impacts on sales forecasts	Section 7.1 Demand Forecasts
21	Sales forecasts to Sydney Water, including a breakdown of sales forecasts for supplying the North Richmond plant	Section 7.1 Demand Forecasts
22	The costs associated with water supply for the North Richmond plant, and if they differ from the other water supplied to Sydney Water	Section 7.4 Pricing methodology for North Richmond
23	The need and basis for including price adjustment mechanisms to address risks faced by SCA	Section 9.1 Price adjustment mechanism for unforeseen cost
24	SCA's proposal for addressing revenue risks	Section 6.7 Revenue variation
25	Its views on the introduction of wholesale scarcity pricing, the barriers to the implementation of a water market, and how it would work in practice.	9.2 Wholesale scarcity pricing
26	"The systems, planning, approach, robustness of decision-making processes, prudence, efficiency, timing and prioritisation of different project phases to ensure optimal outcomes for customers and lumpiness minimised over the expenditure profile.	6.3 SCA's Corporate Sustainability Strategy
27	Configuration, resources and management systems of SCA and the extent to which these could be optimised having regard to effectiveness and efficiency.	5.1 Organisational achievements
28	Consideration of alternative options to achieve SCA's objectives and service delivery	Appendix 1 - SCA's Corporate Sustainability Strategy
29	The size and significance of heritage-asset obligations and other non-commercial activities on operating and capital costs.	Section 9.3 Cost recovery of heritage asset obligations and non commercial activities

Appendix 5 – IPART'S Submission Guidelines for SCA

Item	Reference Response in Submission
An Executive Summary has been included	Executive Summary
Role and functions of the agency have been explained	1 Introduction
Performance over current determination period	5 Review of Current Price Path
■ Service levels	4.3 Customer service, 5.3 Service standards
■ Revenue	5.4 Water sales and revenue variation
■ Sales volumes and customer connections	5.4 Water sales and revenue variation
■ Historic operating expenditure. Data presented in nominal $.	5.5 Operating expenditure
■ Historic capital expenditure. Data presented in nominal $.	5.6 Capital Expenditure
■ Implementation of current determination under s.18(5) IPART Act	5 Review of Current Price Path
Standards of service	
■ Explained service levels (quantity, quality and scope) for next determination period	6.1 Service Standards
Forecast operating expenditure	
■ 5 years of future operating costs by service are provided	6.5 Projected operating expenditure
■ Operating costs are in real $ of last year of current determination period	Yes. See *ibid*.
■ Drivers, justification and services levels are explained	6.5.2 Drivers for expenditure
■ A robust business case for proposed operating expenditure is presented	6.3 SCA's Corporate Sustainability Strategy, 6.5.2 Drivers for expenditure
■ Explained key assumptions underlying forecasts and indentified risks	*Assumptions*: 6.5.1 Projected expenditure, 6.5.2 Drivers for expenditure, *Risks*: 6.5.3 Emerging issues relating to operating expenditure
■ Explained potential efficiency gains	6.5.2 Drivers for expenditure

Item	Reference Response in Submission
Forecast capital expenditure	
■ 5 years of capital expenditure by service is provided	6.4 Future capital expenditure
■ Capital expenditure is in real $ of last year of current determination period	Yes
■ Drivers, justification and service levels explained	6.4.2 Drivers for capital expenditure
■ A robust business case for proposed capital expenditure is presented	6.3 SCA's Corporate Sustainability Strategy
■ Explained key assumptions underlying forecasts and indentified risks	Appendix 7 - Forecast Major projects
■ Explained potential efficiency gains	6.4.2 Drivers for capital expenditure
Elements of Regulatory Framework	
■ Length of determination period	6.2 Regulatory period
■ Other issues e.g. prices charged between agencies	6.5.3 Emerging issues relating to operating expenditure
Proposed WACC, Depreciation and Asset Lives	
■ Proposed WACC, WACC components and supporting analysis	6.6.3 Rate of return
■ Outline of proposed depreciation method	6.6.1 Asset life and depreciation
■ Proposed asset lives	6.6.1 Asset life and depreciation
Sales Volumes	
■ Sales volumes and methodology used to forecast sales	7.1 Demand forecasts
Customer Numbers or Entitlement Forecasts	
■ Connection numbers by year and service (metropolitan water utilities)	7 Proposed prices
■ Entitlement numbers by year, valley and type (bulk water utilities)	N/A
Outstanding Issues from the Previous Determination	
■ Explanation of how outstanding issues have progressed with a summary of analysis in appendix	6.8 Outstanding Issues
Proposed Prices	
■ Proposed tariffs for each service over the next five years	7.6 Sydney Water prices, 7.7

Item	Reference Response in Submission
	Council prices
Impacts of Proposed Prices	
■ Transitional arrangements to manage or mitigate price changes	N/A
■ Rebates and other measures to mitigate price impacts	N/A
■ Other impacts, environment, section 15 etc	N/A
■ Analysis of affordability	8 Customer Impact
■ Financial impacts on the agency	8.3 Impacts on the agency – credit ratings, financial viability
Quality Assurance Requirements	
■ QA check has been performed	Yes.

Appendix 6 – Comparison actual capital expenditure by project to IPART determined capital expenditure by project

CONFIDENTIAL SUBMISSION

Appendix 7 – Forecast of Major Projects

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Appendix 8 – Forecast Financial Summary

	2012	2013	2014	2015	2016	2017
Operating Results ($M 11-12)						
Regulatory revenue	200.2	204.9	209.2	214.0	219.1	218.8
Other revenue	2.5	2.2	1.9	1.9	1.9	1.9
Total Revenue	**202.7**	**207.1**	**211.1**	**215.9**	**221.0**	**220.7**
Less: Operating expenditure	99.6	91.0	90.7	90.7	90.7	90.7
Earnings before interest, tax and depreciation	**103.1**	**116.1**	**120.4**	**125.2**	**130.3**	**130.0**
Depreciation and Loss on assets	24.4	24.5	24.6	24.7	24.3	24.2
Financing charges	32.6	31.6	30.2	29.3	27.0	30.9
Earnings before tax	**46.1**	**60.0**	**65.6**	**71.2**	**79.0**	**74.9**
Income tax expense	13.8	18.0	19.7	21.4	23.7	22.5
Net Profit after tax	**32.3**	**42.0**	**45.9**	**49.8**	**55.3**	**52.4**
Summary Balance Sheet ($M 11-12)						
Total assets	1,399.6	1,406.2	1,413.8	1,425.1	1,446.0	1,481.2
Total borrowings	462.5	436.5	418.2	402.9	394.5	407.3
Other liabilities	178.5	183.7	184.8	186.0	189.0	186.2
Net Assets	**758.6**	**786.0**	**810.8**	**836.2**	**862.5**	**887.7**
Represented by:						
Equity	471.5	457.8	446.6	435.7	425.1	414.7
Retained profits/ Accumulated surplus	40.2	49.5	59.8	70.8	82.9	94.0
Asset revaluation reserve	246.9	278.7	304.4	329.7	354.5	379.0
Total Equity	**758.6**	**786.0**	**810.8**	**836.2**	**862.5**	**887.7**
Financial Indicators						
FFO Interest Coverage	2.6	3.1	3.3	3.5	3.9	3.5
Pre-tax interest cover	2.4	2.9	3.1	3.4	3.9	3.4
Funds flow net debt payback ratio	9.3	6.3	5.7	5.2	4.7	5.0
FFO/ avge debt	11%	15%	17%	18%	20%	19%
Gearing Ratio	38%	36%	34%	33%	31%	31%

Appendix 9 – Weighted Average Cost of Capital Report

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8 September 2011

Dear Rod

Re: Weighted average cost of capital advice

1. Introduction

You have requested Deloitte Touche Tohmatsu (Deloitte) to provide advice to the Sydney Catchment Authority (SCA or the Company) on the appropriate weighted average cost of capital (WACC) to be used in your upcoming submission to the Independent Pricing & Regulatory Tribunal of New South Wales (IPART) for the regulatory period commencing on 1 July 2012. Our advice is set out in this letter (the Letter).

2. Purpose and Statement of Responsibility

We understand that this Letter is required to assist the SCA in the preparation of its regulatory submission to IPART in September 2011.

The Letter was prepared for the use of the SCA for the purpose as set out above. Deloitte agrees that the SCA may provide the Letter to IPART as part of the SCA's regulatory submission provided you first seek our consent in relation to the context in which references to the Letter are made in any such documents (such consent not to be unreasonably withheld). In addition, the SCA will seek Deloitte's consent prior to use of the report for any other purpose or release of the report to any other party not contemplated by this Letter.

This Letter is prepared solely for the purpose of assisting the SCA for the purpose as set out above and in our engagement letter dated 22 August 2011 and only for their benefit and purpose. This Letter may not be used for any other purpose unless written consent has been provided by us. This Letter is not intended for and should not be referred to, used or relied upon by anyone else and we accept no duty of care to any other person or entity.

3. Limitations and reliance on information

The opinion of Deloitte is based on economic, market and other conditions prevailing at the date of this letter. Such conditions can change significantly over relatively short periods of time. This letter should be read in conjunction with the declarations outlined in Section 6.

Our procedures and enquiries do not include verification work nor constitute an audit or a review engagement in accordance with standards issued by the Auditing and Assurance Standards Board or equivalent body and therefore the information used in undertaking our work may not be entirely reliable.

4. WACC calculation

We understand that the SCA requires a real pre-tax WACC for its submission to IPART. We have calculated the real pre-tax WACC for the SCA in a manner consistent with regulatory practice. The formula adopted in calculating the real pre-tax WACC is set out below:

$$WACC = [1 + (K_e * E/V + K_d * D/V)] / (1 + i) - 1$$

The components of the formula are:

K_e	=	cost of equity capital (pre-tax and adjusted for dividend imputation)
K_d	=	cost of debt (pre-tax)
E/V	=	proportion of company funded by equity
D/V	=	proportion of company funded by debt
i	=	rate of inflation

The corporate tax rate has been assumed to be 30%, in line with the Australian corporate tax rate.

In determining each element of the WACC for the SCA we have considered, among other factors, the following:

- IPART's final determination in respect of the WACC for the SCA for the regulatory period from 1 July 2009 to 30 June 2012 (the Previous SCA Determination)
- IPART's final determination in respect of the WACC for Country Energy's water services for the regulatory period from 1 July 2010 to 30 June 2013 (the Country Energy Determination). This is IPART's most recent determination in respect of the WACC for water services
- IPART's June 2011 issues paper in respect of a review of prices for Sydney Desalination Plant Pty Limited's (SDP) water supply services for the regulatory period to 30 June 2017 (the SDP Issues Paper)
- SDP's July 2011 submission to IPART in response to the SDP Issues Paper (the SDP Submission)
- IPART's April 2010 final decision paper, "IPART's weighted average cost of capital" (the IPART WACC Paper)
- IPART's April 2011 final decision paper, "Developing the approach to estimating the debt margin" (the IPART Debt Margin Paper).

Cost of equity capital (K_e)

The cost of equity, K_e, is the rate of return that investors require to make an equity investment in a firm.

We have used the CAPM to estimate the K_e for the SCA. CAPM calculates the minimum rate of return that the company must earn on the equity-financed portion of its capital to leave the market price of its shares unchanged. The CAPM is the most widely accepted and used methodology for determining the cost of equity capital.

The CAPM was adopted in determining the cost of equity capital in the Previous SCA Determination, the Country Energy Determination, the SDP Issues Paper and the SDP Submission.

The pre-tax cost of equity capital under CAPM, including the effect of dividend imputation credits, is determined using the following formula:

$$K_e = [R + \beta(R_m - R_f) + a] / [1 - t_c(1 - \gamma)]$$

The components of the formula are:

K_e	=	required return on equity (pre-tax and adjusted for dividend imputation)
R_f	=	the nominal risk free rate of return
R_m	=	the nominal expected return on the market portfolio
β	=	beta, the systematic risk of a stock
α	=	specific company risk premium
t_c	=	corporate tax rate
γ	=	the proportion of imputation credits that can be used by shareholders

Each of the components in the above equation is discussed below.

Risk free rate (R_f)

The risk free rate compensates the investor for the time value of money and the expected inflation rate over the investment period. The frequently adopted proxy for the risk free rate is the long-term government bond rate.

In determining R_f, consistent with regulatory practice, we have taken the average over the 20-day trading period to 23 August 2011 of the 10-year Australian Government Bond yield, being 4.54%. The 10-year bond rate is a widely used and accepted benchmark for the risk free rate in Australia. This rate represents a nominal rate and thus includes inflation.

This approach in determining R_f is consistent with the approach used by IPART in the Previous SCA Determination, the Country Energy Determination and the IPART WACC Paper.

Equity market risk premium (EMRP)

The EMRP ($R_m - R_f$) represents the risk associated with holding a market portfolio of investments, that is, the excess return a shareholder can expect to receive for the uncertainty of investing in equities as opposed to investing in a risk free alternative. The size of the EMRP is dictated by the risk aversion of investors – the lower (higher) an investor's risk aversion, the smaller (larger) the equity risk premium.

The EMRP is not readily observable in the market and therefore represents an estimate based on available data. There are generally two main approaches used to estimate the EMRP, the historical approach and the prospective approach, neither of which is theoretically more correct or without limitations. The former approach relies on historical share market returns relative to the returns on a risk free security; the latter is a forward looking approach which derives an estimated EMRP based on current share market values and assumptions regarding future dividends and growth.

In evaluating the EMRP, we have considered both the historically observed and prospective estimates of EMRP.

Historical approach

The historical approach is applied by comparing the historical returns on equities against the returns on risk free assets such as Government bonds, or in some cases, Treasury bills. The historical EMRP has the benefit of being capable of estimation from reliable data; however, it is possible that historical returns achieved on stocks were different from those that were expected by investors when making investment decisions in the past and thus the use of historical market returns to estimate the EMRP would be inappropriate.

It is also likely that the EMRP is not constant over time as investors' perceptions of the relative riskiness of investing in equities change. Investor perceptions will be influenced by several factors such as current economic conditions, inflation, interest rates and market trends. The historical risk premium assumes the EMRP is unaffected by any variation in these factors in the short to medium term.

Historical estimates are sensitive to the following:

- the time period chosen for measuring the average
- the use of arithmetic or geometric averaging for historical data
- selection of an appropriate benchmark risk free rate
- the impact of franking tax credits
- exclusion or inclusion of extreme observations.

The EMRP is highly sensitive to the different choices associated with the measurement period, risk free rate and averaging approach used and as a result estimates of the EMRP can vary substantially.

We have considered the most recent studies undertaken by the Securities Industry Research Centre of Asia-Pacific Limited, Morningstar Inc, ABN AMRO/London Business School and Aswath Damodaran. These studies generally calculate the EMRP to be in the range of 5% to 8%.

Prospective approach

The prospective approach is a forward looking approach that is current, market driven and does not rely on historical information. It attempts to estimate a forward looking premium based on either surveys or an implied premium approach.

The survey approach is based on investors, managers and academics providing their long term expectations of equity returns. Survey evidence suggests that the EMRP is generally expected to be in the range of 6% to 8%.

The implied approach is based on either expected future cash flows or observed bond default spreads and therefore changes over time as share prices, earnings, inflation and interest rates change. The implied premium may be calculated from the market's total capitalisation and the level of expected future earnings and growth.

Selected EMRP

We have considered both the historically observed EMRP and the prospective approaches as a guideline in determining the appropriate EMRP to use in this letter. Australian studies on the historical risk premium approach generally indicate that the EMRP would be in the range of 5% to 8%.

In recent years it has been common market practice in Australia in expert's reports and regulatory decisions to adopt an EMRP of 6%.

In addition, we have considered the EMRP adopted in recent regulatory determinations and submissions, including:

- the EMRP range of 5.5% to 6.5% adopted by IPART in the Previous SCA Determination and the Country Energy Determination
- the EMRP range of 5.5% to 6.5% stipulated by IPART in the IPART WACC Paper
- the EMRP of 6.0% proposed in the SDP Submission.

Having considered the various approaches discussed above and their limitations, we consider an EMRP of 6.0% to be appropriate. We note that the selected EMRP is consistent with recent regulatory precedents discussed above.

Beta estimate (β)

Description

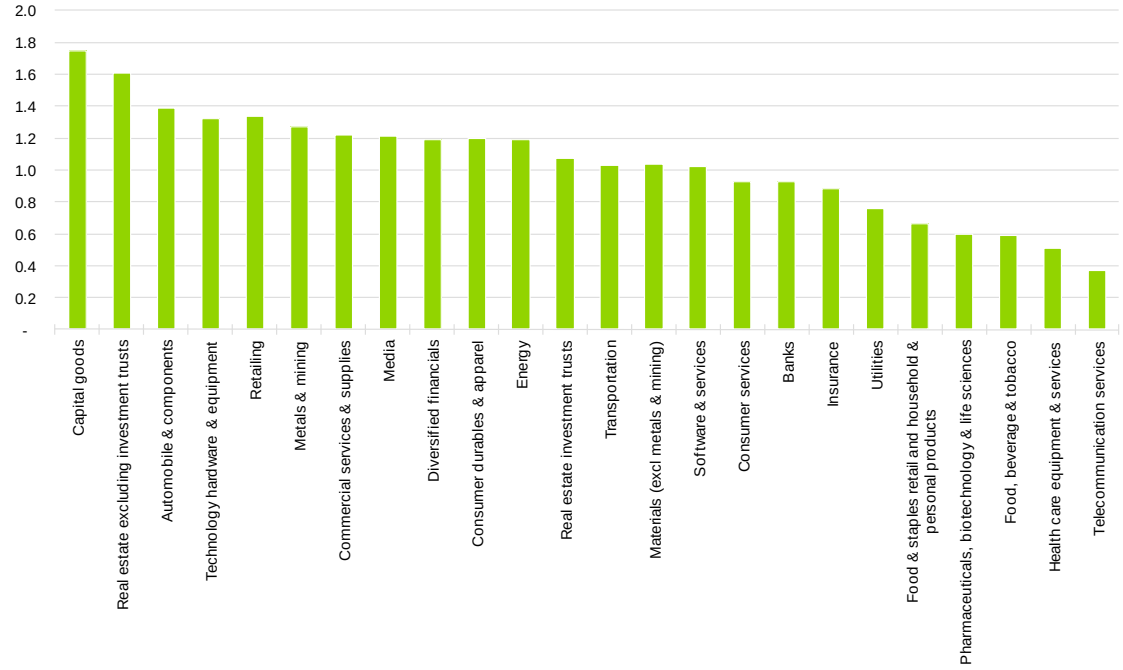
The beta coefficient measures the systematic risk or non-diversifiable risk of a company in comparison to the market as a whole. Systematic risk, as separate from specific risk as discussed below, measures the extent to which the return on the business or investment is correlated to market returns. A beta of 1.0 indicates that an equity investor can expect to earn the market return (i.e. the risk free rate plus the EMRP) from this investment (assuming no specific risks). A beta of greater than one indicates greater market related risk than average (and therefore higher required returns), while a beta of less than one indicates less risk than average (and therefore lower required returns).

