frontier economics

Economic justification for SDP's long-term energy contracts

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Disclaimer

Contents

Tables

Figures

Boxes

1 Executive summary

1.1 About this report

Electricity is one of the largest costs of the Sydney Desalination Plant (SDP). SDP's 2006 Project Approval from the Minister for Planning (Project Approval) required that prior to commencement of operation of the plant it develop and submit for the approval of the Director-General of Planning (the Director-General) a Greenhouse Gas Reduction Plan (GGRP) that includes, amongst other elements, a specified outcome that the plant will be powered by 100% renewable energy, or equivalent.[1]

Sydney Water[2] submitted the GGRP in 2009, which was approved by the Director-General in December 2009. Amongst other elements, the approved GGRP outlined SDP's contracts with Infigen Energy Limited (now Iberdrola[3]) to meet its renewable energy requirements. These contracts include fixed price agreements for the supply of electricity and Renewable Energy Certificates (RECs) and a Project Deed to ensure the construction and operation of the Capital Wind Farm, all running until 2030.[4] Throughout this report, we often refer to these contracts collectively as SDP's energy contract or renewable energy contract.

SDP is required to comply with the conditions of its Project Approval, including in relation to the GGRP.

Nevertheless, this report considers:

- whether, in developing the GGRP to meet the Project Approval requirements for the plant to be powered by 100% renewable energy, there was economic justification for a long-term renewable energy contract in the circumstances faced by SDP, and for a long-term contract of the form SDP entered (ie, a Power Purchase Agreement for fixed volumes, at fixed prices)
- the implications of this for IPART's assessment of SDP's energy cost allowance when it is setting SDP's notional revenue requirement and prices.

1 The Project Approval is available at: https://sydneydesal.com.au/wp-content/uploads/2006-project-approval-desalination-plant.pdf

2 In 2006, Sydney Water Corporation (a State-Owned Corporation) was the proponent of the desalination plant, and (in consultation with other government agencies) developed and submitted its GGRP. Sydney Water established SDP as a wholly owned subsidiary company, before the NSW Government sold a 50-year lease of the plant in June 2012 to a consortium that is now Ontario Teachers' Pension Plan and Utilities Trust Australia. For simplicity, throughout this report we refer to 'SDP' in discussing activities related to the planning, development and approval of SDP, even though it may have been Sydney Water (as then owner of SDP) that undertook the relevant activity – e.g. development and submission of the GGRP.

3 And referred to throughout this report as Iberdrola.

4 Sydney Water, Sydney's Desalination Plant Greenhouse Gas Reduction Plan, November 2009, p 17, available at: https://sydneydesal.com.au/wp-content/uploads/greenhouse-gas-reduction-plan.pdf

1.2 Key context

IPART assesses the efficiency of expenditure based on the circumstances and information prevailing at the time the expenditure or decision to incur the expenditure is incurred.

Below we outline key context in considering the economic justification for SDP entering its long-term renewable energy contract.

1.2.1 The need for the Sydney desalination plant

The desalination plant was developed in response to the Millennium Drought when Greater Sydney's water storages fell to 33% of their capacity and there were major concerns over Greater Sydney's water security.

While the Millennium Drought drove the urgency to develop a desalination plant to address immediate water security concerns, the government was also concerned that extended periods of low inflows into Greater Sydney's water storages would become more regular or more extreme because of climate change. The development of a desalination plant was seen by the NSW Government as a means of making the water supply system more resilient in the face of climate change, along with a range of other water conservation measures that were recommended in the 2006 Metropolitan Water Plan to enhance long-term water security for Greater Sydney.

1.2.2 The conditions of Project Approval

Alongside concern over Greater Sydney's water security, there was also significant public debate about the form and function of the National Electricity Market (NEM) and how Australia was to achieve its international commitments to reduce carbon emissions from a system dominated by carbon-intensive fossil fuel powered generators.

The NSW Government was responsive to growing concerns about climate change and recognised that the operation of a desalination plant powered primarily by fossil fuel would make it more difficult for Australia to reduce its greenhouse gas emissions.

In response to these concerns, the NSW Government committed to power the desalination plant with renewable energy. In practice, this meant that any power consumed by the plant would be offset by additional renewable generation – which would displace, over time, an equivalent amount of electricity produced from a fossil fuel power station.

