IPART
New South Wales

Independent Pricing and Regulatory Tribunal

Review of water prices for Sydney Desalination Plant Pty Limited

From 1 July 2012

Water — Final Report
December 2011

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1 Executive summary

The Independent Pricing and Regulatory Tribunal of NSW (IPART) has reviewed and determined the prices Sydney Desalination Plant Pty Ltd (SDP) can charge its customers for the period 1 July 2012 to 30 June 2017. The NSW Minister for Finance and Services requested that we conduct this review, and provided the Terms of Reference.[1] These required us to make a determination by 4 November 2011. However, in the course of the review, the Minister agreed to extend the timetable to allow us to consider new information provided by SDP in late October 2011.

This is the first time IPART has set prices for SDP. SDP is a wholly owned subsidiary of Sydney Water Corporation (Sydney Water), and currently Sydney Water is its only customer. Until 30 June 2012, the costs of the desalination plant and its connecting pipeline have already been included in the prices that Sydney Water charges its customers.

Our decisions on the prices SDP can charge from 1 July 2012 will not increase the prices that Sydney Water charges its customers. At the same time, our decisions allow SDP to recover all its efficient costs and earn a commercial rate of return on its investments.

This report sets out our decisions on SDP's prices and related matters and explains our reasons for making them. Due to the review's tight timeframe we were not able to release draft decisions for consultation.

1 A copy of the Terms of Reference is included at Appendix A.

1.1 Summary of IPART's decisions

In making our determination on SDP's prices, we used our usual building block approach to establish its total efficient costs over the determination period and to set prices to recover these costs. We made a range of important decisions about our price setting approach, to reflect SDP's particular operating environment, particularly the operating regime it is required to follow. These decisions were to:

- set separate prices for each of the plant's 5 possible modes of operation that recover its full daily notional revenue requirement[2] including the return on capital
- include a methodology for adjusting these prices to share costs if SDP acquires customers in addition to Sydney Water
- include mechanisms to encourage SDP to operate at full capacity whenever dam levels (available storages) are below 70% full, until they rise again to 80%, to help protect the community against drought as a consequence of the Metropolitan Water Plan
- to recommend the introduction of an efficiency gain mechanism that guarantees SDP will keep the benefits of any efficiency gains for a full 5 years before sharing the benefits of cost savings with its customers.

We also made decisions on an efficient level of operating expenditure and an adequate financial return for SDP over the determination period that differ from those SDP proposed in its submission to this review. The sections below summarise these key decisions.

1.1.1 Separate prices for each mode of plant operation

SDP is required to operate the desalination plant in line with a variable regime stipulated in the Metropolitan Water Plan. The plant must be in full operation whenever the Sydney region's total available dam storage level (available storages) is below 70%, and continue to operate only until this level exceeds 80% and, depending on storages levels, may be shutdown for extended periods. The plant's 5 modes include:

- Full operation when the plant operates at full production.
- Short term shutdown for 2 to 10 days.
- Medium term shutdown for 11 to 90 days.
- Long terms shutdown for 91 days to 2 years.
- Water security shutdown for more than 2 years.

2 The notional revenue requirement includes fixed and variable operating costs, the return on working capital, the return on capital and depreciation.

We decided to set separate maximum prices payable for each of these modes based on our estimate of the SDP's notional daily revenue requirement in that mode, rather than using the adjustment mechanisms SDP proposed. All daily fixed charges for all modes include the full daily return on capital, depreciation and return on working capital as well as the efficient fixed operating costs of that mode. All variable operating costs are included in the water usage charge (per ML of desalinated water supplied).

In addition, for the 3 longer shutdowns there are other fixed charges that are payable once each time the plant changes from one mode of operation to another (a 'transition to shutdown' charge and 'transition to restart' charge) that reflect the fixed costs of transitioning between the modes.

1.1.2 Methodology for adjusting the prices if SDP acquires additional customers

There are no restrictions on SDP supplying services to customers in addition to Sydney Water (other than small retail customers). The Government has recently passed legislation which recognises that in time SDP may have other customers. It is important that any additional customers pay their fair share of the desalination plant's costs and Sydney Water and its customers are protected. To ensure this, we decided to include a methodology in our determination for sharing SDP's full operation and shutdown costs (and prices) between its customers relative to the amount of desalinated water they receive.

1.1.3 Mechanism to encourage SDP to maintain full production when requested

As our terms of reference require, we have made decisions on the structure and level of prices that should encourage SDP to be indifferent as to whether or not it supplies desalinated water. However, we also consider it important to ensure that SDP has incentives to maximise production of desalinated water in times of drought. Therefore, we have included an abatement mechanism that reduces the fixed charge in full production if the average production of the preceding 365 days of full production is less than 250ML per day, excluding shutdown and force majeure events.

1.1.4 Mechanism to strengthen SDP's incentives to make efficiency gains

We also consider it important that SDP has incentives to continually strive to improve its efficiency. Based on advice from the recently established National Centre of Excellence in Desalination and a submission from Degremont Ltd we consider there are opportunities for it to make efficiency gains particularly in medium and long term shutdown modes. Therefore we have recommended that the Minister for Finance and Services include an efficiency carry-over mechanism in the

standing Terms of Reference for future reviews of SDP's prices.[3] Such a mechanism would guarantee that SDP will retain any efficiency savings it makes for a full 5 years, regardless of when in the regulatory cycle the savings are achieved.[4] At the end of that period, the benefits of cost savings would be shared with customers via lower prices.

1.1.5 SDP's efficient and prudent operating costs

Our finding on the efficient and prudent level of operating expenditure required by SDP over the determination period (in full operation mode)[5] is $9.5 million (or 2.2%) less than the level SDP proposed in its original and supplementary submissions. This is largely due to our decisions on the efficiency of SDP's proposed energy costs and small adjustments to chemical and membrane costs. Except in relation to energy, we have accepted SDP's estimates of costs for all the shutdown modes.

We decided to adopt benchmark estimates of energy costs, rather than base our calculations on the contracts that exist between SDP and Infigen. This decision recognises that unlike SDP's other input costs, energy can be traded as a commodity. Hence the efficient costs of energy are observable. It also recognises that unlike other water utilities, SDP is likely to be a trader of energy in periods when the plant is not at full production. We also decided to allow an automatic pass through of energy network charges, which are determined through independent review by the Australian Energy Regulator.

1.1.6 Adequate commercial return for SDP

Our finding on an adequate rate of return for SDP, one that reflects the commercial risks faced by its owner in providing the services, is 6.7%. This is lower than the 7.8% SDP proposed. This decision resulted in a revenue allowance for a return on assets that is around $95 million less than SDP proposed over the 5 year determination period.

In line with our usual practice, we calculated the rate of return based on our estimate of SDP's weighted average cost of capital (WACC). Our decisions are consistent with past practice and the findings of our ongoing systematic reviews to ensure our approach remains consistent with good practice and the best evidence available. Like other regulators, we use short term averages of market data to calculate these parameters. We seek to base our estimates of key sector-specific variable parameters, such as the equity beta, gearing and the benchmark credit rating, on the best

3 Letter to Minister Greg Pearce from Mr Jim Cox, 18 November 2011.

4 This recommendation, the opportunities for efficiencies and the operation of the efficiency carry over mechanism are discussed in Chapter 4.

5 Due to the difference between our decisions on price structure and SDP's proposed price structure, it is difficult to compare the revenues arising from our determination and SDP's proposal other than in full operation mode.

available evidence. Our method of calculating the cost of equity is based on the domestic Capital Asset Pricing Model (CAPM).

To inform our decisions, we sought advice from consultants on 2 of the WACC parameters (the equity beta and leverage estimates) and considered stakeholder submissions. We estimated a WACC range of 5.1% to 6.9%, with a mid-point of 5.9%. We decided to use a WACC of 6.7%, as this is consistent with the long term averages of the parameters. In determining a WACC decision 80 basis points above the mid point of our WACC range, we had strong regard to current market uncertainty and the calculated WACC using longer term averages for market parameters.

We also decided to use a pre-tax real WACC, in line with our traditional approach. IPART is currently reviewing the way we treat tax in calculating the WACC,[6] and we have announced our intent to move to a post-tax WACC to all the entities that we regulate. However, for reasons of timing, we decided to maintain the pre-tax approach for this determination. This decision resulted in a $102.1 million revenue allowance for the payment of tax over the determination period, which is much higher than the $56.7 million that would have been the case if we had adopted a post-tax WACC in this review. We will move to the new approach in our next determination of SDP's prices.

1.2 Summary of price outcomes

Table 1.1 summarises the pricing outcomes under our determination in 2011/12 dollars. It shows the prices payable by Sydney Water, assuming that Sydney Water's transfer of the pipeline connecting the desalination plant to Sydney's water network to SDP is completed and the implementation of the carbon pricing scheme. At the time IPART was undertaking its analysis, there was a degree of regulatory uncertainty about these two assumptions. In response to that uncertainty, the determination also includes the prices payable in the event that the pipeline transfer is not completed or in the event a carbon scheme is not operational. (These are presented in Appendix D, and in our legal determination which is attached to this report.)

To further reduce uncertainty, we have allowed for annual adjustments to these prices to pass through the network component of SDP's energy costs (both the variable and fixed network charge).

6 IPART, *The Incorporation of Company Tax in Pricing Determinations - Draft Report*, September 2011.

Table 1.1 IPART's decision on prices ($2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Tariffs for a Plant Operation Mode					
Water usage Charge ($/ML)	539.63 +VNC	582.48 +VNC	619.74 +VNC	634.78 +VNC	660.80 +VNC
Water Service Charge ($/day)	403,504 +FNC	403,315 +FNC	402,827 +FNC	396,681 +FNC	389,255 +FNC
Tariffs for a Shutdown Mode					
Short Term Shutdown					
Daily Shutdown Charge ($/day)	386,752 +FNC	390,774 +FNC	391,346 +FNC	384,583 +FNC	378,011 +FNC
Medium Term Shutdown					
Daily Shutdown Charge ($/day)	403,085 +FNC	405,345 +FNC	415,154 +FNC	398,794 +FNC	395,386 +FNC
Transition to Shutdown Charge	188,034	188,034	188,034	188,034	188,034
Long term Shutdown					
Daily Shutdown Charge ($/day)	393,769 +FNC	386,022 +FNC	380,193 +FNC	372,697 +FNC	369,438 +FNC
Transition to Shutdown Charge	277,502	277,502	277,502	277,502	277,502
Water Security Mode					
Daily Shutdown Charge ($/day)	383,974 +FNC	376,235 +FNC	371,127 +FNC	362,787 +FNC	355,618 +FNC
Transition to Shutdown Charge	1,442,005	1,442,005	1,442,005	1,442,005	1,442,005
Tariffs for a Restart Mode					
Short Term Shutdown					
Daily Restart Charge ($/day)	386,752 +FNC	390,774 +FNC	391,346 +FNC	384,583 +FNC	378,011 +FNC
Medium Term Shutdown					
Daily Restart Charge ($/day)	403,085 +FNC	405,345 +FNC	415,154 +FNC	398,794 +FNC	395,386 +FNC
Transition to Restart Charge	202,129	202,129	202,129	202,129	202,129
Long term Shutdown					
Daily Restart Charge ($/day)	393,769 +FNC	386,022 +FNC	380,193 +FNC	372,697 +FNC	369,438 +FNC
Transition to Restart Charge	1,770,928	1,770,928	1,770,928	1,770,928	1,770,928

	2012/13	2013/14	2014/15	2015/16	2016/17
Water Security Mode					
Daily Restart Charge ($/day)	383,974 +FNC	376,235 +FNC	371,127 +FNC	362,787 +FNC	355,618 +FNC
Transition to Restart Charge	5,497,899	5,497,899	5,497,899	5,497,899	5,497,899
Pipeline Only Tariffs					
Pipeline Charge ($/day)	130,032	130,235	129,399	128,204	127,711

Note: VNC = Variable Network Charge, FNC = Fixed Network Charge.

Note: The fixed charge Medium Term Shutdown Tariff increases relative to the Short Term Shutdown Tariff due to additional costs to maintain the filtration membranes, which are not incurred during a Short Term Shutdown.

Source: IPART analysis.

1.3 Impacts of pricing outcomes for SDP and Sydney Water's customers

In our view, our decisions on SDP's prices achieve a balance between providing an appropriate financial return to SDP and protecting customers from paying more than their fair share of the desalination plant's costs.

For SDP, our pricing decisions are expected to generate around $19.9 million per annum less revenue than SDP sought in its submission over the determination period (assuming the desalination plant is in full operation mode for the entire period). This is largely attributable to our decision to set a lower WACC than SDP requested. We have included $1.5 million per annum to cover insurable risks and recommended a mechanism that rewards SDP for efficiency initiatives regardless of when in the regulatory period the saving was made.

We estimate that our decision to continue to use a pre-tax WACC approach for this review resulted in around $9 million per annum more revenue for the next 5 years than a post-tax WACC approach. We used a pre-tax WACC for this review as at the time our decision of WACC was made we had not completed our consultation of stakeholders in regard to our decision to implement a post-tax WACC in future reviews.

Compared to SDP's proposed adjustment mechanism, we consider that our decision to set separate prices for each possible operation mode reduces uncertainty for SDP – for example, uncertainty about a future regulator's willingness to adjust revenues in subsequent determinations.

For customers, our decisions will not lead to higher water prices. Under the determination, the amount Sydney Water is expected to pay SDP in 2012/13 is 2.3% (or $4.9 million) less than the SDP-related costs already included in the determination for Sydney Water's current prices.[7] At the same time, we have included a mechanism to share SDP's fixed and variable costs between its customers relative to the amount of desalinated water that they receive.

Further, our determination ensures that Sydney Water is only liable to pay the usage charge when total available storages fall below 70%, and ceases to be payable when storages exceed 80%, in line with the Metropolitan Water Plan.

1.4 What does the rest of the report cover?

The rest of this report explains IPART's decisions and findings for this determination in detail, and the analysis that underpins them. It is structured as follows:

- Chapters 2 and 3 provide background to the review, including a summary of SDP's submission and information about contracts between SDP and other parties.
- Chapter 4 provides an overview of the approach we used to set prices, and the key decisions we made in relation to this approach.
- Chapter 5 provides an overview of our decisions on SDP's notional revenue requirements in each possible mode of operation, and Chapters 6 to 9 explain these decisions in detail.
- Chapter 10 presents our pricing decisions.

7 In the Sydney Water 2008 determination of prices, we forecast that the annual revenue requirement needed to recover the costs of the desalination plant and the distribution pipeline in the last year of the determination (2010/11) was $257.2 million ($2011/12). Based on the prices for desalinated water we have determined for this review, we forecast that in a full operation period, the annual revenue requirement for the desalination plant and the distribution pipeline for the first year of this determination (2012/13) will be $251.6 million ($2011/12), including an estimated value for network cost pass through.

2 Scope and context for the review

The Sydney Desalination Plant (SDP) was constructed by Sydney Water Corporation (Sydney Water), as part of the NSW Government's Metropolitan Water Plan. This 25-year plan to secure Sydney's water supply was released in 2004.[8] Under the plan, SDP's role is to help 'drought-proof' the greater Sydney area by providing a source of non-rainfall-dependant drinking water that can be drawn on when available storage levels fall below a certain threshold. Thus the plant is essentially a back-up water system that will only produce water for limited periods of time, as required.

The plant's construction began in 2007. It started operating in January 2010, and is being run at full production capacity until mid-June 2012 to enable its performance to be monitored and any defects and other issues to be addressed while it is under warranty.[9] Once commissioning is complete, the plant will operate in line with the operating regime set out in the Metropolitan Water Plan.

Since 2008, the costs of constructing, operating and maintaining the plant have been recovered by Sydney Water through the prices it charges its customers. IPART set these prices in our determination for the period from 1 July 2008 to 30 June 2012. At the time of this determination, the plant and the pipeline were still under construction but were expected to begin operations during the determination period. In making our next Sydney Water determination (for the period from 1 July 2012) we will take account of this SDP determination of the prices SDP can charge Sydney Water.

The sections below provide important background information to help readers understand the purpose and process of our review of SDP's prices, and the contextual issues that influenced our pricing decisions. These sections cover:

- the ownership and operation of the SDP
- IPART's terms of reference
- the other matters we considered
- the review process we followed
- the analytical process we used.

8 The Plan was updated in 2006 and 2010.
9 NSW Government, *Metropolitan Water Plan 2010,* p 36.

2.1 SDP's ownership and operating environment

SDP is a wholly owned subsidiary of Sydney Water. The plant was designed and constructed by Blue Water Joint Venture[10] under contractual arrangements with SDP. It is operated and maintained by Veolia Water Australia Pty Limited, also under contractual arrangements with SDP.

On 9 August 2010, SDP was granted a network operator licence and a retail supplier licence under the *Water Industry Competition Act 2006* (WICA). In line with the Metropolitan Water Plan, SDP's network operator licence requires it to follow a specified operating regime. The plant must maximise its capacity to provide services when available storage level falls below 70% and continue to do so until this level reaches 80%.

Certain characteristics of SDP's operating environment, including the contractual arrangements it has entered into and its regulatory requirements, strongly influence its costs. These characteristics are discussed in Chapter 3. The most important contract is the 30-year Water Supply Agreement between Sydney Water and SDP. This requires that Sydney Water take delivery of all water produced by the plant[11] that is not sold to other parties, provided that the water meets the Australian Drinking Water Guidelines.

In its policies for the 2011 election, the NSW Government announced its intention to refinance the Sydney Desalination Plant through a long term lease, to fund priority infrastructure projects. Advisors for the SDP refinancing were appointed by Sydney Water in July 2011 to work with NSW Treasury and the NSW Government. For reasons of clarity only, we state that this determination will apply whether or not SDP is refinanced.

2.2 IPART's terms of reference

The prices for water services that are declared monopoly services in NSW must be determined by IPART, pursuant to section 52(1)(a) of WICA. On 6 May 2011, the Minister for Finance and Services, the Hon. Greg Pearce MLC, declared the SDP to be a monopoly supplier, and the services it provides under its network operator and retail supplier licences to be monopoly services, under section 51 of WICA.

To establish prices for SDP's declared monopoly services, the Minister directed IPART to determine prices. The direction is initially for the period 1 July 2012 to 30 June 2017, and contains a standing terms of reference for later price determinations. We commenced our review in July of this year.

10 Blue Water Joint Venture is a consortium of Veolia Water Australia Pty Ltd and John Holland.

11 Sydney Water is obliged to take water produced even when available storage levels exceed 80%, until such time as storages once again fall below 70%, but is not required to pay the variable charge for that supply, under the Water Supply Agreement.

The terms of reference required that the SDP price determination be completed by 6 November 2011. In late October 2011, SDP provided new information to our price review. Given the new material, we were granted an extension to 9 December 2011 by the Minister. We consider 7 months to be a short timeframe for performing a complicated review of prices. In general, IPART allows 12 months for the determination of water prices.

The Minister noted that it "is important that the community can see what the charges paid for water from the desalination plant are, and that they are determined independently". He indicated that setting separate prices "is also a precursor to a possible refinancing of the desalination plant by way of a lease or similar arrangement".[12]

The Minister provided specific terms of reference for our determination.[13] These state that, given the operating regime in SDP's network operator licence (discussed in section 2.1 above), the prices we determine should reflect the following water supply services:

a) the supply of non-rainfall-dependant drinking water, and

b) the making available of the plant to supply non-rainfall-dependant drinking water.

In other words, the terms of reference indicate that the price structure we set should include 2 components:

- a variable charge for the water supplied, reflecting a) above, and
- a fixed charge that applies in all modes, reflecting b) above.

In addition, the terms of reference require us to consider a range of pricing principles in making our pricing decisions, including:

- The prices should be set so the revenue they are expected to generate will recover the efficient costs of providing the services described at a) and b) above over the life of the assets. These costs include operating costs, a return of assets (depreciation) and a return on assets.
- The depreciation should reflect the economic lives of the assets.
- In calculating the return on assets, an appropriate opening asset value should be determined, and then a rate of return that reflects the commercial risks faced by the asset owner in providing services.
- The structure of prices should encourage SDP to be financially indifferent as to whether or not the plant supplies water. This implies that the structure of prices should comprise (at least) separate prices for the different water supply services described at a) and b) above.

12 Minister for Finance and Services, Terms of Reference covering letter, p 1.

13 A copy of the Terms of Reference are included in Appendix A.

- The prices for water supply services in a) above should reflect all efficient costs that vary with output, including variable labour, energy and maintenance costs.
- The prices for water supply services described at b) above should be a periodic payment and should reflect fixed costs, including the fixed component of operating costs, a return of assets and a return on assets. SDP should be entitled to charge for providing the water supply services in b) above irrespective of the levels of water in dam storages servicing Sydney or the availability of water from other sources.
- Any other matters that IPART may consider relevant.

These principles provide very specific guidance on the structure of the prices we are to set and the type of costs to be recovered through the various price components. However, the terms of reference also allow us to consider any other matters we consider relevant.

Appendix A provides a copy of these terms of reference, and information about how we considered these in our decision-making.

2.3 Other matters we were required to consider

In addition to the specific terms of reference for this review, section 52 of WICA requires us to undertake this determination in line with the requirements of Part 3 of the *Independent Pricing and Regulatory Tribunal Act 1992* (*IPART Act*). Among other things, this part of the *IPART Act* lists a range of matters we must have regard to when making price determinations (in section 15). The most relevant matters for this review include the following:

- the efficient cost of providing the services concerned
- the protection of consumers from abuses of monopoly power in terms of prices, pricing policies and standard of services
- the appropriate rate of return on public sector assets, including appropriate payment of dividends
- the need for greater efficiency in the supply of the services so as to reduce costs for the benefit of consumers and taxpayers
- the quality, reliability and safety of the services (see Appendix B for the full list of matters included in section 15).

In considering these matters, we aimed to balance the diverse needs and interests of stakeholders, such as ultimate consumer affordability and the costs of providing services, while also ensuring that SDP is adequately recompensed for the services it provides. We also took into account the principles issued by the Council of Australian Governments (COAG) and contained in the National Water Initiative. Appendix B sets the section 15 matters in full, and includes information about our consideration of these matters in our decision-making.

2.4 Our review process

As Chapter 1 noted, the terms of reference for this review required us to complete our determination by 6 November. On 20 October 2011, we sought an extension from the Minister to allow us to receive and consider new information from SDP. On 3 November, the Minister granted us an extension to 9 December 2011.

Despite the limited timeframe for the review, we conducted an extensive investigation and public consultation process, and engaged consultants to provide us with expert opinion on specific aspects of our review. However, we were not able to publish a draft report.

Our review process included:

- Releasing an Issues Paper in June 2011.
- Inviting SDP to make a submission to the review that set out its pricing proposals. We received this submission in July 2011.
- Inviting other interested parties to make submissions in response to our Issues Paper and comment on SDP's submission. We received submissions from 7 stakeholders in July 2011.
- Engaging Halcrow Pacific Pty Ltd (Halcrow) to review the efficiency of the proposed operating and capital expenditure in SDP's submission. We published Halcrow's final report on our website, with confidential information redacted at SDP's request following review by IPART.
- Engaging Strategic Finance Group Consulting (SFG) to review equity beta and leverage estimates for SDP, to assist us in deciding on an appropriate rate of return. We commissioned a peer review of SFG's draft report by Professor Kevin Davis. SFG considered this review before presenting its final report. We published SFG's final report and the peer review on our website. We subsequently received and published submissions from 2 stakeholders.
- Engaging Frontier Economics (Frontier) to develop an estimate of the energy cost components that SDP would incur as an efficient supplier of water, and published Frontier's report on our website.
- Engaging the National Centre of Excellence in Desalination to review information provided by SDP about its costs in shutdown and water security modes. We have published this advice.
- Holding a Public Hearing in August 2011 to give stakeholders an additional opportunity to communicate their views.
- Requesting and receiving an extension of time to report in October 2011, as noted above.
- Received further information from SDP on 21 and 27 October 2011.
- Publishing our determination and this final report explaining the determination.

We have published the reports of all our consultants and the submissions we received on our website.

In the course of this review SDP made claims regarding the confidentiality of materials provided to our consultants and to IPART. We reviewed these claims and where appropriate have published redacted versions of the consultant's report and SDP's submission.

In addition, we have not published those submissions that contained confidential or commercially sensitive information.

2.5 Our analytical approach

The analytical approach we used for this determination was designed to comply with our terms of reference, while still taking account of a broad range of issues consistent with the matters we must consider under the IPART Act. This approach included the following key steps:

1. Considering a range of matters related to SDP's operating environment that will affect its costs over the determination period, as well as SDP's forecasts of these costs included in its pricing submission.
2. Considering and making decisions on the price setting approach for this determination, including:
   a) the methodology for determining SDP's revenue requirement over the determination period
   b) whether to include mechanisms sought by SDP to adjust this revenue during to the period to take account of certain risks and uncertainties
   c) the appropriate price structure, taking into account the terms of reference and our considerations and decisions on the operating environment and the other issues of methodology
   d) appropriate reporting requirements.
3. Using this price setting approach to determine SDP's revenue requirements and set prices for SDP in each mode of operation and each year of the determination period.

3 SDP's operating environment and pricing submission

The first step in our analytical approach for this determination was to consider the characteristics of the desalination plant's operating environment that have a large influence on its efficient costs. These include:

- the characteristics of the plant itself
- the legislative and license requirements it is obliged to meet
- the numerous legal contracts SDP has entered into to operate the plant and meet its legislative requirements.

We also considered the pricing submissions we received from SDP. Each of these characteristics and SDP's submissions are discussed below.

3.1 Characteristics of the desalination plant

The desalination plant is currently sized to produce 250 megalitres (ML) of drinking water per day, and has been designed to be scaled up to a capacity of 500ML per day, if required in the future. It can produce up to 15% of Sydney's water needs when operating at the 250ML level. It produces potable water by forcing sea water through membranes at high pressure. This process requires considerable amounts of energy.

In line with the Metropolitan Water Plan Operating Rules, the desalination plant has the flexibility to operate at less than full capacity, and to enter a water security mode (where no water is produced). SDP's total costs are highest when the plant is in full operation mode and producing water. However, it still incurs costs when the plant is not producing water.

SDP has 5 modes of operation:

- Full operation when the plant is producing water.
- Short term shutdown for 2 to 10 days.
- Medium term shutdown for 11 to 90 days.
- Long terms shutdown for 91 days to 2 years.
- Water security shutdown for more than 2 years.

SDP's major physical assets include:

- the desalination plant
- the seawater intake and outlet tunnels and risers, sized for the plant's full potential capacity of 500ML a day
- a drinking water pumping station with an initial pumping capacity of 250ML a day, and sufficient space to be scaled up to the full potential capacity of 500ML a day
- the 45 hectares of land on which the desalination plant and pumping station are located.

Sydney Water has advised that it is in the process of transferring ownership of the desalinated water pipeline to SDP. SDP has lodged an application with IPART to vary its WICA licence to include the pipeline. This pipeline is sized for 500ML per day. The transfer is expected to be complete before 1 July 2012.

3.2 Legislative requirements

SDP's operations are governed by various legislative instruments, which influence its operations to varying degrees. As discussed in Chapter 2, SDP holds network operator and retail supplier licences in accordance with the provisions of WICA. The licences include a range of obligations under the *Water Industry Competition (General) Regulation 2008* (the Regulation). In particular, SDP is obliged to prepare and implement licensing plans relating to:

- water quality
- infrastructure operation
- retail supply management.

These plans must be consistent with the Australian Drinking Water Guidelines and good asset management practice, amongst other specific requirements. There are also requirements regarding the content of and compliance with the plans. Compliance with the plans is audited and reports provided to the Minister for Finance and Services.

The network operator licence also requires SDP to follow an operating regime consistent with the Metropolitan Water Plan operating rules. As Chapter 2 discussed, this regime includes commencing production of treated water when Sydney's available dam storage level falls to 70%, and continuing until that level reaches 80%.

In addition, SDP is regulated by a number of government agencies including the Office of Environment and Heritage and IPART. The Office of Environment and Heritage is the environmental regulator of the desalination plant, and has issued an environment protection licence that requires SDP to meet certain requirements such

as water quality criteria for the outfall.[14] IPART is responsible for regulating SDP's prices under Section 52 of WICA.

The Project Approval for the Desalination Project (which was granted under the *Environmental Planning and Assessment Act 1979*) includes a requirement that the plant use renewable energy.

3.3 Contracts entered into by SDP

SDP's operating framework comprises a set of agreements, which include:

- an operating and maintenance agreement with Veolia Water Australia Pty Ltd
- contracts for the supply of electricity to power the plant and renewable energy certificates (RECs) to offset the plant's power use
- a non-exclusive water supply agreement with Sydney Water
- a service level agreement with Sydney Water.

In its submission[15], SDP explained the key components of this operating framework. Redacted copies of these contracts can be found on Sydney Water's website.

3.3.1 Operating and maintenance agreement

SDP reports that the desalination plant is operated and maintained for SDP by Veolia Water Australia Pty Ltd. The operating and maintenance (O&M) contract between SDP and Veolia is dated 18 July 2007 and has a 20-year operating term. The O&M contract provides that:

- Veolia will operate and maintain the plant in accordance with industry best practice and a detailed Operations Management Plan
- the plant will provide drinking water in quantities directed by SDP
- the services performed by Veolia will meet technical requirements specified by SDP, including drinking water standards.[16]

Payments made under the contract cover the majority of the plant's direct operating costs, excluding energy supply costs.

14 Ms Lisa Corbyn to Mr Jim Cox, Office of Environment and Heritage submission, 25 July 2011, p 1.
15 SDP submission to IPART's review of prices, p 1.
16 Ibid, p 2.