Betas will primarily be affected by three factors which include:

- the degree of operating leverage employed by the firm in that companies with a relatively high fixed cost base will be more exposed to economic cycles and therefore have higher systematic risk compared to those with a more variable cost base
- the degree of financial leverage employed by a firm in that as additional debt is employed by a firm, equity investors will demand a higher return to compensate for the increased systematic risk associated with higher levels of debt
- correlation of revenues and cash flows to economic cycles, in that companies that are more exposed to economic cycles (such as retailers), will generally have higher levels of systematic risk (i.e. higher betas) relative to companies that are less exposed to economic cycles (such as regulated utilities).

The betas of various Australian industries listed on the ASX are reproduced below and provide an example of the relative industry betas for a developed market.

Figure 1: Betas for various industries (as at 31 March 2011)



Source: Securities Industry Research Centre of Asia-Pacific Limited

The differences are related to the business risks associated with the industry. For example, the above diagram indicates transportation companies are more correlated to overall market returns with a beta close

to 1.0 whereas telecommunications and other infrastructure companies (in particularly those that are regulated) typically have betas lower than 1.0.

The geared or equity beta can be estimated by regressing the returns of the business or investment against the returns of an index representing the market portfolio, over a reasonable time period. However, there are a number of issues that arise in measuring historical betas that can result in differences, sometimes significant, in the betas observed depending on the time period utilised, the benchmark index and the source of the beta estimate. For unlisted companies it is often preferable to have regard to sector averages or a pool of comparable companies rather than any single company's beta estimate due to the above measurement difficulties.

Market evidence

In estimating an appropriate beta for the SCA we have considered the betas of listed companies that are comparable to the SCA. Selected comparable companies primarily consist of UK companies operating regulated water and sewage assets (as there are no Australian listed companies operating water infrastructure assets) and infrastructure companies operating regulated energy transmission and distribution assets in Australia. These betas for these companies, which are presented below, have been calculated based on weekly and monthly returns, over two and four year periods, compared to the relevant domestic index.

Table 1: Analysis of betas for listed companies with comparable operations to the SCA

				4 year monthly		2 year weekly	
Comparable companies	Currency	Enterprise value (million)	Debt to enterprise value (%)	Levered beta	Unlevered beta	Levered beta	Unlevered beta
Water infrastructure							
United Utilities Group	GBP	9,143	55%	0.5	0.2	0.5	0.3
Severn Trent Plc	GBP	7,531	53%	0.3	0.2	0.5	0.3
Pennon Group Plc	GBP	4,431	44%	0.4	0.2	0.6	0.3
Northumbrian Water	GBP	4,474	52%	0.1	0.1	0.4	0.2
Cascal N.V.	USD	420	46%	0.2	0.1	n/m	n/m
Average			**51%**	**0.3**	**0.2**	**0.5**	**0.3**
Median			**53%**	**0.3**	**0.2**	**0.5**	**0.3**
Other regulated infrastructure							
SP AusNet Limited	AUD	9,327	46%	0.3	0.2	0.5	0.3
DUET Group	AUD	7,134	73%	0.6	0.2	0.6	0.2
APA Group	AUD	5,756	49%	0.8	0.4	0.7	0.4
Envestra Limited	AUD	2,672	66%	0.4	0.2	0.5	0.3
Spark Infrastructure	AUD	2,949	36%	0.9	0.3	0.7	0.3
Challenger Infrastructure	AUD	1,399	76%	0.6	0.2	0.4	0.1
Hastings Diversified	AUD	9,327	40%	0.3	0.2	0.9	0.6
Average			**55%**	**0.6**	**0.2**	**0.6**	**0.3**
Median			**49%**	**0.6**	**0.2**	**0.6**	**0.3**
Overall low			**36%**	**0.1**	**0.1**	**0.4**	**0.1**
Overall high			**76%**	**0.9**	**0.4**	**0.9**	**0.6**
Overall average			**54%**	**0.4**	**0.2**	**0.6**	**0.3**
Overall median			**52%**	**0.4**	**0.2**	**0.5**	**0.3**

Source: Reuters

Note:

1. Betas observed as at 23 August 2011

Descriptions for the above companies are provided in Appendix 1.

The observed beta is a function of the underlying risk of the cash flows of the company, together with the capital structure and tax position of that company. This is described as the levered beta.

The capital structure and tax position of the entities in the table above may not be the same as those of the SCA. The levered beta is often adjusted for the effect of the capital structure and tax position. This adjusted beta is referred to as the unlevered beta. The unlevered beta is a reflection of the underlying risk of the pre-financing cash flows of the entity.

In selecting an appropriate beta for the SCA we have considered the following:

- observed betas are based on historical data, which may not be representative of the market's current view, in particular given the evolution of the regulatory environment within which the industry operates
- the regulated nature of the operations of the SCA
- the SCA has traditionally operated in a monopoly market, subject to a limited degree of competition introduced by the *Water Industry Competition Act* in 2006. We note, however, that the SDP commenced operations in January 2010 and is capable of producing up to 90 billion litres per year. This represents approximately 20 percent of the SCA's sales for FY 2011. Potential also exists to upscale the plant's production capacity to 180 billion litres per year in response to severe drought and/or population growth[1]
- we consider United Utilities Group Plc, Severn Trent Plc, Pennon Group Plc and Northumbrian Water Group Plc to be the most comparable to the SCA due to the following:
    - there are no listed water utility companies in Australia
    - the regulatory framework for UK water utilities is broadly similar to the regulatory framework for Australian water utilities. We note, however, that the UK Water Services Regulation Authority has introduced a revenue recovery mechanism for the 2010 – 2015 regulatory period which removes most of the scope for water utilities to either over- or under-recover revenue relative to the assumptions made during the pricing approval process. This correction mechanism reduces the earnings risk of UK water utilities relative to Australian water utilities. Consequently, we would expect the beta for an Australian water utility to be higher than that of a comparable UK-based water utility
    - comparable UK companies tend to have a combination of regulated and unregulated business operations, similar to the SCA
    - all of the selected companies provide water management services.

  The average and median unlevered beta for these companies based on monthly returns over a four year period compared to the relevant domestic index is 0.2, with a range of 0.1 to 0.2. As noted above, we would expect the beta for SCA to be higher than that of comparable UK companies.

  The average and median unlevered beta for these companies based on weekly returns over a two year period compared to the relevant domestic index is 0.3, with a range of 0.2 to 0.3. As noted above, we would expect the beta for SCA to be higher than that of comparable UK companies
- the selected domestic listed comparable companies primarily operate or have investments in regulated assets in the energy (electricity and gas) transmission and distribution sector
- the average and median unlevered beta, based on monthly returns over a four year period compared to the relevant domestic index, for comparable domestic companies is 0.2, with a range of 0.2 to 0.4
- the average and median unlevered beta, based on weekly returns over a two year period compared to the relevant domestic index, for comparable domestic companies is 0.3, with a range of 0.1 to 0.6

[1] 2010 Metropolitan Water Plan, NSW Government

- the average and median unlevered beta, based on monthly returns over a four year period compared to the relevant domestic index, for all comparable companies is 0.2, with a range of 0.1 to 0.4
- the average and median unlevered beta, based on weekly returns over a two year period compared to the relevant domestic index, for all comparable companies is 0.3, with a range of 0.1 to 0.6
- the SCA has a high fixed cost base relative to other water utility companies. As noted earlier, companies with a relatively high fixed cost base are more exposed to economic cycles and therefore have higher systematic risk and higher betas compared to those with a more variable cost base
- assuming an unlevered beta in the range of 0.3 to 0.4, a corporate tax rate of 30% and a debt to enterprise value mix of 60% for the SCA gives a relevered beta in the range of 0.74 to 0.88
- the relevered beta is adjusted using the Blume formula[2] which adjusts the beta to reflect the tendency of a company's systematic risk to move towards the market level in the long term. The Blume adjustment is commonly applied in beta estimation using research tools such as Bloomberg Financial Markets
- the Securities Industry Research Centre of Asia-Pacific has estimated the average levered beta of utilities companies to be 0.76, based on monthly returns for the four year period to 31 March 2011
- in past regulatory decisions and methodology decision papers, IPART has stated an intention to maintain a consistent beta range between regulatory decisions due to the uncertainty inherent in estimating beta. IPART adopted an equity beta in the range of 0.8 to 1.0 in the Previous SCA Determination.

Having regard for the foregoing, we have selected a relevered beta of 0.8 to 1.0 for the SCA. In selecting this range for the beta, we have placed a greater emphasis on past regulatory practice, although we note that the selected beta range is broadly consistent with market evidence.

Company specific risk premium

The specific company risk premium adjusts the cost of equity for company specific factors, including unsystematic risk factors such as:

- company size
- depth and quality of management
- reliance on one key individual or a few key members of management
- reliance on key customers
- reliance on key suppliers
- geographic diversity
- product diversity (limits on potential customers)
- labour relations, quality of personnel (union/non-union)
- capital structure, amount of leverage
- existence of contingent liabilities.

We have considered the appropriateness of a specific company risk premium in respect of changes to the operating rules under the Metropolitan Water Plan for desalination and Shoalhaven pumping.

[2] The Blume formula adjusts the beta to reflect the tendency of a company's beta to move towards the market beta of 1 in the long term. It does this by partially weighting the beta towards 1 using the following formula:

$$\text{Blume-adjusted beta} = [\text{relevered beta} \times (2/3)] + (1/3)$$

The SCA has traditionally operated in a monopoly market, subject to a limited degree of competition introduced by the *Water Industry Competition Act* in 1997. Changes to the desalination operating rules under the Metropolitan Water Plan could give rise to reduced volumes for the SCA. As discussed above, the SDP is capable of producing up to 90 billion litres per year, which represents approximately 20 percent of the SCA's total sales for FY 2011, with potential for an increase in capacity to 180 billion litres per year. Whilst the changes to the operating rules for Shoalhaven pumping are not likely to have an impact on competition faced by the SCA, it is likely that costs to SCA will increase.

The comparable companies considered in our selection of the beta above mainly operate assets in monopoly markets. In general, we consider that a company operating in a monopoly market would be subject to less risk than a company facing some degree of competition, for instance in a duopoly market.

We consider the changes to the operating rules under the Metropolitan Water Plan for desalination would likely increase competition for the SCA business, and therefore increase the risk of the SCA business. If this additional risk were to be reflected in the WACC for the business, by applying a specific company risk premium, we would expect the WACC to increase.

Dividend imputation

Dividends paid by Australian corporations may be franked, unfranked, or partly franked. A franked dividend is one that is paid out of company profits which have borne tax at the company rate, currently 30%. Where the shareholder is an Australian resident individual or complying superannuation fund, it will generally be entitled to a tax credit (called an imputation credit) in respect of the tax paid by the company on the profits out of which the dividend was paid. If the recipient of the dividend is another company, the dividend will give rise to a credit in that company's franking account thereby increasing the potential of the company to pay a franked dividend at a later stage.

Dividend imputation can be treated as:

- an adjustment to the WACC
- an adjustment to the cash flows
- no adjustment - on the basis that the observed EMRP already includes the value that shareholders ascribe to franking credits in the market as a whole.

In determining an appropriate estimate for the gamma (γ) factor, we have considered the following factors:

- γ in the range of 0.3 to 0.5 adopted in the Previous SCA Determination
- γ in the range of 0.3 to 0.5 adopted in the Country Energy Determination
- γ of 0.25 proposed in the SDP Submission
- infrastructure funds typically adopt γ values in the range of 0.7 to 0.8 in assessing asset values during acquisitions
- in May 2011, the Australian Competition Tribunal (ACT) handed down a decision in respect of an appeal from ETSA Utilities against the final determination made by the Australian Energy Regulator in 2010. The ACT ruled that, amongst other things, the γ to be applied to ESTA Utilities should be reduced from 0.65 to 0.25. A γ of 0.25 was also reaffirmed by the ACT with respect to the gas assets of Jemena Gas Networks (NSW) in a decision handed down in June 2011.

Based on the above considerations and having particular regard to the ACT decisions made with respect to ETSA Utilities and Jemena Gas Networks, being the most recent regulatory precedents, we consider a γ of 0.25 is appropriate for the SCA.

Conclusion on cost of equity

Based on the above factors we arrive at a pre-tax cost of equity, K_e, as follows:

Table 2: *K_e* applied to valuation of the SCA

Input	Low	High
Risk free rate (%)	4.54	4.54
EMRP (%)	6.00	6.00
Beta	0.80	1.00
K_e[1] – calculated	12.06%	13.61%

Source: Deloitte analysis

Notes:

1. K_e includes the impact of dividend imputation.

Cost of debt capital (K_d)

We have considered the following factors in estimating the cost of debt for the SCA:

- 98.4% of outstanding loan obligations of the SCA as at 30 June 2010 are long term fixed rate loans from the NSW Treasury Corporation. The remaining balance relates to call loans and variable interest loans. The estimated effective interest rate for financial year (FY) 2010 was 5.9%[3]
- the 20-day average yield to 23 August 2011 of 7.1% for the bonds sampled in the IPART Debt Margin Paper[4]. This represents a margin of approximately 250 basis points above the selected risk free rate assumption of 4.54%
- the debt margin of 280 to 350 basis points adopted in the Previous SCA Determination
- the debt margin of 180 to 380 basis points adopted in the Country Energy Determination
- the debt margin of 342 basis points proposed in the SDP Submission
- a 20 basis point allowance for debt raising costs, as stipulated in the IPART Debt Margin Paper
- a cost of debt assumption of 7.00% to 8.00% implies a margin of approximately 250 to 350 basis points above the selected risk free rate assumption of 4.54%.

Based on the above considerations, we have estimated the cost of debt for SCA to be in the range of 7.00% to 8.00%.

[3] Calculated as follows: interest expense for FY 2010 ÷ average debt for FY 2010

[4] Excluding the APT Group and Santos Limited

Debt and equity mix

We have considered the following factors in determining the debt to enterprise value mix for the SCA:

- the SCA's average debt to enterprise value ratio[5] was 40.1% for the period FY 2006 to FY 2010
- the average and median debt to enterprise value ratio of domestic comparable companies is 51% and 53%, respectively
- the average and median debt to enterprise value ratio of all comparable companies is 54% and 52%, respectively
- debt to enterprise value ratio of 60% adopted in the Previous SCA Determination
- debt to enterprise value ratio of 60% adopted in the Country Energy Determination
- debt to enterprise value ratio of 60% adopted in the SDP Submission

Based on the above considerations, we have selected a debt to enterprise value mix for the SCA of 60%, consistent with standard regulatory practice.

Inflation

In selecting an appropriate inflation rate assumption we have considered the following:

- forecasts prepared by the Economist Intelligence Unit (EIU). These are set in the table below:

Table 3: Inflation rate forecasts by EIU

	2011	2012	2013	2014	2015
Inflation (%)	3.4	3.0	2.8	2.4	2.3

Source: EIU

The average inflation rate forecast by EIU for the period from 2011 to 2015 is 2.8%

- the approach to monetary policy adopted by the Reserve Bank of Australia, which has the stated aim of maintaining inflation within a target range of 2.0% to 3.0%
- inflation rate assumptions adopted in recent regulatory determinations and submissions, including:
  - an inflation rate of 2.5% adopted by IPART in the Previous SCA Determination
  - an inflation rate of 3.0% adopted by IPART in the Country Energy Determination
  - an inflation rate of 2.6% proposed in the SDP Submission.

Based on our consideration of the above, we have selected an inflation rate assumption of 2.8%.

[5] Using book value of equity as a proxy for the market value of equity

Calculation of WACC

Based on the above, we have assessed the nominal pre-tax WACC for the SCA to be:

Table 4: WACC applied to valuation of the SCA

	Low	High
Cost of equity capital[1]	12.06%	13.61%
Cost of debt capital[2]	7.00%	8.00%
Debt to enterprise value ratio	60.00%	60.00%
Nominal WACC (pre-tax)	9.02%	10.24%
Real WACC (pre-tax)	6.05%	7.24%
Selected WACC	**6.10%**	**7.20%**

Source: Deloitte analysis

Notes:

1. Cost of equity capital is pre-tax and includes the impact of dividend imputation credits
2. Cost of debt is pre-tax

5. Sources of information

In preparing this letter we have had access to the following principal sources of information:

- publicly available information on comparable companies published by Thomson Reuters
- other publicly available information, media releases and brokers reports on the Australian infrastructure sector.

In addition, we have had discussions and correspondence with certain members of the SCA's management including Rod McInnes, Commercial Analyst, Corporate Development Group, in relation to the above information and to current operations and prospects.