Consistent with the Government's commitment, a key requirement of the conditions of the plant's Project Approval was that SDP had to prepare, submit and gain NSW Government approval for a Greenhouse Gas Reduction Plan (GGRP). Amongst other factors, this plan was to ensure the desalination plant is powered by 100% renewable energy, or equivalent, over its life.

1.2.3 Significant uncertainty in the renewable energy market

At the same time, the outlook for the renewable energy market was uncertain. There was (and continues to be) divergent views between (and at times within) the major political parties on the best way to tackle climate change and energy policy, and hence significant uncertainty around

the renewable energy 'market' and the associated renewable energy / emission reduction schemes designed to encourage investment in renewable energy.

For instance, at the time that SDP was developing its GGRP, it was far from clear that there would be any long term functional renewable energy / emission reduction schemes, with serious questions about the longevity and nature of the two existing schemes at the time – the NSW Greenhouse Gas Abatement Scheme (GGAS) and the Commonwealth Renewable Energy Target (RET) scheme.

1.2.4 Large fixed, sunk costs of desalination plants and renewable energy generators

The desalination plant is characterised by large fixed and sunk costs – which includes the cost of the plant itself and the costs of tunnels and pipelines to draw raw seawater and to connect the desalination plant at Kurnell to Sydney Water's network at Erskineville. Once these costs are incurred, they cannot be avoided.

The desalination plant's largely fixed cost structure increased the commercial importance of it complying with its Project Approval. In turn, this increased the commercial importance of it securing a reliable, ongoing source of renewable energy. SDP could not commence operation of the desalination plant until its GGRP was approved, and then if the conditions of its Project Approval were not met or breached after its sunk costs were incurred this would put its investment at risk.

Similarly, renewable energy generators, including wind farms, are also characterised by large fixed and sunk costs. This means they are unlikely to invest without certainty that their revenues will recover their fixed, sunk costs. To do this, wind farm proponents typically seek to sign long-term contracts —covering both the energy and renewable certificates—with customers prior to committing capital to the investment.

Given this, and the state of the energy market at the time, SDP would have been unlikely to find a guaranteed long-term source of renewable energy (consistent with its Project Approval requirement to develop a GGRP to ensure the plant would be powered by 100% renewable energy or equivalent) without committing to a long-term contract with a renewable energy generator.

Considering the above, SDP's long-term energy contract can effectively be considered a fixed, sunk cost of establishing and operating the desalination plant – like the costs of the plant itself and its pipelines. As discussed below, this has implications for how IPART should assess SDP's contracted energy costs and set its energy cost allowance in determining SDP's regulated prices.

1.3 Findings

As summarised below, we find there is economic justification for a long-term renewable energy contract of the form SDP entered, given the circumstances at the time SDP executed its contract.

Given this, we consider that IPART should assess the efficiency of SDP's energy contract based on the circumstances prevailing at the time it was executed (akin to how it assesses the efficiency of capital expenditure) and reflect its findings of this assessment in SDP's energy cost allowance when setting its prices.

1.3.1 There is economic justification for a long-term renewable energy contract in the circumstances faced by SDP

In response to the conditions of its Project Approval and the above circumstances, SDP concluded a long-term (20-year) contract with Infigen Energy (now Iberdrola[5]) to supply electricity and renewable energy offsets (or RECs) at fixed prices from a dedicated asset built in respect to the contract – the Capital Wind Farm.

Given the large fixed and sunk costs of the desalination plant itself, the need for SDP to assure its compliance with the conditions of its Project Approval to develop a GGRP that ensured the plant is powered by 100% renewable energy and the uncertain outlook for the renewable energy market, there was economic justification for SDP to enter such a long-term renewable energy contract.

The uncertain outlook for the renewable energy market created a risk that unless SDP entered such a long-term contract for guaranteed renewable energy:

- it could not meet the conditions of its Project Approval – which would put the large, upfront/sunk investment in the desalination plant and associated assets at risk, and/or
- the costs of meeting the conditions of its Project Approval would be high – due to high transactions costs in an illiquid and/or uncertain renewable energy market.

Similarly, given the large fixed, sunk costs of the Capital Wind Farm and the uncertain outlook for the renewable energy market, a long-term contract that guaranteed revenue to the windfarm's investors was likely necessary for investment in the windfarm (or any other potential long-term sources of guaranteed renewable energy at the time) to occur.