3.3.2 Energy and renewable energy certificate contracts

Electricity for the desalination plant is provided under a contract between SDP and Infigen Energy Markets Pty Ltd, which is a subsidiary of Infigen Energy Limited. SDP states that the conditions of the Energy Supply Agreement include:

- a 20-year term
- fixed real prices
- no pass through of any future tax, levy, impost or charge relating to greenhouse gas or carbon emissions
- no pass through of any cost arising from the introduction or operation of any emissions trading scheme
- a contracted annual volume sufficient to support full operations at the desalination plant
- the ability to sell load back to the market if electricity demand is lower than forecast.[17]

SDP also has agreements with Renewable Power Ventures Pty Ltd, another subsidiary of Infigen Energy Limited, for the supply of RECs to offset the power used by the desalination plant.[18] The RECs are supplied by the Capital Wind Farm at Bungendore near Canberra, which was built and is operated and maintained by Renewable Power Ventures under a 20-year Project Deed with SDP.

SDP reports that the RECs are sold to SDP under a 20-year Renewable Energy Certificate Agreement, which provides for the supply of RECs at fixed real prices. The agreement includes a minimum annual number of RECs that SDP must purchase.[19] Any surplus RECs may be sold in the market.

17 SDP submission to IPART's review of prices, p 3.
18 Ibid, p 3.
19 Ibid, p 3.

3.3.3 Water supply agreement

SDP has a 30-year Water Supply Agreement with Sydney Water. SDP reports that this agreement sets out arrangements for the quantity, quality and price of water to be supplied to Sydney Water by SDP.

Under the agreement, Sydney Water will:

- take delivery of all water produced by the plant[20] that is not sold to other parties provided the water meets agreed quality specifications and complies with the Australian Drinking Water Guidelines set by the National Health and Medical Research Council[21]
- pay the contract price for all water that is sold to it while the plant is operating in accordance with the Metropolitan Water Plan operating rules, which are reflected in SDP's Network Operator Licence.[22]

However, this contract price will be superseded by the prices IPART has set under this determination.

3.3.4 Service level agreement

SDP has no direct employees as most of its functions are performed by Veolia under contract. SDP reports that its 'back office' services (for example governance and contract management services) are currently provided by Sydney Water under a short term service level agreement.[23] Under this agreement, SDP reimburses Sydney Water for the cost of these services. For instance, Sydney Water staff prepares SDP's accounts and Board reports. SDP reimburses Sydney Water for the costs incurred in doing so. SDP reports that the cost of the service level agreement is around 1% of the total operating cost of SDP.[24]

3.4 Overview of SDP's pricing submission

SDP provided a pricing submission to IPART in July 2011. SDP provided a number of further submissions in October 2011. The original submission proposed that:

- SDP's revenue requirement when in full production for the whole year, for both the desalination plant and the bulk water pipeline (once transferred), will be $272 million in 2012/13
- this annual revenue requirement will fall to $269 million in 2016/17 (the final year of the determination period).[25]

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20 Including when available dam storage levels exceed 80%.
21 SDP submission to IPART's review of prices, p 4.
22 Ibid, p 4.
23 Ibid, p 4.
24 Ibid, p 5.
25 Ibid, p 25.

Both these figures are in real $2011/12, and were calculated using a modified building block approach that is consistent with IPART's normal regulatory practice.[26]

SDP's proposed revenue requirement for 2011/12 includes around $90 million per year in operating costs, around $40 million depreciation and a return on assets of around $140 million. To calculate the return on assets, SDP used a weighted average cost of capital (WACC) of 7.8% real pre-tax. It considers that this WACC reflects the level of risk it is exposed to in owning a single asset that (at this stage) has a single customer and a limited ability to diversify its cost and revenue risks.[27]

Table 3.1 shows SDP's proposed revenue requirements when the plant is in full operation mode for the determination period.

Table 3.1 SDP's proposed revenue requirement when the plant is in full operation mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Plant					
Operating costs (including insurance adjustment)	81.8	87.4	91.8	92.0	90.7
Return on working capital	1.5	1.5	1.5	1.5	1.4
Depreciation	36.0	36.1	36.2	36.2	36.3
Return on assets	99.2	96.6	93.8	91.1	88.4
Total	218.5	221.5	223.3	220.8	216.9
Distribution pipelines					
Operating costs	0.1	0.1	0.1	0.1	0.1
Return on working capital	0.5	0.5	0.5	0.5	0.5
Depreciation	4.6	4.6	4.6	4.6	4.6
Return on other assets	50.0	49.7	49.3	49.0	48.6
Total	55.3	54.9	54.5	54.2	53.8
Plant and Pipelines					
Operating costs (including insurance adjustment)	81.9	87.5	91.9	92.1	90.8
Return on working capital	2.0	2.0	2.0	2.0	1.9
Depreciation	40.6	40.7	40.8	40.8	40.9
Return on other assets	149.3	146.2	143.2	140.0	137.0
Total	273.8	276.4	277.9	274.9	270.7

Source: SDP submission to IPART Review of prices, p 25, Table 5.1, adjusted for CPI.

[26] Chapter 4 sets out our approach to price setting and Appendix C describes our modelling approach and modifications to the standard building block approach in great detail.

[27] SDP submission to IPART's review of prices, Chapter 4.

SDP submitted that to ensure that its prices reflect its costs, when the plant is operating and producing water, SDP should charge a variable charge to recover its variable operating costs and an availability charge to recover its fixed operating costs and capital costs. In addition, when the plant is not in full operation mode, it should charge a fixed charge only, to recover its fixed operating costs and capital costs.

SDP noted that when the plant is in a shutdown mode (and not producing water) its costs are lower. It acknowledged the importance of ensuring that the community benefits from these lower costs, and that SDP receives a revenue stream appropriate to these lower costs. However, it also noted that it is difficult to predict when and for how long the plant will be in a shutdown period, so it is not possible to accurately forecast the cost reduction over the determination period (and thus set a single or average availability charge per year). Instead, SDP proposed one daily availability charge to apply when the plant is producing treated water, and another lower availability charge to apply when the plant is not producing treated water and adjustment mechanisms to deal with under and over recovery.[28]

Table 3.2 shows SDP's proposed prices when the plant is in full operation mode and when it is in a shutdown mode.

Table 3.2 SDP's proposed prices for when the plant is full operation mode and a shutdown mode ($2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Desalination plant operating at full capacity					
Availability charge 1 ($/day)	610,764	612,826	613,033	602,929	588,804
Variable charge ($/ML)	550	571	586	594	603
Desalination plant in shutdown					
Availability charge 2 ($/day)	597,465	591,279	586,742	578,082	570,968
Variable charge ($/ML)	0	0	0	0	0

Source: SDP submission to IPART Review of prices, pp 30-31., adjusted for CPI.

28 SDP submission to IPART's review of prices, Chapter 6.

In addition, SDP proposed a series of adjustments that would apply in a shutdown mode. These adjustments would provide a mechanism for additional savings that may be achievable when the plant is shutdown (and not producing water) to be passed-through to customers, while also affording SDP some limited protection from unpredictable costs that are associated with shutting down and restarting the plant. These adjustments include:

- one-off shutdown and restart prices
- a renewable energy standby adjustment
- a shutdown mode (described by SDP as a no production mode) savings adjustment
- a methodology to apply if SDP supplies multiple customers
- an abatement regime.

These mechanisms are discussed in Chapter 4, where we also discuss our considerations and decisions on whether to include the proposed or other adjustment mechanisms in our determination.

4 IPART's price setting approach

As the second step in our analytical approach, we considered and made decisions on the price setting approach we would use for this determination. The price setting approach can be defined as the rules and methodologies a regulator uses to determine, monitor and change prices for regulated services over a determination period. The components of this approach we considered include:

- the length of the determination period
- the methodology for determining SDP's notional annual revenue requirements to meet its efficient costs when the plant is in full production mode, and in the various shutdown modes, and whether or not to include adjustment mechanisms proposed by SDP to account for potential unpredictable costs
- the appropriate price structure to recover these notional revenue requirements
- a methodology for allocating costs and adjusting prices in the event that SDP serves customers in addition to Sydney Water
- a mechanism to provide enhanced incentives for SDP to pursue efficiency gains during the determination period
- an abatement mechanism to ensure that, while SDP is financially indifferent as to whether or not it supplies water, it also has no incentive to withhold supply when available dam storage levels are below 70% or until levels rise again above 80%
- whether to accept SDP's proposed shutdown savings adjustment mechanism or its proposed renewable energy adjustment methodology
- the reporting requirements on SDP.

The sections below discuss our decision on each of these components.

4.1 Length of the determination period

1 IPART's decision is to adopt a 5-year determination period, from 1 July 2012 to 30 June 2017.

While we usually consider a range of factors to decide on the most appropriate length of the determination period, for this determination the terms of reference stated that the 'determination period is to cover the period to 30 June 2017'.[29]

[29] Terms of Reference, Appendix A, p 121.

Accordingly, we have adopted a determination period from 1 July 2012 to 30 June 2017.

4.2 Approach to determining SDP's notional revenue requirements

2 IPART's decision is to use a building block approach and to account for the differences between SDP's efficient costs and revenue requirements in its various modes of operation by:

- Determining a notional daily revenue requirement for full operation mode in each year of the determination period. This revenue includes our estimate of SDP's efficient operating expenditure, plus allowances for a return on assets, depreciation and working capital.

Due to the operating regime stipulated in the Metropolitan Water Plan and SDP's WICA network licence, SDP's costs will vary depending on whether it is in full operation mode or in one of its 4 shutdown modes. As a result, its annual notional revenue requirement will vary, depending on the proportion of time the plant is in full operation or in one its shutdown modes in that particular year.

We decided to account for this by adapting our normal building block method. For each year in the determination period, we calculated a notional daily revenue requirement when the plant is in full operation mode using our standard approach. We then calculated a notional daily revenue requirement when the plant is in each of the other modes by:

- calculating SDP's efficient operating and maintenance expenditure when in this mode
- substituting this expenditure for the operating expenditure in the notional revenue requirement for full operation mode.

We prefer this approach to SDP's proposed adjustment mechanism because the building block approach ensures that the full, efficient costs of providing the regulated services are measured and monitored in a rigorous and transparent way. It is also consistent with the approach IPART uses in regulating other water businesses and industries in NSW. The approach has enabled us to set separate prices applicable for each mode of operation. We set these prices to generate the full notional daily revenue requirement for the relevant mode.

We also decided to allocate all SDP's costs into fixed and variable categories depending on the mode of plant operation. We noted that depending on this mode, some 'fixed' costs could be avoidable. For example, while in water security mode, some costs regarded as fixed when the plant is in short term shutdown mode would be avoidable. We have taken account of this in our decisions about operating expenditures and prices for each of the shutdown modes.

We considered the various methodologies SDP proposed for adjusting the notional revenue requirements for potential unpredictable costs. We decided not to adopt these mechanisms, but instead to:

- determine separate notional daily revenue requirements for the following scenarios:
  - assuming a carbon pricing scheme is operational and is not operational (discussed in Chapter 7)[30]
  - the transfer of the pipeline connecting the plant and Sydney Water's system to SDP is completed and if it is not completed (discussed in Chapter 6)[31]
- pass through the fixed and variable network charges as determined annually by the Australian Energy Regulator (AER), rather than include estimates of these costs in the operating expenditure cost blocks (discussed in Chapter 7).

Together, these decisions represent our view of SDP's total efficient costs for each mode of operation, and hence its notional revenue requirements for the purpose of setting prices.

4.3 Price structures

3 IPART's decision is to set a schedule of maximum prices applicable to each of the potential modes of plant operation and shutdown. For a full operation mode, the prices include a fixed daily service charge and a variable usage charge (per ML). For each of the 4 shutdown modes, the prices include a fixed daily charge. For medium term, long term and water security shutdowns, there are fixed transition to shutdown and restart charges that are payable once per transition. The schedule also includes separate prices for the following scenarios:

- a carbon pricing scheme is operational and is not operational, reflecting the regulatory uncertainty that prevailed at the time IPART was undertaking its analysis
- the transfer of the pipeline connecting the plant and Sydney Water's system to SDP is completed and is not completed.

4 The prices exclude the costs associated with fixed and variable energy network charges. Instead we have provided for these to be passed through as determined by the AER.

30 At the time that IPART was undertaking its analysis there was some regulatory uncertainty regarding the implementation of the carbon pricing scheme. Our analysis took account of this by determining prices for a number of foreseeable scenarios. This includes, for example, once a carbon pricing scheme is in operation or if there are delays in the implementation of the scheme.

31 This approach ensures that, in the unlikely event ownership of the pipeline is not transferred, SDP's customers would not bear higher prices than are necessary to recover efficient costs.

In deciding on the structure of SDP's prices, we considered:

- the terms of reference of the review, including the principle that the price structure should encourage SDP to be financially indifferent as to whether or not it supplies water
- the matters set out in section 15 of the IPART Act, including the impacts of prices on customers and economic efficiency, and
- SDP's proposed price structures.

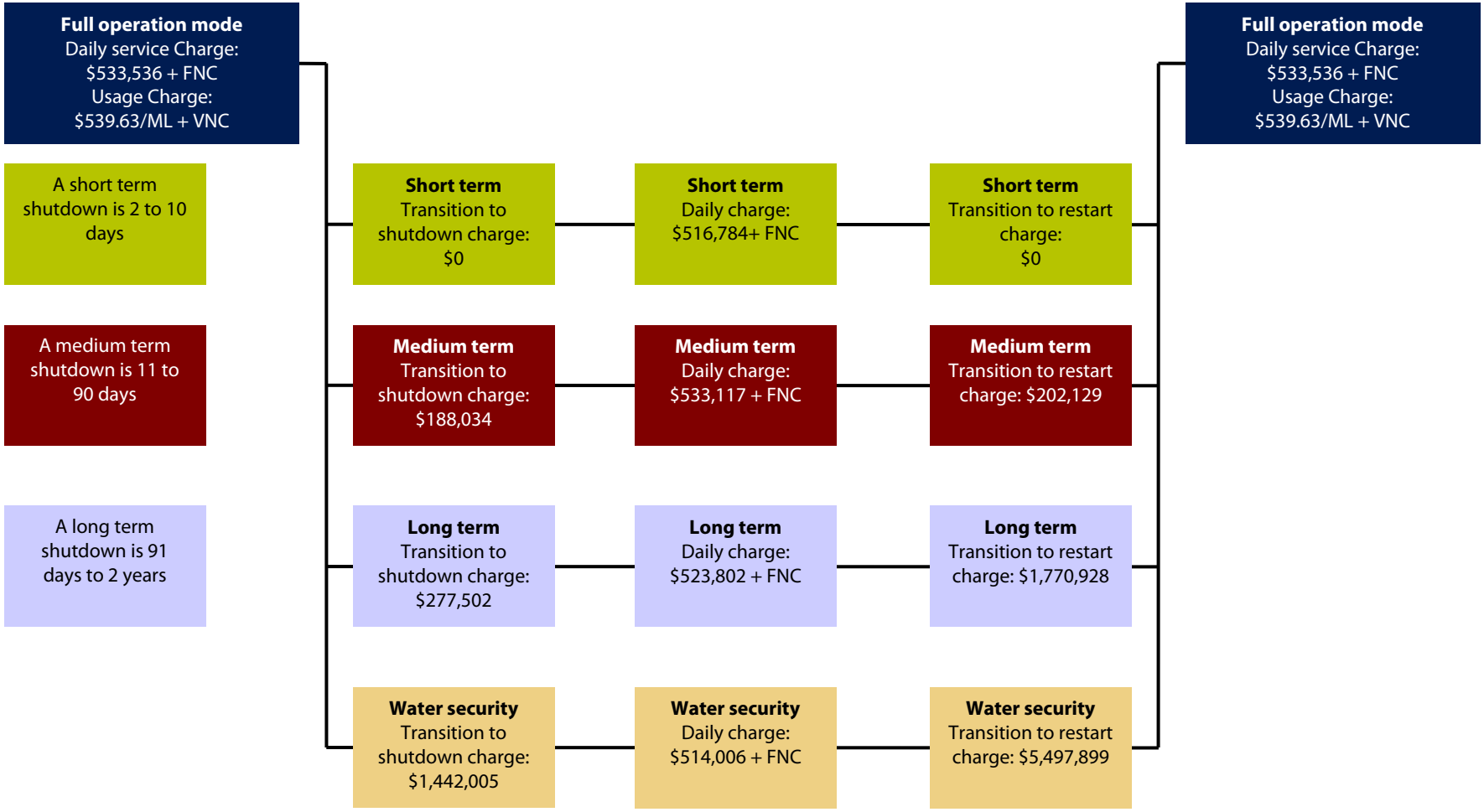
We consider that the pricing structure we decided on is most consistent with the terms of reference and best balances stakeholders' competing interests. In particular, this price structure best reflects the efficient costs and risks SDP faces in its business. It allows SDP to recover its costs in all modes of operation. However, it also ensures that customers benefit from lower prices when the plant incurs lower costs during shutdown periods.

Importantly, the price structure ensures that Sydney Water will not liable to pay a variable usage charge to SDP once available dam storage levels rise above 80%, and will not be liable until these levels fall below 70%. It is also consistent with the views of some stakeholders that price structures should support the Metropolitan Water Plan and should not encourage inefficient production. The Total Environment Centre expressed a strong view that inefficient production should be discouraged.[32]

Figure 4.1 illustrates the price structure using the price levels for 2012/13. Chapter 10 sets out the price structures and levels for the whole determination period.

[32] Total Environment Centre submission, 11 August 2011. The Total Environment Centre suggested amendments to the plant's operating regime to lower available storage level at which production would commence.

Figure 4.1 Structure and level of SDP prices in 2012/13 (with pipeline transfer) ($2011/12)



Note: VNC refers to variable network costs and FNC consists of 2 parts; the fixed network costs and the variable network costs associated with the fixed charge.

We considered SDP's proposals, including its proposed adjustment mechanisms for unknown or unpredictable costs. We decided not to include the proposed shutdown savings or renewable energy adjustment mechanisms proposed by SDP (see sections 4.7 and 4.8 below). Instead we decided to take account of some of the issues raised by SDP regarding uncertainties in its operating environment by setting separate prices for all foreseeable scenarios related to the carbon pricing scheme and pipeline transfer, and providing for electricity network costs to be passed through annually as determined by the AER.

4.4 Methodology for allocating costs and adjusting prices in the event that SDP serves multiple customers

5 IPART's decision is include a methodology to calculate each customer's prices when the plant is in full operation and in shutdown modes

- When the plant is in full operation, costs will be allocated between customers relative to the water purchased by each customer as a proportion of total desalinated water purchased that day.
- When the plant is in a shutdown mode, costs will be allocated between customers relative to the water purchased by each customer as a proportion of total desalinated water purchased in the 12 months preceding that shutdown.

Under its licence, SDP is able to provide services to customers in addition to Sydney Water, provided the customers are not classified as small retail customers under WICA.

The Government has flagged its expectation that new customers will emerge. The Government has introduced amendments to WICA which inserts a new head of power to enable conditions to be imposed on drinking water retail supply licences so as to promote the equitable sharing of the costs of water industry infrastructure that significantly contribute to water security.

Minister Pearce states that "these amendments are designed to ensure a level playing field as the drinking water market evolves. With the proposed refinancing of the desalination plant, the potential for new drinking water market entrants is expected to increase."[33]

SDP identified in its submission that as its customer numbers grow, arrangements to share SDP's costs fairly between its customers will be necessary. It proposed that its customers, including Sydney Water and other water retailers, share its fixed and variable water charges and shutdown costs in proportion to their share of metropolitan demand.[34]

33 Hansard, Minister Greg Pearce, Second Reading of the *Water Industry Amendment Bill 2011*, p 7.
34 SDP submission to IPART's review of prices, p 33.

Sydney Catchment Authority's submission also expressed support for a mechanism that allocates costs between Sydney Water and new retailers (including 'small retail customers' currently excluded under SDP's licences) to ensure that they pay a proportionate share of SDP's costs.

Having considered these submissions, we decided to include the mechanism outlined above, to calculate prices payable by all of SDP's customers when the plant is operating and in shutdown modes.

We did not accept SDP's request to hold it harmless against the risks of bad debt and insolvency. We consider that, when new customers emerge, this issue can be effectively addressed via contracts.

4.5 Mechanism to provide enhanced incentives for SDP to pursue efficiency gains

6 IPART's decision is to recommend to the Minister for Finance and Services that he amend the standing terms of reference for the review of Sydney Desalination Plant price to include an efficiency carryover mechanism.

In its submission to this review, Degremont Ltd (Degremont) suggested that IPART consider introducing an efficiency carryover or similar incentive mechanism which would provide a stronger incentive for SDP to pursue efficiency improvements than under a standard CPI-X approach.[35] It argued for a mechanism that rewards efficiency improvements achieved at any time during the determination period by allowing SDP to retain the benefit of that efficiency gain for 5 years from when it is made.

Such a mechanism would address a well-documented weakness of CPI-X regulation, namely that it provides weak incentives for efficiency gains late in the determination period. This is because under a standard CPI-X approach, such gains would only be retained by the regulated entity until the end of that period.[36] This provides an incentive for the operator to defer efficiency gains that could be made late in a determination period until the start of next determination period.

35 Letter to Mr Jim Cox from Mr Roch Cheroux, 31 August 2011.
36 See IPART, Working paper – Incentives for cost saving in CPI-X regimes, July 2011.

We considered Degremont's submission, along with advice we received from the National Centre of Excellence in Desalination (the Centre).[37] Based on analysis of SDP's cost information, the Centre suggests that SDP's costs for full production mode, short term shutdown mode and water security mode seem reasonable. However:

- SDP's estimated costs for medium term and long term shutdown modes may be generous. The Centre notes for example a reasonable chemical preservative costs would be of the order of $150,000 per month.
- Alternative operating protocols for plant operation in medium term shutdown mode may be more cost-effective, for example one alternative to membrane preservation would be to maintain low level production and circulation.
- If membrane preservation is required, there may be a more cost-effective technique. For example, the Centre cited a newly developed technology that does not affect fibreglass, hence reducing maintenance costs, rather than sodium metabisulphite.

We also note that mechanisms similar to the one Degremont suggested have been included in decisions of the AER.[38]

Overall, we see merit in including a mechanism to strengthen SDP's incentive to pursue efficiency gains. Realising such gains and other cost savings would benefit the plant's owner and customers alike. In addition, we note that relative to most of the water utilities regulated by IPART:

- There is little historical SDP expenditure data available to help inform our decisions about the efficiency of its proposed expenditures.
- SDP's accounts and expenditures can be clearly defined to specific cost items/contracts. Hence it is feasible to effectively monitor any efficiency savings over multiple determination periods.

Having considered various ways to implement this decision, we decided that implementation via an amendment to our standing terms of reference to review SDP's prices would provide the maximum certainty to SDP and any future lessee and investors. We have written to the Minister for Finance and Services recommending this amendment.[39]

37 National Centre of Excellence in Desalination, 4 November 2011.

38 Australian Energy Regulator, *Electricity distribution network service providers, efficiency benefit sharing scheme, Final decision*, June 2008.

39 Letter Mr Jim Cox to Minister Greg Pearce, 18 November 2011.

4.6 Abatement mechanism

7 IPART's decision is to include an abatement mechanism to adjust the water service charge to ensure that while SDP is financially indifferent as to whether or not it supplies water, it also has no incentive to withhold supply when available dam storages are below 70% or until levels rise again above 80%.

In its submission, SDP proposed that IPART include a mechanism to abate charges if SDP fails to provide desalinated water services when otherwise required to do so under the Metropolitan Water Plan. Following clarification from SDP, we understand that SDP is of the view that:

- SDP's customers face a risk that SDP will not provide services when available dam storages are below 70% or until levels rise above 80%
- this risk cannot be effectively addressed through contracts.

We have decided to include an abatement mechanism in the determination. This mechanism reduces the daily water service charge applicable in that day's full operation mode if the average production of the preceding 365 days of full production is less than the plant's nameplate capacity (ie, 250ML/day). In calculating the average daily product production over 365 days of full production, shutdown event days and force majeure events are excluded.

The attached determination includes a worked example to explain the operation of this mechanism and the legal definitions.

We decided to set the abatement mechanism with reference to the plant's nameplate capacity rather than 95% of that nameplate capacity, as requested by SDP. We did not include SDP's 'catch up' mechanism to 'bank' abatement credits. Our decisions reflects the plant's recent construction and that it has maintained production over the nameplate capacity for the 3 months prior to the making this determination.

4.7 SDP's proposed shutdown savings adjustment mechanism

8 IPART's decision is not to not adopt SDP's proposed shutdown savings adjustment methodology.

Because of SDP's stipulated operating regime, it is difficult to predict what portion of the determination period the plant will be in full operation mode and what portion it will be in each of the shutdown modes. This makes it difficult to set annual prices.

In response to this problem, SDP proposed a methodology designed to ensure that its actual revenue is not significantly different to that required to recover its actual costs. SDP argued that this methodology is designed to share the risks between it and its customers. The methodology also protects SDP from potential losses arising from the resale of energy and RECs in shutdown periods.

The SDP's proposed methodology provides for an annual adjustment to its prices for the difference between actual operating costs and the value for operating costs set under IPART's determination. The methodology would only apply if there was a period during the year when the plant was not producing, and if the difference between regulated and actual operating costs was greater than 2% of actual costs. SDP noted that its proposed shutdown adjustment would be applied after all other adjustments have been made.

As discussed above, we decided to set separate prices for each mode of operation that reflects the estimated efficient operating costs in that mode. In our view, this negates the need for SDP's proposed shutdown savings adjustment mechanism. This is because IPART's approach allows recovery of the efficient costs of each day of full operation and each day of shutdown as it occurs.

4.8 SDP's proposed energy adjustment methodology

9 IPART's decision is not to not adopt SDP's proposed renewable energy standby adjustment.

SDP proposed that an energy adjustment mechanism be applied at the end of a financial year in which the plant has been in shutdown mode. This adjustment mechanism is designed to account for any gains or losses that result from it on-selling its surplus electricity and RECs due to its contractual arrangements with Infigen Energy. The mechanism:

- increases energy costs where losses occur from on-selling (when prevailing market prices are below the contract price), or
- decreases energy costs where profits are made from on-selling (when prevailing market prices are greater than the contract price).

This adjustment is then offset against fixed costs to implement an end of year reconciliation.

We decided not to adopt this approach, but to consider the expected efficient costs of purchasing energy at the time that SDP faces a regulatory requirement to purchase it. We consider that the contracts SDP has entered into do not provide adequate estimates of these costs. Our approach for determining an allowance for the energy costs component of SDP's prices is consistent with the approach we use in retail electricity determinations.[40] Specifically, this approach:

- ensures that the energy cost allowance reflects the efficient costs of providing 'retail' services over the period 2012/13 to 2016/17
- establishes the wholesale energy cost allowance:

[40] Conceptually SDP can be considered to be a "retail supplier" of bulk water that bundles the costs of wholesale and network energy, the costs of operating and maintenance the desalination plant and an appropriate profit margin into retail prices that are payable by Sydney Water and its customers.

- with respect to SDP's load
- giving consideration to current market information, ie, being consistent with a point in time estimate of efficient costs that IPART has previously adopted and is standard in financial accounting.

Our decision reallocates the risk of SDP entering long term contracts from the customers to SDP. We consider it is inappropriate to pass through these risks to customers as they are a result of SDP's commercial decisions. We consider there is a significant risk of gains and losses, with a higher probability of gains in the later years. The risks borne by SDP have been considered in the rate of return.

4.9 SDP's reporting requirements

10 IPART's decision is to require SDP to provide annual reports to IPART, as set out in Table 4.1 and 4.2, by the last working day of October of each year.

To undertake our price monitoring role, IPART requires certain information from SDP. Under WICA, regulated entities are required to provide information requested by IPART. To provide due notice of our annual information provision requirements, we have developed a reporting framework for this determination. As required by WICA, IPART will write to SDP in each year to confirm these requirements.

Except in 2016, SDP is required to provide this information by the last working day of October of each year. In the next price review year, information will be required at an earlier date to be specified by IPART as prices applicable from 1 July 2017 must be determined by December 2016.

Table 4.1 Reporting requirements - information that IPART does not intend to publish

Information to be provided by the last working day of October of each year
A completed Annual Information Return: this is an Excel spread sheet template provided annually by IPART to SDP. The 2012/13 onward Annual Information Return will build on Returns completed by SDP in 2009/10 and 2010/11 and for this price review.
Daily desalinated water production.
Daily plant availability.

Note: While IPART does not intend to publish these reports, it should be noted that these report would be subject to government information disclosure requirements.

Table 4.2 Reporting requirements - information that IPART intends to publish

Information to be provided by the last working day of October of each year
Annual revenue (nominal)
Annual expenditure (nominal)
Annual production
The number of days the plant was in a full production, short term, medium term, long term or water security shutdown

5 Overview of revenue requirements

As the third step of our analytical approach, we calculated SDP's the notional daily revenue requirements in each mode of operation, consistent with the building block approach and the decisions discussed in Chapter 4. To do this, we first determined the following cost building blocks for the desalination plant for each year of the determination period:

- forecast efficient operating expenditure over the determination period for each possible mode of operation
- an appropriate allowance for a return on working capital (which is the same for all modes)
- an appropriate allowance for a return of capital assets (regulatory depreciation) (also the same for all modes)
- an appropriate allowance for a return on capital assets (also the same for all modes).

Next we determined the same cost building blocks for the distribution pipeline (which are the same in all modes of operation). The sum of these amounts, for each mode of operation, represents our view of SDP's total efficient costs over the determination period, or the notional revenue requirements for each mode of operation.

In determining the operating costs, we also classified them into fixed and variable components for each mode of operation. This allowed us, in setting prices, to reflect the fixed operating costs in the fixed charge for each mode, and the variable operating costs in the variable usage charge for full operation mode. In addition, we determined the efficient costs of transitioning the desalination plant from one mode of operation to another. These are one-off costs that are on top of the notional daily revenue requirements for each mode of operation.