6. Declarations and consents

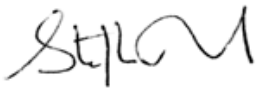
This letter has been prepared and our work has been undertaken only for the benefit of the SCA, exclusively for the purpose of assisting the SCA in the preparation of its regulatory submission to IPART in September 2011.

Statements and opinions contained in this letter are given in good faith but, in the preparation of this letter, Deloitte has relied upon the completeness of the information provided by the SCA and its officers, employees, agents or advisors which Deloitte believes, on reasonable grounds, to be reliable, complete and not misleading. Deloitte does not imply, nor should it be construed, that it has carried out any form of audit or verification on the information and records supplied to us. Drafts of our letter were issued to the SCA management for confirmation of factual accuracy.

In recognition that Deloitte may rely on information provided by the SCA and its officers, employees, agents or advisors, the SCA has agreed that it will not make any claim against Deloitte to recover any loss or damage which the SCA may suffer as a result of that reliance and that it will indemnify Deloitte against any liability that arises out of either Deloitte's reliance on the information provided by the SCA and its officers, employees, agents or advisors or the failure by the SCA and its officers, employees, agents or advisors to provide Deloitte with any material information relating to the valuation.

The employees of Deloitte principally involved in the preparation of this letter were Stephen Reid, Partner; Thimendra Karawdeniya, Associate Director; and Kanishka Dayawansa, Senior Analyst. Stephen is a Partner of Deloitte and has many years experience in the provision of corporate financial advice, including specific advice on valuations, mergers and acquisitions, as well as the preparation of expert reports.

Yours sincerely



Stephen Reid
Partner
Deloitte Touche Tohmatsu

APPENDIX 1 – COMPARABLE COMPANY DATA

We provide the descriptions for our selected comparable companies as follows:

United Utilities Group Plc

United Utilities Group Plc manages and operates the regulated electricity distribution, water and wastewater networks in North West England. The company also manages other infrastructure assets in the United Kingdom and overseas.

Severn Trent Plc

Severn Trent Plc supplies water, waste, and utility services throughout the United Kingdom, Europe, and the United States. The company offers a range of water purification, sewage treatment and disposal, and recycling services. Severn Trent Plc also provides utility companies with a range of information technology services and software solutions, as well as engineering consultancy services.

Pennon Group Plc

Pennon Group Plc operates and invests primarily in the areas of water and sewage services and waste management. Its principal subsidiary, SouthWest Water Limited, holds the water and sewerage appointments for Devon, Cornwall and parts of Somerset and Dorset. Viridor Waste Limited, another subsidiary, operates a waste treatment and disposal businesses in the UK.

Northumbrian Water Group Plc

Northumbrian Water Group plc offers drinking water and collects and treats sewage. The company also operates the Kielder Reservoir under contract with the Environment Agency. Northumbrian Water operates in northeast England, Essex and Suffolk.

Cascal N.V.

Cascal N.V. provides water and wastewater services. The company collects raw water from surface and groundwater sources or wastewater from customers' premises, treats it and then supplies the water through a distribution network to its customers or the treated wastewater to the environment.

SP AusNet Limited

SP AusNet Limited owns and operates electricity transmission and electricity and gas distribution assets in Victoria, Australia.

DUET Group

DUET Group invests in energy utility assets located in Australia and New Zealand. The group's investment assets include gas pipelines and electricity distribution networks.

APA Group

APA Group has interests in a portfolio of high-pressure gas transmission pipelines in Australia covering four states and two territories which transport natural gas.

Envestra Limited

Envestra Limited operates natural gas distribution networks and transmission pipelines in South Australia, Queensland and the Northern Territory. The company's networks distribute gas to households and businesses in Adelaide, Brisbane, Alice Springs and various regional centres in South Australia and Queensland.

Spark Infrastructure Group

Spark Infrastructure Group invests in utility infrastructure assets in Australia

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APPENDIX 1 – COMPARABLE COMPANY DATA

Challenger Infrastructure Fund

Challenger Infrastructure Fund invests in a diversified portfolio of global infrastructure, utility and related assets.

Hastings Diversified Utilities Fund

Hastings Diversified Utilities Fund invests in utility infrastructure assets such as gas transmission and distribution assets, electricity generation, transmission and distribution assets, hydro and wind power generation assets and regulated and unregulated assets.

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APPENDIX 2 – QUALIFICATIONS, DECLARATIONS AND CONSENTS

The Letter has been prepared at the request of the SCA to assist it in the preparation of its regulatory submission to IPART in September 2011. Accordingly, it has been prepared only for the benefit of the SCA's management, exclusively for the purposes discussed above and should not be used for any other purpose unless written consent has been provided by us. We are not responsible to you, or anyone else, whether for our negligence or otherwise, if the Letter is used by any other person for any other purpose. This engagement has been conducted in accordance with professional standard APES 225 Valuation Services issued by the APESB.

Statements and opinions contained in this Letter are given in good faith but, in the preparation of this Letter, Deloitte has relied upon the completeness of the information provided by the SCA and its officers, employees, agents or advisors which Deloitte believes, on reasonable grounds, to be reliable, complete and not misleading. Deloitte does not imply, nor should it be construed, that it has carried out any form of audit or verification on the information and records supplied to us. Drafts of our Letter were issued to the SCA management for confirmation of factual accuracy.

In recognition that Deloitte may rely on information provided by the SCA and its officers, employees, agents or advisors, the SCA has agreed that it will not make any claim against Deloitte to recover any loss or damage which the SCA may suffer as a result of that reliance and that it will indemnify Deloitte against any liability that arises out of either Deloitte's reliance on the information provided by the SCA and its officers, employees, agents or advisors or the failure by the SCA and its officers, employees, agents or advisors to provide Deloitte with any material information relating to the valuation.

The employees of Deloitte principally involved in the preparation of this Letter were Stephen Reid, Partner; Thimendra Karawdeniya, Account Director; and Kanishka Dayawansa, Senior Analyst. Stephen has many years experience in the provision of corporate financial advice, including specific advice on valuations, mergers and acquisitions, as well as the preparation of expert reports.

Deloitte will receive a fee for preparing this Letter. This fee is not contingent on the conclusion, content or future use of our Letter.

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Appendix 10 – Scarcity Pricing Report

Options for scarcity pricing

A FINAL REPORT PREPARED FOR SYDNEY CATCHMENT AUTHORITY

September 2011

Options for scarcity pricing

Options for scarcity pricing

Figures

Tables

Executive summary

Background

Scarcity pricing has figured prominently in the public debate on water pricing, particularly since the widespread imposition of severe water restrictions across urban Australia in recent years.

The basic idea of scarcity pricing is to set volumetric prices to reflect the opportunity costs of using water storages as dam levels change. For example, the price would be relatively low when the dam is full (and the probability of running out of water is low) and higher when storages decline (and there is a need to augment dam water with emergency supplies or impose restrictions).

In its 2009 price determination for Sydney Catchment Authority (SCA), the Independent Pricing and Regulatory Tribunal (IPART) expressed interest in possibly developing a form of 'scarcity pricing' for potential implementation at the 2012 SCA price determination, particularly for wholesale prices (i.e. SCA charges to Sydney Water).

In the context of pricing at the wholesale level, one of the key objectives is encouraging efficient water use and investment by Sydney Water and facilitating competition in bulk supply.

This paper examines a small number of potential options and assesses them against key pricing objectives taking into account SCA's strategic interests, as well as the broader implications for the metropolitan system. We compare each option to the status quo situation (of set fixed and variable bulk water charges) in both wet and dry inflow sequences.

Our analysis

Under current pricing arrangements there is an inherent conflict between achieving revenue stability for SCA on the one hand and IPART's desire to send a signal on the value of water to inform Sydney Water's sourcing and investment decisions on the other. A key issue in assessing options for scarcity pricing is whether they can provide appropriate signals for efficient use and investment while not exposing SCA to undue revenue risk. There is a strong argument that SCA, as a relatively passive manager of catchments and dams in accordance with government defined operating strategies, should be able to recover its efficient costs without being excessively exposed to demand risk over which it has no control.

Our view is that scarcity pricing (based on principles of marginal cost pricing) would address this issue. This model would broadly involve:

- Aligning SCA's volumetric price with its short-run operating costs, with a fixed charge to address any revenue shortfall. This would require a large

increase in revenue generated from SCA's fixed charge compared to current arrangements.

- Setting a separate volumetric price that reflects the estimated marginal value of water in storage, which would be in addition to SCA's infrastructure charges but would effectively apply only when predefined triggers are reached.
  - The revenue collected through this additional scarcity charge represents a separate resource rent outside of SCA's required revenue requirement and could potentially be retained by government or alternatively used to offset Sydney Water's fixed charges in the current or future regulatory periods.

This pricing approach would reduce the revenue risk to SCA embodied in current tariff structures while providing an appropriate price signal for consumption and investment to Sydney Water (and other SCA customers) and potential new entrants at times when water is scarce. It does so by clearly differentiating between pricing for SCA's infrastructure services and the water resource itself.

The extent to which these prices will have a material effect on the current and future portfolio of supply options for Sydney will partly depend on broader institutional arrangements for urban water planning. For example, current government policies (for example, strict desalination plant operating rules) may lock in particular sourcing decisions and investments and thus limit Sydney Water's flexibility to respond to wholesale water prices.

The design of the scarcity pricing regime also needs to consider carefully how scarcity prices will combine with existing operating rules for the Sydney system to achieve the most efficient mix of options for balancing supply and demand. For example, to the extent the operating rules for the desalination plant already take into account risks to existing storages and therefore reflect an 'optimal' operating strategy, there is a risk that the addition of scarcity pricing for SCA supplies will double count the costs of consuming dam water. This is not so say scarcity pricing is not worthwhile, but rather that current operating rules may need to be reconsidered in light of this new option for balancing supply and demand.

Putting this pricing model into practice will be challenging. In particular, estimating the value of water in storage is a key issue to determine. In this paper we canvass potential options for estimating the marginal value of water in storage ranging from heuristic approaches based on existing operating rules (e.g. setting prices equal to the operating cost of alternative options such as desalination when dam levels trigger operation of the desalination plant) to economic modelling approaches.

In theory, an economic model that calculated an optimal price based on existing system constraints, planned investments and operating plans would produce

efficient price signals. However, we recognise that much work would be required to develop such a model and for it to be accepted in a regulatory price setting context.

Conclusions

In summary, we would advocate replacing the current pricing arrangements based on setting SCA's volumetric charges with regard to its LRMC with a more cost-reflective approach based on SCA's SRMC together with an additional scarcity price based on the costs of predefined triggered alternatives. This would better protect SCA's revenue adequacy while also achieving IPART's aim of a more efficient price signal to SCA's customers and potential new suppliers.

1 Introduction

1.1 Study background

Scarcity pricing has figured prominently in the public debate on water pricing, particularly since the widespread imposition of severe water restrictions across urban Australia in recent years.

While a number of variants have been proposed, the basic idea of scarcity pricing is that the price of water would be higher when water was relatively scarce (e.g. dam levels were low) and lower when water was more plentiful (e.g. when dam levels were high). The underlying rationale for scarcity pricing is that it may be a more efficient way of balancing supply and demand, particularly for short-term shortages, and could signal the cost of using rainfall-dependent sources of supply.

Scarcity pricing could potentially occur at the wholesale level and/or retail level. In its 2009 Determination for the SCA, IPART decided not to implement retail scarcity pricing at that time but canvassed the idea of introducing a form of scarcity pricing at the wholesale level.

It flagged that it was interested in receiving stakeholders' views on the potential application of scarcity pricing in Sydney and in particular on the design and application of such a pricing model, implementation issues to be addressed, and its potential advantages and disadvantages.

Scarcity pricing at the wholesale level would obviously have major implications for the SCA, particularly in terms of its recovery of costs and revenue volatility in the context of a regulated price path. A wholesale scarcity price would also have broader implications for other stakeholders, agencies and customers in relation to the efficient optimisation of the portfolio of supply and demand side measures contributing to supply security and reliability in the Sydney metropolitan area.

1.2 Purpose and scope of this paper

Against this background, the key deliverable from the consultancy is a concise paper that identifies and assesses a range of wholesale scarcity pricing options for strategic discussion by the Board, prior to discussion with IPART.

The paper examines a small number of potential options and assesses them against key pricing objectives taking into account SCA's strategic interests, as well as the broader implications for the metropolitan system. We compare each option to the status quo situation (of set fixed and variable bulk water charges) in both wet and dry inflow sequences.

The project was largely a desktop exercise with consultation with the SCA's project manager as required.

1.3 Pricing options

We assessed the following broad approaches to setting SCA's wholesale water charges:

- **Current approach or status quo** - SCA recovers costs from Sydney Water using a two-part tariff (i.e. fixed and variable charge), with IPART setting the variable charge with reference to the long-run marginal cost (LRMC) of supply. There is no scope to adjust variable charges during the regulatory period in response to sudden reductions in dam levels or associated increases in supply costs.
- **Scarcity pricing based on SCA's operating costs** – this involves setting SCA's variable charge to Sydney Water based on its short-run operating costs and increasing this charge when dam levels trigger increased operating costs (particularly due to Shoalhaven pumping cost).
- **Scarcity pricing based on the cost of alternative triggered supply and demand options** – this involves setting a variable charge to Sydney Water based on estimates of the opportunity cost of using dam water (e.g. the cost of Sydney Water operating the desalination plant or imposing water restrictions). The price increases would have links to existing operating rules that require Sydney Water to deploy supply or demand management options when dam levels fall to a certain levels.
- **Dynamically efficient pricing based on a system optimisation model for Sydney** – involves using an economic model to calculate a schedule of efficient prices defined in terms of dam levels.

Consistent with IPART's proposal, we examined these pricing options on the basis that they would apply in conjunction with existing institutional and policy settings (e.g. desalination operating rules, restrictions policies etc) rather than as an alternative. Our analysis also assumes that scarcity pricing applies only at the wholesale level and not the retail level. However, we do identify the implications of these constraints for the efficacy of scarcity pricing options.

1.4 Paper structure

The structure of the rest of this paper is as follows:

- Section 2 describes current water supply and regulatory arrangements.
- Section 3 describes pricing objectives.
- Section 4 assesses the pricing options compared to the status quo.
- Section 5 provides our conclusions.

2 Current water supply and regulatory arrangements

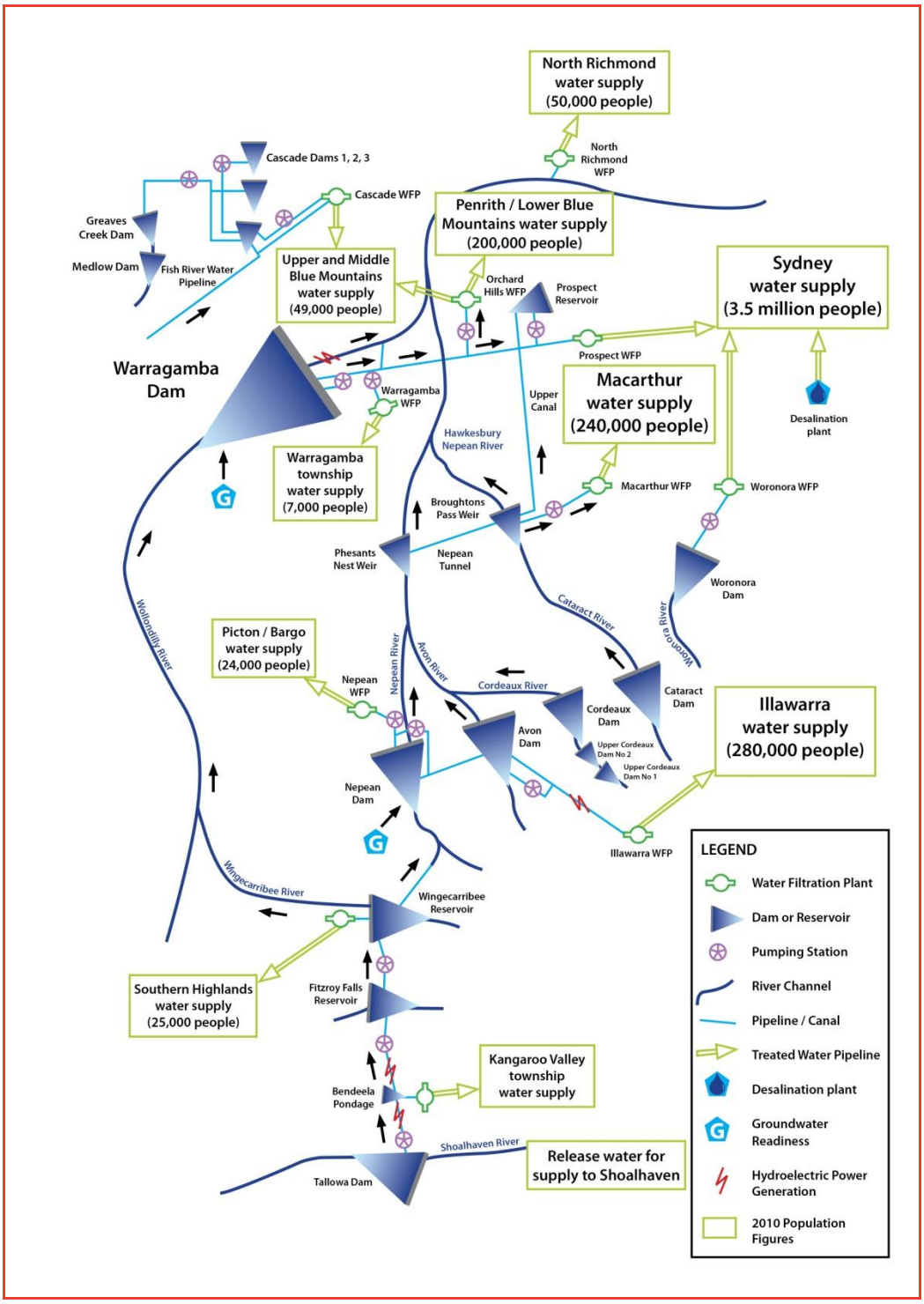
This section provides background information on current water supply and regulatory arrangements in Sydney, which is relevant to the design and implementation of scarcity pricing options at the wholesale level.