That is, to facilitate and protect its investment in the desalination plant (by assuring its compliance with the conditions of its Project Approval) and avoid potentially high transaction costs in engaging with an uncertain and illiquid renewable energy market, SDP entered a long-term contract to underwrite the Capital Wind Farm, which was akin to its own complementary investment or vertical integration.

As outlined in this report, in such circumstances the decision to enter such a long-term contract is supported by economic theory. This is because it can be an efficient way to manage risks and transaction costs given the importance of a reliable supply of renewable energy to the desalination plant and the uncertain outlook for the renewable energy market at the time. That is, the economic literature suggests that a long-term contract can be an efficient way of dealing with risk, managing transaction costs and accommodating investment, particularly when investing large fixed and sunk costs into a business that would otherwise be dependent on an input from an illiquid and uncertain market (as discussed further below).

This theory is also supported by the practices of entities in similar circumstances (including other desalination plants around Australia at the time) – ie, entities with large energy requirements and fixed costs will often seek long-term procurement – and regulatory precedent. Further, in 2017 IPART's own consultant, Marsden Jacob, found SDP's energy contracts to be prudent, given SDP's

[5] And referred to throughout this report as Iberdrola.

requirement for 100% renewable energy and the risks of being uncontracted and attempting to secure contracts when required.[6]

We further explain the economic case for SDP's long-term energy contract below.

Transaction costs and risks are an important consideration in assessing options to meet the conditions of Project Approval

To develop a GGRP to comply with the conditions of Project Approval, SDP considered a range of options, including an agreement with a retailer or some other third party to organise its electricity supply arrangements, buying energy and renewable certificates on an ongoing basis in the open market, or a power purchase agreement, which is a long-term direct commercial arrangement between SDP and the power supplier.

These options could be seen as representing choices between organisational structure. That is, how an organisation should structure itself to operate in terms of the extent to which it 'buys' versus 'makes' inputs. SDP could choose to 'buy' from the market (eg, via a short-term contract) or effectively 'make' (or vertically integrate) through entering a long-term contract that underwrote the development of a renewable generator and hence guaranteed its supply.

In choosing between these options, transaction costs are an important consideration. Transaction cost economics provides a well-developed and accepted framework for considering the efficiency of SDP's decisions with respect to its energy contract (see Box 1).

[6] Marsden Jacob Associates, Final Report Reviewing Energy Costs for Sydney Desalination Plant (SDP), Report Prepared for IPART, p 53, February 2017.

Box 1: Transaction costs and their implications for organisational structure

In *The Nature of the Firm*[7], Nobel Prize winning (1991) economist Ronald Coase developed an economic framework for explaining why different forms of organisational structures could be efficient. Coase explained that it could be efficient if firms *made* instead of *bought* inputs, and vice versa. Differences in organisational structures can be explained by what Coase referred to as *transaction costs*.

Transaction costs are the costs involved in organising the formation of inputs required to produce goods and services. These costs include the costs of coordinating factors of production, searching for the best deal, negotiating, contracting, assessing and deciding between options, and dealing with contingencies.

Transaction cost theory can be used to predict when firms choose to buy or make their own inputs. The economist Oliver Williamson (1981, 1991), who was also a Nobel Prize winner for his work on transaction costs, theorised that when the transaction costs of supplying an input to a production process were high, these inputs would more likely be made by the producer.[8] Conversely, when transactions costs are low, buying the goods or services on the open market was the preferred option.

Each option available to SDP would have had different risks, benefits and costs for SDP – including different transaction costs. The renewable energy obligations imposed on SDP in the conditions of its Project Approval had a major bearing on the nature and scope of these potential transaction costs, as failure to ensure the plant was powered by renewable energy (or equivalent) over its life would put the large, upfront/sunk investment in the desalination plant and associated assets at risk.

The state of the renewable energy market would have had a major bearing on transaction costs and risks

The state of the renewable energy market also had a major bearing on transaction costs – which are generally higher when participating in less developed, less liquid and more volatile markets. In this context, it is important to recognise that at the time that SDP was considering its renewable energy supply options there was great deal of uncertainty about the future shape of the National Electricity Market (NEM), especially in respect of the role of carbon pricing and the future of State and Commonwealth renewable energy schemes. Indeed, this debate continues today.