In determining the allowances for depreciation and a return on assets, we determined the value of SDP's regulatory asset bases over the determination period. We also determined an appropriate rate of return for SDP, given the commercial risks its owner faces in providing the regulated services.

Section 5.1 below summarises our decisions on SDP's notional daily revenue requirements (with a carbon pricing scheme). Section 5.2 compares SDP's proposed annual notional revenue to our estimates for its efficient costs in full operation mode.

5.1 Summary of IPART's decisions on SDP's notional daily revenue requirements

IPART's decisions on SDP's notional daily revenue requirements are shown in Table 5.1.

Table 5.1 IPART's decisions on the daily notional revenue requirements in Operation, Shutdown and Restart Modes ($2011/12)

Notional Revenue Requirements	2012/13	2013/14	2014/15	2015/16	2016/17
IPART decision:					
Operation Mode	536,564	546,942	555,640	552,774	552,191
Short term Shutdown Mode	386,752	390,774	391,346	384,583	378,011
Medium term Shutdown Mode	403,085	405,345	415,154	398,794	395,386
Long term Shutdown Mode	393,769	386,022	380,193	372,697	369,438
Water security Shutdown Mode	383,974	376,235	371,127	362,787	355,618
Short term Restart Mode	386,752	390,774	391,346	384,583	378,011
Medium term Restart Mode	403,085	405,345	415,154	398,794	395,386
Long term Restart Mode	393,769	386,022	380,193	372,697	369,438
Water security Restart Mode	383,974	376,235	371,127	362,787	355,618
Pipeline – all modes of operation	**130,032**	**130,235**	**129,399**	**128,204**	**127,711**

Note: Excludes electricity network pass through charges.

The difference between our decisions on the notional daily revenue requirement when the plant is in full operation mode and the shutdown modes is exactly equal to the change in the operating costs in each shutdown mode.

In addition to the notional revenue requirements, we have allowed fixed one-off charges to recover the efficient cost of changing the plan from one mode of operation to another. These one-off costs are considered in Chapter 6 and Chapter 10. We have not considered them as a component of our notional revenue requirements.

5.2 IPART's estimates of SDP's efficient annual costs in full operation mode compared to SDP's proposed annual revenue requirements

In its submission, SDP proposed its annual revenue requirements assuming that the plant is in full operation mode for the whole determination period as shown in Table 5.2 below. To enable our decisions to be compared with its proposal, Table 5.3 summarises our estimates of its efficient annual costs under this scenario.

Table 5.2 SDP's proposed revenue requirement when the plant is in full operation mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Plant					
Operating costs (including insurance adjustment)	81.8	87.4	91.8	92.0	90.7
Return on working capital	1.5	1.5	1.5	1.5	1.4
Depreciation	36.0	36.1	36.2	36.2	36.3
Return on assets	99.2	96.6	93.8	91.1	88.4
Total	218.5	221.5	223.3	220.8	216.9
Distribution pipelines					
Operating costs	0.1	0.1	0.1	0.1	0.1
Return on working capital	0.5	0.5	0.5	0.5	0.5
Depreciation	4.6	4.6	4.6	4.6	4.6
Return on other assets	50.0	49.7	49.3	49.0	48.6
Total	55.3	54.9	54.5	54.2	53.8
Plant and Pipelines					
Operating costs (including insurance adjustment)	81.9	87.5	91.9	92.1	90.8
Return on working capital	2.0	2.0	2.0	2.0	1.9
Depreciation	40.6	40.7	40.8	40.8	40.9
Return on other assets	149.3	146.2	143.2	140.0	137.0
Total	273.8	276.4	277.9	274.9	270.7

Source: SDP submission to IPART Review of prices, p 25, Table 5.1, adjusted for CPI.

SDP calculated these revenue requirements using a building-block approach. It calculated the allowances for depreciation and a return on assets based on a regulated asset base (RAB) of $1,986.4 million and a rate of return of 7.8%. Its RAB includes a value of $1,320.2 million) for the desalination plant and $666.2 million ($2011/12) for the pipeline.[41]

SDP proposed addressing the uncertainty of the plant's actual operation regime – ie, how much of a year is spent in each mode of operation – through a retrospective mechanism to adjust revenues in the event that a shutdown took place in the prior 12-month period.

41 SDP submission to IPART's review of prices, p 26, adjusted for CPI.

Table 5.3 IPART's estimates of SDP's efficient annual costs in full operation mode ($million, 2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Plant					
Operating costs	69.7	76.4	82.0	84.0	85.7
Return on working capital	2.2	1.6	1.7	1.7	1.7
Depreciation	37.1	37.1	37.1	37.1	37.1
Return on assets	87.0	84.5	82.1	79.6	77.1
Total Plant	195.8	199.6	202.8	202.3	201.5
Pipeline					
Operating costs	0.1	0.1	0.1	0.1	0.1
Return on working capital	0.0	0.4	0.4	0.4	0.4
Depreciation	4.6	4.6	4.6	4.6	4.6
Return on assets	42.8	42.5	42.2	41.9	41.6
Total Pipeline	47.5	47.5	47.2	46.9	46.6
Plant & Pipeline					
Operating costs	69.8	76.5	82.1	84.1	85.8
Return on working capital	2.2	2.0	2.0	2.0	2.0
Depreciation	41.6	41.7	41.7	41.7	41.7
Return on assets	129.8	127.0	124.2	121.5	118.7
Total Plant & Pipeline	**243.3**	**247.2**	**250.0**	**249.2**	**248.2**

Note: Operating costs excludes electricity network pass through charges.
Source: IPART analysis.

IPART's estimates of SDP's efficient annual costs in full operation mode are lower than SDP's proposed annual revenue requirements. The primary reasons for this are our decisions on the appropriate WACC for SDP and on its efficient operating costs:

- we used a real pre-tax WACC of 6.7% whereas SDP used a pre-tax WACC of 7.8%
- we accepted the recommendations of our consultant, Halcrow, on SDP efficient operating costs (with the exception of its energy costs), which included expensing some maintenance SDP proposed should be capitalised in 2015/16 and 2016/17
- estimated SDP's forward energy expenses whereas SDP used the prices from their electricity supply contract with Infigen Energy.

We estimate that our decision will result in SDP's prices generating around $99.5 million less revenue over the 5-year determination period than SDP proposed.[42]

[42] This has been estimated during full operation periods and does not include revenue from network pass through costs, which were included in SDP's proposed revenue requirement, but are additional to our revenue requirement. For scenarios involving shutdown periods, the Transition to Shutdown and Transition to Restart charges are additional to our revenue requirement but were included in SDP's proposal.

Chapters 6 and 7 discuss in detail our analysis and decisions for the efficient operating expenditure cost block. Chapters 8 and 9 discuss our key decisions for determining the depreciation and return on assets cost blocks: the value of SDP's regulatory asset bases and the appropriate rate of return on these assets.

6 Efficient operating expenditure

To determine SDP's efficient operating expenditure in each mode of operation over the determination period, we took the following steps:

1. Allocated the operating cost items associated with the desalination plant into fixed and variable cost categories for each mode.
2. Determined the efficient annual level of these fixed and variable costs for the plant in each mode and for the pipeline.
3. Used our decisions in step 2 to calculate the efficient daily operating costs for the plant for each mode and for the pipeline.
4. Determined the efficient level of fixed one-off operating costs associated with transitioning the plant from one mode of operation to another (for example changing from full operation mode to water security mode).

In reaching our decisions on these steps, we considered the information provided by SDP in its submission, as well as comments on operating expenditure in other stakeholders' submissions. We engaged Halcrow to review SDP's submission on operating expenditure and recommend an efficient level of operating costs.[43]

As SDP's submission included forecast operating costs for the full operation and long term shutdown modes only, we sought more information to help us determine these costs for the other shutdown modes. We asked the National Centre of Excellence in Desalination (the Centre) to review this information and provide advice on the costs' reasonableness and efficiency.

In addition, we asked Halcrow to conduct a strategic management review, to determine whether SDP has management plans in place to ensure its operations and maintenance planning and capital planning are undertaken in an appropriate manner.

Finally, we engaged Frontier to advise us on the energy cost component of SDP's operating costs. As energy costs are the largest single operating cost item for SDP, we undertook considerable analysis to determine the efficient level of these costs. Our considerations and decisions on these costs are discussed separately in Chapter 7.

[43] We received further information from SDP about insurable risks after the finalisation of Halcrow's recommendations. As such, this information is not considered in that report.

Our decision on the return on working capital is included in section 6.6 at the end of this chapter.

The sections below summarise our key decisions on SDP's efficient operating expenditure, then discuss our considerations in reaching these decisions in more detail.

6.1 Summary of IPART's decisions on efficient operating expenditure

11 IPART's decisions on the efficient annual level of fixed and variable operating costs associated with the plant and pipeline in full operation mode are as shown in Table 6.1.

The decisions summarised below represent our view on SDP's efficient levels of operating expenditure, including when a carbon pricing scheme is operational. At the time IPART was undertaking its analysis, there was some regulatory uncertainty regarding the implementation of a carbon pricing scheme. Our decisions on the efficient levels of operating expenditure in event that such a scheme is delayed or ceases to be in operation are set out in Appendix D.

Table 6.1 Decisions on efficient annual level of fixed and variable operating costs in full operation mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
SDP proposed (includes energy network charges)					
Fixed operating costs	31.0	34.7	37.8	37.3	35.1
SDP additional proposed (insurance risks)	1.5	1.5	1.5	1.5	1.5
Variable operating costs	49.5	51.3	52.7	53.5	54.2
Total	**82.0**	**87.6**	**92.0**	**92.2**	**90.8**
IPART decision (excludes energy network charges)					
Plant fixed operating costs	21.1	24.0	26.2	26.8	26.2
Plant variable operating costs	48.6	52.4	55.8	57.1	59.5
Pipeline operating costs	0.1	0.1	0.1	0.1	0.1
Total	**69.7**	**76.4**	**82.0**	**84.0**	**85.7**

Source: SDP submission to IPART's review of prices and IPART analysis.

12 IPART's decisions on the efficient daily level of operating costs associated with the plant and pipeline in each operation mode are as shown on Table 6.2.

Table 6.2 Decision on efficient daily level of operating expenditure associated with the plant and pipeline ($ per day, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
IPART decision (excludes energy network charges)					
Full operation mode	190,863	209,269	224,591	229,399	234,774
Short term shutdown mode	41,050	53,102	60,297	61,208	60,595
Medium term shutdown mode	57,383	67,673	84,105	75,419	77,969
Long term shutdown mode	48,068	48,349	49,144	49,321	52,021
Water security mode	38,272	38,563	40,078	39,411	38,201
Pipeline – all modes of operation	**282**	**282**	**282**	**282**	**282**

Source: IPART analysis.

13 IPART's decisions on the efficient level of fixed one-off operating costs associated with transitioning the plant from one mode to another are as shown in Table 6.3.

Table 6.3 Decision on efficient one-off operating costs of transitioning the plant from one operation mode to another ($2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Transition to shutdown from full operation mode					
To short term shutdown	0	0	0	0	0
To medium term shutdown	188,034	188,034	188,034	188,034	188,034
To long term shutdown	277,502	277,502	277,502	277,502	277,502
To water security	1,442,005	1,442,005	1,442,005	1,442,005	1,442,005
Transition to restart from shutdown mode					
From short term shutdown	0	0	0	0	0
From medium term shutdown	202,129	202,129	202,129	202,129	202,129
From long term shutdown	1,770,928	1,770,928	1,770,928	1,770,928	1,770,928
From water security	5,497,899	5,497,899	5,497,899	5,497,899	5,497,899

Source: IPART analysis.

6.2 The allocation of fixed and variable operating cost items

In allocating the desalination plant's operating and maintenance expenditure items into fixed and variable categories, we considered the information provided by SDP in its submission and Halcrow's review of this information. All the pipeline's operating costs are fixed.

6.2.1 SDP's submission of fixed and variable operating cost items

SDP's submission indicated that some of the desalination plant's operating costs are fixed, regardless of what mode of operation the plant is in, while others are variable and depend on the mode of operation. It provided its allocation of fixed and variable operating costs in full operation mode and long term shutdown mode (Table 6.4) and noted that, in its view, the allocation for full operation mode is consistent with the terms of reference for this review.

Table 6.4 SDP's allocation of plant operating costs into fixed and variable components in full operation mode

Fixed costs	Variable costs
insurance costs	water treatment costs (mainly chemicals and some labour)
fixed labour costs	variable retail electricity charges
periodic maintenance	variable network electricity charges
fixed electricity costs	renewable energy certificate purchase costs
projected electricity standby costs	
land tax and council rates	
audit and bank fees	
marine and estuarine monitoring program costs	
incremental changes in each of the above cost categories	
membrane replacement costs	

The submission explained that when the plant is in full operation:

- Fixed operating costs include:
  - Baseline fixed costs, which are incurred regardless of whether or not the plant is operating.
  - Incremental fixed costs, which do not vary with the volume of water produced but can be avoided in shutdown modes. As a general rule, more incremental fixed costs are avoided in longer term shutdown modes.
- Variable operating costs include those that are only incurred when the plant is operating and change broadly in proportion to the volume of desalinated water produced. These variable costs primarily comprise water treatment and energy costs.

6.2.2 Halcrow's analysis of SDP's operating cost allocation

As part of its review of the efficiency of SDP's proposed operating expenditure, Halcrow examined SDP's allocation of fixed and variable of costs. As part of review, SDP provided Halcrow with a revised allocation of these costs. The revision placed a higher proportion of energy costs into the variable category.

Halcrow considered that the revised version is more appropriate than that originally submitted. However, on the basis of the information available, it was still concerned about the allocation of energy costs between fixed and variable, and recommended further adjustment. This matter is discussed in Chapter 7.

6.2.3 IPART's conclusions on SDP's operating cost allocation

Having considered the information provided by SDP and Halcrow's review of this information, we made decisions on the allocation of plant operating costs into fixed and variable categories for each of the plant's 5 modes of operation. Our decisions for full operation mode are consistent with Halcrow's recommendations.

Our decisions for the shutdown modes reflect the following:

- No operating costs are allocated to the variable category, as the efficient costs for these periods do not vary in line with production.
- The amount of fixed costs generally decreases as the length of the shutdown increases.[44] This is the result of increasing opportunities to avoid or reduce or defer costs in long term shutdown or water security mode – for example, by reducing staffing levels.

These decisions are consistent with Halcrow's recommendation that the level of fixed costs in each shutdown mode should reflect the costs of the unavoidable energy demand of the plant.

In making our decisions, we separated out the one-off fixed cost items associated with shutting down and restarting the plant, in line with our decision to set separate prices to recover these costs. These costs are discussed in section 6.4.

[44] Note that during a medium term shutdown, the daily level of cost is not proportionate to other shutdown periods. This is because additional chemicals are used to preserve the membranes during a medium term shutdown (micro-organisms attack the membrane if they are not chemically treated). These expenditures are not incurred for a short term shutdown (10 days) and the costs of such treatment are averaged over the longer period for long term shutdowns.

6.3 Efficient level of operating costs for the plant and pipeline

In deciding on the efficient level of operating costs for the plant and pipeline over the determination period, we considered SDP's proposed level of operating costs for the full operation and long term shutdown modes and Halcrow's review of this proposal. We also considered the additional information SDP provided on its operating costs in the other shutdown modes, and the advice provided by the Centre on this information.

In addition, we considered Frontier Economics' advice on SDP's proposed energy costs. As noted above, our considerations in relation to energy costs are discussed in Chapter 7.

6.3.1 SDP's proposed level of operating costs for the plant and pipeline

SDP's original pricing submission set out its actual and forecast levels of operating expenditure in full operation mode for the period 2010/11 to 2016/17, and its forecast levels in long term shutdown mode for the period 2012/13 to 2016/17. Late in the review, SDP provided further submissions, including one related to additional operating costs associated with its insurable risks.

SDP argued that its forecast operating expenditures are demonstrably efficient because the major cost items will be incurred under contracts entered into through competitive tendering processes,[45] and the non-tendered cost items are generally set by third parties (for example local council rates). It also noted that IPART accepted its past operating costs as being efficient when we set Sydney Water's prices in 2008.

Forecast operating costs in full operation mode

SDP's past and forecast operating costs in full operation mode are shown in Table 6.5 below.

[45] Appendix 1 of SDP's submission provides details of the tendering process employed in choosing contractors to build and operate the plant and in choosing a private sector partner to assist Sydney Water build the distribution pipeline.

Table 6.5 SDP's forecast operating costs in full operation mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Fixed costs (including electricity network costs)	31.0	34.7	37.8	37.3	35.1
Additional fixed costs associated with insurable risk[a]	1.5	1.5	1.5	1.5	1.5
Variable costs (including electricity network costs)	49.5	51.3	52.7	53.5	54.2
Total	**82.0**	**87.6**	**92.0**	**92.3**	**90.8**

a SDP provided information on its insurable risk in a supplementary submission received in October 2011.

Source: SDP submission to IPART Pricing review, Table 3.2 converted to $2011/12.

Additional fixed operating costs due to insurable risks

Late in the price review, SDP provided a number of supplementary submissions. One of these included a proposal to recover additional fixed costs associated with insurable risks. SDP argued that these costs should be recovered through the allowance for a return on assets (by adjusting the WACC). However, as IPART indicated during the consultation process that we were not likely to accept this argument, SDP proposed recovering its insurance costs related to these risks as an alternative.

SDP's supplementary submission stated that a premium for insuring against these risks would be $1,512,726 per annum, excluding GST. This estimated premium includes coverage for acts of terrorism, stamp duty and a state government fire service levy payable on insurance policies. To support this claim, SDP provided advice from an insurance broker based on benchmarking of similar risk type exposures (ie, other desalination plants) rather than a formal insurer quotation.

IPART's considerations and decision in relation to SDP's view that the costs associated with these risks should be recovered through an adjustment to the WACC are discussed in detail in Chapter 9.

Operating costs incurred under contracts

To support its argument that most of its operating costs are incurred under contracts entered into through a competitive tendering process (and therefore are efficient), SDP provided information on its forecast operating costs in 3 categories: payments under its operating and maintenance contract, payments under its electricity and REC contracts, and other operating costs (Table 6.6).

Table 6.6 SDP's forecast of operating costs incurred under contracts in full operation mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Operating and maintenance costs	31.4	35.2	37.7	37.4	35.7
Electricity costs	25.7	27	28.4	28.8	28.9
Renewable energy costs	19.4	20.4	21.1	21.1	21.1
'Other' operating costs	4	3.5	3.2	3.4	3.6
Insurance adjustment	1.5	1.5	1.5	1.5	1.5
Total	**82.0**	**87.6**	**92.0**	**92.2**	**90.8**

Note: SDP provided information on its insurable risk in a supplementary submission received in October 2011.
Source: SDP submission to IPART Pricing review, Table 3.1 converted to $2011/12.

SDP indicated that payments to the plant operator, Veolia, under the operating and maintenance contract include:

- Variable costs that relate to the cost of treating water (basically the cost of chemicals) which broadly vary with volume of water produced.
- Fixed costs that do not vary with the volume of water produced although they do vary on an annual basis. These cover items such as membrane replacement and laboratory and testing costs.
- An energy efficiency adjustment which increases or decreases the contracted payment to Veolia depending on whether Veolia exceeds or does not meet a contracted energy efficiency target.

SDP noted that this contract also includes incentives to help ensure that the cost of membrane replacement, periodic maintenance and insurance are efficient.

SDPs contracts with Infigen Energy for electricity and RECs are discussed in Chapter 7.

'Other' operating costs include:

- various fees and charges such as council rates and bank charges
- marine monitoring program costs, which will be incurred for 3 years to meet a condition of the planning consent for the plant
- corporate/administrative functions, which are currently performed by Sydney Water under the Service Level Agreement.

Forecast operating costs in long term shutdown mode

As noted in section 6.2 above, SDP's operating costs in full operation mode include both fixed and variable costs, while those in the shutdown modes comprise only fixed costs. SDP's submission explained that to meet the Metropolitan Water Plan Operating Rules,[46] the plant may go into 4 shutdown modes over the determination period. These include:

- short term shutdown (for 2 to 10 days)
- medium term (for 11 to 90 days)
- long term (91 days to 2 years)
- water security (more than 2 years).

SDP's forecast operating costs in long term shutdown mode are shown in Table 6.7.

Table 6.7 SDP's forecast operating costs in long term shutdown mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Fixed costs	26.2	26.9	28.2	28.1	28.5
Additional fixed costs associated with insurable risk	1.5	1.5	1.5	1.5	1.5
Variable costs	0.0	0.0	0.0	0.0	0.0
Total	**27.7**	**28.4**	**29.7**	**29.6**	**30**

Source: SDP submission to IPART review, Table 3.3 converted to $2011/12.

As for its forecast costs in full operation mode, SDP indicated that its operating costs in long term shutdown mode include payments under its operating and maintenance contract with Veolia, payments under its electricity and REC contracts with Infigen, and 'other' operating costs.

When the plant is in a shutdown mode, SDP is required to pay daily standby payments to Veolia as well as payments to Veolia for fixed operating and maintenance costs (which vary with the category of the shutdown period). These are generally lower than when the plant is in full operation and some costs relating to membrane replacement can be deferred or avoided altogether if the shutdown is of significant length.

SDP's other operating costs (for example insurance, corporate costs, taxes and operating costs for the bulk water pipeline from the plant to Sydney Water's network) do not change when the plant is not producing water.

46 Under the Water Supply Agreement between Sydney Water and SDP, from around mid-June 2012 onwards, Sydney Water will not be required to pay for any water produced by SDP when dam levels are above 80%. Sydney Water will still be required to pay a fixed monthly charge.

SDP also noted that it incurs one–off fixed costs to transition the plant from full operation to shutdown mode and to later restart the plant to enter full operation mode. These costs vary with the category of the shutdown mode. These costs are included in its past and forecast operating cost levels, shown in the tables above.

6.3.2 Halcrow's review of the efficient level of operating expenditure

IPART engaged Halcrow to review SDP's past and forecast operating expenditure, and make recommendations about the efficient level of operating expenditure required to provide SDP's services from 2011/12 to 2016/17. Halcrow examined the information provided by SDP in its submission.

Halcrow's findings on past operating expenditure

Halcrow found that SDP's actual operating expenditure in the period 2009/10 to 2011/12 is higher than was estimated in Sydney Water's submission to IPART's 2008 price review. However, based on its analysis, Halcrow reached the view that the expenditure incurred reflects SDP's obligations under its operations and maintenance and energy supply contracts. It also found that while SDP's actual operating costs were much higher than projected in 2007, they remained within the range of other Australian desalination plants, particularly for plants that offset their energy usage with 'green energy'.

Table 6.8 compares the operating cost projections included in Sydney Water's 2007 submission to SDP's actual costs for 2009/10 and 2010/11 and budgeted costs for 2011/12. The figures for 2011/12 are based on the plant being in full operation mode.

Table 6.8 SDP's actual operating expenditure compared to forecasts in Sydney Water's 2007 submission ($million, $2011/12)

	2009/10	2010/11	2011/12
Sydney Water 2007 submission			
Total	30.5	59.8	59.8
SDP 2011 AIR			
Total	20.3	68.4	77.3
Variation			
$million	-10.2	8.6	17.6
%	-33.4%	14.4%	29.3%

Source: Halcrow, *Review of operating and capital expenditure of SDP*, p 18, Table 5.1. Adjusted for CPI.

Halcrow identified that the main reason for the variation between Sydney Water's forecasts and SDP's actuals was much higher electricity costs. This was due to:

- Sydney Water's commitment to bear the cost of any deviation between its submission to the 2008 Sydney Water Price Determination and the final negotiated energy prices. (Halcrow noted that SDP's electricity contracts were finalised in the period between Sydney Water's September 2007 submission and the release of IPART's 2008 Final Price Determination).
- Significant increases in electricity network charges over the period (network charges are a pass through item under the electricity supply agreement).
- SDP's commitment under the electricity supply and REC contracts to purchase minimum quantities of each calendar year. Surplus quantities can be sold in the market. As current market prices are below contract prices, this has resulted in losses. While losses on RECs are excluded from SDP's reported historical expenditure, Halcrow reported that, contrary to the treatment of the surplus RECs, the energy figures for 2009/10 and 2010/11 include mark to market adjustments.
- The plant operator (Veolia) is entitled to energy efficiency payments under its contract when less electricity is used for a given volume of output than prescribed.

Halcrow found that other causes for the differences between Sydney Water's 2007 submission and SDP's submission were delays in the handover of the plant and a cessation of production while Ausgrid carried out repairs to the power supply network that supplies the plant. Halcrow concluded that the latter 2 reasons combined to reduce production below forecast levels and hence increased unit costs.

Halcrow's findings on forecast operating expenditure in full operation mode

Halcrow found that SDP's forecast level of operating expenditure in full operation mode was higher than Halcrow considered efficient, and recommended adjustments to this level (Table 6.9).[47]

[47] Please note that the tables in this section calculated by Halcrow have been adjusted to reflect an updated CPI index for 2011/12. This explains the minor differences in the values in the tables compared to the same tables in the Halcrow Report.

Table 6.9 Halcrow's recommended adjustments to SDP's forecast operating expenditure in full operation mode ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
SDP total forecast operating expenditure	80.5	86.1	90.5	90.8	89.3
Halcrow total recommended operating costs	72.7	76.8	79.9	80.8	80.2
Halcrow total efficiency adjustment	-7.8	-9 .2	-10.5	-9.9	-9.0

Source: Halcrow, *Review of operating and capital expenditure of SDP*, p 64, Table 5.20, adjusted for CPI.

As the table shows, Halcrow recommended adjustments to payments to the plant operator, as well as adjustments to energy and REC costs, and other operating costs. The sections below discuss these recommendations and Halcrow's other key findings.

Adjustments to payments to the plant operator

Under SDP's operating and maintenance contract with Veolia, the actual cost of membranes and chemicals incurred by the operator are passed through to SDP. Halcrow found that SDP had included significant increases in these costs in its forecast payments to Veolia. In relation to membrane costs, it noted that the forecast increase for the 5 years of the 2012 determination period, this is significantly higher than the increases that have occurred in recent years.

In relation to chemical costs, Halcrow found that SDP had assumed that the price of chemicals will increase in line with past trends in chemical costs. For example, the weighted index used in the pass through of chemical costs rose 36% (in nominal terms) between July 2007 and November 2010.[48]

Halcrow requested, but has not received, any additional information in support of these greater than CPI increases. In the absence of additional information, Halcrow recommends that the forecast cost of membranes and chemicals be held constant in real terms.

Following the finalisation of Halcrow's report, SDP provided further information and the calculation of the cost indices. Halcrow notes that this does not explain why SDP suggested historical movements in costs will continue or why over the longer term it would exceed CPI. Halcrow states that it believes there are opportunities for efficiencies in this area.[49]

48 Halcrow, *Review of Operating and Capital Expenditure by SDP*, p 29.
49 Letter Mr Jim Sly, Halcrow, to Ms Amanda Chadwick, IPART dated 26 October 2011, p 4.

Adjustments to electricity and REC costs

Halcrow reviewed the efficiency of SDP's electricity use and the reasonableness of its contracted energy supply charges and cost of RECs. Halcrow recommends that only 50% of the difference between the contract and market prices be allowed for both energy and REC purchases in the period to 2016/17. This recommendation is discussed in Chapter 7.

Adjustments to other operating costs

SDP's operating and maintenance contractual arrangements with Veolia include an outline of expected asset maintenance costs. Halcrow understands that the contracted allowances for these costs were provided and agreed to as part of the tender process, and that (in simple terms) payment for asset maintenance costs are based on these allowances, with provision for adjustments when:

- escalation of labour costs vary relative to the average weekly earnings index
- 'other' fractions vary relative to CPI
- actual periodic maintenance costs exceed a 5-year cap.

In reviewing SDP's forecast operating expenditure, Halcrow found that the forecast asset maintenance costs included in this expenditure exceed the contracted allowances, and that SDP has not provided sufficient justification for this. It considered that, in the absence of any other identified related costs, asset maintenance expenditure forecasts should be based on the contracted asset maintenance cost. In Halcrow's view, it is appropriate to adopt an assumed escalation equivalent to CPI. Accordingly, Halcrow recommended that an adjustment be made equal to the variance between SDP's submission and the contracted maintenance costs.

Following the finalisation of Halcrow's report, SDP provided further information. After considering this document, Halcrow noted that it "presents possible reasons for the discrepancies…but has still not provided any detail as to the derivation of its maintenance expenditure forecast. Accordingly, no adjustment to the previous recommendation is proposed."[50]

In its submission, SDP proposed that all periodic maintenance expenditure incurred from early 2016 be treated as capital expenditure. Halcrow considered that capitalisation of the entire periodic maintenance expenditure is not justified and recommended that the total amount should be re-allocated to forecast operating expenditure. A more detailed discussion of this issue is contained in section 8.1.2.

50 Letter Mr Jim Sly, Halcrow, to Ms Amanda Chadwick, IPART dated 26 October 2011, p 3.

Other findings

SDP has no staff – rather it has a Service Level Agreement with Sydney Water to provide all management and support services. In considering SDP's forecast costs under this agreement, Halcrow found that Sydney Water forecasts that the cost of its services will increase by 40% from 2011/12 onwards. However, Halcrow did not sight information to support this. Nevertheless, Halcrow considered that the Agreement terms provide good value for SDP.

However, Halcrow also found that Sydney Water currently has no effective ring-fencing arrangements in place. It recommended that Sydney Water establish robust ring-fencing arrangements in relation to the provision of services to SDP. SDP contested this conclusion. In response Halcrow provided examples to illustrate the rudimentary nature of ring-fencing arrangements.[51]

Halcrow's findings on forecast operating expenditure in long term shutdown mode

In relation to SDP's forecast operating expenditure costs in long term shutdown mode, Halcrow recognised that forecasting when the plant will be in full operation or one of the shutdown modes over the determination period is difficult. It noted that in the past, a variety of approaches have been used for this forecasting (for example, in assessing and agreeing on contractual arrangements).[52]

Halcrow also recognised that when the plant is not operating, the allocation and level of operating costs vary depending on which shutdown mode it is in. However, it did not make specific findings on shutdown modes expenditures.