2.1 Current metropolitan water supply sources

SCA and Sydney Water are the two main water businesses responsible for operating Sydney's water supplies. SCA is responsible for catchment operations and selling bulk water supplies to Sydney Water (as well as three local councils)[1] from its system of dams (including transfers from the Tallowa dam on the Shoalhaven River)(Figure 1). Sydney Water supplies retail water supplies to metropolitan customers drawing on raw water supplies from SCA and other bulk water sources (i.e. desalination, recycled water).

[1] Shoalhaven City Council, Goulburn Mulwaree Council and Wingecarribee Shire Council.

Figure 1: Sydney water supply system



Source: Sydney Catchment Authority.

Current water supply and regulatory arrangements

Sydney Desalination Plant Pty Limited (SDP), a wholly owned subsidiary of Sydney Water, owns the Sydney desalination plant. The private sector operates and maintains the desalination plant facilities in return for monthly performance-based payments based on a formula that includes variable costs associated with the daily drinking water volumes from the plant (Sydney Water, 2011).

Although the NSW government has taken steps to diversify Sydney's water supplies in the past decade by investing in desalination and recycling, the majority of Sydney's water supply still comes from capturing rainwater and storing it in dams (NSW Office of Water, 2010). In 2011, water available from dams was 570 GL per year compared to 90 GL from desalination (Figure 2). The Metropolitan Water Plan for Sydney (NSW Office of Water, 2010) indicates that increases in recycling, desalination plant capacity and improvements in water-use efficiency could help meet future demand needs.

Figure 2: Current and future water supply sources for Sydney

Measure	2010	2015	Beyond 2025
Dams	570 billion litres can be taken from the dams each year (calculated as at December 2006)	the amount of water that can be taken from the dams each year is recalculated any time there is a change to the supply system	augmentation of the Shoalhaven water supply system will increase water supplied from Tallowa Dam and protect river health
Recycling	about 33 billion litres of water is being saved through reuse projects	70 billion litres will be saved through reuse projects	future large-scale water recycling schemes will be delivered in Sydney's west as population grows
Desalination	up to 90 billion litres (about 15%* of current water needs)	up to 90 billion litres (plus potential to upscale to 180 billion litres in response to severe drought)	potential to upscale to 180 billion litres in response to severe drought and/or population growth
Water efficiency	over 100 billion litres of water is being saved every year	145 billion litres will be saved every year	continued improvement in water efficiency through the BASIX and WELS programs

The adoption of the measures in the table above means that, under all modelled rainfall and dam inflow scenarios, the 2010 plan secures greater Sydney's water supplies until at least 2025. A process summary document has been developed which provides more detail on the portfolio approach to water planning and explains how the security of supply has been established. The document can be found at www.waterforlife.nsw.gov.au/review.

*Based on a long-term average usage of 600 billion litres per year

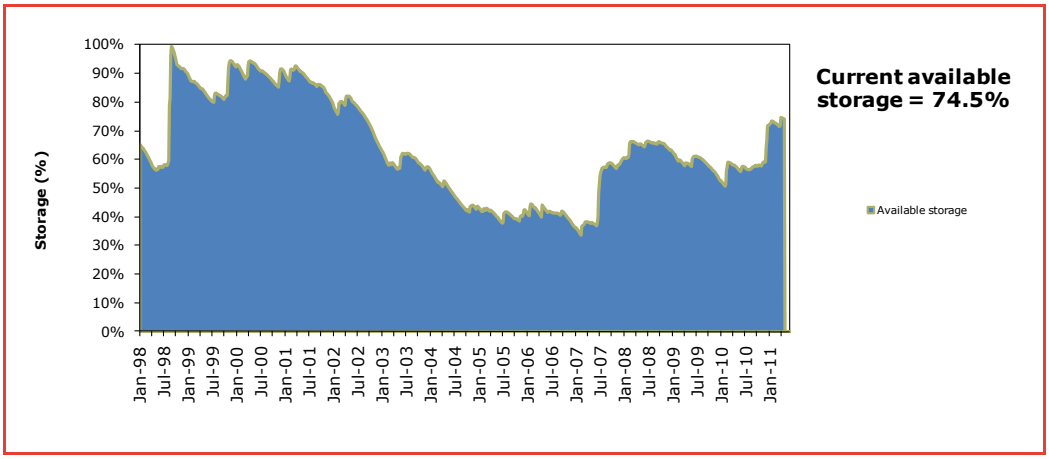
Source: NSW Office of Water, 2010.

2.2 Variability of dam inflows and levels

Although the capacity of Sydney storages is one of the largest in the world per head of population (NSW Office of Water, 2010) inflows are highly variable and dam levels can increase or decrease significantly from year to year. Since the early 1990s, average rainfall and inflows have declined compared to previous decades (1950s to early 1990s) and there have been substantial drought transfers from the Shoalhaven (CIE 2010). Examples of the variability of dam levels in Sydney include the decline in storages from 90% to approximately 30% between 2001 and 2007 (Figure 3). In the eight months leading up to March 2009, dam levels fell from above 65 percent to 58 percent (SCA, 2009).

These fluctuations in dam levels are greater than in other major cities. Although Melbourne also experienced large reductions in inflows between 2001 and 2007, for example, dam levels decreased from around 60% to 40% during that time (Melbourne Water, 2010).

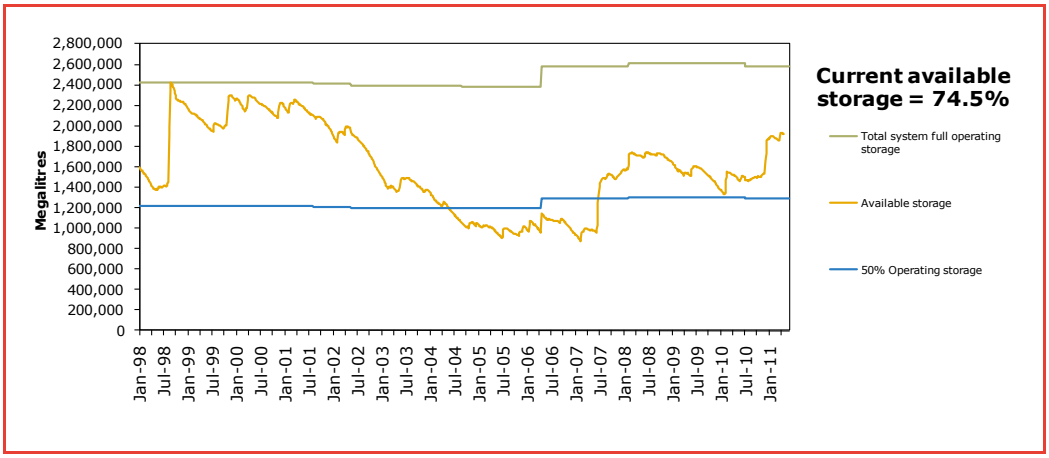
Figure 3: Sydney storage levels (%), 1998-2011



Source: SCA 2011

Figure 4 presents storage levels in volumetric terms. It shows that dam level can decrease several hundred GL (1GL = 1000ML) in one year.

Figure 4: Change in SCA storages (ML), 1998-2011



Source: SCA 2011

2.3 Current water security framework

2.3.1 Responsibilities for supply planning and operations

New South Wales has adopted a standing committee approach to formulate a water security framework for metropolitan Sydney. Chief executive officers from all water businesses and key government departments make up this committee,

with the NSW Office of Water acting as a secretariat. The Minister for Water is responsible for approving the Metropolitan Water Plan. An independent panel, comprising specialists in environmental management, economics, social research and water industry experts oversee the planning process (PwC, 2010). The NSW government maintains ultimate control over the mix of measures to secure greater Sydney's water supply.

Under the metropolitan plan, Sydney Water is responsible for a wide range of initiatives, including wastewater recycling, desalination, demand management and leak reduction. Sydney Water's operating licence specifies water efficiency targets, demand management and recycling requirements issued by the Government.

Sydney Desalination Plant (a subsidiary of Sydney Water) holds a Retail Supplier and a Network Operator licence under the Water Industry Competition Act 2006, which include operating rules for the desalination plant issued by Government (Sydney Water, 2011).

SCA holds a water management licence under the Water Act 1912, which specifies rules for operating the Sydney bulk supply system, including environmental flows and Shoalhaven transfers. Its operating licence includes provisions relating to infrastructure management and water conservation including undertaking practicable actions to conserve water and minimise water losses, which may include working collaboratively with its customers (SCA, 2011).

2.3.2 Supply operating rules

Supply operating rules govern how the SCA and Sydney Water operate the metropolitan supply system. Specific rules in the metropolitan plan include:

- **Shoalhaven transfer rules (for SCA)**: under system operating rules, transfers from Tallowa Dam in the Shoalhaven can begin when Sydney's total dam storage level falls below 75 percent but only while the storage level of Tallowa Dam is above its minimum operating level of minus one metre from full supply level.[2] In severe drought, the plan allows the minimum operating level for transferring water from Tallowa Dam to Sydney to lower to minus three metres (NSW Office of Water, 2010).[3] The SCA must cease water transfers from the Shoalhaven system when total system storage reaches 80% (SCA Water Management Licence).

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2 The full supply level is the level of the water surface in storage when it is at its maximum operating level under normal conditions (not flood conditions). The minimum operating level helps ensure 'the Shoalhaven community's water supply is secure and the health of the lower Shoalhaven River system is maintained with ongoing environmental flows' (NSW Office of Water, 2010).

3 SCA's water management licence states 'The SCA must not commence transferring water from the Shoalhaven system via the Shoalhaven Scheme unless total system storage is less than 75%'.

- **Desalination operating rules (for Sydney Water)**: the desalination plant will run at full capacity (i.e. 90 GL/year) during a two-year 'defects correction period', which will end in mid June 2012. After this period, the plant will operate at full production capacity and supply desalinated water to Sydney Water's area of operations when the total dam storage level is below 70 per cent and will continue to do so until the total dam storage level reaches 80 per cent (NSW Office of Water, 2010). The metropolitan plan notes 'if necessary, the Government will be able to operate the desalination plant at other times to secure water supplies (for example if availability of water from other parts of the supply system were affected by technical or other problems)' (NSW Office of Water, 2010). As an input to developing the Metropolitan Water Plan, Sydney Water commissioned the Centre for International Economics (CIE) to assess the net benefits of different operating regimes for the desalination plant.[4] This review considered three alternative operating rules (30/40, 70/80 and 80/90)[5] and recommended the '70/80 rule' above based on assumptions about other aspects of system management, such as restrictions policies (CIE , 2010).
- **Drought restrictions (enforced by Sydney Water)**: In 2010, the NSW government announced a revised mandatory restrictions regime, made up of two levels commencing at around 50 percent and 40 percent of Sydney's total dam storage levels. Sydney's total dam storage level, predicted weather patterns, the season, and demand forecasts will influence the exact timing for introducing drought restrictions (NSW Office of Water, 2010). Sydney Water's operating licence notes it may place conditions on water use by customers at the discretion of the Minister or Government.

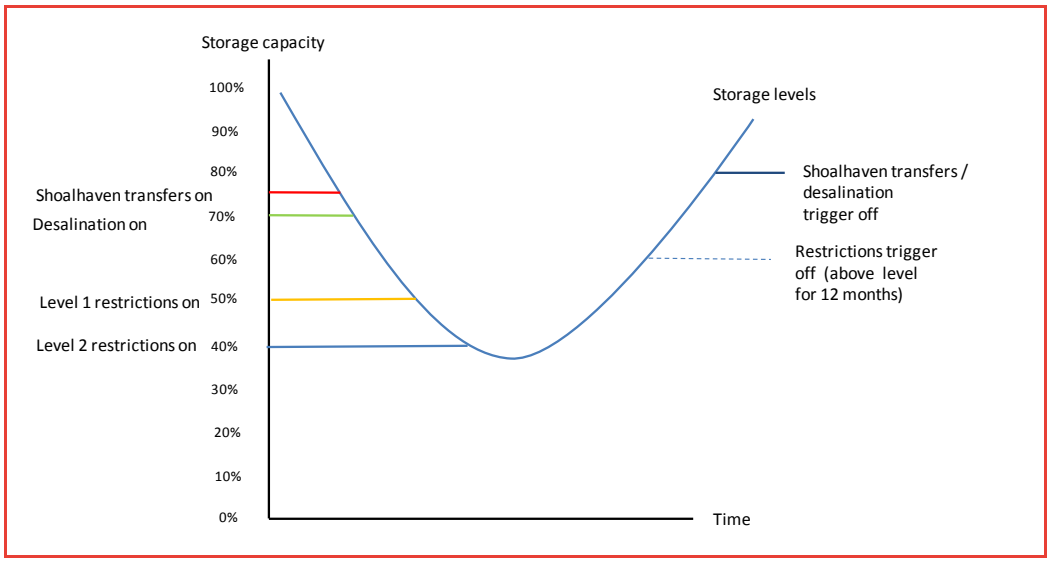
Figure 5 presents a stylised representation of the operating rules for the Sydney supply system. The triggers for commencing and ceasing operation of particular supply options and restrictions may differ. Some triggers are binding (e.g. Sydney Water must run the desalination when storages fall to 70%), while others are more flexible (e.g. SCA may transfers water when storages fall to 75%).

4 The estimate of net benefits included the costs of operating the desalination plant, the costs of water restrictions, avoided infrastructure costs, supply security benefits, and environmental impacts.

5 The first number is the storage level at which Sydney Water switches the desalination plant on and the second number is the storage level at which Sydney Water switches the plant off.

Current water supply and regulatory arrangements

Figure 5: Stylised representation of operating rules based on dam levels



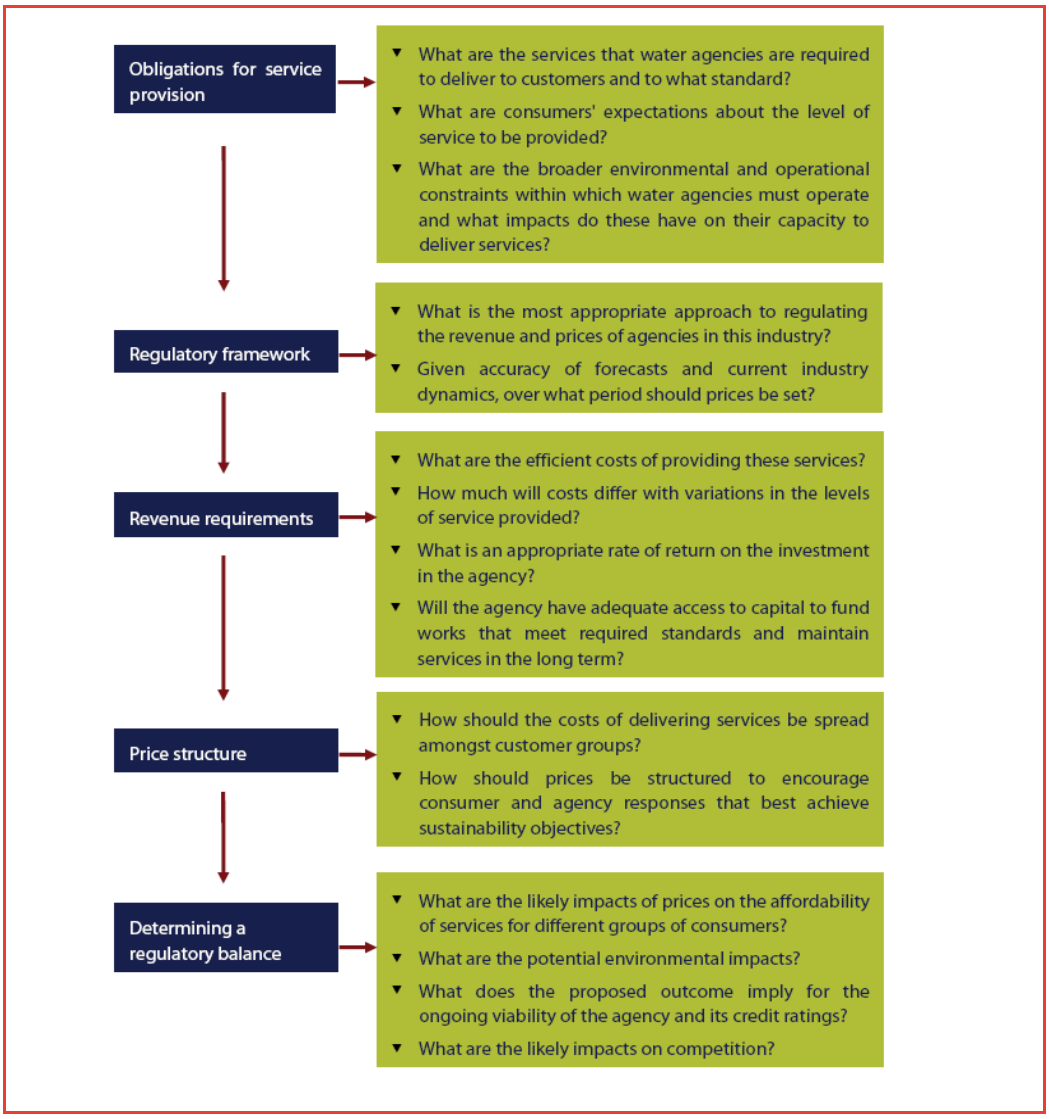
Source: Trigger levels based on *2010 Metropolitan Water Plan (NSW Office of Water, 2010)*

2.4 Price regulation

SCA and Sydney Water are subject to economic regulation by IPART. Figure 6 presents the broad framework for IPART's determination process.