SDP's GGRP could have proposed that it uses a series of short-term contracts to procure renewable electricity. However, it is uncertain whether such a GGRP would have been approved,

7 Coase, R. (1937) The Nature of the Firm, Economica, Vol 4, Issue 16, November, Wiley Online, pp 386-405. Weblink: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1468-0335.1937.tb00002.x

8 Oliver E. Williamson (1981). "The Economics of Organization: The Transaction Cost Approach" *The American Journal of Sociology*. Vol. 87 No. 3: pp 548–577.

Williamson, Oliver E. (1991). *The Nature of the Firm origins, evolution and development*, New York: Oxford University Press.

particularly given the uncertain outlook for the renewable energy market at the time. And, if approved by the Director-General, that would leave SDP with the constant search, negotiating, contracting, coordination and transaction costs of ensuring it could source sufficient renewable energy over the life of the plant. It was reasonable for SDP to seek to manage its transactions costs, and its risk of not complying with the conditions of its Project Approval, given the market was in a state of flux, with no settled policies and no sign of settled policies.

A potential alternative to a series of short-term contracts may have been for SDP to build and operate a renewable energy generation plant itself. However, this would have required SDP to develop or purchase technical and operational capabilities that it did not have or to contract with a plant operator and bear the costs associated with tendering, evaluating proposals and negotiating the contract(s) and then managing the contract(s) over the course of their life. Moreover, SDP would have had to take on considerable additional borrowings to develop the plant and the transaction costs associated with financing and insurance. SDP would also have to manage the costs of refinancing over time as well as dealing with the constantly changing policies and regulations associated with operating a renewable energy generator.

SDP chose the option of a long-term, fixed price contract with a specialist developer/operator of wind generators – Iberdrola. This option allowed SDP to concentrate its transactions costs upfront through a competitive tender for the supply of renewable power, which resulted in a long-term, fixed price contract. This approach avoided the constant transactions costs associated with short-term contracts or formal ownership.

The financial effect of SDP signing a long-term, fixed price contract with Iberdrola was that it gave the developer the commercial confidence required to develop the Capital Wind Farm at a time when there was a great deal of uncertainty surrounding the market for renewable generators. That is, the development of the Capital Wind Farm was a direct consequence of the long-term, fixed price contract that SDP signed with Iberdrola. This meant that SDP could unambiguously satisfy the criteria of additionality over the life of the project (referred to in the Project Approval) and avoid the transactions costs of having to consider and address, for example, how short-term contracts over time relate to this criteria (which would become increasingly complex and difficult as progressively all new generation is from renewable sources).

SDP's long-term contract is consistent with what economic theory predicts for a critical input, sourced from an illiquid or uncertain market with high transaction costs

SDP's behaviour with respect to the way it organised its energy contract is consistent with what the economics literature suggests is an efficient choice for such a critical input, having regard to transaction costs and the state of, and uncertain outlook for, the renewable energy market at the time. SDP chose the option that minimised its transactions costs – a long-term contract that avoided the high costs of constantly searching, negotiating, contracting and coordinating a series of short-term contracts that exposed SDP to potentially material costs in meeting its obligation to be powered by 100% renewable energy over its life.

Not only did SDP choose an approach that was economically efficient, the NSW Government approved this approach by approving the GGRP.

1.3.2 IPART should assess the efficiency of SDP's long-term renewable energy contract based on the circumstances prevailing at the time

The standard practice of economic regulators is to set prices to allow a regulated business to recover its efficient costs of supply. In doing so, economic regulators are mindful to assess the efficiency of fixed, sunk costs based on the *circumstances prevailing and information available at the time the costs were incurred*. This practice aims to provide incentives for businesses to invest prudently, without imposing undue risk on the business and hence stifling investment.

It would not be good practice, or in the long-term interests of customers, to conduct an ex-post review of necessary sunk costs based on what may be 'efficient' in present day circumstances, after the cost has been incurred. Such ex-post optimisation would undermine confidence in the regulatory regime, which would mean that businesses are more reluctant to invest in infrastructure or they require greater compensation for doing so (eg, through a higher return on investment).

This point is recognised in IPART's Discussion Paper on *Encouraging Innovation in the Water Sector*, where it notes that if ex-post adjustments to capital expenditure become commonplace, "businesses might be reluctant to make necessary investments or might seek a higher WACC."[9] IPART's Draft Report on its Regulatory Framework maintains its position that ex-post reviews of capital expenditure should only occur by exception.[10]

This standard economic practice of assessing fixed, sunk costs based on the *circumstances prevailing and information available at the time the costs were incurred* is directly relevant to the regulatory treatment of SDP's energy contracts. In our view there are sound economic reasons that indicate that at the time, signing a long-term contract to procure energy for the desalination plant was an efficient means of ensuring the plant is powered by 100% renewable energy, as per the conditions of its Project Approval.