6.3.3 National Centre of Excellence in Desalination's advice on operating costs in other shutdown modes

As noted above, SDP's submission included forecast operating costs for the full operation and long term shutdown modes, but not for the other potential shutdown modes. This was because SDP's pricing proposal included a retrospective annual adjustment mechanism to take account of differences between the costs of different modes of operation.

However, in determining our approach to setting prices we decided to set separate prices for each mode of operation. We sought further information from SDP about the costs associated with the different shutdown period types to assist with this. SDP provided this information in an operating cost model plus output tables of various shutdown scenarios. For example, in one scenario the plant is in full operation mode

51 For example, no timesheets are kept by Sydney Water staff working on SDP activities. Letter Mr Jim Sly, Halcrow, to Ms Amanda Chadwick, IPART dated 26 October 2011, p 4.

52 For example, Halcrow identified that Sydney Water employed consultants BurnVoir to evaluate tenders for energy and REC supply. Its method for forecasting was to apply probabilities, depending on energy usage, to the time that the plant would operate over the 20-year term of the energy contracts.

for year 1 of the determination period, then short term shutdown mode for year 2, followed by full operation for years 3 to 5. The output tables reviewed show the operating costs by category and by year for each scenario.

We engaged the Centre to review the model and output tables. The Centre conducted a desk top review and applied its expert industry knowledge. Due to time constraints, it did not interview SDP or seek further information from SDP.

Overall, the Centre found that SDP's forecast operating and maintenance costs were reasonable and consistent with other comparable Australian seawater desalination plants. However, it raised significant concerns about the efficiency of the plant's operating regime, and therefore its future operations.

In particular, the Centre expressed concerns about SDP's estimates of the costs associated in medium term and long term shutdown modes. It noted that there are no international precedents for the plant's operating regime as articulated in the Metropolitan Water Plan. The Centre suggested alternative operating protocols for plant operation in medium term shutdown mode may be more cost-effective. Specifically it noted that it may be more efficient to operate the plant at low levels than to enter medium or long term shutdown modes.

In addition, the Centre suggested that SDP's estimated costs for the medium term and long term shutdown modes may be generous. However, within the constraints of the time and resources available, it was not able to recommend specific adjustments to ensure only efficient costs are recovered in prices.

Further, the Centre identified specific opportunities for efficiency gains. For example, it suggested that if membrane preservation is required, SDP should consider new technologies that are more cost-effective than sodium metabisulphite, as these technologies do not affect fibreglass and so reduce maintenance costs.

6.3.4 Halcrow's strategic management review

We also asked Halcrow to determine whether SDP has appropriate management plans in place to ensure that operations and maintenance planning and capital planning are undertaken in an appropriate manner.

SDP operates under the provisions of WICA and holds both Network Operator and Retail Supplier Licences. Halcrow reported that, under the provisions of its licences, SDP is required to develop and implement various management plans. SDP provided Halcrow with its Infrastructure Operating Plan, which outlines both the operating regime/environment within which the facility is operated and SDP's operational strategies. It also provided its Operations and Maintenance Contracts in respect of both the desalination plant and the drinking water pumping station.

Halcrow found that, on the basis of the documentation available, SDP appears to have appropriate management systems in place.[53] However, it identified that SDP does not appear to have well-established protocols to determine which shutdown mode to adopt when a particular water supply scenario emerges. Given the potential impact of such decisions on the quantum of operating costs, Halcrow recommended that it is essential for SDP to develop such protocols.

6.3.5 IPART's conclusions on the efficient level of operating costs for the plant and pipeline

Plant in full operation mode

Except in relation to energy costs, we accepted Halcrow's recommendations on SDP's forecast efficient operating expenditure for the plant in full operation mode. Our decisions on this expenditure per annum and per day are shown in Tables 6.1 and Table 6.2 above. (Our decisions in relation to energy costs are discussed in Chapter 7.)

Plant in each mode of operation

To make our decisions on the efficient level of operating expenditure for the plant in each of the 4 shutdown modes, we developed a model based on information provided by SDP. To ensure that our approach and calculations are transparent, we have provided detailed information and worked examples in Appendix C.

While we could estimate directly from our model the operating costs for shutdown modes that last 1-year or more, some of these modes are less than 1-year in length. This means that the plant will operate for part of the year and be in shutdown mode for part of the year. To derive the operating costs for the shutdown period in these scenarios, we compared the annual costs of each of these shutdown scenarios against the annual costs of a full operation period that lasts for the full year. From this comparison we derived the operating costs that are incurred for the particular shutdown mode. We then converted those costs into a daily shutdown cost, as shown in Table 6.3 above.

These scenarios assumed that each shutdown mode was for the maximum term for that mode (for example a short term shutdown can be between 2 to 10 days, so the scenario assumed the shutdown was for 10 days). We chose the maximum term because it is the most conservative estimate. Then, once we had calculated the cost of the maximum term, we converted that value into a daily cost by dividing the cost by the number of days of that maximum term.

[53] Under WICA, SDP's Infrastructure Operating Plan and associated management plans are subject to audit. An audit of these plans commenced on 7 November 2011 and will be provided to the Minister for Finance and Services.

We note that determining the operating costs incurred by the desalination plant when shutdown is complex. These costs generally decrease as the length of the shutdown increases, but not proportionately. In a short term shutdown, there are broadly no variable costs compared to when the plant is producing water. For example, the need for chemicals to treat water and energy required to pump water through the filtration membranes is minimal (some water is used to maintain membranes and some chemicals are used to preserve the membrane condition, depending on the length of shutdown).

In a medium term shutdown (maximum 90 days), there is a small aberration because there are some additional costs associated with preserving the membranes that are not incurred when the plant is shut down for a short term (maximum 10 days), and are averaged over a shorter period than when the plant is in a long term shutdown. These costs relate to chemical treatment of the membranes to address microbial destruction.

In a long term shutdown (maximum of 2 years) and water security shutdown (greater than 2 years), there are no variable costs and fixed costs are greatly reduced. These fixed cost savings are in the categories of labour, membrane replacement, deferred periodic maintenance, avoidance of routine maintenance and avoidance of the fixed costs associated with water monitoring and testing.

Pipeline

To make our decision on the efficient level of operating expenditure for the pipeline (assuming ownership is transferred from Sydney Water to SDP as planned) we accepted Halcrow's recommendation that SDP's estimate of the annual operating expense for the pipeline of $100,000 is appropriate. We note that this cost is not material to prices we set for SDP.

6.4 Efficient level of fixed one-off operating costs associated with transitioning the plant from one mode of operation to another

To determine the fixed one-off costs that arise from transitioning from full operation to shutdown mode and vice versa, we considered the information provided by SDP about its shutdown modes and its operation and maintenance contract, Halcrow's recommendations and our own analysis. These costs form the basis for our determined one-off prices for Transition to Shutdown and Transition to Restart.

These fixed shutdown and start-up costs vary depending on the relevant shutdown mode (see Table 6.3). For example, the cost of going to medium term shutdown from full operation mode is $188,034, and the cost of restarting full operation from medium term shutdown is $202,129. The cost of going to water security mode from full operation mode is $1,442,005, whereas the cost of restarting to full operation from water security mode is $5,497,899.

6.5 Recommendation on protocols for decisions about shutdowns

In the course of the review, Halcrow identified the need to establish clearer protocols for decisions about entering shutdown modes. We support that recommendation and have written to SDP to establish appropriate operational protocols which will become a reporting requirement in future reviews.[54] We will review SDP's progress in this regard at the next pricing determination.

Recommendation

1 SDP should establish clearer protocols for determining when it should enter each of the possible shutdown modes.

6.6 Return on working capital

Working capital is another element of the building block revenue requirement. The returns to the working capital allowance are displayed in Table 6.10. These returns are included in the notional revenue requirements for all modes and are recovered through the daily charges applicable in each mode.

Table 6.10 Return on working capital over the determination period ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Return on working capital for desalination plant	2.2	1.6	1.7	1.7	1.7
Return on working capital for distribution pipeline	0.0	0.4	0.4	0.4	0.4
Combined return on working capital	2.2	2.0	2.0	2.0	2.0

Source: IPART analysis.

54 Letter to Dr Kerry Schott from Mr Jim Cox, 7 December 2011.

7 The cost of energy

Desalination is an energy intensive process, and the costs of energy are a significant proportion of SDP's operating costs. SDP has estimated that in a full operation period, energy comprises over 32.4% of the plant's operating costs and that the purchase of Renewable Energy Certificates (RECs) comprises an additional 23.7% of these costs.

To reach our decision on the efficient level of energy expenditure to include in SDP's efficient operating expenditure (discussed in Chapter 6) for price setting purposes, we undertook a careful review of SDP's energy contracts and the submissions we received. We also engaged Halcrow and Frontier to provide expert advice.

We decided to set the level of SDP's energy costs by estimating the efficient costs at this point in time and including the majority of these costs in our estimate of SDP's efficient variable operating costs, as the costs of energy vary with plant usage. These costs are reflected in the variable usage charges applicable only when the plant is in full operation mode.

In estimating the forward costs of purchasing energy, we included values for renewable energy schemes and an allowance for an energy market retail costs, as well as margin and other relevant costs. In addition, rather than allowing for estimated future energy network costs payable by SDP in prices, we have included a methodology for adjusting prices in line with the annual changes on network charges as approved by the Australian Energy Regulator (AER).

In adopting this approach, IPART considers that the energy and RECs contracts of SDP are akin to financial contracts. A competitive market exists where energy and RECs can be traded as commodities. Therefore, the contracts SDP has entered into are effectively over-the-counter forward contracts. We note that given the variable nature of the plant's operation, SDP is highly likely to be an active trader of energy and RECs. This potential was known, or ought to have been known to SDP, when the contracts were first negotiated[55] and then renegotiated in 2010.

We considered issues regarding the potential for contracts to be renegotiated over time. We note that, to date, the contracts have been renegotiated once.

[55] In the course of the December 2007 public hearing for the Sydney Water 2008 Price Determination, the then Managing Director of Sydney Water noted that the plant was likely to have a variable operating regime and that as a result Sydney Water would hedge its power costs, IPART transcript, p 27.

At the time that our analysis was undertaken, there was regulatory uncertainty regarding the implementation of a carbon pricing scheme. By the time that our analysis was undertaken and the determination drafted a Carbon Pricing Scheme had been passed by the Parliament but not yet been implemented. To manage this uncertainty and potential impacts for customers, we have determined sets of prices for each of these scenarios, namely with a carbon pricing scheme in operation and without such a scheme in operation. Our decisions when a Carbon Pricing Scheme is not operation are set out in Appendix D.

The sections below provide a summary of our decisions on the energy component of SDP's efficient operating costs, and then discuss each of the inputs into our decision making and our analysis and decisions in detail.

7.1 Summary of IPART's decision on efficient energy costs

We have considered a range of issues in relation to determining the efficient cost of purchasing energy to be reflected in SDP's water prices. Table 7.1 show our determined wholesale and renewable energy costs (with the introduction a carbon pricing scheme). We have also determined a cost pass through mechanism for actual fixed and variable network costs that will take effect on an annual basis over the determination period.

Table 7.1 IPART decision on energy costs ($/MWh, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Variable energy costs					
Wholesale Electricity ($/MWh)	60.47	63.99	64.48	66.27	70.94
REC ($/MWh)	44.29	46.06	47.9	49.82	51.82
SRES and other costs ($/MWh)	7.65	5.17	5.22	5.29	5.37
Total Efficient Energy Cost ($/MWh)	112.41	115.22	117.6	121.38	128.13
Network costs					
Fixed	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology
Variable	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology

Note: A detailed explanation of the methodology for the pass through of network charges can be found at Box 7.1.

Source: IPART Analysis.

7.2 Background

The 3 major elements of SDP's electricity costs are:

- the price and volume of energy that SDP requires or the wholesale market cost
- the network charges payable for the transmission of this energy over the network
- the costs of renewable energy arising from the planning approval for the plant, any voluntary commitments made in relation to SDP's operations and the implications of mandatory green schemes that energy retailers operating in NSW are required to comply with.

There is some uncertainty about all 3 components over the price path period from 1 July 2012 to 30 June 2017. This uncertainty reflects the dynamic nature of the energy market in terms of the economic, commercial and regulatory/policy factors that affect the wholesale market, as well as the cost of purchasing network services and complying with green schemes. It also reflects the difficulty of predicting SDP's operation and energy needs over the regulatory period arising from the plant's operating regime as articulated in the Metropolitan Water Plan.

7.3 SDP's proposed energy costs and treatment in the pricing process

As described in more detail in Chapter 3, SDP has entered into 2 contracts, each of 20 years duration, with subsidiaries of Infigen Energy for electricity supply and a subsidiary of Infigen Energy for the supply of RECs.

These contracts were subject to competitive tendering processes. SDP contends that the costs arising from the contracts are demonstrably efficient because they are incurred under contracts let through a competitive tendering process. The key elements of this tendering process are set out in SDP's submission. In addition SDP argues that the contracts present good value for money as they include real prices for a 20-year term, with no pass through of future carbon pricing scheme costs.[56] At the time this determination was drafted, contracted prices were currently higher than current market prices. SDP states that, in the period after the price path, this situation will reverse.[57]

SDP's submission identifies that under the contract its actual electricity costs are based on:

- variable electricity use costs, based on a fixed, real per megawatt hour rate
- an annual minimum volume commitment
- a contract maximum for the site energy load.[58]

56 SDP submission to IPART's review of prices, pp 3, 38.
57 Transcript of SDP Public Hearing, p 15.
58 SDP submission to IPART's review of prices, p 15.

Under the contract, network electricity charges are passed on to SDP by its supplier. The network costs that SDP pays are based on:

- variable network use costs, based on a fixed real per megawatt hour charge
- a fixed daily network access charge
- a network capacity charge that depends on the maximum load that the plant places on the electricity network in the preceding 12 months.[59]

SDP argues that its planning conditions obliged it to purchase RECs in line with the volume of electricity used in operating the plant. SDP's cost of purchasing RECs is based on:

- a fixed real price per REC, and
- a commitment for SDP to buy a fixed minimum number of RECs per year.[60]

Consequentially, SDP suggest that the annual cost of RECs should be treated as a fixed real cost based on the contract price for RECs.

In the Issues Paper IPART sought information on whether the cost of using renewable energy should be included in SDP's prices. In response SDP indicated that:

- the Project Approval for the Kurnell desalination plant includes a requirement to purchase RECs
- Sydney Water was directed under section 20P of the *State Owned Corporations Act 1989* to build the plant in accordance with the Project Approval and that direction then resulted in a section 16A direction under the *IPART Act*.

SDP argues that the costs of REC certificates should be recovered through prices rather than via community service obligation payable by the Government to SDP.

SDP also argues that the contract for RECs will not be an ongoing burden. The contract has a fixed price that only allows for CPI increases. As such, the contract excludes pass-through of other costs such as new taxes and emission trading schemes.[61]

SDP proportioned energy costs into fixed and variable components when the plant is in full operation mode. This allocation was examined by Halcrow and is discussed in section 7.5.2.

59 Ibid, p 15.
60 Ibid, p 15.
61 Ibid, p 3.

Based on the arguments that contract costs are fixed but plant's operation are variable, SDP's submission included recommendations about a renewable energy standby adjustment methodology that would apply when the plant was in shutdown.[62]

7.4 Stakeholder submissions

The Sydney Catchment Authority (SCA) submission includes discussion of the appropriate allocation of specific energy costs between a fixed and variable charge. Specially, the SCA suggests that:

- the cost of RECs should be classified as variable costs because they are ultimately dependent on energy used as a result of water produced
- given principles of allocative efficiency, the cost of green power should be recovered in SDP's volumetric charges (as SDP proposes).

IPART has considered the SCA's submission and has determined variable usage prices that recover the variable efficient energy costs and daily fixed charges that recover fixed component of energy network charges, and the minimum energy needs identified as necessary to maintain the plant in a water security shutdown mode.

In its submission, the Office of Environment and Heritage (OEH) confirmed that the use of green power at the plant was subject to planning consent conditions. OEH suggests that these conditions require SDP to use green energy. They note that the planning consent for the plant also required the plant to be designed to use energy efficient equipment and energy recovery techniques.[63] IPART has considered this submission and included an allowance for renewable energy in decisions on efficient energy costs.

7.5 Halcrow's review of SDP's energy costs

Halcrow were engaged by IPART to review the efficiency and prudency of SDP's expenditures.

7.5.1 Electricity supply and REC contracts

In reaching a view on the efficiency and prudency of proposed energy expenditures, Halcrow identified that:

- The forecast energy consumption of the plant per ML of desalination water produced is within the range of that consumed by other Australian desalination plants.
- SDP's contracted prices are currently higher than current market prices.

62 SDP submission to IPART's review of prices, Appendix 3.
63 Office of Environment and Heritage submission to IPART's review of SDP's prices, p 2.

Halcrow's analysis led them to conclude that the contracts place considerable risk on SDP. Consequently, Halcrow recommends the disallowance of the full contract prices for energy and RECs. It recommended that only 50% of the difference between the contract and market prices be allowed for both energy and REC purchases in the period to 2016/17.

Halcrow noted that in a water security shutdown period the desalination plant will use around 9.64GWh a year of energy. Halcrow therefore propose that, on the basis of information currently available for the no production mode, the energy costs coinciding with the 9.64GWh usage (and excluding potential gains or losses on mark to market) be classified as fixed costs.

7.5.2 Identification of energy costs that vary with output

In its pricing submission, SDP allocated its energy costs into fixed and variable components when the plant is in full operation mode. In its review, Halcrow investigated this allocation. Following discussion, SDP provided further advice to Halcrow about a revised apportionment. Through that revision, SDP places a higher proportion of its energy costs into the variable category. Halcrow reviewed the revised allocation and has accepted the allocation as more reasonable.

However, Halcrow recommended a further adjustment which means that fixed charges should only include 9.64GWh per annum of energy costs, as that is the plant's expected energy use when in a shutdown mode.

7.6 Frontier Economics estimation of efficient energy costs

Background

IPART engaged Frontier to develop an estimate of the energy cost components that SDP would incur as an efficient supplier of water. This information establishes a current view of efficient energy costs and enables comparisons between SDP's forecasts of energy costs and the current forecasts of wholesale energy and renewable costs.

Specifically, Frontier was requested to provide estimates of the:

- long run margin cost (LRMC) of generation as a long term proxy for wholesale market spot and contract prices, and
- LRMC of meeting the RET as a proxy for REC market prices.

In requesting this analysis, IPART considered the benefits of consistency between the approach for setting of an appropriate allowance for the energy costs component of SDP's prices and the approach we use in retail electricity determinations,[64] specifically:

- Ensuring that the energy cost allowance reflects the efficient costs of providing services over the period 2012/13 to 2016/17.
- Establishing the wholesale energy cost allowance:
  - With respect to SDP's load shape – it is broadly flat as it is either operating at full capacity for a period of time, or is off.
  - Giving consideration to current market information such as forecast generation costs and other input assumptions to estimate the long run marginal cost (LRMC) or current market prices. An alternative source of market information is the futures trade in electricity contracts on the ASX (d-Cypha). That is, being consistent with a point in time efficient cost principle that IPART has previously adopted and is consistent with financial accounting practices.
  - Not considering the actual contracts entered into. That is, we de-link prices and costs to provide incentives for businesses to achieve efficiencies rather than allow a cost plus form of regulation.
  - Allocating risk to those best able to manage risks including passing through of network costs to customers given these costs are difficult to forecast and there is little ability of a retailer to control these costs.
  - Ensuring that the structure of fixed and variable charges reflects the structure of underlying costs of the plant.

Frontier's findings

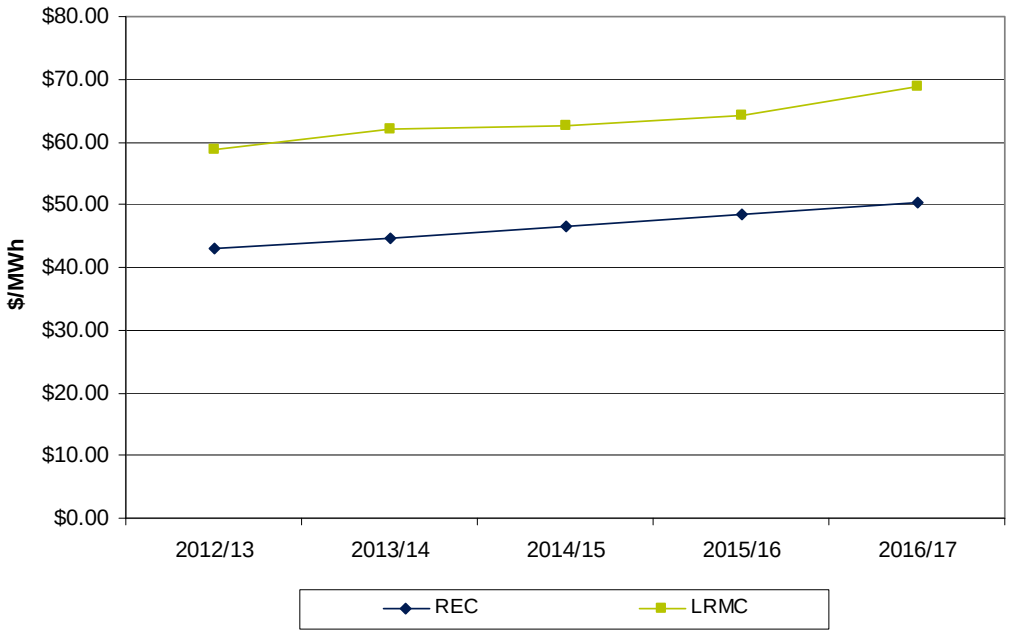
Frontier has estimated the expected wholesale energy prices (based on the LRMC of generation as a long term proxy for market prices) and REC prices (based on the LRMC of meeting the RET as a proxy of REC prices) over the determination period. A copy of Frontier's report is available on our web site.

Recognising the uncertainty about a Carbon Pricing Scheme that existed at the time the analysis was conducted, Frontier estimated the expected wholesale energy prices and the RECs prices under 2 scenarios: where a Carbon Pricing Scheme is operational and if a Carbon Pricing Scheme is not.

Figure 7.1 illustrates Frontiers forecasts if a Carbon Pricing Scheme is in place. It shows that the wholesale electricity costs, determined on an LRMC basis, are within the range of $60 to $70/MWh over the 2012/13 to 2016/17 period.

64 Conceptually SDP can be considered to be a "retail supplier" of bulk water that bundles the costs of wholesale and network energy, the costs of operating and maintenance the desalination plant and an appropriate profit margin into retail prices that are payable by SWC.

Figure 7.1 Frontier Economics' forecasts of LRMC, spot prices in NSW and RECs (assuming a Carbon Pricing Scheme is operational)



Source: Frontier Economics.

7.7 IPART's analysis

7.7.1 Uncertainty regarding the Carbon Pricing Scheme

14 To address uncertainty regarding the Carbon Pricing Scheme at the time our analysis was undertaken, IPART has determined a set of prices applicable when the scheme is operational and another set applicable when there is no scheme in operation.

At the time that our analysis was undertaken, there was regulatory uncertainty regarding the implementation of a Carbon Pricing Scheme. By the time that this determination was prepared a Carbon Pricing Scheme had been passed by the Parliament but not yet been implemented. To manage this uncertainty, IPART has determined sets of prices for each of these scenarios, namely when a Carbon Pricing Scheme is operational and when there is no scheme in operation.

7.7.2 Expected efficient costs

In making our decisions, we have examined the proposals of SDP, stakeholder submissions, Halcrow's recommendations and analysis undertaken by Frontier.

Our decision is to allow efficient energy costs as set out in Table 7.1. We have not accepted SDP's proposed energy costs nor Halcrow's recommendations about the adjustment of these costs to include losses when surplus energy and RECs are sold.

SDP's proposal involved considering actual costs incurred in its contracting process. This approach is often used to assess capital and other expenditure as in many instances it is the best information available to develop estimates of efficient costs. However, in the case of SDP's energy and RECs costs it is possible to observe competitive markets in which energy and RECs can be traded as assets.

We have taken the view that Frontier's forecast of the market values is more likely to represent efficient costs than SDP's actual costs, in that:

- it reflects the fact that electricity contracts are like financial instruments that have a market value which fluctuates through time
- it is consistent with outcomes expected in a competitive market
- it de-links prices and actual costs such that the business is provided with incentives to manage its costs efficiently.

In reaching this decision we have considered that:

- the process of desalination is energy intensive and hence energy inputs contribute around 55% of SDPs operating costs in a full operation mode
- unlike many of the other inputs to SDP's processes, energy is readily traded and therefore has a regularly updated market value
- as a result of the variable nature of the desalination plant's operating regime and the contracts that it has entered into, SDP is likely to have excess energy in periods when the plant is not in full operation. This is unlike the situation of other water utilities
- while contracts for the supply of energy and RECs are currently in place, contracts can be subject to renegotiation
- in previous retail electricity reviews, IPART has endorsed the principle of setting a point of time estimate of expected efficient costs[65]
- some statements by SDP suggest establishing a wind farm as a new source of renewable energy was a higher priority than efficient costs.[66]

65 IPART, *Review of regulated retail tariffs and charges for electricity 2010-2013*, March 2010, p 94.

66 Sydney Water, SDP Public Hearing, August 2011, p 13, 'I think the other thing you could say is that it was essential to provide a long term contract certainty in relation to the REC contract, at least, because of the need to construct the wind farm. That contract is the under-pinning for the construction of the wind farm at Bungendore that delivers the REC agreement. It was therefore essential to take the RECs over that period of time, or we would not have been able to provide the backing for the construction of the wind farm. Once you have taken the RECs for that period, back to back with the electricity contract, the provision of power, it was agreed it made a lot of sense.'

Electricity contracts are in essence financial contracts. Because of the role and nature of electricity costs in this review, we have considered the potential parallels between the treatment of debt and electricity costs. A business will typically have a portfolio of debt at different prices and different maturities. When we consider the cost of debt for pricing purposes over the regulatory period, we consider the cost of debt at the time the decisions are made on the future regulated prices. We do not pass through the actual costs of debt entered into by the regulated business in the past, regardless of the requirements in relation to procuring debt.

7.7.3 Identification of energy costs that vary with output

A key element in promoting efficient outcomes is ensuring that the structure of fixed charges and variable charges reflects the structure of underlying costs of the plant – particularly the structure of fixed and variable costs of operating the plant.

IPART has accepted Halcrow's recommendations regarding the allocation of energy costs between the fixed and variable components of prices. As discussed at section 7.5.2, these recommendations are largely consistent with SDP's revised approach.

Most energy costs will vary with production, reflecting the additional energy used and therefore the additional energy that it needs to be purchased from a retailer, to supply desalinated water. The impact of energy costs is greatest when the plant is running. Additional energy is also consumed during start-up mode.

However, some energy costs are fixed and reflect the small amounts of energy required to keep the plant available and the fixed component of network charges which are incurred regardless of whether any energy is consumed.

7.7.4 Treatment of network charge

15 IPART has decided to establish an annual methodology for the cost pass through of fixed and variable network charges as shown in Box 7.1 below.

In its submission of energy costs, SDP includes estimates of future network costs that it expects to be passed through by its energy supplier, Infigen. To develop a forecast, SDP has been required to make assumptions about future decisions of the AER about network tariffs including:

- that network costs will increase by the average increase in network tariffs (X-factor) set out in the AER's network determination for 2012/13 – 2013/14
- a percentage increase in network costs over the remaining 3 years of the SDP regulatory period (2014/15 to 2016/17).

It is unlikely that the network costs estimates submitted by SDP will reflect the actual network charges incurred by SDP over the regulatory period. This is because:

- the increase in individual network charges (particularly large customers on 'cost reflective network pricing') may be different to the average change in tariffs, particularly given that as at October 2011 the AEMC is undertaking a review of the economic regulation provision in the National Electricity Rules.
- there is significant uncertainty about average changes in network prices beyond the current regulatory period (the AER's determination ends in 2013/14).

We note that while these costs are uncertain, they are subject to review by an independent price regulator. As such, we have decided to establish a methodology to pass through fixed and variable network charges determined by the AER to SDP's prices. We note that this approach reduces SDP's risks as it does not have to bear the risk associated with changes in network costs (thereby allocating this risk efficiently and lowering its risk profile), which in turn ensures that the charges paid by water customers ultimately reflect the actual network costs.

Box 7.1 Network charges cost pass through mechanisms

Variable water usage prices are calculated as

$$\left(WUC + \frac{\$/MWh \times 340{,}360MWh}{90{,}000ML}\right) \times AS$$

Where:

WUC = the water usage charge determined by IPART

$/MWh = the Variable Network Charge for the applicable mode

AS = the number of ML of Desalinated Water supplied by SDP from the Plant to that customer during the applicable mode

This means that assuming a Carbon Pricing Scheme is operational, the variable water usage charge is equal to:

- the prices set by IPART (included in Table 2 of IPART's determination) plus the variable network charge determined by the AER multiplied by the plant's estimated energy use divided by name plate production level of the plant
- multiplied by the volume of desalinated water actually produced.

A parallel methodology has been included in the determination for the variable usage charges and the fixed service charge if the Carbon Pricing Scheme is not operational.

Fixed water service prices are calculated as

$$\left(WSC + FNC + \left(\$/MWh \times -26.5MWh\right)\right) \times \frac{AS}{TS}$$

Where:

WSC = the water service charge determined by IPART

FNC = the Fixed Network Charge applicable for the relevant day

$/MWh = the Variable Network Charge for the applicable mode

AS = the number of ML of Desalinated Water supplied by SDP from the Plant to that customer on the relevant day

TS = the number of ML of Desalinated Water supplied by SDP from the Plant to all customers on the relevant day

This means that assuming a Carbon Pricing Scheme is operational, the fixed water service charge is equal to:

- the prices set by IPART (and included at Table 4 of IPART's determination) plus the fixed network charge determined by the AER quantity of energy forecast to be required when the plant is shutdown
- multiplied by the volume of desalinated water actually supplied to the customer and divided by the total quantity supplied to all customers.