Currently, IPART uses a building block approach to calculate SCA's notional revenue requirement. To apply this approach, it makes decisions on the revenue SCA will require for efficient operating expenditure and capital investment over the determination period (which is currently three years - July 2009 to 30 June 2012). It then considers appropriate price levels and prices structures taking into account objectives such as protecting SCA's financial viability, encouraging economic efficiency and protecting water consumers from price shocks (IPART, 2009).

Figure 6: IPART Determination process



Source: IPART 2009

IPART can adjust SCA's notional revenue requirement to account for unexpected developments during the previous regulatory period, such as differences between actual and forecast water sales or capital expenditure. It can also include regulatory mechanisms to address the risk of variations between actual and forecast required revenue in the upcoming regulatory period (such as by allowing SCA to pass through unexpected costs associated with Shoalhaven transfers). In the most recent determination in 2009, IPART did not allow a cost pass-through mechanism for Shoalhaven transfers as it deemed such transfers were unlikely during the regulatory period following the government imposing a temporary moratorium of such transfers (IPART, 2009).

Current water supply and regulatory arrangements

2.5 Current water prices and cost structures

In general, the short-run marginal cost (SRMC) of water supply is the cost of providing a unit of water when infrastructure capacity is fixed and the long run marginal cost (LRMC) of supply is the cost of providing a unit of water when it is possible to vary infrastructure capacity. Regulators sometimes set volumetric prices for water to reflect one of these costs.

Figure 7 presents current prices and indicative cost structures facing SCA and Sydney Water and relates these to storage levels[6]. It shows SCA's current volumetric price for raw water (approximately $250/ML) is above SCA's short-run marginal cost (SRMC) (up to $70/ML) but below the SCA's LRMC (at least $1200/ML)[7]. As recent estimates of the SCA's SRMC are based on pumping costs from the Shoalhaven (i.e. $70/ML), which are additional costs incurred by SCA when storages are below 75%, we have assumed a hypothetical SRMC of $30/ML to represent SCA's SRMC without Shoalhaven transfers.

Sydney Water's short-run cost when dam levels are above 70% is essentially SCA's raw water charge ($250/ML) plus additional filtration cost ($80/ML) (CIE 2010). The marginal operating cost of desalination is at least $422/ML[8] (IPART, 2009). IPART has previously estimated Sydney Water's LRMC as $1.93/kL (or $1930/ML) based on the cost of expanding the capacity of the existing desalination plant from 250ML/day to 500ML/day (Independent Advisory Panel, 2008).

In 2005, IPART increased the proportion of revenue SCA obtained from its volumetric charges to Sydney Water from half to two-thirds. It did this to 'send a pricing signal to Sydney Water that will help achieve the State Government's demand management objectives' and help achieve the objective of setting charges with reference to SCA's Long Run Marginal Cost of supply (LRMC)(IPART, 2009).

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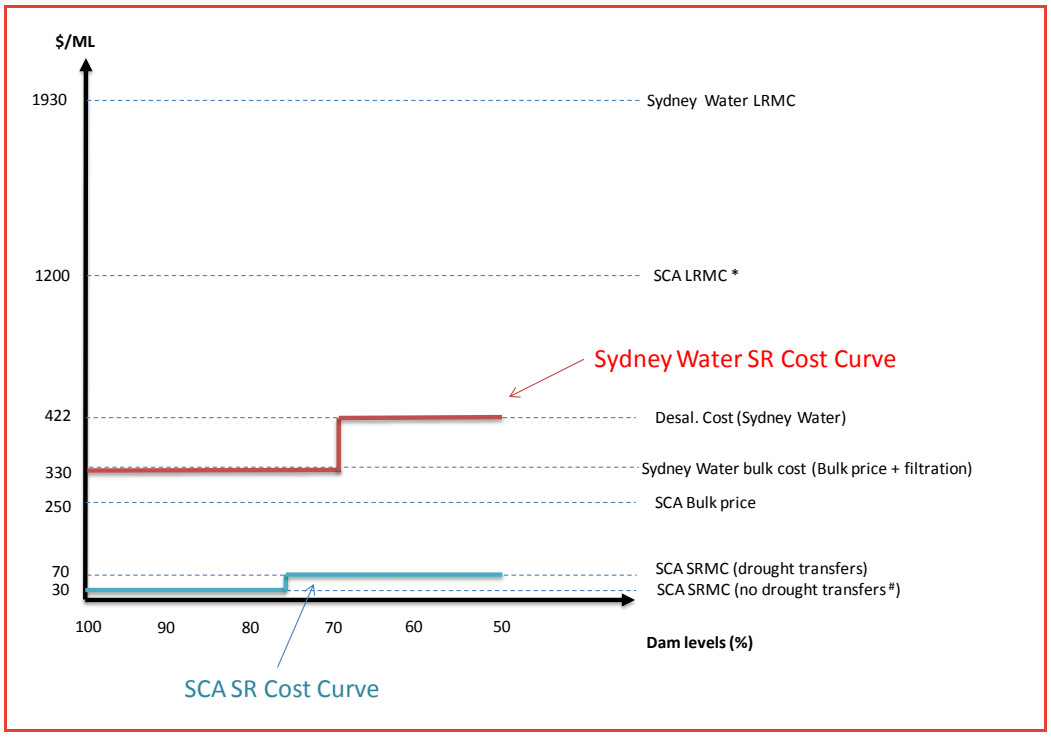
6 It is recognised that these prices and cost structure may increase in the future due to factors such as changes in energy prices. The numerical analysis in this report is for illustrative purposes rather than representing expectations of actual outcomes.

7 In general terms, SCA's LRMC is calculated as the present value of the cost of SCA's next supply augmentation measure divided by the present value of the amount of water supplied by the measure. IPART based its estimate of SCA's LRMC ($1200/ML) on indicative estimates of the cost and yield of SCA's next likely supply augmentation project (a form of Shoalhaven transfers project) (IPART, 2009).

8 CIE estimated additional water is produced by desalination at approximately 60 cents per kL or $600/ML (excluding start-up and shutdown costs)(CIE 2010).

Figure 7: Current prices and short-run costs related to dam trigger levels



Source: Triggers levels based on 2010 Metropolitan Water Plan *(NSW Office of Water, 2010)*

*Estimated as at least this amount # Hypothetical.

Current water supply and regulatory arrangements

3 Objectives

3.1 What is scarcity pricing trying to achieve?

Currently, SCA's volumetric price to Sydney Water for raw water does not vary with short-term changes in water storages; the price is the same regardless of whether the dam is half full or spilling. A key concern about this approach is that the volumetric price does not send appropriate signals to Sydney Water about the true cost of using dam water as storages decline and can result in unintended consequences. These include triggering water restrictions more frequently (which imposes cost on water customers) or inhibiting investment in other supply options by underpricing SCA's raw water.

The basic idea of scarcity pricing is to set volumetric prices to reflect the opportunity costs of using water storages as dam levels change. For example, the price would be relatively low when the dam is full (and the probability of running out of water or imposing restrictions is low) and higher when storages decline (and there is a need to augment dam water with emergency supplies or impose restrictions).

In its 2009 price determination for SCA, IPART expressed interest in possibly developing a form of 'scarcity pricing' for potential implementation at the 2012 SCA price determination, particularly for wholesale prices (i.e. SCA charges to Sydney Water) (IPART, 2009).

In the context of pricing at the wholesale level, one of the key objectives is encouraging efficient water use and investment by Sydney Water and facilitating competition in bulk supply. IPART (2009), for example, have expressed interest in scarcity pricing on the basis it may:

- provide incentives to Sydney Water to invest in water conservation and demand management measures, where efficient
- signal to Sydney Water when it is more appropriate to obtain water from sources other than SCA, and vice-versa
- provide signals to potential new suppliers of bulk water as to when it may or may not be viable for them to invest in new water supply infrastructure

IPART clearly wishes to explore the scope for scarcity pricing to assist in the optimal utilisation of and investment in the range of alternative sources of supply. This appears to reflect an underlying concern that if SCA prices do not reflect the underlying value of the water itself, there may be an incentive for Sydney Water (and other SCA customers) to use too much of water from storages and undermine future security of supply, as opposed to using desalination or recycled. IPART (2009) note:

> 'While acknowledging the dominant role that SCA is likely to continue to play in the provision of water, IPART considers that it is also important to recognise that Sydney is likely to increasingly have alternative sources of water supply. In addition to SCA's dams, desalination and the use of recycled water for non-potable purposes will become increasingly important. Some alternative sources of water are owned by Government, but others may be privately owned. In these circumstances, it is worth investigating the role that pricing can play in providing effective signals to both Sydney Water and potential new suppliers of bulk water, to ensure that Sydney's water needs are supplied at least cost to the community.'

In theory, scarcity pricing at the wholesale level could feed through to the retail prices of Sydney Water and provide signals to consumers of the resource to reduce consumption in times of scarcity. However, scarcity pricing at the wholesale level does not require water charges to Sydney Water customers vary with dam levels. In fact, IPART (2009) notes:

> A separate question is whether Sydney Water's retail prices should also vary with SCA's dam levels to reflect the economic value of water. IPART notes that this does not necessarily need to occur, even if SCA's wholesale price to Sydney Water does vary with dam levels.
>
> If a form of scarcity pricing were to be introduced at the retail level, IPART envisages that it would be applied at the margin, targeting discretionary water consumption only and operating to support the water restriction regime in equating water demand with supply.

As noted earlier, the focus of this paper is scarcity pricing at the wholesale level.

3.2 Principles of efficient pricing of water

The objectives espoused by IPART are essentially ones relating to the concept of economic efficiency, which requires allocating resources across all consumption and production activities (present and future) in a manner that maximises benefits to society.

Theory of marginal cost pricing

Economic theory suggests pricing resources at social marginal cost (defined as the cost of meeting an incremental increase in demand for water) provides an efficient basis for allocating resources.

Griffin (2006) argues that the marginal cost of supply potentially can include:

- short-run infrastructure operating costs - these costs typically encompass pumping and treatment costs that vary with output. Short-run operating costs can increase during drought as the water business uses higher cost supply options.

- the marginal value of water - the value of an extra unit water from renewable natural water sources to society.[9] This increases if water availability decreases. If water is not scarce, however, the marginal value of water will be zero.[10]
- the marginal capacity costs – the social costs incurred when infrastructure capacity (e.g. storage and delivery infrastructure) is fully employed and the quantity of capacity demanded exceeds the quantity supplied. For example, over time population growth may mean that a city's annual water requirement increases relative to the supplier's delivery capacity. At the extreme, the supplier may need to ration supply capacity thus imposing costs on customers. The marginal capacity cost will only be non-zero when infrastructure capacity is constraining (e.g. capacity constraints in delivering water). In practice, investments in infrastructure capacity are typically lumpy and generally avoid infrastructure constraints that require rationing of capacity. Hence, the marginal value of capacity in this context is defined as the incremental cost to the water business of installing additional infrastructure capacity to meet supply needs (i.e. the basis of LRMC pricing).

The estimates of short-run marginal cost in section 2.5 only relate to infrastructure operating cost incurred by SCA in undertaking its supply activities. However, from society's perspective the marginal cost of water supply may exceed operating costs as either water becomes scarce (the marginal value of water increases) or infrastructure capacity becomes scarce and limits supply (the marginal capacity cost increases). The marginal value of water (or marginal user cost) rises as water availability/dam levels fall.

Figure 8 provides an example of how the social marginal cost of supply might vary with dam levels. As dam levels fall, SCA incurs additional operating costs associated with managing drought supplies (i.e. Shoalhaven transfers). At the same time, the opportunity cost of using dam storages (marginal value of water) gradually increases. Hence, the overall increase in the social marginal cost of water as dam levels fall reflects both an increase in operating costs of delivering the water *and* an increase in the value of water itself. We assume that there are no infrastructure constraints and the marginal capacity cost for SCA is zero. Based on this broader definition of the SRMC, SRMC pricing could exceed the current volumetric bulk charges.

In practice, the marginal value (opportunity cost) of water is notoriously difficult to estimate as it is not readily observed in a market, as in the rural sector. As

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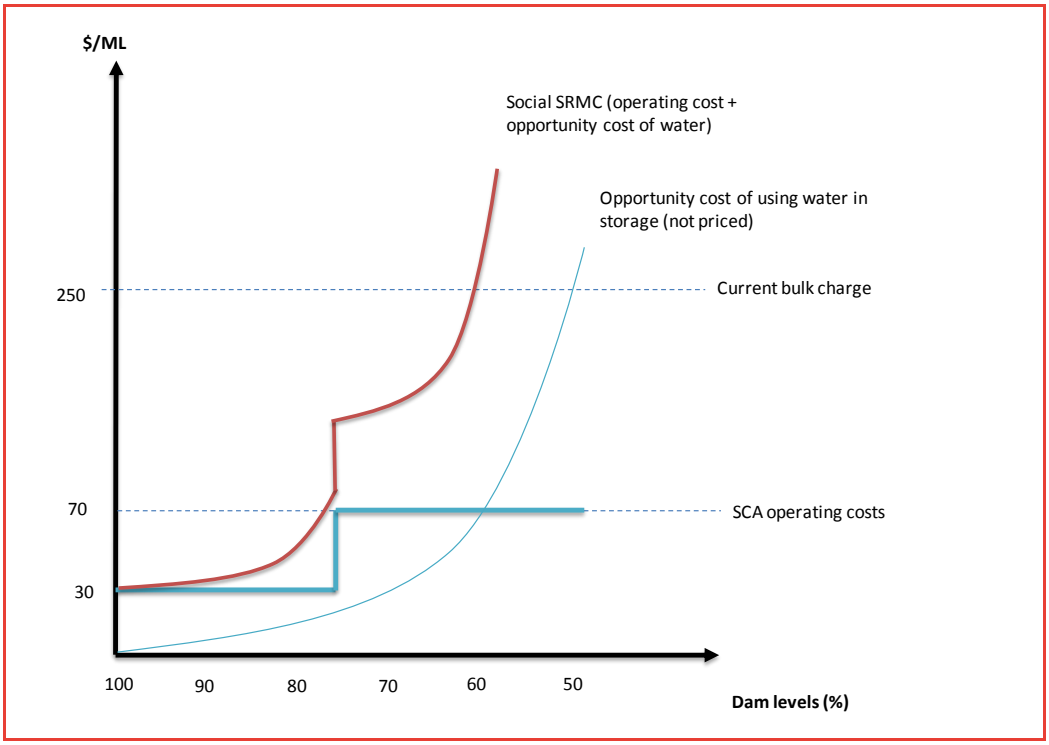
9 Where a source is depletable, Griffin (2006) suggests the appropriate measure is the marginal user cost – the present value of an extra unit of water in the future. Griffin suggests this mostly relates to groundwater but could apply to a dams containing tight supply over the next several periods.

10 Griffin assumes this water has a zero accounting costs to the water business (i.e. it is not purchased in a market).

discussed below, stakeholders have proposed a variety of approaches to estimate the marginal value of water ranging from rules of thumb to sophisticated models.

Figure 8: Social SRMC (including the opportunity cost of water)



Despite the efficiency properties of short run marginal cost pricing, regulators have typically not applied SRMC but rather have tended to have regard to LRMC. For example, IPART (2004) has previously noted:

> The Tribunal considers that the appropriate next step towards wholesale water price reform is to review the balance between the fixed access charge and the variable usage charge and, if possible, set the usage charge with reference to the SCA's long run marginal cost. Long run marginal cost here refers to the additional costs of the measures that the SCA must incur to balance supply and demand, divided by the amount of additional water provided by those measures.

The LRMC approach to pricing has tended to focus on providing a smoothed long-term pricing signal to customers. An implicit assumption is that the service is being provided by a monopoly supplier where its availability is determined solely by the supply capacity which will need to be augmented when demand grows to take up all of the existing capacity. While this may be a reasonable assumption for many services – and for water when the supply is reliable, it is increasingly recognised that this may not hold for water supply in Australia.

Pricing at long-run marginal cost communicates the expected cost of consuming an additional unit of water. If the expectations underpinning the calculation of long-run marginal cost are accurate, then the incentives created for water use and conservation will be efficient. However, given uncertainty about future demand,

the efficient investment path, and particularly supply from rainfall-dependent water sources, these expectations will almost certainly not be accurate. Periods of short-run scarcity are likely, and during these times long-run marginal cost pricing will fail to represent accurately the increases in the opportunity cost of water stemming from that scarcity.

Further, given that Sydney Water has alternative options for meeting demand other than SCA dam water there is a question of whether SCA's LRMC is appropriate or relevant for informing Sydney Water's water sourcing and investment decisions or as a basis for efficient competition from new suppliers. In particular:

- SCA's LRMC of infrastructure may be problematic for sending efficient signal for consumption, particularly given SCA only has some of the available supply augmentation options. That is, Sydney Water may well have alternative options such as recycling that it would take up prior to any augmentation of SCA's system.
- If Sydney Water bases its decisions about operating the desalination plant or deploying demand management options according to their short-run marginal cost, pricing SCA's supplies to Sydney Water at LRMC will distort Sydney Water's sourcing decisions (i.e. it may produce too much desalinated water compared to drawing on dam water).
- Similarly, in a competitive market, prices will tend to short run marginal cost. While pricing SCA water at LRMC may make potential alternative supply sources more attractive, this would not represent efficient competition.
- Setting prices with respect to LRMC requires a great deal of information to estimate future demand and supply conditions, in order to plot the efficient path for investment. Consequently, there may be a great deal of uncertainty about whether such prices reflect the efficient price.

The Independent Panel (2008) notes that changes in the water supply environment may require rethinking the current approach of LRMC pricing:

> In light of quite dramatic and ongoing change to the nature of water supply businesses in Sydney, there is a risk that price determinations made along existing guidelines might fail to keep pace with change
>
> The impact of drought and climate change is indeterminate and still unfolding. It has influenced the introduction of readiness options, one important one of which has been exercised in the form of the desalination plant.
>
> The existence of this source raises questions about using LRMC as a basis for bulk water pricing in particular.
>
> The advent of the Water Industry Competition Act means that there are potentially many smaller water suppliers to enter the market in Sydney, which changes the landscape in comparison to the earlier model of a single monopoly provider of both bulk and retail water.