A long-term contract is effectively a sunk investment in the desalination plant, deemed necessary to efficiently comply with the condition of SDP's Project Approval that it develops, and receives approval for, a GGRP that ensures it is powered by 100% renewable energy over its life. Given this, IPART should assess SDP's energy contract akin to how it conducts ex-post reviews of sunk capital expenditure. That is, it should assess the efficiency of SDP's energy contract based on the circumstances *prevailing at the time* the contract was executed and reflect its findings in SDP's energy cost allowance when setting its regulated prices.

In this context, we note that:

- SDP (then Sydney Water, in consultation with other government agencies) followed an extensive competitive procurement process in arriving at its decision to enter this contract, and
- IPART's own consultant found the contract to be prudent given the circumstances faced by SDP.

9 IPART, *Encouraging Innovation in the Water Sector, Discussion Paper*, August 2021, pp 29-30.

10 IPART, Draft Water Regulatory Framework: Technical Paper, May 2022, p 47.

In the absence of any evidence to suggest that SDP's long-term, fixed price contract with Iberdrola was inefficient given the circumstances prevailing at the time, IPART should allow the costs of this contract to be recovered from SDP's regulated prices to its customer (Sydney Water), with appropriate adjustments under the Energy Adjustment Mechanism to manage key volume and price risks beyond SDP's control.

This does not necessarily mean that SDP's efficient energy costs should be added to its Regulatory Asset Base (RAB). Given SDP's periodic payments to Iberdrola and the workings of the Energy Adjustment Mechanism (EAM), it is simplest and most appropriate for these costs to be recovered as operating expenditure in the regulated cost base.

If IPART does not recognise SDP's energy costs as a sunk cost, and instead sets SDP's energy cost allowance according to a contemporary benchmark price, or one that ignores the costs of managing the risks of investing a large amount into a fixed and sunk cost investment, then it risks undermining investment certainty within the regulatory regime.

1.4 The rest of this report

This report is structured as follows:

- Chapter 2 outlines IPART's regulatory role, its terms of reference, issues for it to consider in determining efficient costs and cost allowances, its approach to setting SDP's energy cost allowance to date and implications for its determination of SDP's energy cost allowance if it agrees there is economic justification for SDP's long-term energy contract
- Chapter 3 discusses key elements of the circumstances prevailing at the time SDP entered its long-term energy contract, including the conditions of its Project Approval, and the state of, and uncertain outlook for, the energy market
- Chapter 4 considers the cost structures of SDP and renewable energy generators, which is relevant for the economic justification for the type and form of SDP's energy contract
- Chapter 5 presents the economic justification for the type and form of SDP's energy contract.
- Chapter 6 summarises our key conclusions.

2 IPART's regulatory role

SDP's prices are regulated by the NSW Independent Pricing and Regulatory Tribunal (IPART). This chapter discusses IPART's regulatory role and the key issues it is required to consider, including the importance of ensuring that IPART sets prices to allow SDP to recover its efficient costs.

2.1 The framework for IPART's determinations of SDP's prices

In making its decisions about what desalination costs should be passed through to consumers, IPART is required to comply with the Terms of Reference (ToR) for its determination of SDP's prices, relevant sections of the *Independent Pricing and Regulatory Tribunal Act 1992* (the IPART Act) and the Water Industry Competition Regulation 2008.

IPART should also ensure that its determination is consistent with key Government policies and plans – such as the Greater Sydney Water Strategy (as it has previously done with the Metropolitan Water Plan).

The first pricing principle in the ToR requires IPART to consider how to set prices so that the expected revenue covers the *efficient* cost of providing the services. In addition, section 15(1)(e) of the IPART Act requires IPART to have regard to the need for greater efficiency in the supply of services to reduce costs for the benefit of consumers and taxpayers.