The determination includes:

- parallel methodologies for the pass through of network cost to variable usage charges and the fixed service charge if the Carbon Pricing Scheme is not operational
- parallel methodologies for the pass through of network cost to the fixed and daily charges for each shutdown mode type.

8 Value of SDP's regulatory asset bases

One of our key steps in determining the allowances for a return on assets and depreciation was to establish the value of the regulatory asset bases (RABs) for the desalination plant and the pipeline. We established the opening value of the RABs and their values throughout the determination period by taking the following steps:

1. assessing SDP's past capital expenditure over the 2008 Sydney Water determination period to decide whether it was prudent and should therefore be incorporated into the opening value of the RABs
2. assessing SDP's forecast capital expenditure to determine whether it is efficient and should therefore be included when rolling forward the RABs
3. calculating the allowance for depreciation by deciding on an appropriate depreciation method and asset lives for SDP's existing and new assets
4. calculating the annual value for the RABs over the determination period, taking into account our decisions on efficient past and forecast capital expenditure and making adjustments for regulatory depreciation and inflation.

To determine depreciation, we set asset lives and applied the straight-line depreciation method.

The sections below discuss each of the above steps, and explain our decisions on key inputs used to calculate the regulatory asset base and regulatory depreciation.

8.1 Assessing SDP's past and forecast capital expenditure

16 IPART's decisions are that past capital expenditure shown in Table 8.1 and Table 8.2 was prudent and efficient and that the forecast capital expenditure shown in Table 8.3 is efficient.

Table 8.1 Decision on past efficient and prudent desalination plant capital expenditure ($million, $2011/12)

	2008/09	2009/10	2010/11	2011/12	Total
SDP actual	531.5	128.4	2.9	0.9	663.7
Halcrow recommended	531.5	128.4	2.9	0.9	663.7
IPART decision	531.5	128.4	2.9	0.9	663.7

Source: Halcrow, *Review of Operating and Capital Expenditure by Sydney Desalination Plant Pty Ltd*, p 68, Table 6.2.

Table 8.2 Decision on past efficient and prudent pipeline capital expenditure ($ million, $2011/12)

	2008/09	2009/10	2010/11	2011/12	Total
Sydney Water actual	371.4	154.3	2.7	16.6	545.1
Halcrow recommended	371.4	154.3	2.7	16.6	545.1
IPART decision	371.4	154.3	2.7	16.6	545.1

Source: Halcrow, *Review of Operating and Capital Expenditure by Sydney Desalination Plant Pty Ltd*, p 68, Table 6.2.

Table 8.3 Decision on level of efficient and prudent forecast desalination plant capital expenditure ($'000s, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17	Total
SDP forecast	1150.3	2684.8	0	1027	3453	8315.2
Halcrow recommended	451.3	1053.1	0	0	0	1504.4
IPART decision	451.3	1053.1	0	0	0	1504.4

Note: These are SDP's forecasts at the time that its submission was lodged. Since then SDP has provided further information, as discussed in 8.1.2.

Source: Halcrow, *Review of Operating and Capital Expenditure by Sydney Desalination Plant Pty Ltd*, p 80, Table 6.6.

8.1.1 Past capital expenditure, 2008/09 to 2011/12

SDP's submission on past capital expenditure

Table 8.4 compares SDP's and Sydney Water's desalinated water distribution pipeline actual capital expenditure over the 2008 Sydney Water determination period with the capital expenditure we allowed for in the 2008 Sydney Water determination. It shows that the combined actual expenditure level over the current determination was marginally more than was allowed for in the determination.

Table 8.4 SDP's actual desalination plant capital expenditure compared to the expenditure allowed for in the 2008 Sydney Water determination ($ million, $2011/12)

	2008/09	2009/10	2010/11	2011/12	Total
2008 determination	864.5	341.2	0	0	1205.7
SDP actual expenditure – desalination plant	531.5	128.4	2.9	0.9	663.7
Sydney Water actual expenditure – pipeline	371.4	154.3	2.7	16.6	545.1
Plant and pipeline actual expenditure	902.6	282.8	5.6	17.6	1208.8
Variation to 2008 determination	38.4	-58.4	5.6	17.6	3.2
Variation to 2008 determination (%)	4.41%	-17.12%	n/a	n/a	0.26%

Source: Halcrow, *Review of Operating and Capital Expenditure by Sydney Desalination Plant Pty Ltd*, p 68, Table 6.2.

SDP submitted that it delivered the following significant projects that were forecast at the 2008 Sydney Water price review over the determination period:

- desalination plant
- desalination distribution pipeline
- seawater intake system
- seawater outlet system
- drinking water pumping station.

Halcrow's review of the efficiency and prudency of SDP's past capital expenditure

In assessing the efficiency and prudency of SDP desalination plant capital expenditure over the 2008 Sydney Water determination period, Halcrow:

- reviewed differences between SDP's actual capital expenditure and the level of expenditure IPART allowed for in making the 2008 Sydney Water determination
- conducted detailed analysis of capital expenditure projects (including assessing SDP's performance against its output measures for the 2008 Sydney Water determination period)
- reviewed SDP's processes for the identification, selection and development of capital projects.

In assessing the efficiency and prudency of Sydney Water's desalinated water distribution pipeline capital expenditure over the 2008 Sydney Water determination period, Halcrow:

- reviewed differences between Sydney Water's desalinated water distribution pipeline actual capital expenditure and the level of expenditure IPART allowed for in making the 2008 Sydney Water determination
- conducted detailed analysis of capital expenditure projects (including assessing Sydney Water's distribution pipeline performance against its output measures for the 2008 Sydney Water determination period)
- reviewed Sydney Water's processes for the identification, selection and development of capital projects.

In summary, Halcrow found that SDP's and Sydney Water's desalinated water services and distribution pipeline actual expenditure over the 2008 Sydney Water determination period was $1,205.3 million.[67] This was $3.2 million greater than we allowed for in the 2008 Sydney Water determination.

Halcrow found that the procurement of the desalination plant and pipeline was undertaken in a generally prudent and efficient manner.

[67] Halcrow, *Review of Operating and Capital Expenditure by SDP*, p 67.

IPART's analysis of SDP's past capital expenditure

After considering SDP's submission and Halcrow's report, we have accepted Halcrow's finding on the prudency of SDP's and Sydney Water's desalinated water services and distribution pipeline capital expenditure over 2008/09 to 2011/12, for the purposes of calculating the opening value of the RABs and calculating SDP's prices for the determination.

8.1.2 Forecast capital expenditure, 2012/13 to 2016/17

SDP's submission on forecast capital expenditure

SDP's forecast capital expenditure for the 2012 determination period is shown in Table 8.5.

SDP submitted that its forecast capital expenditure is driven by:

- upgrading of the backup electricity supply which will be required when Ausgrid decommissions the network to which the backup supply is currently connected
- capitalised maintenance expense – SDP has assumed that all periodic maintenance incurred from early 2016 can be treated as capital expenditure.

Halcrow's review of the efficiency of SDP's forecast capital expenditure

To assess the efficiency of SDP's forecast capital expenditure, Halcrow:

- conducted detailed analysis of SDP's capital projects
- reviewed the drivers and nature of the projects making up the forward capital program
- considered potential efficiencies in the delivery of the forecast capital program.

As shown in Table 8.5 below, Halcrow found that some of SDP's proposed capital expenditure over 2012/13 to 2016/17 was not efficient as it overestimates the forecast cost of back-up energy investments and includes capitalisation of maintenance costs.

Table 8.5 Halcrow's findings on SDP's forecast capital expenditure that is efficient ($'000s, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17	Total
SDP's forecast expenditure	1150.3	2684.8	0	1027	3453	8315.2
Halcrow's findings on efficient expenditure	451.3	1053.1	0	0	0	1504.4

Note: These are SDP's forecasts at the time that its submission was lodged. Since then SDP has provided further information, as discussed below.

Source: Halcrow, *Review of Operating and Capital Expenditure by Sydney Desalination Plant Pty Ltd*, p 78, Table 6.6.

Halcrow notes that given Ausgrid's plan to decommission the 33kV/11kV Kurnell Zone Substation, it is necessary to upgrade the backup electricity supply. Halcrow notes that subsequent to SDP's submission to IPART, SDP undertook an options assessment relating to the backup electricity connection. While not presented in its submission, SDP has confirmed that it is proceeding with the option that provides an alternative standby supply at 11kV with the same capacity as the current standby feeders. The estimated cost is $1.5 million.

Halcrow considered that this option at $1.5 million to be the most efficient option.[68]

Halcrow reviewed the information presented in SDP's proposal to capitalise maintenance expense. Halcrow found:

> …the basis upon which SDP proposes to capitalise its future periodic maintenance expenditure is not apparent.[69]

Halcrow noted that while some of the maintenance expenditure will be associated with asset renewal, it does not consider capitalisation of the entire periodic maintenance costs is appropriate. Halcrow considers the proposed capitalisation of maintenance is not justified and recommends that it would be more appropriate to allocate it to operating expenditure.

IPART's analysis

We have accepted Halcrow's finding on the efficiency of SDP's capital expenditure over 2012/13 to 2016/17. Our decision is set out in Table 8.3.

8.2 Calculating the allowance for regulatory depreciation

To calculate the allowance for regulatory depreciation, we decided on a depreciation method and asset lives for SDP and Sydney Water's desalinated water distribution pipeline existing and new assets, then calculated depreciation accordingly.

8.2.1 Depreciation method

As for previous determinations, we chose to use the straight-line depreciation method. Under this method, the assets in the RABs are depreciated by an equal value in each year of their economic life, so that their real written-down value follows a straight line over time, from the initial value of the asset to zero at the end of the asset's life. We consider that this method is superior to alternatives in terms of simplicity, consistency and transparency.

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68 In email correspondence dated 6 October 2011, SDP confirmed that it is proceeding with the $1.5 million option. The email informed that the SDP Board had approved proceeding with that option and although the exact expenditure was not finalised, SDP did not expect it to be more than $1.5 million.

69 Halcrow, *Review of Operating and Capital Expenditure by SDP*, p 74.

8.2.2 Asset lives

For the 2008 determination, we used asset lives of 90 years for civil components, 15 years for mechanical components, 20 years for electrical components and 15 years for electronic components in calculating the allowance for desalination plant regulatory depreciation. For the 2012 determination, we considered SDP's proposal and sought Halcrow's advice before making our decision.

SDP's proposal

Table 8.6 below shows SDP's proposed economic lives for each asset category.

Table 8.6 SDP proposed asset lives

	Proposed economic lives
Original SDP assets	
Plant	30
Intake infrastructure	90
Outlet infrastructure	100
Pumping station	25
Pre-operations payment	20
Sydney Water related costs	44
Non-depreciating	n/a
Future SDP capital expenditure	
Civil	90
Electrical	20
Mechanical	15
Electronic	15
Non-depreciating	n/a
Distribution pipeline	
Civil	140
Electrical	30
Mechanical	40
Electronic	15
Non-depreciating	n/a

Source: SDP's submission to IPART's review of prices for SDP, p 27, Table 5.4.

Halcrow's advice

We asked Halcrow to review asset lives in SDP's RABs and forward capital program. Halcrow considered the asset lives proposed by SDP to be consistent with what is normally expected for engineering projects of its type. Halcrow noted that in some instances the economic design lives are significantly greater than the design lives set out in the design contract. Halcrow indicated that SDP's proposed asset lives are appropriate and recommended that they be adopted by IPART.

IPART's analysis

We accepted SDP's proposal to calculate depreciation using the asset lives they put forward, given Halcrow's advice that these lives were appropriate.

In line with this decision and the straight-line depreciation method, SDP's assets will be depreciated at a rate of approximately 2.2% per annum over the 2012 determination period. This means that, in general terms, we calculated the allowance for regulatory depreciation by multiplying the annual value of the RABs over the determination period by 2.2%. This resulted in the annual allowances shown in Table 8.7 below.

Table 8.7 SDP and distribution pipeline allowance for depreciation ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Desalination plant allowance for regulatory depreciation	37.1	37.1	37.1	37.1	37.1
Distribution pipeline allowance for regulatory depreciation	4.6	4.6	4.6	4.6	4.6
Plant & pipeline allowance for regulatory depreciation	41.6	41.7	41.7	41.7	41.7

Source: IPART analysis.

8.3 Calculating the annual value of the RABs over the determination period

To determine both the allowance for a return on assets and the allowance for regulatory depreciation, we calculated the values of SDP's RABs in each year of the determination period. Given that transfer of the pipeline ownership has not yet been affected, we set separate RABs for the desalination plant and for the distribution pipeline. We established the methodologies for calculating the values of the RABs at the start of the determination period (the opening values of the RABs), and for rolling forward the RABs to the end of the determination period. Then we applied these methodologies.

8.3.1 Methodologies for establishing opening value of the RAB and rolling forward the RAB

To establish the opening value for SDP's desalinated infrastructure services and for the desalinated water distribution pipeline RABs (ie, as at 1 July 2012), we:

- Rolled forward the 1 July 2008 RABs to 30 June 2012 by including the actual capital expenditure over this period that is found to be prudent (as discussed in section 8.1.1).
- Made other necessary adjustments, including:
  - deducting regulatory depreciation as allowed for in the 2008 Sydney Water determination.
- Indexed the annual closing RABs for actual/forecast inflation. In making this calculation, we assumed that half of the capital expenditure and disposals occurred at the beginning of the year (and therefore receive a full year of indexation), while the other half occurred at the end of the period (and therefore is not indexed).

To roll forward to the end of the upcoming determination period (ie, 30 June 2017), we:

- added the forecast expenditure found to be efficient (as discussed in section 8.1.2 above) to the closing value of the RABs for the previous year
- made other necessary adjustments to the value of the RABs for each year, including:
  - deducting regulatory depreciation
  - indexing for forecast inflation.

Both methodologies are the same as those we used in making the 2008 Sydney Water determination.

8.3.2 Applying these methodologies

To apply these methodologies, we rolled forward the opening value of the desalination plant in Sydney Water's RABs at the 2008 determination to reflect its findings on prudent actual capital expenditure over the 2008 Sydney Water determination period and efficient forecast capital expenditure for 2012/13 to 2016/17. As noted above, these expenditures are discussed in section 8.1.1.

The sections below discuss the other adjustments we made to the value of the RABs, including regulatory depreciation. SDP has not received and is not forecast to receive any capital contributions, nor has there been or is there forecast to be any asset disposals in the determination period. If there were, the RABs would be adjusted accordingly.

Adjustments for regulatory depreciation

The RABs are adjusted each year to account for regulatory depreciation. To determine the value of SDP's RABs at 1 July 2012, we deducted the allowance for regulatory depreciation we included in making the 2008 Sydney Water determination. To calculate future regulatory depreciation to be deducted from the RABs (to roll forward the RABs to the end of the 2012 determination period) we have used the straight line depreciation method. An allowance for depreciation is made within the revenue required for capital investment. The amounts deducted are shown in Tables 8.8 and 8.9 below.

Table 8.8 SDP and the distribution pipeline's regulatory depreciation deducted from the opening RABs ($million, $2011/12)

	2008/09	2009/10	2010/11	2011/12
Desalination plant regulatory depreciation	0	34.8	38	38.9
Distribution pipeline regulatory depreciation	2.5	4.3	5	5.1

Source: IPART analysis.

Table 8.9 SDP and distribution pipeline allowance for depreciation ($million, $2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Desalination plant allowance for regulatory depreciation	37.1	37.1	37.1	37.1	37.1
Distribution pipeline allowance for regulatory depreciation	4.6	4.6	4.6	4.6	4.6
Plant & pipeline allowance for regulatory depreciation	41.6	41.7	41.7	41.7	41.7

Source: IPART analysis.

8.3.3 Resulting annual value for the RAB

Table 8.10 shows our calculated annual values of the plant and pipeline's RABs over the 2012 determination period. These RABs incorporate the past and forecast capital expenditure discussed in sections 8.1.1 and 8.1.2, making the adjustments discussed in section 8.3.2, and indexing the closing RABs for forecast inflation.

Table 8.10 SDP and the distribution pipeline's RABs ($million, $2011/12)

	Opening RAB	2012/13	2013/14	2014/15	2015/16	2016/17
SDP RAB	1,340.4	1,302.5	1,265.2	1,226.8	1,188.5	1,150.2
Distribution pipeline RAB	659.8	655.1	650.4	645.7	641.1	636.2
Combined RAB	2,000.2	1,957.6	1,915.6	1,872.5	1,829.5	1,786.4

Source: IPART analysis.

The primary reasons for the differences between the RABs we calculated and SDP's RAB are the differences in allowed capital expenditure and differences in the application of CPI indexing.

9 Appropriate rate of return on SDP's assets

One of our most important steps in determining the allowance for a return on assets to be included in SDP's notional revenue requirements was deciding on the appropriate rate of return on its regulatory asset bases (discussed in Chapter 8). While there are several potential approaches for determining the rate of return, the terms of reference for this review stipulated that we use a weighted average cost of capital (WACC) that reflects the commercial risks faced by the owner of SDP in providing desalinated water to the Sydney potable water network.

The WACC for a regulated business is the expected cost of its various classes of capital (debt and equity) over the determination period, weighted to take into account the relative share of debt and equity in its total capital structure. To determine this cost for SDP, we used our usual approach for price setting purposes. This approach involves 2 steps:

1. Estimating the possible range for the WACC, by calculating values for each of the parameters that influence the cost of debt and the cost of equity in the regulated business.
2. Making a judgement on the appropriate point estimate for the regulated business' WACC within this range.

We then calculated the allowances for a return on assets by multiplying the regulatory asset bases by this point estimate.

We consider it important that our approach for determining the WACC is consistent and transparent, and engage in a program of systematic reviews to ensure this approach remains consistent with good practice and the best evidence available. Over recent years, we have published a series of papers on our approach for estimating key parameters including the risk free rate, debt margin and the inflation rate. Like other regulators, we use short term averages of market data to calculate these parameters. We seek to base our estimates of key sector-specific variable parameters – such as the equity beta, gearing and the benchmark credit rating – on the best available evidence. Our method of calculating the cost of equity is based on the domestic Capital Asset Pricing Model (CAPM).

The section below summarises our decisions on the WACC for SDP and the resulting allowance for a return on assets. The subsequent sections outline the key inputs we considered in making these decisions – including SDP's proposed WACC and submission comments and expert advice from the Strategic Finance Group and Professor Kevin Davis – and then discuss our analysis and decisions in detail.

9.1 Summary of our decision

We estimated a possible range for SDP's WACC of between 5.1% and 6.9% with a midpoint of 5.9%, and decided on an appropriate point estimate for the WACC of 6.7% (Table 9.1).

Table 9.1 IPART's decisions on the WACC parameters and range appropriate for SDP

WACC parameters	Final decision
Nominal risk free rate	3.9%
Inflation adjustment	2.6%
Market risk premium	5.5% to 6.5%
Debt margin	3.5%
Debt to total assets	60%
Dividend imputation factor (gamma)	0 to 0.5
Tax rate	30%
Equity beta	0.6 to 0.8
Cost of equity (nominal post-tax)	7.2% to 9.1%
Cost of debt (nominal pre-tax)	7.4%
WACC range (real pre-tax)	5.1% to 6.9%
WACC range (real pre-tax) midpoint estimate	5.9%
WACC (real pre-tax) point estimate	6.7%

Note: Midpoint is calculated from the midpoint of the parameters, not the midpoint of the WACC range.

We determined the values for the parameters of the WACC based on market conditions over the 20 days to 28 October 2011. The risk free rate and debt margin have been affected by market volatility and the prolonged weak market following the credit crisis of 2008. The change in these factors has potentially created a disparity between these parameters (for which we use short term average data) and the market risk premium (for which we use long term average data).

However, the effects of this disparity are mitigated by our decision to use a point estimate of 6.7%, which is 80 basis points higher than the midpoint of our estimated WACC range. In doing so, we had strong regard to the calculated WACC using longer term averages for market parameters.

As for previous determinations, we have used a real pre-tax WACC. However, we intend to use a real post-tax WACC for future SDP price determinations, in line with our recent decision on the treatment of tax in setting the WACC for price setting purposes. We were not able to apply this decision as we had not completed our consultation with stakeholders at the time when decisions regarding the WACC for SDP were made.

The allowances for a return on assets resulting from our decisions on the value of SDP's RABs (discussed in Chapter 8) and the WACC are shown in Table 9.2.

Table 9.2 Decision on an allowance for a return on assets ($ million, real 2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Return on desalination plant RAB	87.0	84.5	82.1	79.7	77.3
Return on pipeline RAB	42.8	42.5	42.2	41.9	41.6
Return on combined RAB	129.8	127.0	124.3	121.6	118.9
Rate of return (WACC)	6.7%	6.7%	6.7%	6.7%	6.7%

9.2 SDP's proposed WACC

In its initial submission, SDP proposed a real pre-tax WACC of 7.8%. It noted that its preferred approach for calculating the WACC parameters differed from IPART's approach in some areas. For example, in relation to our treatment of diversifiable risk, SDP commented that it:

> … cannot diversify its cost risks. IPART typically does not allow utilities to accommodate specific risks in operating costs. As such, all commercial risks for SDP need to be considered in setting the equity beta.[70]

In addition, SDP proposed changes to our approach for calculating the following parameters:

- term to maturity – it proposed using a 10-year term to maturity for the inflation rate, debt margin and risk free rate
- inflation rate – it proposed using a geometric average of the Reserve Bank of Australia's inflation forecasts and inflation band over the term to maturity
- debt margin – it proposed excluding bonds issued in the United States from the calculation of the debt margin
- dividend imputation credits – it proposed IPART adopt a range between 0 and 0.25 for gamma.

SDP's WACC proposal is shown in Table 9.3.

70 SDP's submission to IPART's review of prices for SDP.

Table 9.3 SDP's proposal for the rate of return and parameters to calculate the WACC

WACC parameters	SDP's proposal
Nominal risk free rate	5.2%
Real risk free rate	2.6%
Inflation adjustment	2.6%
Market risk premium	6.0%
Debt margin	3.42%
Debt to total assets	60%
Dividend imputation factor (gamma)	0.25
Tax rate	30%
Equity beta	0.9
Cost of equity (nominal post-tax)	10.6%
Cost of debt (nominal pre-tax)	8.62%
WACC (nominal pre-tax) point estimate	10.6%
WACC range (real pre-tax)	N/A
WACC (real pre-tax) point estimate	**7.8%**

Source: SDP's submission to IPART's review of prices for SDP, p 21, Table 4.1.

After considering the reports from our expert consultants on its WACC proposal (discussed in section 9.3 below), SDP sought advice on the appropriate cost of capital parameters from Value Adviser Associates (VAA).[71] It then provided a revised submission and comments on the WACC in line with VAA's advice.[72] SDP's revised submission is generally consistent with its original proposal on the WACC. In this submission, it notes that:

> SDP supports an adjustment of the market risk premium to recognise current market conditions rather than continuing to use the long term average assumption of 6 per cent.[73]

It also indicated that it would prefer an increase to the market risk premium, and argued that the current market volatility should be considered in regard to the averaging period used to calculate the debt margin and risk free rate. In particular, it stated that:

> A longer averaging period may be appropriate for determining these parameters, given the increase in market volatility being experienced at present. Averaging over a longer period would reduce the impact of this volatility.[74]

71 Value Adviser Associates, Commentary on Cost of Capital Parameters for Sydney Desalination Plant, August 2011.
72 Sydney Desalination Plant Pty Ltd submission to IPART Cost of Capital Parameters for SDP, August 2011.
73 Ibid, p 3.
74 Ibid, p 4.

SDP noted that the AER accepts averaging periods of between 10 and 40 business days.

SDP also provided additional information regarding its risk profile and the extent to which commercial risks could be covered by insurance, submitting that "SDP is essentially a much riskier investment than a normal water distribution network business".[75] It argued that this higher risk is due to 3 factors:

1. Higher regulatory risk as the only regulated private sector business in NSW potable water industry.[76] SDP argued that being a new entrant it has a higher exposure to regulatory risk and less experience with the regulatory environment. SDP also argued that its status as a new entrant means it is also exposed to start up risks.
2. Higher sovereign risk as changes in government policy could leave it exposed to substantial changes in its operating environment.
3. Higher asset risk as it is a single asset business with a single customer and many single points of failure. SDP argued that other water utilities have system redundancy to mitigate this risk.

SDP consider the most appropriate method of addressing these issues is with a higher beta value.

In supplementary information, SDP cited Ofwat's PR09 decision where an explicit allowance to account for market conditions during the credit crisis of 2008 was made in setting the equity beta. SDP considers it appropriate for IPART to include a similar allowance in this determination on account of the current sovereign debt crisis in Europe.

9.3 SFG and Professor Davis' advice on equity beta and leverage

We engaged Strategic Finance Group (SFG) to provide advice on estimating the 2 industry-specific WACC parameters – equity beta and leverage – for SDP. We also engaged Professor Kevin Davis to provide a peer review of SFG's advice. Both these reports are available on our website.[77,78]

SFG recommended parameters that would have a net effect of reducing the pre-tax WACC for SDP. SDP's recommendations rely on the concept of internal consistency which it summarised as:

> … the return required by equity holders must be at least equal to the return required by debt holders in the same firm.[79]

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75 Schott, K. (Sydney Desalination Plant), Letter to Jim Cox (IPART CEO), 20 October 2011, p 1.
76 If SDP is sold by Sydney Water
77 Strategic Finance Group, *Cost of capital parameters for Sydney Desalination Plant*, August 2011.
78 Davis, K., *Cost of capital parameters for Sydney Desalination Plant: by SFG Consulting: An initial review for IPART*, August 2011.
79 Strategic Finance Group, *Cost of capital parameters for Sydney Desalination Plant*, August 2011, p 1.

SFG put forward 2 views of internal consistency: its preferred view and a less strict view. It made separate recommendations for the equity beta under each of these views:

> … an equity beta if 0.80 is appropriate if IPART were to agree with our view of internal consistency in WACC parameters, and 0.70 otherwise.[80]

SFG reviewed the specific risk characteristics of SDP. Its analysis indicated that SDP could maintain an investment grade credit rating with a 70% debt to total assets ratio. SFG also proposed another option:

> An alternative to the 70% leverage/BBB debt assumption is to hold leverage at 60% but adopt a higher credit rating due to SDP's relatively lower risk [to other water utilities]. In this event we would recommend an A- credit rating…[81]

Professor Davis reviewed the key points of the SFG's (then draft) report. In relation to the equity beta, Professor Davis indicated that a comparison between utilities under different regulatory regimes may not be appropriate. He also questioned the appropriateness of the bias correction SFG implemented in its report:

> While the bias-correction adjustment used by SFG does not markedly affect the estimated betas, the rationale for such an adjustment, particularly using a long data sample of specifically chosen water utility stocks is not strong.[82]

Professor Davis indicated that he considers SFG's preferred view of internal consistency to be unnecessarily strict. These 2 factors suggest Professor Davis supports a beta lower than that proposed by SFG.

In relation to the treatment on non-systematic risks and the existence systematic risk with certain cash flows, Professor Davis supported SFG's views.

9.4 Calculation of the range and midpoint estimate

IPART's approach to calculating the WACC resulted in a range of which the midpoint was 5.9%.[83] The parameters used to calculate the WACC range for the decision were based on market conditions over the 20 days to 28 October 2011 (where relevant). These parameters, particularly the risk free rate and debt margin, have been affected by the market volatility and prolonged weak market following the credit crisis of 2008. The change in these factors has potentially created a disconnect between the risk free rate and the debt margin for which we use short term averages, and the market risk premium, for which we use a long term average.

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80 Ibid, p 3.

81 Ibid, p 3.

82 Davis, K., *Cost of capital parameters for Sydney Desalination Plant: by SFG Consulting: An initial review for IPART*, August 2011, p 2.

83 The midpoint is calculated on the basis of the midpoint of the range for each parameter. Because the formula is non-linear, the calculated midpoint is not necessarily the midpoint of the range of the WACC.

These effects have been mitigated by IPART's decision to deviate 80 basis points from the midpoint, to 6.7%.

9.4.1 Nominal risk free rate and inflation

17 IPART's decision is to use:

- a nominal risk free rate of 3.9%, based the 20-day average of the yield on nominal 5-year Commonwealth Government bonds
- an inflation adjustment of 2.6%, based on swap market data sampled over 20 days.

The risk free rate is used as a point of reference in determining both the return on equity and the cost of debt within the WACC. In both the CAPM and the cost of debt calculation, the risk free rate is the base to which a premium or margin is added to reflect the riskiness of the specific business for which the rate of return is being derived.

IPART's current approach for estimating the risk free rate is to use the 20-day average of the yield on nominal Commonwealth Government bonds with a 5-year term to maturity. SDP's proposed that we change this term to maturity to 10 years. This proposal was supported by SDP's consultant, VAA.

In establishing our current approach for determining the WACC, we gave much consideration to the term to maturity for the risk free rate. We have also consulted with stakeholders on this matter. While our decision to move to a 5-year maturity is fairly recent, we note that other jurisdictions have made similar changes, for example the Commerce Commission of New Zealand.

In deciding to maintain this term to maturity for this review, we considered the information provided by SDP and other stakeholders. We acknowledge the points made by TCorp in the material it submitted.[84] However, we decided that it was preferable to maintain regulatory consistency with our decision in April 2011 to use a 5-year term to maturity.[85] This ensures that the regulatory environment created by our WACC decisions is as predictable and transparent as possible.