Sending suitable price signals to consumers, and maintaining consistency of signals through the supply chain becomes more of a challenge in this environment.

In practice (as seen in the previous chapter), SCA's volumetric prices is between the two extremes of the SCA's short-run marginal operating costs (i.e. the SRMC when water and infrastructure capacity are not scarce) and an estimate of SCA's long-run marginal cost. This perhaps reflects attempts to compensate for the lack of an explicit price signal for the marginal value of water.

Benefits of efficient pricing

Scarcity pricing could provide a more cost-reflective signal to Sydney Water regarding the cost of drawing on dam water during drought (i.e. increased operating costs and the marginal value of water). As dam levels fall, for example, the increase in price for dam supplies would provide Sydney Water with an incentive to substitute dam water with other sources (e.g. recycling, demand management) which would in turn take pressure off dam supplies and reduce the risk of restrictions.

Hence, guiding questions relevant to assessing specific pricing options include:

- Do pricing arrangements provide Sydney Water with incentives to source supplies and invest in demand management in manner that maximises net social benefit?
- Does the approach provide incentives for efficient competition in the provision of water services?

3.3 Other pricing objectives

There is a number of other pricing objectives, including:

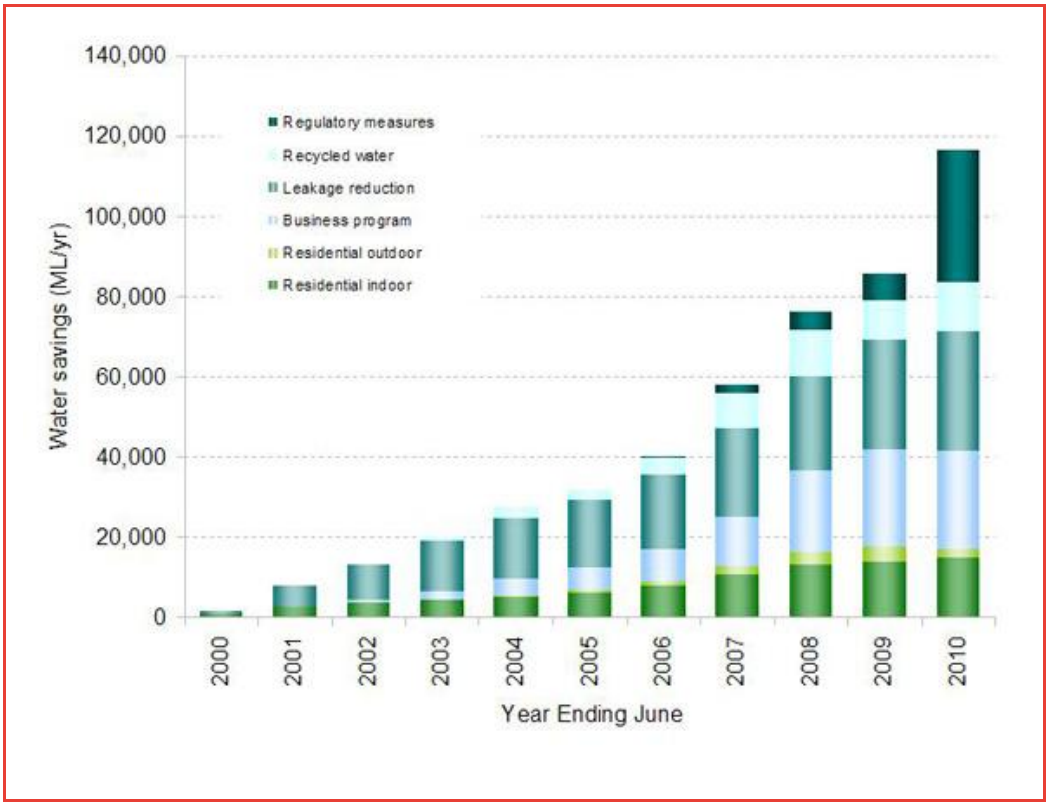
- Effectiveness
- Revenue adequacy and stability
- Appropriate allocation of risk
- Administrative simplicity
- Transparency.

Effectiveness

While scarcity pricing may provide more efficient sourcing and investment signals to Sydney Water, its effectiveness in influencing Sydney Water's sourcing and investment decisions is another matter. SCA (2009) notes IPART has previously argued that financial incentives are not as effective for a Government owned business such as Sydney Water which respond to other imperatives.

Conceptualising Sydney Water's operating decisions as being strongly influenced by current wholesale prices can be overly simplistic for several reasons. As noted above, for example, Sydney Water has licence obligations that require it to meet specific supply standards and/or invest in recycling and demand management. These obligations internalise, or at least reduce, the risks associated with water restrictions even in the absence of price signals reflecting the marginal value of water.[11] Hence, although the marginal cost of recycling and demand management projects can significantly exceed the current raw water price, investment in recycling and demand management in Sydney has nevertheless grown over the past decade (Figure 9).

Figure 9: Demand management and water savings in Sydney, 2000 to 2010.



Source: Sydney Water, 2010.

Similarly, the operating rules for the Sydney Water desalination plant (developed by government) currently limit Sydney Water's flexibility to change its operations in to response to price signals from SCA. Hence, the likely effect of scarcity pricing on Sydney Water's bulk water sourcing decisions needs to be considered within the broader institutional setting

11 Modelling underlying the metropolitan plan presumably places a social value on different options based on their contribution to supply security.

A further point to note is that Sydney Water knows that it will incur higher costs as dam levels fall and thus it will have a financial incentive to undertake actions to mitigate this risk even in the absence of an explicit price on dam water.

Guiding questions relevant to assessing specific pricing options include:

- Does Sydney Water have the capacity to respond to the price signal from SCA?
- Is the level of the price signal likely to be material?

Revenue adequacy and stability

Pricing principles adopted at the state and national levels recognise the principle that regulated business should be able to recover efficient costs of supplying services (Council of Australian Governments, 2004 and 2010).

In a regulated setting, revenue adequacy relates to ensuring all legitimate costs are included in the revenue requirement and the pricing structure provides the business with reasonable opportunity to recover this revenue.

Typically, regulated businesses recover required revenue through a two-part tariff, with the volumetric charge designed to send an appropriate signal to customers about the 'marginal costs' of additional consumption. Because pricing at marginal cost (particularly where this is low) may not generate sufficient revenue to recover total costs, the fixed charge is designed to recover the balance of the revenue requirement (based on estimates of likely demand and hence revenue likely to be generated from the volumetric charge).

In practice, the actual level of revenue from tariffs depends on the actual demand that eventuates. If demand is less than forecast then the business will collect less revenue; if demand turns out to be higher than expected, the business will collect more revenue than expected.

The extent to which forecasting errors lead to under- or over-recovery of costs depends on the extent to which the tariff structure is reflective of the business' underlying cost structure. In particular, if the volumetric price is set to reflect the costs that vary with output (i.e. SRMC operating cost), then any change in demand will be offset by a change in the business' costs of supply. If the volumetric price is set at a level that does not reflect the variable costs incurred by the business, then variations in demand from those forecasts will lead to revenues diverging from costs, with the extent of this divergence depending on how far away the volumetric price is from the actual marginal costs of the business.

Currently, SCA recovers approximately two thirds of its revenue requirement through its volumetric charge. This is despite the fact SCA's cost structure is predominantly fixed – with relatively few costs varying with the level of water sold to Sydney Water or other customers. In submissions to past determinations,

SCA has pointed out that this introduces considerable revenue volatility when combined with other factors such as a high degree of uncertainty in demand forecasting. In 2008, for example, SCA reported that its water sales for the 2005 determination period were 12 per cent less than the forecasts IPART used to set prices in 2005 due to restrictions. SCA estimated that this resulted in a total shortfall in revenue of approximately $57 million ($14 million of which relates to variations greater than the 10 per cent dead band allowed by IPART) (IPART 2009).

IPART (2009) has suggested scarcity pricing (whereby prices vary inversely with dam levels) could mitigate sales risk.

> A pricing approach that varied SCA's volumetric price inversely with its dam levels could also mitigate sales risk to SCA. Presently, if SCA's sales are less than forecast when setting its volumetric price (e.g. due to the effect of higher than forecast restriction levels in reducing water demand), it is at risk of under recovering its revenue requirement – particularly as its costs are mostly fixed. To date, this has acted to limit the extent to which IPART can increase SCA's volumetric charge at the expense of its fixed charge.

Another specific concern identified by SCA in past determinations is that current volumetric prices do not vary when it incurs additional operating costs when dam levels fall and it must pump supplies from the Shoalhaven.

> Given the high and unpredictable costs associated with pumping, the SCA proposes that the full cost of future pumping be a pass through component of SCA's cost recovery from Sydney Water as it is no longer viable for the SCA to carry these significant costs, and not equitable for the charges to be borne by all NSW taxpayers through the resulting reductions in returns (SCA 2009).

Hence, guiding questions in assessing the alternative pricing options include:

- Does the approach provide for sufficient revenue for SCA to finance its activities?
- Does it ensure against excessive volatility in SCA's revenues?
- Does the option prevent monopoly rents? How does it deal with over recovery?

Appropriate allocation of risk

Closely related to the issue of revenue adequacy and stability is the question of how risk should be allocated between the parties. Of particular relevance here is how to allocate demand risk between the SCA and Sydney Water.

IPART notes that the allocation of financial risk (between SCA, Sydney Water and water customers) arising from any new water pricing arrangements is an issue that requires further consideration.

Currently, SCA has little control over many of the levers that influence demand risks, such as investing in new supplies to avoid restrictions.

Hence, guiding questions in assessing the alternative pricing options include:

- Is risk allocated to the party best able to manage or bear it?

Administrative simplicity

Ease of operation is concerned with ensuring that a pricing approach is practical to implement. In particular, ease of operation is concerned with ensuring there are no institutional, administrative or other barriers that would prevent the approach being implemented. Administrative simplicity means that the resources required to implement a pricing approach (in terms of administration, compliance, enforcement and information costs) are proportional to the benefits of the approach.

There is a range of approaches to implementing scarcity pricing with different levels of complexity. One key factor will be whether prices relate to increased operating costs incurred by SCA, which are relatively easy to estimate and incorporate within the current pricing regime, or based on the opportunity cost of water in dams, which adds a layer of complexity (e.g. estimating the value of water and dealing with excess revenues).

Another factor that will influence administrative complexity is the overall design of the pricing regime (i.e. number of steps in the pricing schedule and frequency of prices charges).

Guiding questions in assessing this criterion include:

- Is it practical to implement?
- Are there institutional, administrative or other barriers that would prevent an approach being implemented?
- What are the administrative costs for water service providers, regulators and customers (and do these costs outweigh the benefits that are likely to accrue by implementing the approach)?

Transparency

Transparency ensures that water users and others can understand and hence have confidence in the arrangements. The NWI objectives highlight the importance of price transparency in water storage and delivery systems (Council of Australian Governments, 2010).

While scarcity pricing provides a means of providing more cost-reflective and efficient price signals, there will be a trade-off between the sophistication of the pricing regime and transparency.

The guiding question in assessing this criterion is whether customers and other stakeholders readily ascertain and understand what prices are being charged and how they are determined

4 Assessment of options

4.1 Overview

IPART's 2009 determination for SCA highlighted several options for introducing scarcity pricing at the wholesale level. These broadly include:

- **Scarcity pricing based on SCA's operating costs** – this involves setting SCA's variable charge to Sydney Water based on its short-run operating costs and increasing this charge when dam levels trigger increased operating costs (particularly due to Shoalhaven pumping cost).
- **Scarcity pricing based on the costs of alternative triggered supply and demand management options** – this involves setting a variable charge to Sydney Water based on estimates the opportunity cost of using dam water (e.g. the cost of Sydney Water operating the desalination plant or imposing water restrictions). The price increases would have links to existing operating rules that require Sydney Water to deploy specific supply or demand management options when dam levels fall to a certain levels.
- **Dynamically efficient pricing based on a system optimisation model for Sydney** – involves using an economic model to calculate a schedule of efficient prices defined in terms of dam levels.

Below we compare these options to current arrangements.

4.2 Scarcity pricing based on SCA's operating costs

4.2.1 Description

One option for sending more efficient signals about the marginal cost of using dam water is to base SCA's volumetric prices on its short-run operating costs, which would increase as SCA activates drought supply measures triggered by dam levels. For example, Shoalhaven drought transfers currently commence when dam levels fall to 75%. Hence, the volumetric price of dam water could be say $30/ML (non-drought operating cost) when dam levels were above 75% storages and $70/ML (marginal pumping costs of Shoalhaven transfer) when dam levels were below 75%. A similar logic would apply if further decreases in dam levels triggered even higher marginal operating costs for SCA.

IPART could adjust SCA's variable price annually (or some other period) to reflect storage levels at the time. A benefit of this option from SCA's point of view is that there would be an inbuilt mechanism to increase the variable price during the regulatory period, which would mitigate the risk of incurring additional pumping costs when dam levels fall unexpectedly.

In its submission to IPART's 2009 price determination, SCA suggested that increasing charges to Sydney Water to reflect Shoalhaven pumping costs during drought was a form of scarcity pricing.

> The commencement and cessation of pumping from the Shoalhaven is directly triggered by dam levels. The SCA contends that passing through SCA's Shoalhaven pumping cost, if and when it occurs, is consistent with this approach.

A fixed charge would recover any estimated revenue shortfall from SCA's variable charge. As SCA's volumetric prices would relate to its operating costs (SRMC), which are less than the current volumetric price set with reference to LRMC, SCA's fixed charge would account for a larger proportion of SCA's revenue than under current arrangements. For example, the fixed fee might account for around 90% of revenue as opposed to 35%.

The exact level of the fixed charge will depend on SCA required revenue (e.g. $190m) and expectations about the revenue generated from variable charges, which will in turn depend on expected water sales and dam levels (e.g. low dam levels will trigger a higher volumetric price and more revenue per ML of water sold). If prices are set during a non-drought period when water sales are expected to be 500 000ML and SCA's volumetric price is $30/ML, for example, variable charges will recover $15m and the fixed charge could be set to recover the $175m shortfall from required revenue.

If predictions are wrong and dam levels and water sales decline during the regulatory period, the variable charge will increase automatically. IPART could adjust SCA's fixed charge when it changes the variable charge or simply set the fixed charge for the regulatory period and address any under or over recovery at the next price review. The table below assumes that a fixed charge would apply for the regulatory period but the variable charge would change as dam levels change.

Table 1: Illustrative scarcity pricing schedule to Sydney Water (based on SCA operating costs)

Storage level	Scarcity price/Cost	Basis
Above 75%	$30 per ML (plus fixed charge, e.g. $175m)	SCA non-drought operating cost
75%	$70 per ML (plus fixed charge, e.g. $175m)	SCA marginal pumping costs for Shoalhaven transfers

An alternative option for addressing revenue shortfalls from unexpected pumping costs during drought is for SCA to simply pass through these costs on an annual basis, as and when they occur (either through the fixed or variable charge). However, this is less akin to marginal cost pricing.

Assessment of options

4.2.2 Assessment

Efficiency and effectiveness

Efficiency of price signal

Economic theory suggests setting SCA's variable charge with respect to its short-run marginal costs of operating infrastructure will send an efficient signal to users of those infrastructure services. As falling dam levels trigger Shoalhaven pumping costs and a higher volumetric price, for example, Sydney Water would have an incentive to reduce demand for dam supplies.

Prices based on infrastructure operating costs would not, however, account for the marginal value of water itself and hence not reflect the full social cost of using water in SCA storages.

Impacts on Sydney Water's bulk water sourcing decisions

As the SRMC of operating water supply infrastructure (e.g. ranging from $30/ML to $70/ML) is lower than the current bulk charge ($250/ML), a move to more cost-reflective pricing for infrastructure would theoretically provide Sydney Water with an incentive to use more dam water relative to other supplies when it was not scarce. In practice, Sydney Water's existing regulations and desalination operating rules potentially reduce the extent to which this would happen in practice (particularly in the short term).

Given the estimated magnitude of the increase in operating costs attributed to Shoalhaven transfers (e.g. from $30/ML to $70/ML) it is debateable whether a price increase to reflect increased drought supply costs would loom large in Sydney Water's procurement decisions.

Revenue adequacy and stability

The move from setting SCA's volumetric price with reference to its LRMC to its SRMC of operating infrastructure would increase SCA's revenue stability as it would mean SCA would generate a much higher proportion of revenue from its fixed charge (e.g. increasing from 35% to 90%) which is not responsive to changes on water sales. This would be more reflective of SCA's underlying cost structure.

Introducing prices that more accurately reflected increased costs associated with Shoalhaven transfers when dam levels fall would also address revenue adequacy for SCA. From a cost recovery perspective, drought costs associated with Shoalhaven transfers would appear to be a potentially significant component of SCA's operating costs and hence likely to have a material effect on revenue adequacy. For example, SCA estimates that unforeseen costs of pumping water from the Shoalhaven over the 2005 determination period amounted to $31 million to the end of 2007/08, with annual drought pumping costs of $8.5

million in 2005-06, $9.5 million in 2006-07, and $12.8 million in 2007-08. For perspective, allowed operating expenditure for the period was $334.3m (or approximately $81m – $85m annually) (IPART, 2009). This means drought transfers accounted for approximately 10 per cent of operating costs.

In general, we believe there is a strong case for SCA to be able to recover efficient costs associated with Shoalhaven transfers when they are required.