2.2 IPART's assessment of efficient costs

In assessing the efficiency of a water business' actual and forecast expenditure, IPART considers the information available to the business at the relevant point in time. That is, according to IPART:

- "for forecast operating and capital expenditure, we assess whether the proposed expenditure is efficient given currently available information
- for historical capital expenditure, we assess whether the actual expenditure was efficient based on the information available to the utility and the circumstances prevailing at the time it incurred the expenditure".[11]

This is critical in the consideration of SDP's electricity contract. SDP had to make a decision about its electricity supply arrangement to incorporate in the GGRP, in compliance with the conditions of its Project Approval, so that it could secure the government's approval to operate the desalination plant. The efficiency of this expenditure decision should be assessed based on the *information available to the utility and the circumstances prevailing at the time it incurred the expenditure.*

[11] IPART, *Guidelines for Water Agency Pricing Submissions*, November 2020, p 18.

In determining what is efficient, IPART should also have regard to all forms of cost efficiency (see Box 2), and it may have to make trade-offs between these forms of efficiency in making its regulatory decisions. Regulation that focusses on static efficiency (or short-term cost minimisation) and has little regard to dynamic (long-term) efficiency may result in an overall less efficient outcome, and not just for the current regulatory determination. Reputational effects can and do spill over to other entities and sectors.

In assessing efficient expenditure (and expenditure decisions), IPART should also consider transaction costs, which have a static and dynamic dimension. As identified in Chapter 5, transaction costs are incurred in organising the formation of inputs required to produce goods and services. These include the costs of coordinating factors of production, searching for the best deal, negotiating, contracting, assessing options and dealing with contingencies.

Depending on the expected size of these transaction costs, producers may decide to internalise the provision of inputs to their production process (in this case, SDP would build and operate its own renewable generator), or they could choose to "buy-in" inputs. If SDP chose to buy inputs, it could enter a series of short-term or long-term arrangements (although long-term arrangements are often akin to the business making or internalising inputs). The choice between these will depend on which is expected to be cheaper over the long-term, having regard to all risk adjusted costs, including transactions costs.

SDP considered short and long-term arrangements and their respective risks, benefits and costs to SDP – including different transaction costs – and chose the option of a long-term energy contract because it was considered the most economically efficient option to meet the NSW Government's condition of Project Approval.[12] SDP's long-term contracting strategy was included in its GGRP, which was subsequently approved by the NSW Government and therefore formed part of its conditions of approval to operate the plant.

[12] That SDP develop, and obtain approval for, a GGRP that ensured the plant would be powered by 100% renewable energy, having regard to (amongst other things) cost, certainty of supply, flexibility and additionality in the long-term.

Box 2: The different forms of economic efficiency

It is well understood that there are different dimensions to economic efficiency:

- **Productive (technical) efficiency** – this is concerned with maximising the quantity of output from a given quantity of inputs or minimising the quantity of inputs used to produce a given quantity of outputs. Productive efficiency can be decomposed into pure technical efficiency, factor allocative efficiency, scale efficiency and factor congestion efficiency. The product of these different efficiencies determines overall productive efficiency.
- **Allocative efficiency** – this relates to the extent to which resources have been used in a way to produce things that are valued most in the economy.
- **Dynamic efficiency** – this refers to improving productive and allocative efficiency over time. Dynamic efficiency is the prime way an economy improves its productivity over time through investment in new technologies, education and innovation.

Productive and allocative efficiency are static concepts in that they are concerned with these dimensions of efficiency at a point in time. By contrast, dynamic efficiency is, by definition, intertemporal in nature.

2.3 The rationale for economic regulation

Economic regulation generally applies to natural monopolies, with the aim of regulating their prices and performance to replicate (as much as possible) the outcomes of competitive markets, to promote the long-term interests of customers. This is achieved through ensuring that prices reflect the efficient costs of delivering services that customers want and need.

Setting prices to recover efficient costs should protect customers against potential monopoly pricing practices and send efficient price signals. Notably, it should also provide regulated businesses with confidence that they will be able to recover the efficient costs of their investments – particularly their efficient sunk costs. If this is not the case, they may be reluctant to invest in important infrastructure or require a higher rate of return to invest – neither of which would be in the long-term interests of customers.

As Viscusi, Harrington and Sappington identify:

> *"If a firm is forced to serve unprofitable markets for a considerable time, it may have difficulty attracting investment capital. If meagre earnings or even bankruptcy are deemed likely, investors will only supply capital to the firm if they are promised relatively high returns. Such promises increase the firm's cost of capital, which typically induces the firm to reduce investment. The reduced investment, in turn, can lead to reduced capacity, productivity and product quality."*[13]

[13] Viscusi, K. W., J. E. Harrington & D. E. M. Sappington (2018), *Economics of Regulation and Antitrust*, 5th edition, The MIT press. p 601.