We recognise stakeholders' concerns that the current difference between the 5-year and 10-year bond yields is much larger than the historical average. We also recognise that the risk free rate derived from the 5-year yields is historically low. Indeed, this was one of the main reasons we decided to set the point estimate for SDP's WACC towards the top of the possible range we estimated. We are satisfied that this decision adequately addresses stakeholders' concerns (see section 9.5 for more detail).

84 Mr Stephen Knight, TCorp, Response to Sydney Water's inquiry, letter to Sydney Water, 8 August 2011.

85 IPART, *Developing the approach to estimating the debt margin - Final Decision*, April 2011, pp 14-28.

9.4.2 Debt margin

18 IPART's decision is to adopt a debt margin of 3.5%, based on the average debt margin of BBB+ rated securities over a 20-day sampling period plus 20 basis points for debt raising costs.

The debt margin represents the cost of debt that a company has to pay above the nominal risk free rate. The debt margin is related to current market interest rates on corporate bonds, the maturity of debt, the assumed capital structure and the credit rating. Our current approach is to calculate a debt margin that represents the margin over the risk free rate for BBB/BBB+ rated debt, without specifying the source of this rating. We determined the average debt margin from our sample of BBB/BBB+ rated corporate bonds and added 20 basis points for debt raising costs.

For this review, we considered the comments and proposals we received in relation to the debt margin. In particular:

- SDP proposed that we change this approach for this review, by changing the term to maturity to 10 years and excluding US issued bonds from the bond sample. It proposed replacing the US issued bonds with the Bloomberg 7-year fair value yield curve extrapolated to 10 years. SDP's proposal on the term to maturity was supported by VAA.
- SFG suggested that if benchmark gearing was held at 60%, SDP would be able to achieve an A- credit rating. This would decrease the debt margin significantly.

In relation to SDP and VAA's proposal to increase the term to maturity, we decided to maintain consistency with our past determinations on WACC parameters. We note that the Commerce Commission of New Zealand recently adopted a 5-year maturity after an extensive review. Other regulators in Australia, such as the Queensland Competition Authority have also recently adopted a shorter term to maturity. We consider that this will help ensure that the regulatory environment created by our WACC decisions is as predictable and transparent as possible.

In relation to SDP's proposal to replace US issued bonds with the Bloomberg 7-year fair value curve, we decided to set the debt margin with reference to our current universe of BBB+ rated securities. We note that the owner of SDP will not be restricted to Australian bonds for financing the project. Therefore, we consider that our current bond sample is preferable.

In relation to SFG's comments regarding the credit rating, we decided to use our standard water utility assumption of a BBB rating. We note that SDP's actual debt level, unlike other water utilities we regulate, is currently well above the 60% gearing assumption, and therefore it may not be able to borrow at an A- bond level in the determination period.

Table 9.4 details the composition of the bond sample we used to set the debt margin over the 20-day sampling period. In setting the margin, we determined the average debt from this sample and added 20 basis points for debt raising costs. This resulted in a debt margin of 3.5%.

Table 9.4 Current universe of securities

Security	Average debt margin over the sampling period (basis point)
Bloomberg 5 year BBB fair value curve	342
Australian bond issued in the Australian bond markets	
Leaseplan Australia	335
Mirvac	284
Sydney Airport	274
Santos	233
GAIF	454
Mirvac	405
New Terminal	341
Dexus	305
Sydney Airport F	328
Brisbane Airport	272
APT Pipelines	338
Australian bond issued in the American bond markets[a]	
FBG Finance Ltd	280
PTTEP Aust Intl	397
FBG Finance Ltd	304
FBG Finance Ltd	356

[a] Cost of Australian bonds issued in US includes cost of swapping back to Australian dollars.

Note: excludes debt raising costs.

Source: Bloomberg 28 October 2011.

9.4.3 Equity beta

19 IPART's decision is to adopt an equity beta of 0.7, based on our view of SDP's systematic risk profile.

The equity beta value is a business specific parameter that measures the extent to which the return of a particular security varies in line with the overall return of the market. It represents the systematic or market-wide risk of a security that cannot be avoided by holding it as part of a diversified portfolio. It is important to note that the equity beta does not take into account business-specific or diversifiable risks.

In estimating the equity beta for this review, we considered the views expressed by SDG and its consultant VAA, and by our consultants, SFG and Professor Davis. These views broadly related to:

- SDP's risk profile and whether its diversifiable risks should be incorporated in the beta
- the need to incorporate an allowance into the beta to account for market volatility
- the preferred methodology for estimating beta, including the concept of internal consistency.

The sections below summarise these views and our considerations of them.

SDP's risk profile and whether its diversifiable risks should be incorporated in the beta

SDP proposed an equity beta of 0.9, based on its view that since IPART "typically does not allow utilities to accommodate specific risks in operating costs…all commercial risks for SDP should be considered in setting the equity beta",[86] including diversifiable risks. VAA supported this view to an extent, noting that "it is important to capture these risks/costs in the price setting process".[87] It also put the view that there was a danger in the approach SFG recommended – creating a working capital allowance to account for diversifiable risks – as this would mean that:

> … the costs are ignored because of the difficulty in estimating the actuarially fair cost. In such circumstance we would prefer to see an adjustment to the discount rate [through the beta], albeit arbitrary, than to ignore costs.[88]

To support its proposal for a higher equity beta, SDP argued that it has a higher risk profile that other regulated water businesses (see section 9.2 above).

Having considered SDP's arguments, we do not accept that it has higher risks. In particular:

- We do not accept that SDP has a higher regulatory risk as the only privately owned potable water company in NSW and a new entrant. We consider its ownership structure to be irrelevant to the regulatory environment. We do not differentiate between private companies and state owned corporations in our reviews. We consider SDP's regulatory environment to be transparent and accommodating. As such, new entrants should not be exposed to higher regulatory risks. It is generally consistent with the regulatory frameworks applied to other infrastructure assets in Australia.

86 SDP's submission to IPART's review of prices for SDP, p 21.
87 Value Adviser Associates, *Commentary on Cost of Capital Parameters for Sydney Desalination Plant*, August 2011, p 9.
88 Ibid, p 9.

- We consider that sovereign risk for utility businesses is small in Australia. In regard to SDP's business-specific sovereign risk regarding policy change, we consider that incorporation of these risks into the water supply contracts with Sydney Water provides a better and more effective means of protecting the investors in SDP.
- We consider it inappropriate to take account of single asset risk in the estimation of beta. We note that SDP does have several "single points of failure". We have allowed SDP additional insurance to cover a plant failure. The insurance covers both the replacement costs and business interruption expenses.

Moreover, we consider that SDP's claimed higher risks are diversifiable risks, not systematic risks, and therefore should not be incorporated into the equity beta. We note that both SFG and Professor Davis recommended that we not consider diversifiable risks in the equity beta. They both preferred the creation of a working capital allowance for SDP to manage these risks. We also note that incorporating non-systematic risks in the WACC is inconsistent with CAPM, and that the owner of SDP is not restricted from investing in other businesses to diversify its portfolio. In addition, as section 6.1 discussed, in determining SDP's efficient operating expenditure we included the efficient level additional insurance to cover an efficient level of its commercial risk.

Overall, taking into account the features of SDP and how they affect its exposure to systematic risk, we consider that SDP will have lower systematic risk than other water utilities over the determination period. This is due to our decision to set separate prices for each mode of operation and each of the likely scenarios it faces in relation to a carbon pricing scheme and the transfer of its distribution pipeline (discussed in Chapters 4 and 10). It is also due to its agreement with Sydney Water, which compels Sydney Water to buy the desalinated water it produces while available dam storages are below 70% and until such time as it rises again above 80%. As a result of these measures we expect that SDP's revenues will be removed from economic conditions.

Need to incorporate an allowance into the beta to account for market volatility

SDP also proposed that we include a specific allowance in the beta to account for market volatility. To support this proposal, it pointed out that Ofwat had included such an allowance in setting equity betas during the credit crisis of 2008. However, we note that the 2008 crisis was one of corporate and private debt, and firms faced significant difficulty in raising debt at this time. Ofwat took account of this difficulty in making its decision. We consider that the current market volatility is more related to sovereign debt than corporate debt, and we have observed little change in firms' ability to raise debt. Therefore we consider it inappropriate to include a specific volatility allowance in the equity beta. Nevertheless, we have taken account of the current market volatility in determining the appropriate point estimate for the WACC for SDP. This is discussed in section 9.5.

Preferred methodology for estimating beta and the concept of internal consistency

In forming its advice on the equity beta, SFG analysed empirical evidence from water companies, predominantly operating in the United Kingdom and the United States. It used its preferred methodology, which considered the beta only during periods where the risk free rate outperformed the market, to estimate 2 possible betas. The first (0.8) reflected its concept of internal consistency (discussed in section 9.3, while the second (0.7) reflected a less strict view of this consistency. SFG recommended that we adopt a 0.8 beta if we accepted its concept of internal consistency with a gamma of 0.4 and a BBB rating, and a 0.7 beta if we did not.

As section 9.4.5 will discuss, we decided that the appropriate gamma for SDP is 0.25, not 0.4 as SFG assumes in their report. With this gamma, the minimum beta in line with SFG's concept of internal consistency is less than 0.7. This suggests that a beta of 0.7 is consistent with SFG's recommendations. A beta of 0.7 represents a significant premium on SFG's regression estimates of 0.52 and 0.55.[89] SFG's regression estimates in periods of below normal market returns, or "down-market beta", resulted in means of 0.61 and 0.69.

In his review of SFG's advice, Professor Davis put the view that for a 5-year determination period, it was more appropriate to use a methodology that considered the beta over all periods – including those where the market outperformed the risk free rate as well as those when the risk free rate outperformed the market. Professor Davis noted that investors would be unlikely to use a "down-market beta" as it is not representative of expected returns. Professor Davis also put the view that SFG's concept of internal consistency was too strict.[90] He noted that in SFG's draft report, internal consistency required the expected yield of equity to be greater than the face yield of debt. He suggested that it would be more appropriate to require the expected yield of equity to be greater than the expected yield of debt.[91]

In its response to SFG's and Professor Davis's recommendations, VAA also put the view that SFG's concept of internal consistency was not strict enough. VAA suggested that the cost of debt would need to be strictly greater than the cost of equity for foreign investors. VAA suggested that adjusting the beta is an inappropriate method of achieving internal consistency, and that adjusting the market risk premium is a better approach. (This matter is discussed in section 9.4.4 below.)

89 Strategic Finance Group, *Cost of capital parameters for Sydney Desalination Plant*, August 2011, p 5.

90 Professor Davis's comments were based on a draft version of the SFG report. In the final report SFG revised its position on internal consistency to be roughly in line with Professor Davis, though noting that expected yields to debt are difficult to accurately calculate.

91 Davis, K., *Cost of capital parameters for Sydney Desalination Plant: by SFG Consulting: An initial review for IPART*, August 2011, pp 4-5.

9.4.4 Market risk premium

20 IPART's decision is to adopt a market risk premium range of 5.5% to 6.5% based on historical evidence.

The market risk premium (MRP) is the expected return over the risk free rate that investors would require for investing in a well-diversified portfolio of risky assets. Our current approach is to estimate the MRP based on the long term historical arithmetic average market returns over the risk free rate. For this and other recent determinations, this approach results in an MRP of 6.0%.

In making our decision on the MRP, we considered SDP's original submission, which proposed a MRP of 6.5%, as well as its revised submission which proposed a MRP of at least 8.0%, in line with VAA's suggestion. As noted above, VAA considered it more appropriate to adjust the market risk premium than the equity beta, in response to the historically high debt margins for BBB rated debt. VAA argued that it is inconsistent to use a spot priced debt margin and a historical MRP, noting that:

> … the spread for risk in debt markets has increased [since the credit crisis of 2008] so we would also expect the spread of equity over the government debt securities to increase. At the very least it could conceptually remain constant but it certainly would not decrease.[92]

Given this, VAA suggested that the market risk premium[93] should be at least 8.3% for the next 7 years.

We considered VAA's and SDP's proposals carefully. We decided to use the 6.0% MRP that we have used for our past determinations, to maintain a consistent regulatory environment. We consider that the credit crisis of 2008 and the sovereign debt crisis currently unfolding in Europe are different to many previous recessions. We note that in North America and Europe, where the recession has been concentrated, the crises have been primarily debt related, with high mortgage foreclosure rates in the US and fears of sovereign default in Europe. While we acknowledge that there are likely flow on effects to the wider market risk premium, VAA's claim that the equity risk premium over debt margin spread would not decrease may not hold in this particular case.

As noted in section 9.4.1, we recognise stakeholders' concerns about the inconsistency in using short term data in estimating some parameters and long term data in estimating others. We also recognise there is considerable uncertainty over the market risk premium, due to recent market instability. These factors influenced our decision to set SDP's WACC towards the top of the possible range, and we are satisfied that this decision adequately addresses stakeholders' concerns (see section 9.5 for more detail).

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92 Value Adviser Associates, *Commentary on Cost of Capital Parameters for Sydney Desalination Plant*, August 2011, pp 3-4.

93 An equity risk premium is a similar concept to a market risk premium. It is the expected return over the risk free rate that investors would require for investing in a diversified equity only portfolio. It will not including investment in debt, currency, some derivative, commodity and other non-equity securities.

9.4.5 Gearing ratio, tax rate and dividend imputation factor (gamma)

21 IPART's decisions are to adopt:

- a gearing ratio of 60%, based on a benchmark capital structure with credit rating of BBB+, in line with SDP's proposal
- a tax rate of 30%, in line with the statutory tax rate
- a midpoint gamma of 0.25 based on new evidence that the value of gamma is lower than previously estimated.

The gearing ratio is the ratio of debt to total assets in the business' capital structure. In determining this ratio, our current practice is to adopt a benchmark capital structure (rather than the actual financial structure of the regulated entity) to ensure that customers will not bear the cost associated with an inefficient financial structure.

Gamma is the dividend imputation factor. Under the Australian dividend imputation system, investors receive a tax credit (franking credit) for the company tax paid before the dividend. This recognises the fact that companies already paid tax on profits from which the dividends are paid. Since July 2000, imputation credits in excess of personal tax liabilities have been available as a cash rebate. International investors cannot utilise imputation credits.

The value of the imputation tax credits is represented in the CAPM by 'gamma' (γ). The rationale for including the value of gamma in the CAPM is that if investors are receiving a tax credit from their investment, they would accept an investment with a lower return than if there were no tax credits attached to this investment. The gamma is an important input in the CAPM, as a high value (at or approaching one) would reduce the cost of capital considerably.

In making our decision on the gearing ratio for this review, we considered the submission comments and advice we received on the appropriate benchmark capital structure for SDP. SFG's financial analysis of SDP suggested that it could maintain a BBB credit rating, with leverage increased to 70%. In response, VAA and SDP's revised submission considered that a gearing of 60% was a more appropriate benchmark capital structure. VAA stated that it is:

> … not convinced that a case has been [made] for changing the gearing of an efficient business to 70%.[94]

In light of market uncertainty, we decided to adopt the more cautious proposal from SDP of 60% gearing and a BBB+ credit rating.

94 Value Adviser Associates, *Commentary on Cost of Capital Parameters for Sydney Desalination Plant*, August 2011, p 9.

In making our decision on gamma, we considered SDP's initial proposal that we adopt a gamma value of between 0 and 0.25. SDP cited the Australian Competition Tribunal's determination that gamma should have a value of 0.25. It also cited the AER's final decision on WACC parameters, which did not dispute that standard market practice is to exclude the value of imputation credits from the WACC. In addition, we noted SFG's comment that in its analysis internal consistency would be more easily obtained with a lower gamma value.

We concluded that evidence regarding the gamma was sufficient to move our gamma range from 0.3-0.5 to 0-0.5 with a midpoint of 0.25. The impact of this reduction in gamma is to increase the cost of equity relative to the cost of debt. This further alleviates SFG's concerns about the internal consistency of the WACC estimate using our previous assumption on gamma.

We also considered SDP's additional comments on its risk profile, which included the suggestion that we should adopt a gamma of 0, because SDP is in a start-up phase. We agree that companies often make tax losses in the early years of operation. However, we do not consider SDP a typical start-up business. We note that the prices we set ensure that it will receive adequate revenues and return on capital in the early years. We also note that while the level of gearing in SDP may mean few franking credits are generated by SDP, we do not consider SDP's actual gearing levels in our calculation of WACC, but that of an efficient benchmark business.

9.5 IPART's analysis and decision on the appropriate point estimate of the WACC

22 IPART's decision is to use a real pre-tax WACC of 6.7% in calculating SDP's return on assets.

In reaching our decision on the appropriate point estimate of the WACC, we considered our estimated range for the WACC of 5.1% to 6.9%, and its midpoint estimate of 5.9%. By first estimating a range of values, our approach for determining the WACC recognises the uncertainty involved in this, particularly related to the market risk premium, debt margin, equity beta and the dividend imputation factor (gamma). By then selecting the appropriate point estimate within this range, our approach allows us to consider the degree of uncertainty for each particular review, and make a judgement on the WACC that best balances the risks for the business, customers and other stakeholders and meets our terms of reference.

For this review, we consider that the value of the risk free rate is currently well below long term averages and that there is a high level of market uncertainty. We consider the risks in setting a 5-year determination in the current conditions are more significant than under normal market conditions.

We acknowledge the argument that there may be greater stability in the sum of the market risk premium and the risk free rate (ie, the expected market return) than in the individual components. In the current market circumstances, there is some evidence, as SDP noted, to support the view that expectations for the market risk premium have risen as bond yields have fallen. However, it is difficult to measure these short term variations in expectations for market risk premiums. SDP's advisors have developed an approach for addressing this which is interesting, but we consider it requires further testing and observation over time.[95] An alternative approach is to look at the long term averages as a reference point for the sum of the market risk premium and risk free rate.

Therefore, to guide our decision-making on the point estimate for the WACC, we estimated the long term averages of the risk free rate, inflation rate and the market risk premium. We found that using these long term averages, the WACC range would be 5.9% to 7.8% with a midpoint of 6.7% (Table 9.5). This midpoint is 80 basis points higher than the midpoint of the range we determined for the WACC using short term averages for these parameters, but still within this range.

In light of this, we consider it appropriate to use a WACC of 6.7% in setting prices for SDP for the next 5 years. We consider that this WACC addresses the higher level of market uncertainty at this time, and SDP's concerns in relation to the risk free rate, beta equity and market risk premium. We note this WACC is lower than SDP proposed SDP, even though it reflects the long term averages of these parameters. This is because SDP also proposed a higher equity beta and a different definition of the risk free rate than we used.

95 Value Adviser Associates, *Dealing with risk in the regulatory building block approach: A report for Sydney Water*, August 2011, pp 17-24.

Table 9.5 SDP's proposed WACC compared to and IPART's estimate of the WACC using long term averages of parameters

WACC parameters	SDP's proposal	IPART parameters under long term average parameters
Nominal risk free rate	5.2%	5.4%
Inflation adjustment	2.6%	2.5%
Market risk premium	6.0%	5.5% to 6.5%
Debt margin	3.42%	2.0%
Debt to total assets	60%	60%
Dividend imputation factor (gamma)	0.25	0 – 0.5
Tax rate	30%	30%
Equity beta	0.9	0.6 – 0.8
Cost of equity (nominal post-tax)	10.6%	8.7% to 10.6%
Cost of debt (nominal pre-tax)	8.62%	7.4%
WACC (nominal pre-tax) point estimate	10.6%	9.2%
WACC range (real pre-tax)	N/A	5.9% to 7.8%
WACC (real pre-tax) midpoint estimate	**7.8%**	**6.7%**

Source: SDP's submission to IPART's review of prices for SDP, p 21, Table 4.1, and Bloomberg data.

The assumptions and parameters we used in estimating the WACC are consistent with those used in commercial corporate valuation. In addition, the key parameters – the risk free rate, equity beta, market risk premium and debt margin – are within the range that investment practitioners use. We note that research has shown that most Australian investment practitioners have continued to use a market risk premium of 6% since the credit crisis of 2008.[96]

We consider that our point estimate for the WACC of 6.7% reflects the commercial risks that SDP's asset owner faces in providing its regulated services, as required in our terms of reference.

We note that our decision on the WACC implies a nominal post-tax cost of equity of between 8.8% and 9.1% with a nominal pre-tax cost of debt of 7.4%. Under SFG's strict international cost of equity, the post-tax cost of equity is 8.8%. It is clear that the cost of equity is greater than the cost of debt, and our estimate is internally consistent.

96 Value Associate Advisers, *IERs – a conservative and consistent approach to WACC estimation by valuers*, August 2009, pp 9-11.

9.6 Treatment of tax in this and future determinations

For this determination, we have incorporated an allowance for tax through a pre-tax real WACC. However, we have decided to move to incorporate tax through a building block component and estimate a post-tax real WACC in future decisions.[97]

This section explains the tax allowance under our current approach and how this would change under our draft decision to move to incorporate a tax liability as a building block.

9.6.1 Tax allowance in pre-tax real WACC

We currently estimate a nominal post-tax WACC and convert this into a real pre-tax WACC using what is known as the market transformation. The implied tax from this approach is the difference between the real pre-tax WACC and the real (vanilla) post-tax WACC.

Box 9.1 Difference in pre-tax and post-tax WACC formulas

The real pre-tax WACC is calculated as: $r^{pre} = \frac{\left(1+\left\{\frac{R_e}{\left[1-t.(1-\gamma)\right]}.(\frac{E}{D+E})+R_d.(\frac{D}{D+E})\right\}\right)}{(1+\Pi)}-1$

The real (vanilla) post-tax WACC is calculated as: $r^{post} = \frac{\left(1+\left\{R_e.(\frac{E}{D+E})+R_d.(\frac{D}{D+E})\right\}\right)}{(1+\Pi)}-1$

Where R_d is the nominal return on debt, R_e is the nominal return on equity, D is debt, E is equity, γ is gamma (the value of imputation credits), t is the statutory tax rate and Π is inflation.

Our final decision for SDP is a real pre-tax WACC of 6.7%, which is the upper end of the range. Using the parameters from the upper end of the range that generate this figure, the post-tax (vanilla) real WACC is 5.6%. The implied allowance for tax is hence an additional 1.1% on the post-tax rate of return (Table 9.6).

Table 9.6 Tax gap implied in pre-tax real WACC

Item	%
Pre-tax real WACC	6.7%
Post-tax real WACC	5.6%
Tax gap	1.1%

Note: WACC are calculated as in Box 9.1

97 IPART, *The incorporation of company tax in pricing determinations - Final Report*, December 2011.

This tax gap can be applied to the forecast capital base for SDP (and making slight allowances for timing as made in our financial models) to give an amount of implied tax.

9.6.2 Tax allowance from a building block approach

Under a building block approach, tax would be calculated using a formula that scales up post-tax profit to a pre-tax profit based on the way tax is calculated by the Australia Taxation Office, and makes an adjustment for the value of franking credits as is done in a pre-tax approach. This can be expressed through the following formula.[98]

$$T = \frac{1}{(1+\Pi_c)}\left[S.(1+\Pi_c) - OP.(1+\Pi_c) - TD - R_D.D.(1+\Pi_c)\right]\left[\frac{t.(1-\gamma)}{1-t.(1-\gamma)}\right]$$

Where T is the real tax liability, $(1+\Pi_c)$ is the cumulative inflation adjustment, the term in brackets is post-tax profit in an accounting sense (ie, post-tax revenues allowed by the regulator (S)[99] less tax deductible expenses — operating costs (OP), nominal tax depreciation (TD) and interest payments (R_d.D)), t is the corporate tax rate and γ is the value of imputation credits. The debt value would be the same as that used for the pre-tax real approach.

Tax has to be calculated off a nominal profit and then deflated into real terms for use in a real revenue model.

All information required for the building block approach is part of the current regulatory determination except for tax depreciation. Tax depreciation will reflect an initial tax asset base, tax asset lives and choice of depreciation method(s) for assets for tax purposes. Over time tax depreciation will be lower than regulatory depreciation as regulatory depreciation is based off an inflation indexed asset base while tax depreciation is not. They may also differ if there are different allowable tax lives to regulatory lives and whether straight line or accelerated depreciation is implemented.

For the purposes of showing the difference between a building block and pre-tax WACC approach, we take nominal tax depreciation as being equal to real regulatory depreciation, ie, taking out the inflation from depreciation, but make no other adjustments to regulatory depreciation.

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98 This formula is used by the Essential Services Commission of Victoria (ESC 2009, *Metropolitan Water Review, Draft Decision*, pp 85 and 86) in its real form and the Australian Energy Regulator (see for example AER 2010, *Final decision – amendments to post-tax revenue model,* Appendix A) in a nominal form.

99 Revenue could also include in-kind and cash capital contributions, which are not expected for SDP.

9.6.3 Implied tax amounts

Applying the 2 approaches above, the pre-tax real WACC approach allows for tax of $102.1 million from 2012/13 to 2016/17 (Table 9.7). The post-tax building block method would allow for a lower amount of tax of around $57 million over this period under the assumptions that we have made for tax depreciation.

Table 9.7 Tax implied in pre-tax real WACC and building block approach

Item	Pre-tax real WACC ($m, real 2012)	Building block ($m, real 2012)
2012/13	21.3	10.5
2013/14	20.9	10.9
2014/15	20.4	11.4
2015/16	20.0	11.8
2016/17	19.5	12.2
Total	**102.1**	**56.7**

A building block approach for the tax liability will be used for our next review of SDP. It is likely that the allowed tax would then be lower than under a pre-tax WACC approach, at least in the medium term.

In the longer term this may not be the case as the tax asset base will become smaller relative to the regulatory asset base over time. Hence tax depreciation will at some point be lower than regulatory depreciation and a lower amount of tax deductions will be implied from this in the building block approach.

10 Pricing

Having determined the amount of notional revenue needed to enable SDP to conduct its business in an efficient manner, we must then translate that requirement into cost reflective prices.

Our first consideration for the structure and level of prices for SDP was the Terms of Reference for this review. The Terms of Reference state that the prices we determine are to reflect the following water supply services provided by SDP:

a) the supply of non-rainfall dependant drinking water to purchasers, and

b) the making available of the desalination plant to supply non-rainfall dependant drinking water.

The Terms of Reference require us to consider pricing principles which deliver separate prices for the 2 different water supply services described above. That is, the prices for water supply services for a) should reflect all efficient costs that vary with output, and the prices for water supply services for b) should be a periodic payment that reflects fixed costs.

We have extended these principles to determine prices when the plant is in full operation mode (termed production mode in SDP's submission), and for the various shutdown modes (termed no production modes in SDP's submission). This results in a daily fixed water service charge and a water usage charge when the plant is operating, and a daily fixed Shutdown or Restart Charge for each category of shutdown mode. Because of the nature of the plant's operating processes, we have also determined a one-off charge (ie, Transition to Shutdown charge) when the plant is transitioning from full operation mode to a shutdown mode and a one-off charge (ie, Transition to Restart charge) when the plant is transitioning from a shutdown mode (which will lead to an full operation mode once the plant is fully operational). In adopting this approach we took account of the views of stakeholders that prices should be consistent with the plant's operating regime arising from the Metropolitan Water Plan and SDP's WICA licence.

The Terms of Reference also state that the structure of prices should encourage SDP to be financially indifferent as to whether or not it supplies water. Consistent with the principle we have included the return on and of capital components of the building block methodology in the fixed components of our determined charges. This is the largest element of SDP's notional revenue requirements.

Our second consideration was to analyse SDP's and alternative proposals for prices and for methodologies to take account of some of the difficulty of predicting which period and future customers of the plant's operations that may impact on SDP's recovery of costs, our prices don't have that uncertainty. We have determined methodologies and charges to take account of some of this uncertainty including a methodology that shares SDP's costs between its customers relative to the amount of desalinated water that they receive.

Our pricing decisions will not result in increases in the prices paid by Sydney Water's customers. This is because the amount that Sydney Water is expected to pay SDP over the upcoming determination is smaller than the amount for these services included in the calculation of current Sydney Water prices.

We consider that the prices we have determined represent a good balance of the various requirements for this review.

The rest of this chapter explains:

- our pricing decisions compared to SDP's proposals
- our decisions regarding pricing methodologies with reference to SDP's proposals.

10.1 Prices

When the plant is in full operation mode, our determined fixed water services charge is lower than the fixed availability charges proposed by SDP and our determined water usage charge is higher than the variable prices proposed by SDP. When the plant is in a shutdown or restart mode, our fixed daily prices are lower than the fixed shutdown charge proposed by SDP. These differences reflect several key decisions that we have made for this review:

- We adopted operating expenditure and capital expenditure adjustments recommended by our consultants Halcrow, which result in lower levels of expenditure than proposed by SDP.
- We adopted an allocation of costs that places more costs in the variable component compared to the fixed component than was originally suggested by SDP. The adjusted cost split was recommended to us by SDP and Halcrow.
- We adopted benchmark estimates of market energy costs, rather than base our calculations on the contracts that exist between SDP and Infigen. We have also allowed an automatic pass through of energy network charges, which are determined through independent review by the AER.
- We adopted a real pre-tax WACC of 6.7% compared to SDP's proposal for a WACC of 7.8%.

- We have determined individual prices for the one-off costs of shutting down the plant and restarting the plant when moving from full operation mode to a shutdown mode and from a shutdown mode to a restart mode. This is different to the approach proposed by SDP.

While our pricing decisions are based on the recovery of efficient costs, we also took into account some general uncertainties in the current environment that we consider could affect those forecast efficient costs.

Our approach to price structures

23 IPART's decision is to set a schedule of maximum prices applicable to each of the potential modes of operation for the desalination plant and one-off charges for transitions to shutdown and transitions to restart for each category of shut down.

In deciding the price structures, we considered:

- the terms of reference of the review
- the matters set out in section 15 of the IPART Act, including the impacts of prices on customers and economic efficiency, and
- SDP's proposed price structures.

The Terms of Reference required that the price structure should encourage SDP to be financially indifferent to whether or not it supplies water. The terms of reference also require that a periodic payment for making the plant available should reflect the fixed costs and the charge for water supply services should reflect the variable costs of supplying water.