Table 2 is an illustrative example of the impact of SRMC pricing on revenue adequacy for SCA compared to current arrangements under different dam levels and water sales. It broadly shows how actual revenues from tariffs may diverge from expected revenue as dam levels and sales fall. In this example, we assume:

- The expected revenue requirement is $190m.
- Water sales vary with dam levels. This might arise because existing operating rules for Sydney Water reduce its demand for SCA water when dam levels fall (e.g. desalination operation, restrictions).
- Sales of 500 000ML is the basis for setting the fixed charge to ensure revenue adequacy and fixed charges are constant for the regulatory period.
- Actual revenues are annual revenues generated from tariffs under different storage and water sales scenarios (i.e. volumetric price multiplied by sales at a given dam level plus revenue from the fixed fee). Under scarcity pricing, the volumetric price will be higher in years when dam levels are below 75% (i.e. $70/ML instead of $30/ML). For simplicity, we assume a single volumetric price applies in any one year.

Given these assumptions:

- Under current arrangements, a volumetric charge of $250/ML is expected to recover $125m when dams are full and annual water sales are 500 00ML (i.e. 500 000ML multiplied by $250/ML) with a fixed charge of $65m recovering the residual of the revenue requirement (i.e. $190m-$125m)
- Under the SRMC pricing approach, the variable charge (of $30/ML) is expected to recover $15m (i.e. 500 000ML multiplied by $30/ML) in revenue when dams are full with a fixed charge of $175m recovering the residual of the revenue requirement.

Table 2: Indicative revenues from volumetric and fixed charges under different pricing regimes and dam levels

Annual Sales (000's	Storages (%)	Revenue from charges ($000)

Assessment of options

ML)		Actual revenue Current volumetric price ($250/ML)	Current fixed charge	Difference between actual and expected revenue ($190m)	Actual revenue SRMC ($30/ML above 75%, $70/ML below 75%)	Higher fixed charge	Difference between actual and expected revenue ($190m)
500	90-100	**125 000**	**65 000**	**0**	**15 000**	**175 000**	**0**
490	80-90	122 500	65 000	**-2 500**	14 700	175 000	**-300**
480	75-80	120 000	65 000	**-5 000**	14 400	175 000	**-600**
470	70-75	117 500	65 000	**-7 500**	32 900	175 000	**17 900**
460	60-70	115 000	65 000	**-10 000**	32 200	175 000	**17 200**
450	50-60	112 500	65 000	**-12 500**	31 500	175 000	**16 500**
400	Under 50	100 000	65 000	**-25 000**	28 000	175 000	**13 000**

Note: This is a simplified example for illustrative purposes only.

As shown in the table, the current pricing approach consistently recovers less revenue than expected as dam levels and water sales fall, with the annual shortfall ranging from $2.5m to $25m. In practice, the reduction in water sales will reduce SCA operating costs, which will partially offset the amount of revenue under-recovered. For example, the reduction in operating costs when sales are 490 000ML rather than 500 000 ML is $300 000 (i.e. $30/ML multiplied by 10 000ML). However, this leaves a shortfall of $2.2 m.

Under the SRMC pricing approach, the volumetric price initially recovers less revenue than expected when water sales and dam levels fall (from 100% to 75% storages). As explained above, however, reduced operating costs due to lower sales will exactly offset this shortfall between actual and expected revenue from sales.

Below 75% storage levels, the SRMC pricing approach generates higher revenue than expected due to the higher volumetric charge (i.e. $70/ML instead of $30/ML). As all water supplied is priced at the marginal cost of Shoalhaven transfers, the pricing regime will generally generate revenue sufficient to cover at least the additional operating costs associated with Shoalhaven transfers.

A potential issue with using dam levels to trigger an increase in the SCA's volumetric prices is that the price would apply to all SCA water supplies below 75% storage, regardless of whether it was pumped from the Shoalhaven or not. This may create a perverse incentive for SCA. For example, SCA could decide to not pump water when dam levels fall below 75% (and thus not incur additional operating costs) and it would still earn additional revenue from the increase in the

volumetric price. In practice, the regulator could claw back this additional revenue at the end of regulatory period.

An alternative approach to recovering pumping costs would be to include an annual surcharge to reflect the cost of transfers as and when they occur (i.e. the price would not be directly linked to dam levels). The cost pass-through could be averaged across the volumetric price or added as a lump sum to the fixed fee. This is more aligned with the cost pass-through mechanisms proposed by SCA in the most recent price determination. A cost pass-through mechanism (based on average or total pumping costs) may dilute the efficiency properties of marginal cost pricing, but as noted Sydney Water may have limited flexibility/incentive to respond to these signals in any event.

Appropriate allocation of risk

A move to SRMC pricing for SCA's infrastructure services would arguably be more consistent with efficient risk allocation given SCA currently has few tools with which to manage sales risks. However, this would increase risks to Sydney Water. Under current arrangements, reductions in Sydney Water's revenues from reduced sales are offset by reductions in purchases from SCA. If SCA charges Sydney Water a higher fixed charge, however, reductions in Sydney Water's revenues from reduced sales would result in a larger shortfall in cost recovery for Sydney Water.

Administrative complexity

A change to the structure of SCA's tariffs (balance of fixed and variable charges) could occur within the existing regime. However, introducing a cost-pass through mechanism to reflect supply costs may require adjusting prices during the regulatory period. Administrative costs would increase if Sydney Water was required to pass on these price signals to customers. Sydney Water has previously expressed concerns about the administrative costs associated with passing on Shoalhaven pumping costs to retail customers and suggest prices changes be limited to once per year.

> Sydney Water submitted that it would be concerned if Shoalhaven pumping costs were to be passed through to its customers *immediately* after they were incurred (i.e., at the next bill). It opposed this approach as it could involve up to four price changes to its customers in a year, and result in high administrative costs to reconfigure billing systems and inform customers. However, Sydney Water indicated that if IPART assesses that SCA is not able to absorb Shoalhaven pumping costs in between determinations, the pass-through mechanism in Sydney Water's determination could be used to pass through these costs on an *annual* basis (IPART 2009).

Transparency

As SRMC pricing on based on operating costs would relate to costs incurred by SCA, it is arguably more transparent than the current approach of setting the

volumetric price somewhat arbitrarily between SRMC and LRMC based on a mix of different objectives.

Overall

While pricing based on short-run operating costs is consistent with efficient pricing, using dam levels as the trigger for price increases in SCA's volumetric price may create perverse incentives for SCA as it would be able to earn additional revenue regardless of whether it actually incurred pumping costs. In practice, the regulator could claw back this additional revenue at the end of regulatory period.

An alternative would be to include a surcharge to volumetric prices to reflect the average cost of transfers as and then when they occur. While it is debateable whether this would affect Sydney Water's procurement decisions it would help SCA recover its efficient expenditure in providing drought supplies.

By itself, this option would not reflect the full cost of Sydney Water drawing on dam water as it excludes the marginal value of water itself.

4.3 Scarcity pricing based on the cost of alternative triggered supply and demand options

4.3.1 Description

Another option for using prices to reflect the social marginal cost of using dam water is to set prices that reflect the marginal value of water at different dam levels based on the cost of alternative options triggered. For example, under current operating rules the Sydney Water desalination plant begins operation when dam levels fall to 70%. This would suggest that the marginal value of water is at least equal to the marginal cost of producing desalination water. To send signals to Sydney Water about the cost of using dam water, SCA's volumetric price for water could potentially increase by an amount commensurate with the operating cost of desalination (adjusted for avoided system costs etc).

Similarly, SCA or IPART could assign a value to the social marginal cost of water restrictions when dam level fall to a certain trigger levels (e.g. 50%). IPART (2009) appears to allude to this option when it notes 'under a scarcity pricing approach, higher level water restrictions (as a result of low dam levels) will result in proportionally higher volumetric SCA prices'.

Table 3 shows an illustrative schedule of scarcity prices and triggers that SCA/IPART could potentially apply. The pricing schedule could have more or less steps depending on the availability of options and cost estimates. The price assigned to the cost of water restrictions is a hypothetical cost for illustrative purposes.

These prices would be in addition to, but separate from, SCA's charges to recover infrastructure costs discussed in section 4.2.1. As discussed below, the revenue from scarcity charges based on the opportunity cost of water would not necessarily accrue to SCA.

Table 3: Illustrative scarcity pricing schedule to Sydney Water - cost of alternative triggered supply and demand options

Storage level	Scarcity price/Cost	Basis
Above 70%	Marginal value of water $0/ML (plus SCA infrastructure charges)	Full storages imply low scarcity value of water
70%	$422 per ML (plus SCA infrastructure charges)	Marginal cost of operating desalination
50%	$650 per ML (hypothetical) (plus SCA infrastructure charges)	Marginal cost of prolonging water restrictions

SCA or IPART could potentially develop a smoothed pricing schedule based on these estimates (table 4). This approach may require defining steps based on the average cost of two options (i.e. the marginal cost of the present option and the marginal cost next option) or assigning probability weights as falling dam levels increase the chance of incurring costs associated with triggering the next source. This would avoid large price changes as a trigger point is reached.

Table 4: Illustrative scarcity pricing schedule to Sydney Water (smoothed prices)

Storage level	Scarcity price/Cost	Basis
90%	Marginal value of water $0/ML (plus SCA infrastructure charges)	Full storages imply low scarcity value of water
80%	$211 per ML (plus SCA infrastructure charges)	Half the cost of operating desalination
70%	$422 per ML (plus SCA infrastructure charges)	Cost of operating desalination
60%	$536 per ML (plus SCA infrastructure charges)	Mid-point of the cost of operating desalination and cost of prolonging water restrictions
50%	$650 per ML (hypothetical) (plus SCA infrastructure charges)	Cost of prolonging water restrictions

An alternative approach is to estimate a schedule of scarcity prices using sophisticated modelling techniques, such as stochastic dynamic programming,

that considers pricing, storages, and investment decisions in an integrated way (this is discussed as a separate option on 4.4 below).

4.3.2 Assessment

Efficiency and effectiveness

Efficiency of price signal

Defining robust scarcity prices that reflect the marginal value of water in dams can present significant theoretical and practical challenges. While a price based on the cost of desalination could act as a proxy for the opportunity cost of using dam water, for example, the regulator would need to consider whether a relatively basic regime (as described above) would be sufficient to send an efficient signal for investment or whether a more sophisticated pricing approach would be required. The Independent Panels for the Metropolitan Water Plan suggested that that a 'shadow price' based on desalination operating costs would not fully capture the system wide opportunity costs associated with substituting desalinated water for dam water.

> The harder the plant is operated on average, the less air space is available in storages and there is a reduction in the value of this harvesting option. This is a cost that needs to be added to obtain the social operating costs of operating the plant. Further information would be required to calculate an adjusted shadow price along these lines.

Another issue when estimating the opportunity cost of water based on the operating costs of desalination (or other technologies) is determining what the scarcity price should be when production reaches full capacity but dam levels continue to decline. That is, the opportunity cost may exceed the operating cost of desalination following a sequence of low inflow months or years. Notably, the desalination plant produces up to 90GL per year while dam levels can fall up to five hundred GL per year (see Figure 4).

Estimating the cost of water use in prolonging restrictions (triggered when dam levels are below 50%) could draw on studies on the costs of water restrictions (e.g. willingness to pay studies) incorporated in the recent review of desalination plant operating rules (CIE 2010). However, including these costs in a simple pricing schedule based on dam levels would require converting them into costs per megalitre of use.

Given the operating rules for the desalination plant take into account the risk of restrictions, it is arguable that Sydney Water already internalises these costs to some degree.

Impacts on Sydney Water's bulk water sourcing decisions

The magnitude of price increases related to scarcity pricing is potentially significant (e.g. $422/ML for desalination) and is therefore much more likely to influence Sydney Water's water sourcing and investment decisions than cost-reflective pricing for raw water operating costs alone.

Revenue adequacy and stability

Scarcity prices based on the opportunity cost of water (e.g. desalination costs, water restrictions) would generate additional revenues without SCA incurring a corresponding cost (i.e. it is a resource rent). These revenues could potentially be substantial. For example, annual sales to Sydney of 450 000 ML per year (IPART, 2009) and a scarcity price of $422/ML would generate approximately $190m in revenue per year (assuming dam levels were below the trigger level the whole time).

The table below presents information on revenues from pricing SCA's infrastructure services at SRMC from section 4.2.2 along with annual revenues from the two illustrative scarcity pricing models. Notably the revenues generated by scarcity charges exceed SCA's fixed infrastructure charge to Sydney Water when dam levels fall below 70%.

Table 5: Indicative revenues from volumetric charges under different pricing regimes and dam levels

Annual Sales (000's ML)	**Storages (%)**	**Revenue from charges ($000)**				
		SRMC ($30/ML above 75%, $70/ML below 75%	Fixed	Difference from expected revenue ($190m)	Scarcity pricing	Scarcity pricing (smoothed)
500	90-100	**15 000**	**175 000**	0	0	0
490	80-90	14 700	175 000	-300	0	0
480	75-80	14 400	175 000	-600	0	101 280
470	70-75	32 900	175 000	17 900	0	99 170
460	60-70	32 200	175 000	17 200	194 120	194 120
450	50-60	31 500	175 000	16 500	189 900	241 200
400	Under 50	28 000	175 000	13 000	260 000	260 000

Note: This is a simplified example for illustrative purposes only.

This raises the key issue of what happens to the revenues from the scarcity charge. One option would be for SCA to return this revenue to government (i.e.

as a resource rent tax). With respect to the potential for over-recovery of scarce resources, a recent Productivity Commission staff working paper (Barker, Murray, & Salerian, 2010) advocated a resource rent tax rather than regulating returns:

> Capacity rents are distinct from monopoly rents and have different implications. Monopoly rents arise from exploiting market power, creating costs to community Capacity rents, on the other hand, accrue to the owners of capacity-constrained resources (such as aquifers), and act to ration limited supply so as to achieve an efficient market equilibrium. Whereas the existence of monopoly rents might mean there is a role for government regulation to address market power, capacity rents should not be regulated away. Where firms make excessive profits as a consequence of capacity rents, this can be addressed more efficiently through resource-rent taxation that does not distort the price of water.

Alternatively, IPART could use some of the revenue to decrease the fixed charge to Sydney Water on the basis this would result in lower costs to customers/the public and offset the increase in overall variable charges to Sydney Water (including SCA infrastructure costs and the opportunity cost of water). Given there would potentially be a link between Sydney Water's current operating decisions, which influence supply scarcity, and the size of the fixed charge rebate in the next period received by Sydney Water, this approach may have unintended consequences on Sydney Water's sourcing and investment decisions.

IPART could also adjust SCA's required revenues in the next regulatory period to account for excess revenues reflecting scarcity rent.

To the extent SCA's infrastructure prices are set according to its short-run operating costs (see above) with an appropriate fixed charge, its revenues should be sufficient to cover costs and provide revenue stability without the additional scarcity rents from water.[12] In fact, if SCA did collect revenue from the scarcity charge its revenues could potentially be more volatile and more difficult to forecast in a regulatory setting (i.e. variable prices would be $422/ML rather than $250/ML). Separating resource pricing and infrastructure pricing mitigates this effect.

Appropriate allocation of risk

Compared to current arrangements, scarcity pricing would increase bulk supply costs to Sydney Water when water became scarce. This would present financial risks to Sydney water given current retail pricing arrangements are invariant to dam levels and dams remain its main source of supply. In the longer term, however, Sydney Water has tools to manage these risks such as investing in new supplies and demand management and changing the retail price structure or

12 As noted earlier, leaving fixed charges as they currently stand would not achieve revenue adequacy.

levels. As noted, IPART could use some of the revenue from the scarcity charge to offset Sydney Water's fixed charge.

There may be a case for introducing additional steps to smooth prices. This would avoid large price spikes to Sydney Water (e.g. from $70/ML to $422/ML) while still providing an incentive to respond to prices over the short to medium term. It would also potentially help signal the increased likelihood of incurring higher costs.

Administrative complexity

Introducing a simple scarcity charge with a small number of prices/triggers and that only changed infrequently (e.g. less than once a year) would arguably be administratively feasible, particularly given it essentially only applies to one large customer (although it will be important to address specific issues for the three smaller local councils). This pricing option has some similarities to the ACT water abstraction charge, whereby water provider ACTEW faces a volumetric charge for water use (0.55c/KL) that, among other things, is claimed to reflect the scarcity value of water. The ACT government collects the revenue from this charge (ACTEW, 2011).

A more sophisticated regime, with multiple scarcity prices/triggers, which required frequent price changes, would add to the administrative burden.

A major issue will be developing an appropriate proxy for the value of water in storage that stakeholder can agree upon. Notably, there have been (unsuccessful) legal challenges of the ACT water abstraction charge.

Transparency

In contrast to water markets, administered scarcity pricing requires estimating values associated with water, which rely on a number of assumptions. By its nature, this process can be highly contentious. However, links to the costs of alternatives at least provides a defensible benchmark.

Under current arrangements, the regulator is already implicitly estimating these values when setting the volumetric charge. The basis for calculating the LRMC is often not transparent.

Overall

Setting a charge based on the marginal value of water in dams (which is separable from a charge to recover SCA's short-run operating cost) could reduce the revenue risk to SCA embodied in current tariff structures while still providing a more efficient price signal for sourcing decisions by Sydney Water.

A relatively basic approach to valuing water in storage, such as setting prices based on the cost of desalination (when operating rules based on dam levels trigger operation of the desalination plant), may achieve the broad aim of sending

a price signal to Sydney Water. SCA could introduce additional steps in the pricing regime to smooth prices to reduce price volatility to Sydney Water.

Developing an appropriate proxy for the value of water in storage, which stakeholders agree upon, is likely to be a key challenge.