Economic regulation can serve the interest of customers over the long-term by establishing an environment that promotes efficient investment by regulated businesses. It can do this by providing regulated businesses with confidence that they will be able to recover their efficient fixed and sunk costs through regulated prices (instead of setting prices according to a contemporary benchmark price, or one that ignores the efficient costs of managing the risks of investing a large amount into a fixed and sunk cost investment).

Panzar notes that, in the absence of some guarantee that efficient sunk costs (at the time of sinking the costs) will be recovered through the regulatory process over the life of the project, investors will be reluctant to commit to invest in projects that are otherwise welfare maximising.[14] Even if this threat of expropriation does not deter investment, the very presence of this threat will increase the riskiness of the investment, which should increase the cost of capital and, hence, prices.

This issue is also recognised by IPART in its recent Discussion Paper on Encouraging Innovation in the Water Sector. In explaining why it will only make ex-post reductions to a business' actual capital expenditure "by exception" (when setting expenditure allowances), IPART notes that:

- the consequences of cutting past expenditure are more risky than future expenditure, given the business has no opportunity to retrospectively change its decisions and be more efficient, and
- ex-post cuts to capital expenditure would introduce "an added degree of regulatory uncertainty and risk. If ex post adjustments became commonplace, businesses might be reluctant to make necessary investments or might seek a higher WACC."[15]

2.4 IPART's assessment of SDP's energy costs to date

To date, IPART has set SDP's prices to enable it to recover the fixed and sunk costs of the desalination plant and associated pipeline. That is, IPART assessed the efficiency of these costs based on the circumstances at the time they were incurred and included and rolled forward the efficient costs in the regulatory cost base.

However, IPART has not considered SDP's energy costs in the same way, even though SDP has a long-term, fixed price energy supply contract with Iberdrola, which has cost characteristics very similar to the desalination plant. IPART's practice has been to set SDP's energy cost allowance at each price review based on a mark-to-market basis. This means that at times SDP's energy cost allowance in its price determination could be higher or lower than what SDP pays Iberdrola under its fixed price contract.

If it can be shown that it was an efficient decision for SDP to enter a long-term, fixed price contract with Iberdrola to support the development of the desalination plant - a contract that has fixed prices that reflect the fixed cost nature of the renewable plant that Iberdrola built off the back of the contract - then IPART should treat the costs of this energy contract in a similar manner to the way it treats the fixed and sunk costs spent on the desalination plant itself.

14 Panzar, J. (2012) "Regulatory Economics, Thirty Years of progress?", 13th ACCC Regulatory Conference 2012, lessons Learned and New Approaches, Brisbane, Qld, 26 July, p12.

15 IPART, *Encouraging Innovation in the Water Sector*, Discussion Paper, August 2021, p 30.

That is, if SDP's long-term, fixed price contract with Iberdrola was a prudent and efficient decision given the circumstances at the time, then IPART should allow the costs of this contract to be recovered from SDP's regulated prices to its customer (Sydney Water), with SDP's regulated prices adjusted for gains and losses from the sale of surplus energy and RECs through the Energy Adjustment Mechanism.

3 The circumstances at the time

In assessing the economic efficiency of a regulated business' expenditure, it is important to consider the information available to the business and the circumstances prevailing at the time it incurred the expenditure.

As outlined in Chapter 2, this is generally recognised in IPART's approach to assessing efficient expenditure – which is based on the information and circumstances prevailing at the time the business incurs the expenditure (or develops the expenditure forecast).

Below we outline key elements of the circumstances prevailing around the time SDP executed its long-term energy contract. These are relevant in considering the economic efficiency of such a contract – as they impact on its risks, benefits and costs (including transaction costs), relative to other options.

3.1 The conditions of Project Approval

Commitments to develop Australia's desalination plants on the Gold Coast (2005), Sydney (2006), at Wonthaggi in Victoria (2007), Adelaide (2007) and Perth (2004) occurred in response to the Millennium Drought, which was at its most intense from 2003 to 2009.

At the same time, Australia was in the midst of an intense debate about Australia's response to concerns about climate change.

As is widely known, desalination plants use a large volume of electricity to produce drinking water. This became a politically sensitive issue because of the additional difficulties it would create for meeting various international emission reduction commitments if these desalination plants were powered by conventional thermal power plants.