In their submission, SDP proposed we create 3 charges. These include production mode variable charge for the variable costs of supplying water, a fixed availability charge during full operation mode and a fixed availability charge during shutdown modes. SDP did not differentiate between different categories of shutdown modes its submission.

We decided to set a schedule of prices for each mode of operation. During full operation mode our prices follow the same price structure as proposed by SDP. In these periods there is a water usage charge for the variable costs of supplying water and a fixed water service charge that covers all fixed costs (including the operating costs, working capital allowance, depreciation and return on capital).

For shutdown and restart modes we chose a similar methodology to SDP's proposal with 2 important changes:

- We set distinct daily fixed prices for each category of shutdown and restart modes to reflect the different operating costs in each of these periods.
- We extracted the lump sum costs included by SDP in its charges at the beginning of a shutdown mode, and at the beginning of the restart mode. These lump sum costs were calculated as separate items and set as Transition to Shutdown and Transition to Restart charges.

This creates a schedule of prices for shutdown modes and restart modes. It consists of daily charges for each of the 4 categories of shutdown and restart modes and Transition to Shutdown and Transition to Restart charges for 3 categories of shutdown and restart modes (short term shutdown periods do not attract the associated lump sum costs). We consider this the most efficient pricing structure, as under all periods the prices will reflect the operating costs of that period.

Our approach to uncertainty

24 IPART's decision is to set prices with and without the costs associated with the potential transfer and ownership of the distribution pipeline, and with and without a Carbon Pricing Scheme.

At the time that our analysis was undertaken and this report was drafted, there was a degree of regulatory uncertainty regarding:

- the timing of a proposed transfer of the pipeline asset from Sydney Water to SDP
- the introduction of a Carbon Pricing Scheme.

To manage this uncertainty and protect end consumers, IPART has determined 1 set of prices applicable once the pipeline is transferred (and SDP's network operator's licence has been varied to cover the pipeline) and 1 set of prices applicable until the transfer date.

We have also determined 1 set of prices applicable once a Carbon Pricing Scheme is operational and 1 set of prices applicable when a scheme is not operational. These prices are set out in Table D.1 in Appendix D.

After dealing with the potential impact of these uncertainties, we determined prices for SDP as shown in Tables 10.1

25 IPART's decision is to set prices for when the plant is in full operation mode, in a shutdown mode, and in a restart mode as shown in Tables 10.1 (with a Carbon Pricing Scheme) and Table D.1 (without a Carbon Pricing Scheme) in Appendix D. Prices will increase each year by the change in the Consumer Price Index (CPI).

Table 10.1 IPART decision: Prices with a carbon pricing scheme ($2011/12) (VNC = Variable Network Charge, FNC = Fixed Network Charge)

	2012/13	2013/14	2014/15	2015/16	2016/17
Tariffs for a full operation mode					
Water usage charge ($/ML)	539.63 +VNC	582.48 +VNC	619.74 +VNC	634.78 +VNC	660.80 +VNC
Water service charge ($/day)	403,504 +FNC	403,315 +FNC	402,827 +FNC	396,681 +FNC	389,255 +FNC
Tariffs for a shutdown mode					
Short term shutdown					
Daily Shutdown Charge ($/day)	386,752 +FNC	390,774 +FNC	391,346 +FNC	384,583 +FNC	378,011 +FNC
Medium term shutdown					
Daily Shutdown Charge ($/day)[a]	403,085 +FNC	405,345 +FNC	415,154 +FNC	398,794 +FNC	395,386 +FNC
Transition to Shutdown Charge	188,034	188,034	188,034	188,034	188,034
Long term shutdown					
Daily Shutdown Charge ($/day)	393,769 +FNC	386,022 +FNC	380,193 +FNC	372,697 +FNC	369,438 +FNC
Transition to Shutdown Charge	277,502	277,502	277,502	277,502	277,502
Water security mode					
Daily Shutdown Charge ($/day)	383,974 +FNC	376,235 +FNC	371,127 +FNC	362,787 +FNC	355,618 +FNC
Transition to Shutdown Charge	1,442,005	1,442,005	1,442,005	1,442,005	1,442,005
Tariffs for a restart mode					
Short term shutdown					
Daily Restart Charge ($/day)	386,752 +FNC	390,774 +FNC	391,346 +FNC	384,583 +FNC	378,011 +FNC
Medium term shutdown					
Daily Restart Charge ($/day)[a]	403,085 +FNC	405,345 +FNC	415,154 +FNC	398,794 +FNC	395,386 +FNC
Transition to Restart Charge	202,129	202,129	202,129	202,129	202,129
Long term shutdown					
Daily Restart Charge ($/day)	393,769 +FNC	386,022 +FNC	380,193 +FNC	372,697 +FNC	369,438 +FNC
Transition to Restart Charge	1,770,928	1,770,928	1,770,928	1,770,928	1,770,928
Water security mode					

	2012/13	2013/14	2014/15	2015/16	2016/17
Daily Restart Charge ($/day)	383,974 +FNC	376,235 +FNC	371,127 +FNC	362,787 +FNC	355,618 +FNC
Transition to Restart Charge	5,497,899	5,497,899	5,497,899	5,497,899	5,497,899
Pipeline Only Tariffs					
Pipeline Charge ($/day)	130,032	130,235	129,399	128,204	127,711

a The fixed charge medium term shutdown tariff increases relative to the short term shutdown tariff due to additional costs to maintain the filtration membranes, which are not incurred during a short term shutdown.

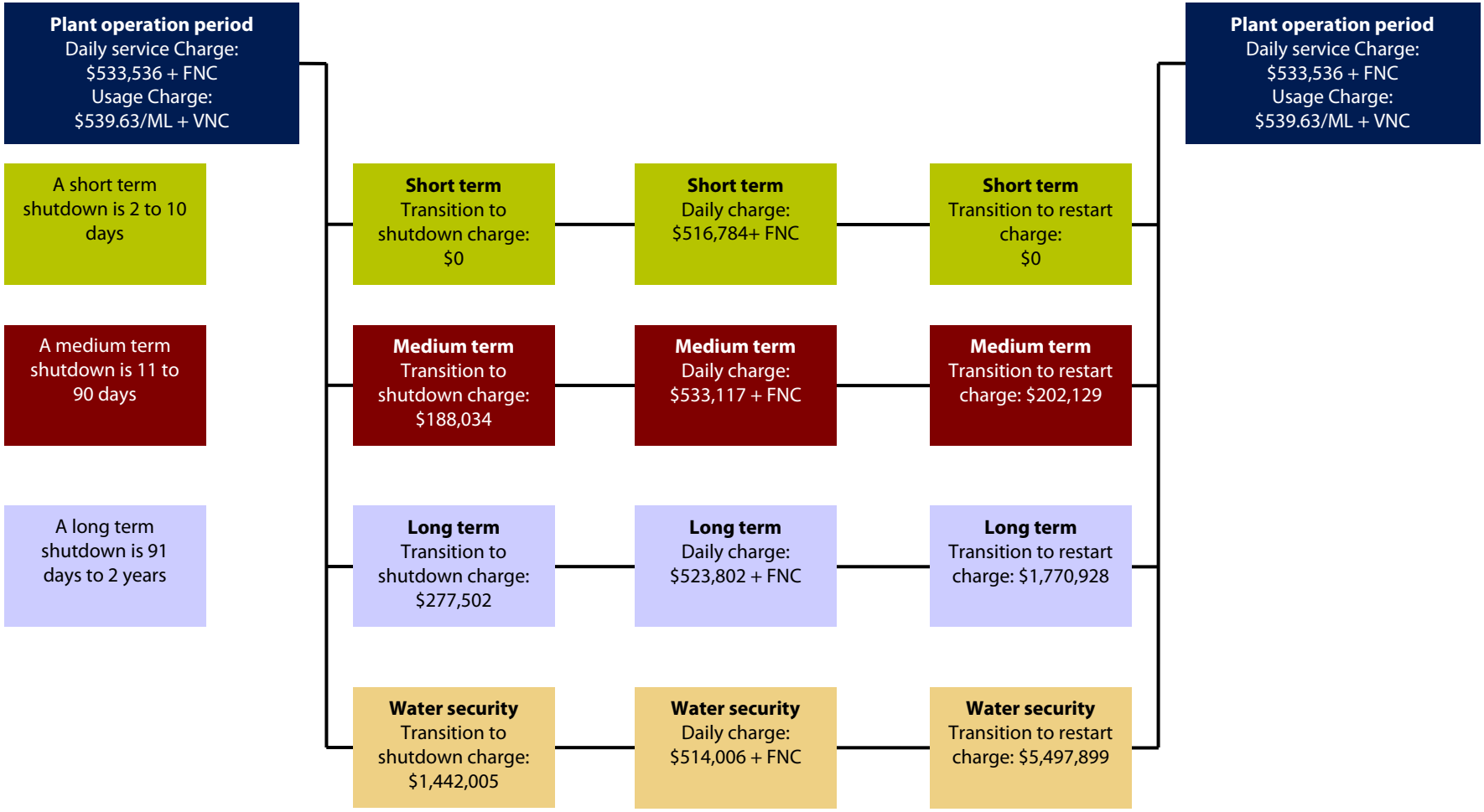
Note: VNC consists of the variable network costs associated with the amount of variable electricity per ML of water produced and FNC consists of two parts; the fixed network costs and the variable network costs associated with the amount of electricity used in that mode of operation not related to the amount of water produced.

Source: IPART analysis.

The application of this price structure is represented in Figure 10.1 below.

The figure illustrates the prices that apply when there is a full operation mode, and a shutdown mode in the first year of the determination. For simplicity, the illustration assumes a Carbon Pricing Scheme is operational and the pipeline is transferred.

Figure 10.1 Structure and level of SDP prices in 2012/13 (with a carbon pricing scheme and pipeline transfer) ($2011/12)



Note: VNC refers to variable network costs and FNC consists of two parts; the fixed network costs and the variable network costs associated with the fixed charge.

One of the characteristics of the desalination plant is that costs can change from one year to the next even for the same operational mode. This is due to the schedule for replacement of membranes and other maintenance and replacement of items. Therefore in our calculation of costs, notional revenues and prices, we modelled various combinations of shutdown modes and full operation modes for each year and mode to derive our final determined prices.

10.1.2 Prices when the plant is in full operation mode

SDP's proposed prices

SDP considers that when the plant is in full operation, the most appropriate price structure is a variable price to recover the variable operating costs and an availability price to recover the fixed component of operating costs and the capital costs.[100]

SDP proposes that prices when the plant is in production should comprise of:

- An availability price that recovers a return on and of SDP's assets, and all of SDP's fixed operating costs.
- A variable price that recovers all of SDP's other operating costs – that is the incremental costs that vary according to the quantity of water produced. These variable operating costs include:
  - water treatment costs (mainly chemicals and some labour)
  - variable retail electricity prices
  - variable network electricity prices
  - costs of RECs.

SDP's proposed prices when the plant is in full operation mode are shown in Table 10.2. By way of comparison to our decisions these prices include allowances for the costs of it owning the distribution pipeline, the one-off costs of transitioning the plant from full operation to shutdown, and the one-off costs of transitioning the plant from shutdown back into full operation.

Table 10.2 SDP's proposed prices when the plant is in full operation mode ($2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Availability charge 1 ($000/day)	610.8	612.8	613.0	602.9	588.8
Variable charge ($/ML)	549.8	570.6	585.9	594.1	602.7

Source: SDP submission to IPART for review of prices for SDP, p 30, Table 6.1.

[100] SDP submission to IPART's review of SDP's prices, p 29.

IPART's analysis

IPART agrees with SDP that when the plant is operating, the most appropriate structure for prices is a variable price combined with a fixed price. This structure is also consistent with the Terms of Reference.

Our variable price covers costs that vary with the production of desalinated water. Similar to SDP, we have included costs such as water treatment costs and variable retail electricity prices.

Based on these inputs, we calculated notional revenue requirements for the variable costs for each year of the determination when the plant is in full operation mode. We converted that notional revenue requirement into a variable charge (Water Usage charge) on a $/ML basis.

Our fixed price (Water Service charge) is the sum of amounts for:

- Fixed operating costs - the fixed operating costs include items such as council rates and membrane replacement.
- An allowance for a return on capital - the allowance for a return on capital is calculated by applying our WACC estimate to the value of our RABs. This allowance is the same for all operational modes.
- An allowance for a return of capital (regulatory depreciation) - the allowance for a return of capital is calculated by applying the depreciation rate derived from our asset life assumptions to the value of the RAB. This allowance is the same for all operational modes.

We used these inputs to calculate an annual notional revenue requirement for each year of the determination for the plant's fixed costs. Finally, we converted each annual notional revenue requirement into a daily notional revenue requirements or daily fixed charge for each year when the plant is in full operation mode. All the capital costs (ie, return on capital and depreciation) are recovered by the fixed charge.

While the structure of our prices is similar to SDP's proposals, the level of our determined prices varies from SDP's. This is mainly a result of differences in our decisions about the inputs into the notional revenue requirements and the allocation of costs between fixed and variable components. We also decided to set fixed daily prices for operation modes and shutdown and restart modes, and fixed one-off prices for transitions to shutdown and transitions to restart (as set out at section 10.1.3 and 10.1.4).

10.1.3 Prices when the plant is in a shutdown mode

SDP's proposed prices

SDP's submission comments that it is possible that the plant will be shut down for prolonged periods of time, although the timing and duration of these periods is difficult to predict.[101] This arises as a result of the plant's operating regime and the high variability of rainfall in Sydney's dams catchments.

SDP considers that when the desalination plant is available but not producing water, no variable price should apply. However it suggests that, a fixed availability price will be required to ensure SDP can recover its fixed costs. This includes a return on and of SDP's assets and the fixed operating costs incurred when the plant is in a shutdown.

As discussed in Chapter 6, SDP states that it has 2 levels of fixed operating costs:

- base level costs that are incurred whether or not the plant is operating ("Availability Costs"),[102] and
- incremental fixed costs that are incurred only when the plant is producing water, but that do not vary with the volume of water produced ("Incremental Fixed Costs").[103]

Accordingly, SDP proposes that the water availability price that applies when the desalination plant is available but not producing water, in accordance with SDP's Network Operator Licence, should recover only the base level costs, or Availability Costs.

SDP considers that, under this tariff structure, costs for consumers are minimised because SDP is entitled to recover fixed costs at a level that is appropriate to its cost structure and the type of service it is providing at any point in time (ie, availability to supply water or actual supply of water). The water availability price that SDP proposes would apply when SDP is not producing water is outlined in Table 10.3.[104] No variable prices would be payable.

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101 SDP submission to IPART's review of SDP's prices, p 30.

102 These include; insurance costs, fixed labour costs, periodic maintenance, fixed electricity costs, projected electricity standby costs, land tax and council rates, audit and bank fees and the costs of the marine and estuarine monitoring program.

103 These include incremental changes in the above base level cost categories and membrane replacement.

104 SDP's abatement proposal is discussed at p 34.

Table 10.3 SDP's proposed availability price when the plant is not producing ($2011/12)

	2012/13	2013/14	2014/15	2015/16	2016/17
Availability charge 2 ($000/day)	597.5	591.3	586.7	578.1	571.0

Source: SDP submission to IPART review of SDP prices, p 31, Table 6.2.

SDP's submission reports that SDP is required to make one-off payments to Veolia if the plant is placed into a medium term, long term or water security shutdown.[105] These payments increase with the length of the shutdown. SDP's proposed prices include allowances for one-off shutdown and restart costs.

IPART's analysis

Like SDP, we have determined daily charges when the plant is in shutdown but we have also determined charges for each type of shutdown and restart modes individual one-off charges when the plant is moving from full operation mode to a shutdown mode and when it is moving from a shutdown mode to a restart mode.

Daily charge

IPART agrees with SDP that only a fixed price should apply when the plant is in full operation mode but not producing water or a shutdown mode. This is consistent with our objective that prices should reflect costs as closely as possible. We have determined prices we consider better reflect the efficient costs incurred when the plant is not producing water or in a shutdown mode.

SDP's submission explains that SDP will at times place the plant in a shutdown mode[106] to enable it to meet its network operator's licence conditions.[107] As set out in Chapter 3, there are 4 different types of shutdown and restart modes in which the plant can be placed under the O&M contract, each with different costs:

- Short term: 2 to 10 days
- Medium term: 11 to 90 days
- Long term: 91 days to 2 years,
- Water security mode: more than 2 years.

[105] SDP submission to IPART's review of SDP's prices, p 17.

[106] Under the Water Supply Agreement between Sydney Water and SDP, from around mid-June 2012 onwards, Sydney Water will not be required to pay for any water produced by SDP when dam levels are above 80%.

[107] SDP submission to IPART's review of SDP's prices, p 16.

Each category of shutdown and restart mode has different operating costs. For example medium term shutdowns require chemical treatment of membranes for preservation and in water security mode membranes can be disposed of and staff can be retrenched (this is discussed in more detail in Chapter 6). We have determined prices to apply to each operating mode. Our prices reflect our decisions regarding various factors including Halcrow's recommendations for forecast operating and capital expenditure, our decisions on renewable energy costs and the appropriate WACC to apply to SDP's RABs.

Our fixed prices are the sum of amounts for:

- Fixed operating costs - the fixed operating costs are different for each category of shutdown and restart mode as certain costs are avoided or incurred depending on the mode.
- An allowance for a return on capital - the allowance for a return on capital is calculated by applying our WACC estimate to the value of our RABS. This allowance is the same for all operational modes.
- An allowance for a return of capital (regulatory depreciation) - the allowance for a return of capital is calculated by applying the depreciation rate derived from our asset life assumptions to the value of the RABs. This allowance is the same for all of the potential modes of full operation.

The allowances for a return on and of capital are the same for all fixed charges in all modes of operation. However, determining notional revenue requirements for the fixed operating costs is more complex.

To determine the costs that are incurred in each mode of shutdown, we modelled various scenarios for the plant in different shutdown and full production combinations. We calculated the total fixed operating costs of each shutdown mode and converted the costs of the particular shutdown into a daily fixed operating cost.

To derive the notional revenue requirements for each shutdown category, we added the daily allowance for return on capital and the daily allowance for depreciation to the daily fixed operating cost. This gives the daily notional revenue requirement or daily charge (not including the one-off costs for shutting down the plant and restarting it, these are covered by decisions explained in sections following). It also ensures that SDP will fully recover its efficient costs in each mode of plant operation. The process we used to calculate the efficient costs in each mode of operation and associated prices is discussed in more detail in Appendix C.

In summary:

- When the plant is in a full production mode for the whole year, then the determined variable (water usage) charge and fixed (water service) charge will apply and they will recover the full annual notional revenue requirement.
- When the plant operates for part of a year and is in shutdown for part of a year, the water usage and water service charges apply during the full operation mode while the relevant daily fixed shutdown charge applies to the mode when the plant is in a shutdown or restart mode. In combination, the charges will generate the annual notional revenue requirement and any one-off costs of shutting down and restarting the plant, which will be recovered in separate one-off charges.
- When the plant is in a shutdown mode, then the relevant daily fixed shutdown charge applies. This charge will generate the annual notional revenue requirement.

Transition to shutdown charge for one-off shutdown costs

When the plant is required to shutdown, there is a transition mode that occurs between the time the plant is producing and the time the plant is fully shutdown. This period of time and the cost varies depending on the category of shutdown. SDP has incorporated these one-off costs of transition in its daily shutdown charge. It proposes to ensure that they are recovered appropriately by use of a Shutdown Savings Adjustment mechanism. After modelling the costs involved in running the plant, we consider that these costs are best recovered by separate prices.

Therefore, we have calculated the one-off costs that are incurred to shutdown the plant. These one-off costs are incurred in addition to the daily costs when the plant is shutdown (discussed above). The one-off charges we have determined recover these costs they are termed Transition to Shutdown charges. The capital costs of return on and of capital are fully recovered by the daily shutdown charges. The daily shutdown charges also apply during the time that the plant is transitioning to shutdown.

We consider that the certainty that efficient costs will be recovered from our determined charges negates the need for the Shutdown Savings Adjustment mechanism proposed by SDP.

10.1.4 Prices when the plant is in a Restart Mode

SDP's proposed prices

Similar to shutting down, there is a transition period that occurs between the time the plant is in shutdown to the time it is placed back in production again. To restart the plant after a shutdown mode takes different lengths of time and incurs different costs depending on the category of shutdown mode that the plant has been in. As with its proposals for shutting down, SDP has incorporated the one-off restart costs in its daily shutdown charge and proposes to ensure that they are recovered appropriately by use of its Shutdown Savings Adjustment mechanism.

IPART's analysis

Daily charge

We have determined a daily restart charge that will apply over the restart mode (note that the capital costs of return on and of capital are fully recovered by the daily restart charges). The daily restart charges are equal in value to the daily shutdown charges for the relevant mode of operation and recover the daily costs that are incurred before the plant begins full operation.

Transition to restart charge for once-off restart costs

Similar to our analysis for the one-off shutdown charge, we have determined a one-off Transition to Restart charge for the mode between a shutdown and the plant restarting full operation, other than a short term shutdown. The level of these charges is based on data provided by SDP, the recommendations by Halcrow and our analysis.

Our method was to first calculate the one-off costs that are incurred to restart the plant after each particular shutdown category. The Transition to Restart charges we have determined recover these one-off costs.

We consider that our determined charges negate the need for the Shutdown Savings Adjustment mechanism proposed by SDP.

Appendices

A Terms of Reference

The Hon. Greg Pearce MLC
Minister for Finance and Services
Minister for the Illawarra

2 May 2011

Mr Rod Sims
Chairperson
Independent Pricing and Regulatory Tribunal
PO Box Q290
QVB POST OFFICE NSW 1230

Dear Mr Sims

I write to advise you that I have signed an order declaring Sydney Desalination Plant Pty Ltd (SDP) to be a monopoly supplier, pursuant to section 51 of the Water Industry Competition Act 2006. The order will be published in the NSW Government Gazette in the near future, as required by the Water Industry Competition Act.

The order declares SDP to be a monopoly supplier, in a network operator and retail supplier capacity, for the purposes specified in SDP's Network Operator's Licence and Retail Supplier's Licence, and for distribution within the area of operations as specified in those Licences, and to specified persons or classes of persons as specified in SDP's Retail Supplier's Licence.

Pursuant to section 52 (1) (a) of the Water Industry Competition Act 2006, I write to request the Independent Pricing and Regulatory Tribunal (IPART) to determine the pricing for the declared monopoly services provided by SDP.

Pursuant to section 13 (1) (c) of the IPART Act, I require IPART to consider the matters set out in the attached terms of reference in reaching its determination.

It is important that the community can see what the charges paid for water from the desalination plant are, and that they are determined independently. This is also a precursor to a possible refinancing of the desalination plant by way of a lease or similar arrangement.

I specify under section 13 (1) (a) of the IPART Act, that IPART should complete its determination within 6 months of the date of Gazettal of SDP as a monopoly supplier under section 51 of the Water Industry Competition Act 2006.

Yours sincerely

Greg Pearce MLC
Minister for Finance and Services

Level 36, Governor Macquarie Tower, 1 Farrer Place, Sydney NSW 2000
Phone: (61 2) 9228 5287 Fax: (61 2) 9228 5899 Email: office@pearce.minister.nsw.gov.au

Terms of Reference for Referral of Sydney Desalination Plant Pty Ltd to IPART under Section 52 of the Water Industry Competition Act

Background

On 29 June 2010 Sydney Desalination Plant Pty Ltd (SDP) was granted a network operator licence in relation to the *desalination plant*. The Minister for Finance and Services has, under section 51 of the Water Industry Competition Act 2006, declared that SDP is a monopoly supplier in relation to the *water supply services* it provides under its network operator licence.

SDP is the only supplier of non-rainfall dependant drinking water in New South Wales. Currently, the primary purchaser of drinking water supplied from the *desalination plant* is Sydney Water Corporation. Sydney Water Corporation purchases bulk water from two main sources, the Sydney Catchment Authority and, since its commissioning, the *desalination plant*.

The *desalination plant* is a key element in Sydney's water security plan. Under its network operator licence, the *desalination plant* is required to maximise water production when dam storage levels in Sydney are below a prescribed threshold. Prices set by the Independent Pricing and Regulatory Tribunal (IPART) should therefore reflect the water supply services provided by SDP set out below:

(a) the supply of non-rainfall dependant drinking water to purchasers; and

(b) the making available of the *desalination plant* to supply non-rainfall dependant drinking water.

Matters for consideration - pricing principles

Each *price determination* is to be consistent with the following pricing principles:

1. Maximum prices should be set so that expected revenue generated will recover the efficient costs of providing the services described at (a) and (b) above over the life of the assets. Costs include operating costs, a return on the assets and return of assets (depreciation).

2. In calculating the return on invested assets:

   i. The rate of return (or Weighted Average Cost of Capital) should reflect the commercial risks faced by the asset owner in providing the services.

   ii. IPART should determine an appropriate opening asset value.

3. Return of assets (depreciation) is to reflect the economic lives of the assets.

4. The structure of prices should encourage SDP to be financially indifferent as to whether or not it supplies water. As such the structure of prices should comprise separate charges for the different water supply services described at (a) and (b) above.

5. The charges for water supply services in (b) above should be a periodic payment and should reflect fixed costs including, return on assets, return of assets, and the fixed component of operating costs. SDP is to be entitled to charge for providing the water supply services in (b) above irrespective of levels of water in dam storages servicing Sydney or availability of water from other sources.

6. The charges for water supply services in (a) above should reflect all efficient costs that vary with output, including variable energy, labour costs, and maintenance costs.

7. Any other matters that IPART may consider relevant.

Timing

The determination period is to cover the period to 30 June 2017.

For each successive price determination period, IPART is to make the price determination at least 6 months before the expiry of the current determination period.

Table A.1 Consideration of Terms of Reference matters by IPART

Matters for Consideration	Report Reference
1. Maximum prices should be set so that expected revenue generated will recover efficient costs of providing the services described at (a) and (b) above over the life of the assets. Costs include operating costs, a return on the assets and return of assets (depreciation).	Chapters 5 to 10
2. In calculating the return on invested assets:	
a) The rate of return (or Weighted Average Cost of Capital) should reflect the commercial risks faced by the owner in providing the services.	Chapter 9
b) IPART should determine an appropriate opening asset value.	Sections 8.1 and 8.3
3. Return of assets (depreciation) is to reflect the economic lives of the assets.	Section 8.2
4. The structure of prices should encourage SDP to be financially indifferent as to whether or not it supplies water. As such the structure of prices should comprise separate charges for the different water supply services described at (a) and (b) above.	Section 4.3 and Chapter 10
5. The charges for water supply services in (b) above should be a periodic payment and should reflect fixed costs including, return on assets, return of assets and the fixed component of operating costs. SDP is to be entitled to charge for providing the water supply services in (b) above irrespective of levels of water in dam storages servicing Sydney or availability of water from other sources.	Section 10.1 and Chapters 6 to 9
6. The charges for water supply services in (a) above should reflect all efficient costs that vary with output, including variable energy, labour costs, and maintenance costs.	Section 10.1 and Chapters 6 and 7
7. Any other matters that IPART may consider relevant.	Sections 2.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9

B Matters to be considered by IPART under section 15 of the IPART Act

In making determinations IPART is required by the IPART Act to have regard to the following matters (in addition to any other matters IPART considers relevant):

a) the cost of providing the services concerned

b) the protection of consumers from abuses of monopoly power in terms of prices, pricing policies and standard of services

c) the appropriate rate of return on public sector assets, including appropriate payment of dividends to the Government for the benefit of the people of New South Wales

d) the effect on general price inflation over the medium term

e) the need for greater efficiency in the supply of services so as to reduce costs for the benefit of consumers and taxpayers

f) the need to maintain ecologically sustainable development (within the meaning of section 6 of the *Protection of the Environment Administration Act 1991*) by appropriate pricing policies that take account of all the feasible options available to protect the environment

g) the impact on pricing policies of borrowing, capital and dividend requirements of the government agency concerned and, in particular, the impact of any need to renew or increase relevant assets

h) the impact on pricing policies of any arrangements that the government agency concerned has entered into for the exercise of its functions by some other person or body

i) the need to promote competition in the supply of the services concerned

j) considerations of demand management (including levels of demand) and least cost planning

k) the social impact of the determinations and recommendations

l) standards of quality, reliability and safety of the services concerned (whether those standards are specified by legislation, agreement or otherwise).

Table B.1 outlines the sections of the report that address each matter.

Table B.1 Consideration of Section 15 matters by IPART

Section 15(1)	Report Reference
a) the cost of providing the services	Section 4.2 and chapters 6 and 9
b) the protection of consumers from abuses of monopoly power	Whole report
c) the appropriate rate of return and dividends	Chapter 9
d) the effect on general price inflation	Not applicable
e) the need for greater efficiency in the supply of services	Section 4.5
f) ecologically sustainable development	Section 3.2
g) the impact on borrowing, capital and dividend requirements	Chapter 9
h) impact on pricing policies of any arrangements that the government agency concerned has entered into for the exercise of its functions by some other person or body	Not applicable
i) need to promote competition	Section 4.4
j) considerations of demand management and least cost planning	Chapters 6 to 8
k) the social impact	Whole report
l) standards of quality, reliability and safety	Chapters 3

C Approach to financial modelling

This section discusses IPART's approach to price modelling to determine SDP's charges. It begins with a brief summary of our standard approach to calculating prices for water utilities, discusses the differences between SDP and other water utilities, and then explains how our methodology had to be adapted to account for these differences.

C.1 IPART's standard building block approach

A key component of our standard approach to price setting involves calculating a water utility's notional revenue requirement by assessing its future cash flow needs. The notional revenue requirement needs to be sufficient to cover:

- the operating, maintenance and administration costs of a water utility's business
- an allowance for working capital
- depreciation of the water utility's capital infrastructure
- a return on the capital infrastructure owned by the water utility.