4.4 Scarcity pricing based on a system optimisation model

4.4.1 Description

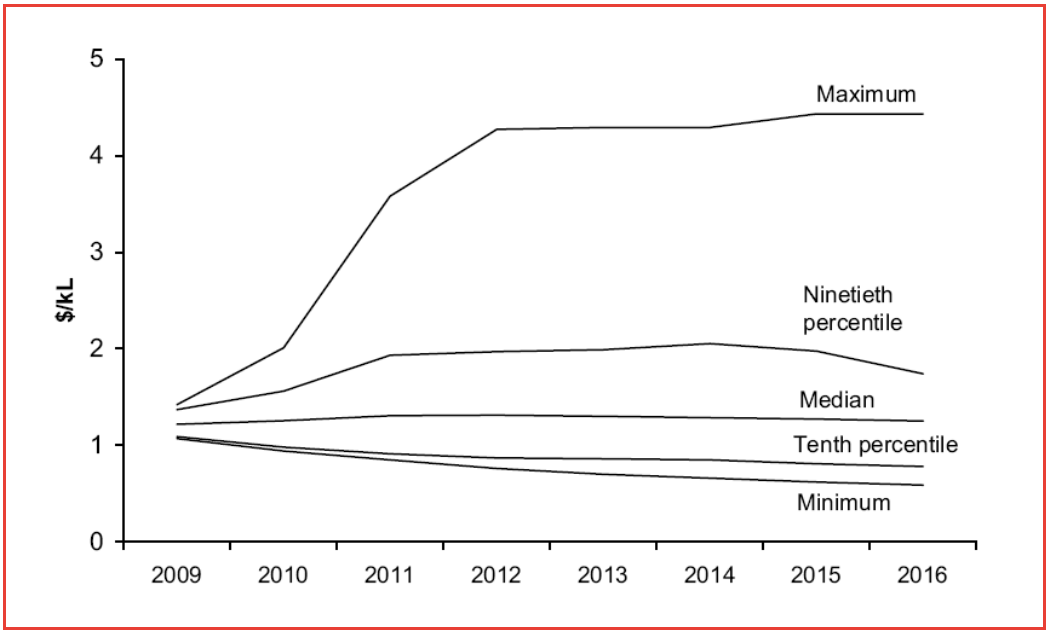
Instead of the heuristic approaches above, IPART could adopt a more sophisticated approach. In particular, it could use economic modelling techniques such as stochastic dynamic programming to define a schedule of prices that optimise community welfare given expected policy constraints, planned investments, future inflows, storages and demand forecasts.

In theory, it should be possible to define a schedule of efficient prices in terms of dam levels, which could be updated either annually or at the start of the regulatory period to account for new information on rainfall, inflows and dam levels. The regulator (drawing on expert advice) would need to make judgments about whether the assumptions underpinning modelled scarcity prices (e.g. chosen inflow scenarios) are reasonable.

Figure 10 illustrates modelled scarcity-based prices under a range of rainfall/inflow scenarios. As these prices relate to end-consumer prices provided by a vertically integrated service provider, further consideration would need to be given to applying the same principles to SCA wholesale operations and how this fits within the broader Sydney supply system. For example, Sydney Water's decisions on how to operate the desalination plant would influence the optimal pricing, storage, and investment patterns of SCA as it would affect demand. To the extent SCA and Sydney Water are subject to operating rules, however, these might be included as constraints in the model.

In theory, however, an increase in SCA's wholesale prices should have an effect on the optimal operating rules for the desalination plant. That is, the review of desalination plant operating rules by CIE estimated costs and benefits of alternative operating regimes assuming scarcity pricing had no role in managing supplies. If SCA introduced scarcity pricing, this may affect the estimated costs and benefits of alternative operating rules and their relative rankings.

Figure 10: Prices under scarcity-based pricing, across various rainfall scenarios



Source: Barker, Murray, & Salerian, 2010.

In Western Australia, the ERA (2009) has developed a model to estimate the short-run value of water. The model is based on a hypothetical wholesale market for metropolitan water supply. The model calculates the price at which supply equals demand for each of the next five years, given the available supply options, supply security requirements and an assumption about the responsiveness of demand to price (ERA 2009). The ERA notes that the model is useful as one source of information for price setting purposes.

The ERA model does not seek to attach a value to water in storage through specific scarcity prices. Instead, it defines a demand schedule for bulk water that achieves 'the amount of water that would ideally be retained in the dams at the end of each year to secure the system'. For example, the security target is to retain enough water in the dams at the end of each year to ensure 'saturated' demand[13] will be met in the following year even if zero inflows occur.

4.4.2 Assessment

Efficiency and effectiveness

Efficiency of price signals

Although economic modelling to generate a dynamically efficient scarcity price represents a theoretically attractive approach for efficient pricing, its practical

13 Saturated demand is defined as 30 per cent above the level of demand that would occur under a total sprinkler ban.

application in the water sector is in its early stages. Further, such models need to be tailored to specific systems or policy questions.

By their nature economics models rely on value judgements and technical assumptions and are information intensive. The quality of the model design, inputs and application will therefore be a key factor influencing whether modelled prices are likely to enhance efficiency. That said, existing pricing arrangements also embody similar types of value judgements and technical assumptions and require similar information.

Overall, however, modelled scarcity prices would be expected to lead to more efficient pricing than the status quo. Modelling by Barker, Murray, & Salerian, (2010) for example showed that scarcity pricing was associated with higher community welfare than pricing based on LRMC.

Impacts on Sydney Water sourcing decisions

Although prices modelled by the Productivity Commission are broadly indicative at best, they suggest prices could diverge significantly from the short-run marginal cost of supplying and distributing water from dams (i.e. minimum price) depending on rainfall and inflows. Largely, the estimated price rise remains within a relatively narrow band 90 per cent of the time. Under more extreme scenarios, the modelled scarcity price rises to many times the short-run marginal (operating) costs. Such prices may well be material to Sydney Water's procurement decisions under drier scenarios.

As noted above, the introduction of scarcity pricing may change the optimal operating rules for the desalination plant and hence Sydney Water's sourcing decisions.

Revenue adequacy and stability

Recent theoretical applications of economic modelling to estimate scarcity prices tend to abstract from institutional issues such as price regulation and tariff structures or deal with them in a general way. The Productivity Commission (Barker, Murray, & Salerian, 2010), for example, notes 'fixed charges (under a two part tariff) are not included in the modelling undertaken for this study'. To the extent this model is an extension of the SRMC scarcity pricing models described above, it should enable SCA to achieve revenue adequacy.

Appropriate allocation of risk

As with other forms of scarcity pricing, a common concern about economic modelling approaches to efficient pricing is the fluctuation in prices. In response, the ERA notes that price variations implied by its wholesale level model would not necessarily translate to similar changes in retail prices and could actually help identify required prices over a set regulatory period.

> The submission from the Water Corporation that a short run water model produces prices that fluctuate from year to year does not mean that usage charges need to fluctuate to the same extent from year to year. Indeed, the model is likely to be most useful if it is used to identify the value of water (and hence usage charges) over the course of the regulatory period (ERA 2009).

Administrative complexity

As an initial step, the NSW government, SCA or IPART could develop a model specific to the Sydney system (likely drawing on existing models, such as WATHNET and economic models developed to assess options under the metropolitan plan) that considers scarcity pricing in a system wide context. This would help establish the workability of this approach to setting scarcity prices and identify any interactions between optimal scarcity prices and other operating rules.

Transparency

One key issue associated with economic modelling is whether stakeholders, such as the regulator, Sydney Water and its customers, would be willing to accept prices determined though this complex 'black box' process. In Western Australia, for example, there has been much debate about the specification of the ERA's proposed short-run value of water model:

> From a practical perspective, the ERA's proposed SRMCP model is not well specified, calibrated or tested, and provides highly unstable results under a wide range of foreseeable circumstances. Without a strong theoretical driver, adopting a methodology that has a high probability of being abandoned at the next price review (due to the potential for unreasonably high or low prices) is not good regulatory practice (Water Corporation submission on Draft Report, Part A, cited in ERA 2009)

There is a risk that such modelling would be simply set aside or rejected when it provides results that stakeholders do not agree with and which IPART cannot easily communicate.

Overall

In theory, an economic model that calculated an optimal scarcity price based on existing system constraints, planned investments and operating plans would produce efficient price signals. However, much work would be required to develop such a model and to achieve buy-in from stakeholders. Further, consideration needs to be given to how these models would interact with the models underpinning the existing operating rules for desalination.

5 Conclusions

In considering options for scarcity pricing at the wholesale level, stakeholders will approach the issue with different perspectives. As a business, a primary objective of SCA is to ensure its prices to Sydney Water enable it to earn sufficient revenue to fulfil its supply functions, including managing its infrastructure efficiently and in accordance with sound commercial principles. IPART, on the other hand, must consider broader issues relating to the efficient operation of the supply system, consisting of multiple sources, and the possible development of a wholesale market. In particular, it must consider whether SCA's prices provide sufficient incentives for Sydney Water to undertake efficient investment in, alternative supplies and demand management.

Under current pricing arrangements, there is an inherent conflict between achieving revenue stability for SCA on the one hand and IPART's desire to send a signal on the value of water to inform Sydney Water's sourcing and investment decisions on the other. A key issue in assessing options for scarcity pricing is whether they can provide appropriate signals for efficient use and investment while not exposing SCA to undue revenue risk. There is a strong argument that SCA, as a relatively passive manager of catchments and dams in accordance with government defined operating strategies, should be able to recover its efficient costs without being excessively exposed to demand risk over which it has no control.

Our view is that scarcity pricing (based on principles of marginal cost pricing) would address this issue. This model would broadly involve:

- Aligning SCA's volumetric price with its short-run operating costs, with a fixed charge to address any revenue shortfall. This would require a large increase in revenue generated from SCA's fixed charge compared to current arrangements.
- Setting a separate volumetric price that reflects the estimated marginal value of water in storage, which would be in addition to SCA's infrastructure charges but would effectively apply only when predefined triggers are reached.
    - The revenue collected through this additional scarcity charge represents a separate resource rent outside of SCA's required revenue requirement and could potentially be retained by government or alternatively used to offset fixed Sydney Water's charges in the current or future regulatory periods.

This pricing approach would reduce the revenue risk to SCA embodied in current tariff structures while providing an appropriate price signal for consumption and investment to Sydney Water (and other SCA customers) and potential new entrants at times when water is scarce. It does so by clearly

differentiating between pricing for SCA's infrastructure services and the water resource itself.

The extent to which these prices will have a material effect on the current and future portfolio of supply options for Sydney will partly depend on broader institutional arrangements for urban water planning. For example, current government policies (for example, strict desalination plant operating rules) may lock in particular sourcing decisions and investments and thus limit Sydney Water's flexibility to respond to wholesale water prices.

Another advantage of this approach is that it would be more flexible to adjust to changing circumstances in the urban water industry under which Sydney Water must make increasingly complex water sourcing and investment decisions across a range of supply and demand management options.

The design of the scarcity pricing regime also needs to consider carefully how scarcity prices will combine with existing operating rules for the Sydney system to achieve the most efficient mix of options for balancing supply and demand. For example, to the extent the operating rules for the desalination plant already take into account risks to existing storages and therefore reflect an 'optimal' operating strategy, there is a risk that the addition of scarcity pricing for SCA supplies will double count the costs of consuming dam water. This is not so say scarcity pricing is not worthwhile, but rather that current operating rules may need to be reconsidered in light of this new option for balancing supply and demand.

Putting this pricing model into practice will be challenging. In particular, estimating the value of water in storage is a key issue to determine. In this paper we canvass potential options for estimating the marginal value of water in storage ranging from heuristic approaches based on existing operating rules (e.g. setting prices equal to the operating cost of alternative options such as desalination when dam levels trigger operation of the desalination plant) to economic modelling approaches.

In theory, an economic model that calculated an optimal price based on existing system constraints, planned investments and operating plans would produce efficient price signals. However, we recognise that much work would be required to develop such a model and for it to be accepted in a regulatory price setting context.

In summary, we would advocate replacing the current pricing arrangements based on setting SCA's volumetric charges with regard to its LRMC with a more cost-reflective approach based on SCA's SRMC together with an additional scarcity price based on the costs of predefined triggered alternatives. This would better protect SCA's revenue adequacy while also achieving IPART's aim of a more efficient price signal to SCA's customers and potential new suppliers.

Conclusions

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Appendix 11 – Outstanding Issues from 2009 Determination Report

Costing of SCA Council and Small Customers

IPART requested for the 2011 SCA Price review that the SCA respond to a number of issues in its 2009 Price Determination:

- Costs of supplying SCA council customers
- Costs of supply SCA unfiltered and raw water customers
- Advice to IPART on scarcity pricing.

This paper addresses the costing requirement in the first two dot points. That is, SCA has estimated the costs of supplying SCA council customers, and unfiltered and raw water customers.

Council Customers

Wingecarribee Shire Council, Shoalhaven City Council are existing customers of SCA and Goulburn-Mulwaree Council is expected to be in the next financial year. IPART determined prices for all three councils in 2009.

Wingecarribee Council takes about 4,100ML per annum, Shoalhaven less than 90 ML per annum for the town of Kangaroo Valley only, and Goulburn is forecast to take 500 to 800 ML per annum as the connection is made and supply commences.

Approach

SCA in the 2008/09 IPART review provided IPART estimates of the range of supply cost for council customers based on a standalone and incremental basis. This range was from $1,000/ML down to $150/ML respectively. Standalone is calculated as if the council customer is provided supply on a dedicated basis, whereas an incremental basis is where all fixed costs are first allocated to other customers (ie. Sydney Water), and only the incremental costs of supplying the customer is allocated to that customers' price. An intermediate method is to allocate fixed costs to the council according to the council's share of supply. In this analysis, this later approach provides the main estimates, which unsurprisingly enough fall in the mid-range of the range provided in 2008.

The assets serving the three councils, besides providing supply to Sydney Water Corporation are part of a transfer system which generates power managed by Eraring Energy. SCA has just revised its long term joint venture agreement with Eraring Energy, and asset accounting related to this is still being finalised. This may have some impact on the asset allocation to council customers and SCA will refine this as the data becomes available.

More generally, the approach taken was consistent with IPART's building block model. That is, having allocated the assets and operating expenditure to the customer by whichever method as above, total cost of supply is built up from operating expenditure, return on capital and return of capital (regulatory depreciation) (cf. Chapter 4, IPART Determination for SCA, 2009).

We were unable to use a method consistent with Sydney Water's approach of deducting treatment costs from total price to deduce a unfiltered or raw water price.

Results

Using this approach, Wingecarribee, Goulburn Mulwaree and Shoalhaven Council are estimated to have an average cost of $268 per ML (compared to SWC's $466 per ML). This cost is within the iThe key driver of the lower result compared to Sydney Water is the better

economies of scale in the local network, relative to the average of the system as a whole (ie. local supply is a relatively small demand in a system scaled for much larger supply). In particular, in earlier estimates to IPART SCA had used a 30GL per annum yield for the Shoalhaven System. Later analysis determined the yield to be above 75GL per annum, more than halving the cost to Council customers.

Small Customers

SCA has 56 unfiltered water customers and 8 raw water customers. Unfiltered customers are supplied with water from SCA transmission mains, while raw water customers access water from

The same general approach as for councils was undertaken. However, allocating assets to small customers was problematic.

Unfiltered customers are relatively low in the supply network along major transmission lines (close to the filtration plants). Individual customers take water at different points along these lines, and arguably should only be allocated the costs of these linear assets to the point of supply. However, this would create a large number of individual costs and prices. It is more practical to cost the class of customers supplied by the particular transmission asset. This effectively means that the unit cost of water supply to the offtake point would be identical to the cost of supplying Sydney Water.

Thus, their costs would not vary from the average costs of supplying SWC (ie. $0.47 per kL in 2010/11), except in regard to any incremental costs (off-take points, distribution pipes) to supply those customers uniquely.

Customers on the SCA transmission pipelines (eg. Warragamba pipeline) are supplied on a different basis to customers on the Upper Canal. Pipeline customers are supplied by SCA with a dedicated offtake point, and distribution line. On the Upper Canal customers provide their own offtake and distribution infrastructure. The difference in cost between these customer types is significant, as distribution infrastructure costs from $6,000 to $10,000 per connection depending on whether it is an existing or new connection. Operating costs with piped connection are also significant in terms of meeting customer requests regarding pressure and reliability. Metering and billing for both is provided by Sydney Water. Meter reading of raw water customers in the Shoalhaven system is undertaken by SCA, as SWC does not operate in this area.

Incremental costs are estimated to be $0.25 to $0.55 per kL for Warragamba Pipeline customers and negligible for Upper Canal customers because the latter supply their own connection. Adding the water cost itself (the current SCA average supply cost of $0.47) Warragamba Pipeline customer cost based on a complete new connection is close to the current price of $1.01 per kL. On the other hand, Upper Canal customers' costs at $0.60 per kL are close to half current prices.

Raw water customers in contrast are relatively high in the system (they extract from dams). Cost allocation is difficult, since the small number of customers is scattered over diverse parts of the SCA system (eg. both Metropolitan Dams and Shoalhaven). The approach taken was to allocate average costs according to the share of dams of total assets. Using this simple approach, the average costs per kL of SCA supplying water from dams alone is estimated to be less than $0.25 per kL compared to the current charge of $0.59 per kL.

Implications

IPART in SCA's 2005 Determination set Council prices on a path of usage price parity with Sydney Water. This is presumably based on the resource pricing principle of the "law of one price", that a commodity, aside from transport costs, will be at the same price in all locations. If this was not true, there would be arbitrage opportunities from moving water from one location to another. Setting price on infrastructure and operating cost such that volumetric price varies by location, though perceived as fair, may create resource use distortions. Though these are unlikely to be significant for the SCA as a whole, this could create local resource wastage or scarcity. This needs to be borne in mind when using cost information, but is certainly not an argument against location based pricing per se, as location costs can be signalled without resource allocation effects via the fixed charge.

However, there are precedents created in moving to regionally or location based pricing. Location cost based pricing was removed from HWC's price schedule in previous determinations. IPART applies postage stamp pricing within SWC's operating area, though there are significantly different bulk water supply costs across different regions of this area eg. Blue Mountains. In summary, careful consideration needs to be taken in using the cost information provided in price setting.