The notional revenue requirement can be represented by the following formula (commonly described as the 'building block' approach):

$$R = O + W + D + C$$

Where,	R = notional revenue requirement
Non-capital costs:	O = operating costs (includes maintenance and administration expenses)
	W = return on working capital
Capital costs:	D = return of capital or depreciation
	C = return on capital

For most water utilities which we regulate, this model works well in determining the notional revenue requirements and the required prices. However, applying this model to SDP is not straightforward due to its different operational modes and the difficulty of predicting when each mode will occur.

C.2 Why SDP is different to other regulated water utilities

SDP is different to other regulated water utilities due to its different operational modes. SDP operating costs (and maintenance expenses) are different for each operational mode. For example, this will mean that a full production building block model will have greater operating costs than a building block model for a long term shutdown mode.

While the operating costs for all water utilities vary with how intensively they are using their assets, no other utility that we regulate has such distinct operational modes. The differences in operating costs in different modes are significant. As such, we decided to modify our building block approach for SDP in this review.

C.3 IPART's building block approach to this review

We decided to use a building block approach that will deliver separate charges for each operational mode. The different operational modes only change the non-capital costs. This is because the capital costs are the same under all modes of operation. The method we adopted to deal with this reality can be viewed, at a high level, as a series of building block models, covering each operational mode in every year of the determination.

In all scenarios, the return of capital (depreciation), the return on working capital and the return on capital are identical. The differences between notional revenue requirements for different modes of operation are entirely due to differences in operating costs.

The operating cost information was provided by SDP, and includes a number of scenarios. The base case is full production throughout the determination period. Alternate scenarios include having one short (10-day) or medium term (90-day) shutdown within the determination period. For each of these types of shutdown, there are separate scenarios that have that shutdown for each year within the determination period.[108] Various long term shutdowns are also modelled, as well as a 'water security' mode, where the plant is shutdown for the entire length of the determination period.

For all scenarios, operating costs were provided for the full year including the shutdown mode. This means that calculating the operating costs for short and medium term shutdowns is not straightforward. Therefore, we have adopted an assumption that during the full operation mode days of every shutdown year, the operating costs are exactly equal to those of the same days in the full production scenario. This simplifying assumption allows us to calculate separate operating expenses for shutdown and operating modes in each scenario.

[108] Each scenario assumes only 1 shut down period per year.

C.4 Calculating SDP's notional revenue requirements

To calculate the notional revenue requirements, we first calculate the return on capital, depreciation and working capital allowance. We calculate these only once, because they are the same for all scenarios.

Next, we add operating costs. These are different for each scenario and are separated into fixed costs (those that do not vary with amount of water produced) and variable costs (those that vary with the amount of water produced). It is important to note that some of the fixed costs do change under different modes of operation; this includes labour, as staff may be laid off in a longer term shutdown. It is equally important to note that the variable costs per ML of water produced differ between the full production scenario and the scenarios with short or medium term shutdown modes. This is due to variations in energy intensity during these shutdowns.

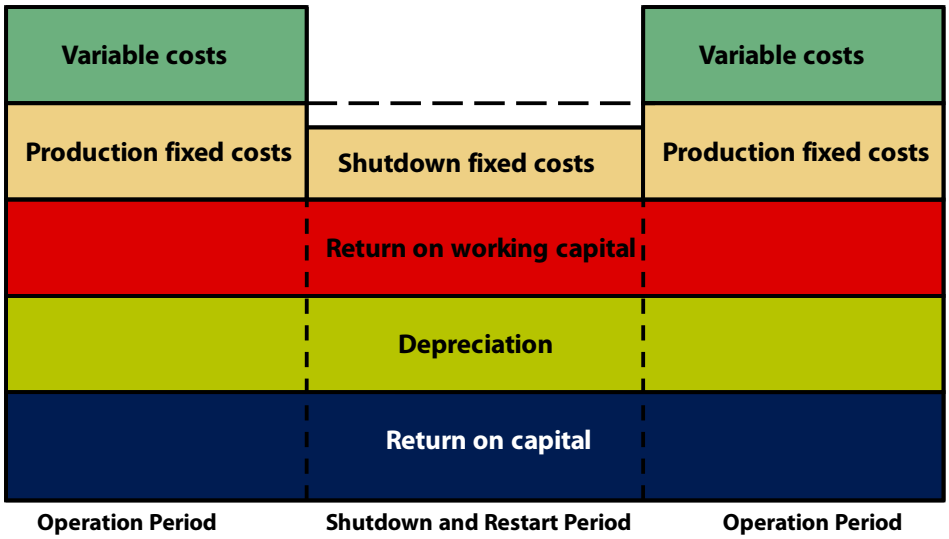
The first scenario that we consider is the base case (ie, the full operation scenario). The operating cost data gives us the annual fixed and variable operating costs in this scenario. We calculate the daily fixed operating costs of full operation by dividing the fixed operating costs by 365 (or 366 in leap years). We calculate the variable operating cost per ML by dividing the annual variable operating costs by the amount of desalinated water produced in that year.[109]

The next set of scenarios are for when the plant is in a water security mode or long term shutdown mode for whole years at a time. Each of these scenarios has its own annual fixed cost and zero variable costs.

The remaining scenarios are for short term (10 day) and medium term (90 day) shutdowns, which last for less than 12 months. Calculating daily costs for these scenarios is more complicated because, as indicated above, the operating cost information for each scenario is for a whole year. There will be different daily costs during the full operation and the shutdown modes of the year. A simplified representation of this is displayed in Figure C.1.

[109] We assume the desalination plant produces 90,000 ML of desalinated water each year of full production; this is equivalent to 246.58 ML per day.

Figure C.1 Simplified diagram of the costs incurred during a year involving a shutdown (excludes lump sum transition to shutdown and transition to restart costs)



To calculate the costs during the shutdown mode we make the simplifying assumptions that:

- During the full operation mode days of the shutdown year, the operating costs are exactly equal to those of the same day in the full production scenario.
- The costs during the shutdown mode capture the full cost adjustment.

In essence, to calculate the fixed costs during the shutdown mode we look at what the total operating costs would be during a year with no shutdown to produce the same amount of water produced during a shutdown year. We then calculate the cost differential between such a year and the shutdown year. This is the cost adjustment that we capture in the daily fixed charge for the shutdown mode (as there are no variable costs during this period).

Specifically, we calculate the costs during shutdowns by:

- subtracting total operating costs for the year including the shutdown from the fixed costs of the full production scenario from that year, and
- subtracting the amount of water produced in the year including the shutdown by the variable cost per ML in the full production scenario from that year.

This gives us the reduction in operating costs under the shutdown. This total is divided by the number of days the plant is shutdown in the scenario. We subtract this daily reduction in operating costs from the daily fixed operating costs for the full production scenario. This gives us our daily operating costs during a shutdown, as there are no variable costs in a shutdown.[110]

To calculate the daily notional revenue requirements from here takes 3 steps:

1. the fixed costs are added to the daily allowed return on capital, depreciation and the working capital allowances[111]
2. the variable cost per ML is multiplied by how much water is produced in that day, and
3. the results from steps 1 and 2 are aggregated.

A worked example is included below in Box C.1.

[110] This methodology was not necessary to calculate the daily fixed operating costs for long term and water security mode shutdowns. However, we used this method for the purpose of consistency.

[111] The daily allowed return on capital, depreciation and working capital allowances are calculated in the same way as the fixed operating costs per day in full production, dividing the annual building block components by 365 (or 366 in leap years).

Box C.1 Daily notional revenue requirement for a short term shutdown in 2014/15 ($2011/12, with carbon)

The building blocks revenue requirement for the following are the same under all scenarios:

- annual return on capital - $82,062,642
- annual depreciation – $37,114,612
- annual return on working capital - $1,655,742

We turn these revenue requirements into daily revenue requirements

- daily return on capital - $82,062,642/365 = $224,829
- daily depreciation - $37,114,612/365 = $101,684
- daily return on working capital - $1,655,742/365 = $4,536

We consider the two components of the full operation scenario's operating costs

- annual fixed operating expenditure - $26,198,981
- annual variable operating expenditure - $55,776,760

We turn the fixed operating expenditure into daily operating expenditure:

- daily fixed operating expenditure - $26198,981/365 = $71,778

We turn the variable operating expenditure into a variable costs per ML (note the plant produces 90 000ML when fully operational for a year)

- variable costs per ML - $55,776,760/90 000ML = $619.74

We consider the total operating costs in the scenario with a short term shutdown in 2014/15, the amount of water produced in that year of the scenario and length of the shutdown

- total operating costs of shutdown scenario - $80,332,777
- water produced in shutdown scenario – 87,534ML
- length of shutdown – 10 days

We now subtract the total operating costs for the scenario with a short term shutdown in 2014/15 from the fixed costs in full operation scenario and the amount of water produced in the year including the shutdown, multiplied by the variable cost of producing that water.

- difference in fixed operating costs –

  ($26,198,981 + $619.74 x 87,534) - $80,332,777 = $114,811

We now convert this decrease in operating costs due to the short term shutdown to a daily rate for each day of the shutdown

- daily decrease in operating costs during shutdown - $114,881/10 = $11,481

We use this to calculate the daily operating expenditure of the shutdown by subtracting this daily saving from the full operation daily fixed operating expenditure

- daily fixed operating costs in shutdown - $71,778 - $11,481 = $60,297

We calculate the daily notional revenue requirement by adding the daily fixed operating costs, the return on capital, depreciation and return on working capital and the variable cost of water multiplied by water produced in that day (note that at full production the plant will produce 247ML per day)

- daily notional revenue requirement during full operation mode

  $71, 778 + $619.74x247ML + $224,829 + $101,684 + $4,536 = $555,640

- daily notional revenue requirement during short term shutdown and restart mode

  $60,297 + $224,829 + $101,684 + $4,536 = $391,346

Note: some of these numbers may not add up due to rounding.

Our model calculates prices that will recover the notional revenue requirement under all the conditions of the terms of reference.

C.5 Calculating SDP's prices

The terms of reference to this review require that our prices encourage SDP to be financially indifferent as to whether or not it supplies water. The Terms of Reference state that there should be a charge for making the desalination plant available to supply water and a separate charge for the supply of water. The charge for availability should reflect the return on assets, depreciation and fixed operating costs. The charge for supplying water should reflect variable costs. We have termed this latter charge the Water Usage Charge.

We have calculated the prices under each scenario in each year. To satisfy the terms of reference, we have equated the charge for supplying water with the variable cost per ML of water produced under full operation.

The fixed charge is the residual total notional revenue requirement when the variable costs have been accounted for by Water Usage Charge. This leaves the daily fixed revenue requirement (as our notional revenue requirement is calculated per day). This daily fixed charge is equal to the sum of the daily fixed operating costs, the daily return on assets, depreciation and working capital allowance discussed in section C.4.

Our model does this by first calculating the building block prices for the Water Usage Charge and Water Service Charge during full operation mode. It calculates the Water Usage Charge by dividing total variable costs for the year by the amount of water produced in that year. The fixed costs are calculated at a daily rate by dividing total fixed costs for the year by 365 (or 366 in a leap year). The daily fixed costs are added to the daily return on capital, depreciation and working capital allowance. This becomes the Water Service Charge.

We use the Water Usage Charge and Water Service Charge to calculate the shutdown and restart mode daily charges. Our first step in calculating the charge during shutdown and restart modes is to calculate the reduction in costs for the year including the shutdown compared to full operation mode. In other words, we look at what variable operating costs would be during a full operation year to produce the same amount of water produced during a shutdown year and the fixed operating costs of a full operating year. We then calculate the cost differential between such a year and the shutdown year.

We calculate this by subtracting total operating costs for the shutdown year from the fixed costs of the full operation mode scenario from that year and the variable costs of the water produced in the full operation mode of the year including the shutdown.[112] This gives us the reduction in operating costs under the shutdown.

This total is divided by the number of days the plant is shutdown. We subtract this daily reduction in operating costs from the daily Water Service Charge for the full operation mode scenario. This gives us our daily restart and shutdown mode charges.

A worked example is included below in Box C.2.

[112] Note: the variable cost of water during the full operation year is equal to the shutdown year, thus this will have no effect on SDP's revenue.

Box C.2 Daily tariffs for a short term shutdown in 2014/15 ($2011/12)

We consider the two components of the full production scenario's operating costs

- annual variable operating expenditure - $55,776,760
- annual fixed operating expenditure - $26,198,981
- annual return on capital - $82,062,642
- annual depreciation – $37,114,612
- annual return on working capital - $1,655,742

We turn the variable operating expenditure of the full operation scenario into the water usage charge (note the plant produces 90 000ML when fully operational for a year)

- water usage charge - $55,776,760/90 000ML = $619.74/ML

We turn the fixed operating costs , return on capital, depreciation and return on working capital into the water service charge

- water service charge –

  ($26,198,981 + $82,062,642 + $37,114,612 + $1,655,742)/365 = $402,827

We consider the total operating costs in the scenario with a short term shutdown in 2014/15, the amount of water produced in that year of the scenario and length of the shutdown

- total operating costs of shutdown scenario - $80,332,777
- water produced in shutdown scenario – 87,534ML
- length of shutdown – 10 days

We now subtract the total operating costs for the scenario with a short term shutdown in 2014/15 from the fixed costs in full production scenario and the amount of water produced in the year including the shutdown multiplied by the variable cost of producing that water.

- reduction in fixed operating costs during shutdown–

  ($26,198,981 + $619.74 x 87,534) - $80,332,777 = $114,811

We use this to calculate the daily shutdown and restart charge by subtracting this reduction in operating costs from the water service charge

- daily shutdown and restart charge in a short term shutdown

  $402,827 - $11,481 = $391,346

Note: some of these numbers may not add up due to rounding.

To verify our results we have built a cross check into our model.

C.6 Cross checks to our financial model

Because of the way we set the prices there is a natural cross check that notional revenue requirements for days in shutdown and restart modes must be the same as the corresponding prices. Furthermore, we calculated the full operation mode notional revenue requirement by separating variable operating costs and the fixed operating costs they correspond exactly to the Water Usage Charge and the Water Service Charge.

We performed a further cross check by calculating the revenue that our charges will produce under each scenario and comparing this to the differences in operating costs in the scenario. To do this we multiplied the number of days of full operation mode in that year, by the daily Water Service Charge the number of days of the shutdown in that year by the relevant shutdown and restart mode daily charge.

We compared revenue generated by our water service charge and daily restart and shutdown charges in each shutdown year to the comparable full operation year without the variable costs/revenue from water production. Since the return on capital, depreciation and working capital allowance are equal under all scenarios the difference should be equal to the differences in total operating costs in shutdown scenarios and the full production scenario for that year. The results of this secondary cross check have proved to be consistent with our prices.

A worked example is included below in Box C.3.

Box C.3 Cross check for a medium term shutdown in 2014/15 ($2011/12)

From Boxes C.1 and C.2 we have ascertained that the difference in fixed operating costs between full production and the scenario with a short term shutdown in 2014/15 is $114,811. We calculate the different amounts of revenue SDP would generate from the water service charge and the daily shutdown and restart charges in these years (ie, revenues excluding the variable water usage charge).

- revenue in full operation - $402,827 x 365 = $147,031,977
- revenue with a short term shutdown – $402,827 x 355+ $391,346 x 10 = $146,917,166

The difference of these two revenues is equal to the difference in fixed operating costs between full operation and the scenario with a short term shutdown in 2014/15

- difference in revenue - $147,031,977 - $146,917,166 = $114,811

Note that some of these numbers may not add up due to rounding.

D Comparisons of costs and prices without a carbon price

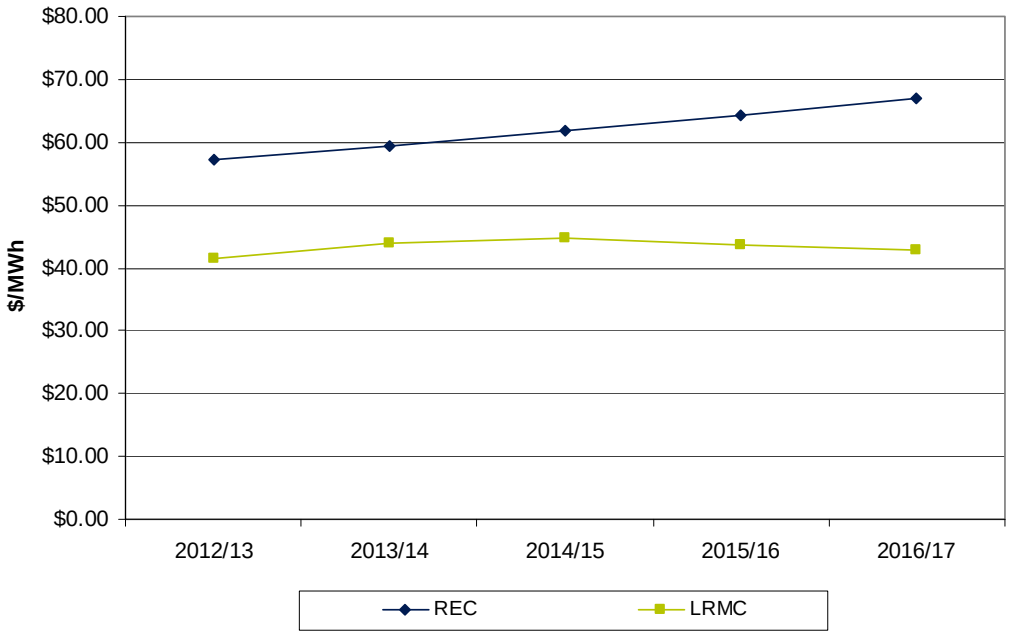
At the time that our analysis was undertaken, there was regulatory uncertainty regarding the implementation of a Carbon Pricing Scheme. By the time that this determination was prepared a Carbon Pricing Scheme had been passed by the Parliament but not yet been implemented.

This section presents the prices, operating costs, energy costs and notional revenue requirements we consider appropriate for SDP, if there is no Carbon Pricing Scheme in operation for all or part of the determination period. For the purposes of our modelling on the cost of energy and the cost of the associated RECs are altered by the carbon pricing mechanism.

D.1 Frontier's forecast cost of energy and RECs without a carbon pricing mechanism

Figure D.1 displays Frontier's forecast cost of energy and RECs if a Carbon Pricing Scheme is not in place. Figure 7.1 in the body of the report shows these forecasts for if a Carbon Pricing Scheme is in place.

Figure D.1 Frontier Economics' forecasts of LRMC, spot prices in NSW and RECs (assuming a Carbon Pricing Scheme is not operational)



Source: Frontier Economics.

Figure D.1 shows that if there is no carbon price, all else being equal, the LRMC of generation is lower than if the carbon price is introduced. In contrast the REC price forecasts are significantly higher given the inverse relationship between wholesale prices and REC prices. That is, while a carbon price will increase the LRMC of generation (and market-based prices), it will lower the costs of complying with the Renewable Energy Target (all else being equal).[113]

D.2 Prices, notional revenue requirements and operating costs without a carbon pricing scheme in operation

The following tables present all of the tables in the body of the report that change when a Carbon Pricing Scheme is not in operation.

[113] A carbon price will increase the costs of black energy as the costs of carbon emissions become part of a generator's marginal costs. All else being equal, increasing the black costs of energy will lower the marginal cost of a Renewable Energy Certificate (REC) by reducing the subsidy renewable generators need to cover their costs.

Table D.1 IPART decision: Prices without a carbon pricing scheme ($2011/12) (NW = Network Costs Pass Through) – corresponds with Tables 1.1 and 10.1

	2012/13	2013/14	2014/15	2015/16	2016/17
Tariffs for a Plant Operation Mode					
Water usage Charge ($/ML)	528.93 +VNC	569.09 +VNC	609.85 +VNC	615.97 +VNC	623.57 +VNC
Water Service Charge ($/day)	403,424 +FNC	403,221 +FNC	402,760 +FNC	396,554 +FNC	389,002 +FNC
Tariffs for a Shutdown Mode					
Short Term Shutdown					
Fixed Charge ($/day)	386,602 +FNC	390,628 +FNC	391,244 +FNC	384,392 +FNC	377,769 +FNC
Medium Term Shutdown					
Daily Shutdown Charge ($/day)	402,946 +FNC	405,165 +FNC	413,340 +FNC	398,545 +FNC	394,919 +FNC
Transition to Shutdown Charge	188,034	188,034	188,034	188,034	188,034
Long term Shutdown					
Daily Shutdown Charge ($/day)	393,689 +FNC	385,927 +FNC	380,126 +FNC	372,569 +FNC	369,185 +FNC
Transition to Shutdown Charge	277,502	277,502	277,502	277,502	277,502
Water Security Mode					
Daily Shutdown Charge ($/day)	383,894 +FNC	376,140 +FNC	371,060 +FNC	362,659 +FNC	355,365 +FNC
Transition to Shutdown Charge	1,442,005	1,442,005	1,442,005	1,442,005	1,442,005
Tariffs for a Restart Mode					
Short Term Shutdown					
Daily Restart Charge ($/day)	386,602 +FNC	390,628 +FNC	391,244 +FNC	384,392 +FNC	377,769 +FNC
Medium Term Shutdown					
Daily Restart Charge ($/day)	402,946 +FNC	405,165 +FNC	413,340 +FNC	398,545 +FNC	394,919 +FNC
Transition to Restart Charge	202,129	202,129	202,129	202,129	202,129
Long term Shutdown					
Daily Restart Charge ($/day)	393,689 +FNC	385,927 +FNC	380,126 +FNC	372,569 +FNC	369,185 +FNC
Transition to Restart Charge	1,770,928	1,770,928	1,770,928	1,770,928	1,770,928
Water Security Mode					
Daily Restart Charge ($/day)	383,894	376,140	371,060	362,659	355,365

	2012/13	2013/14	2014/15	2015/16	2016/17
	+FNC	+FNC	+FNC	+FNC	+FNC
Transition to Restart Charge	5,497,899	5,497,899	5,497,899	5,497,899	5,497,899
Pipeline Only Tariffs					
Pipeline Charge ($/day)	130,032	130,235	129,399	128,204	127,711

Note: The fixed charge Medium Term Shutdown Tariff increases relative to the Short Term Shutdown Tariff due to additional costs to maintain the filtration membranes, which are not incurred during a Short Term Shutdown.

Note: FNC consists of two parts the fixed network costs and the variable network costs associated with the amount of electricity used in that mode of operation not related to the amount of water produced.

Source: IPART analysis.

Table D.2 IPART's decisions on the annual notional revenue requirement in full operation without a carbon pricing scheme during full production mode ($million, 2011/12) – corresponds to Table 5.2

	2012/13	2013/14	2014/15	2015/16	2016/17
Plant					
Operating costs (excludes network cost)	68.7	75.1	81.1	82.2	82.2
Return on working capital	2.2	1.6	1.7	1.7	1.7
Depreciation	37.1	37.1	37.1	37.1	37.1
Return on assets	87.0	84.5	82.1	79.6	77.1
Total Plant	194.9	198.4	201.9	200.6	198.1
Distribution Pipeline					
Operating costs	0.1	0.1	0.1	0.1	0.1
Return on working capital	0.0	0.4	0.3	0.3	0.3
Depreciation	4.6	4.6	4.6	4.6	4.6
Return on assets	42.8	42.5	42.2	41.9	41.6
Total Pipeline	47.5	47.5	47.2	46.9	46.6
Plant & Pipeline					
Operating costs (excludes network costs)	68.8	75.2	81.2	82.3	82.4
Return on working capital	2.2	2.0	2.0	2.0	2.0
Depreciation	41.6	41.7	41.7	41.7	41.7
Return on assets	129.8	127.0	124.2	121.5	118.7
Total Plant & Pipeline	242.3	245.9	249.1	247.5	244.7

Table D.3 IPART's decisions on the daily notional revenue requirements without a carbon pricing scheme in Operation, Shutdown and Restart Modes ($2011/12) – corresponds to Table 5.1

Notional Revenue Requirement.	2012/13	2013/14	2014/15	2015/16	2016/17
IPART decision:					
Operation Period	533,846	543,544	553,135	548,022	542,758
Short term Shutdown Period	386,602	390,628	391,244	384,392	377,769
Medium term Shutdown Period	402,946	405,165	413,340	398,545	394,919
Long term Shutdown Period	393,689	385,927	380,126	372,569	369,185
Water security mode Shutdown Period	383,894	376,140	371,060	362,659	355,365
Short term Restart Period	386,602	390,628	391,244	384,392	377,769
Medium term Restart Period	402,946	405,165	413,340	398,545	394,919
Long term Restart Period	393,689	385,927	380,126	372,569	369,185
Water security mode Restart Period	383,894	376,140	371,060	362,659	355,365
Pipeline – all modes of operation	**130,032**	**130,235**	**129,399**	**128,204**	**127,711**

Table D.4 Decision on revenue required for annual operating expenditure in full operation mode without a carbon pricing scheme ($million, $2011/12) – corresponds to Table 6.1

	2012/13	2013/14	2014/15	2015/16	2016/17
SDP submission (includes energy Network Charges					
Fixed Operating Costs	31.0	34.7	37.8	37.3	35.1
SDP additional proposed (insurance risks)	1.5	1.5	1.5	1.5	1.5
Variable Operating Costs	49.5	51.3	52.7	53.5	54.2
Total	**82.0**	**87.6**	**92.0**	**92.2**	**90.8**
IPART decision (excludes energy network charges)					
Plant fixed operating costs	21.1	23.9	26.2	26.8	26.1
Plant variable operating costs	47.6	51.2	54.9	55.4	56.1
Pipeline operating costs	0.1	0.1	0.1	0.1	0.1
Total	**68.7**	**75.1**	**81.1**	**82.2**	**82.2**

Table D.5 Decision on revenue required for daily operating expenditure for each mode without a carbon pricing scheme ($ per day, $2011/12) – corresponds to Table 6.2

	2012/13	2013/14	2014/15	2015/16	2016/17
IPART decision (excludes energy Network Charges)					
Plant Operation /day	188,144	205,871	222,085	224,646	225,341
Short term shutdown/day	40,901	52,956	60,195	61,016	60,352
Medium Term shutdown /day	57,245	67,493	82,291	75,169	77,502
Long term shutdown/day	47,988	48,255	49,076	49,194	51,768
Water security /day	38,192	38,468	40,011	39,284	37,948
Pipeline – all modes of operation	**282**	**282**	**282**	**282**	**282**

Table D.6 IPART decision on energy costs– including carbon pricing impacts ($/MWh, $2011/12) – corresponds with Table 7.1

	2012/13	2013/14	2014/15	2015/16	2016/17
Variable energy costs					
Wholesale Electricity ($/MWh)	42.82	45.2	46.13	44.99	44.25
REC ($/MWh)	58.9	61.26	63.71	66.26	68.92
SRES and other costs ($/MWh)	7.65	5.17	5.22	5.29	5.37
Total Efficient Energy Cost ($/MWh)	109.37	111.63	115.06	116.54	118.54
Network costs					
Fixed	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology
Variable	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology	Actual costs past through via a methodology

Glossary

2008 Sydney Water Determination	IPART, Review of prices for Sydney Water Corporation's water, sewerage, stormwater and other services, From 1 July 2008, Water – Determination and Final Report
2012 determination period	The period from July 1 2012 to June 30 2017
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
CAPM	Capital asset pricing model
Carbon pricing scheme	Term for government policy pricing carbon emissions, such as the scheme included in the Clean Energy Future package
Degremont	Degremont Ltd
FNC	Network charges associated with daily charges, these consist of a fixed network charge and a variable network charge commensurate with the amount of electricity being used
Force majeure event	Any event or circumstances which reduces the amount of desalinated water the plant is capable of supplying, is outside the reasonable control of SDP and could not have been prevented, avoided or overcome by SDP
Frontier	Frontier Economics
Full operation mode	Term for the operational mode where the plant is producing water
GWh	Gigawatt hour
Halcrow	Halcrow Pacific Pty Ltd
IPART Act	Independent Pricing and Regulatory Tribunal Act 1992
kL	Kilolitre

Long term restart mode	Term for the operational mode where the plant is being restarted from a period of not producing water of between 91 days and 2 years
Long term shutdown mode	Term for the operational mode where the plant is not producing water for between 91 days and 2 years
LRMC	Long run marginal cost
Medium term restart mode	Term for the operational mode where the plant is being restarted from a period of not producing water of between 11 and 90 days
Medium term shutdown mode	Term for the operational mode where the plant is not producing water for between 11 and 90 days
ML	Megalitre
MRP	Market risk premium
O&M	Operating and maintenance
OEH	NSW Office of Environment and Heritage
Ofwat	The Water Services Regulation Authority (England and Wales)
Ofwat's PR09	Ofwat's Price Review 2009
RAB	Regulated asset base
RECs	Renewable Energy Certificates
RET	Renewable Energy Target
SCA	Sydney Catchment Authority
SDP	Sydney Desalination Plant Pty Limited
SFG	Strategic Finance Group Consulting
Short term restart mode	Term for the operational mode where the plant is being restarted from a period of not producing water of between 2 and 10 days
Short term shutdown mode	Term for the operational mode where the plant is not producing water for between 2 and 10 days
SLA	Service level agreement

SOC Act	State Owned Corporations Act (1989)
Sydney Water	Sydney Water Corporation
The Centre	The National Centre of Excellence in Desalination Australia
VAA	Value Adviser Associates
Veolia	Veolia Water Australia Pty Ltd
VNC	Variable network charges that are related to the variable electricity used in water production
WACC	Weighted average cost of capital
Water security mode	Term for the operational mode where the plant is not producing water for longer than 2 years
Water security restart mode	Term for the operational mode where the plant is being restarted from a period of not producing water of longer than 2 years
Water Service Charge	Fixed daily charge that applies during the full operation period
Water Usage Charge	Variable water charge that applies for every megalitre of water supplied to SDP's customers
WICA	Water Industry Competitionp2006 (NSW)