The State governments developing desalination plants were under significant political pressure to ensure that these energy intensive plants were powered from renewable energy sources.

The NSW Government established a governance regime to guide the development of the desalination plant. This regime was based on the conditions of SDP's Project Approval, which SDP had to satisfy before the NSW Government would issue development approval of the desalination plant. One of the conditions of Project Approval was the requirement for the proponent (then Sydney Water) to develop and submit for approval a Greenhouse Gas Reduction Plan (GGRP).[16]

The conditions of Project Approval included several requirements the GGRP had to satisfy (see Box 3). Of these, there were two conditions that were particularly influential over the nature of the investment choices made by SDP, with resulting risks, benefits and costs. The first of these is Condition a). This condition states that the plant had to be powered by 100% renewable energy, "or equivalent". The second of these was Condition e). This condition sets out a range of factors

[16] Sydney Water (2009), Sydney's Desalination Plant Greenhouse Gas Reduction Plan, November 2009, Website: https://sydneydesal.com.au/wp-content/uploads/greenhouse-gas-reduction-plan.pdf

that SDP must consider and manage so that Condition a) is achieved. These factors include availability, certainty, flexibility, adaptability, additionality and any co-benefits.

Box 3: Conditions of Project Approval

Prior to the commencement of operation of the desalination plant project, the Proponent shall develop and submit for the approval of the Director-General, a Greenhouse Gas Reduction Plan to detail a strategic plan for the management, minimisation and off-set of greenhouse gas generation associated with electricity supply to the desalination plant. The Plan shall be consistent with the Plan detailed in the Proponent's Statement of Commitments and shall include, but not necessarily be limited to:

a) a specified outcome that the desalination plant will be powered by 100% renewable energy, or equivalent;

b) details of how renewable energy will be purchased, such as using "Green Power", or equivalent;

c) details of relevant regulatory requirements with respect to energy and greenhouse gases, and a system for managing change in these requirements over time;

d) a monitoring and recording system to track the energy consumption of the desalination plant project and the resultant equivalent emissions of carbon dioxide;

e) a framework for considering and managing factors such as availability, certainty, flexibility, adaptability, additionality and any co-benefits of options identified and/ or applied to achieve the outcome specified under a) above;

f) a framework and management principles for accommodating any shortfalls in the availability of renewable energy that may occur from time to time;

g) systems to monitor and audit the processes, procedures and outcomes stipulated under the Plan; and

h) a program for periodic review of the energy performance, and consideration of additional or improved energy efficiency measures that may be reasonably applied from time to time to ensure efficient energy use.

Source: 2006 Project Approval, Desalination Plant.

3.2 SDP's response to the conditions of Project Approval

In 2007 the NSW Government asked Sydney Water to chair a committee of representatives from various NSW Government agencies to develop criteria and assess the available electricity supply options. The resulting criteria were:

- Certainty of delivery – contractual certainty that greenhouse gas abatement is delivered when required
- Additionality – there is additional renewable energy being produced and supplied onto the electricity grid equal to the electricity consumption of the desalination plant

- Flexibility to accommodate desalination plant operating regimes, which may change significantly from year to year
- Adaptability to future policy and market environments
- Cost, in terms of $/tonne greenhouse gas abated
- Management complexity of implementation (for SDP)
- Transparency and verifiability of abatement
- Competitiveness of markets
- Communications, including the ability for abatement to be articulated to stakeholders, and
- Co-benefits, including the existence of benefits beyond the primary outcome of greenhouse gas abatement.[17]

After applying these criteria, the intergovernmental committee's short-listed options to meet the objective of powering the plant by 100% renewable energy were:

- a supplier of accredited GreenPower (such as an electricity retailer)
- a renewable energy generator through a power purchase agreement
- a specific renewable energy generator via a third-party trader (such as an electricity retailer), or
- market purchases of electricity and renewable energy certificates (RECs).

This was a comprehensive list of the options available both at the time and presently.

In November 2007, Sydney Water issued a Request for Proposals for the supply of 100% renewable energy to the desalination plant. The proposals were assessed against the above-mentioned criteria. The GGRP also noted the procurement process was "shaped by consideration of the market for renewable energy in Australia as well as the likely operating characteristics and regulatory requirements of the desalination plant."[18]

Six proponents were short-listed to receive a Request for Tender (RFT) in January 2008. In response, all tenders relied on wind power as the primary source of renewable energy certificates.

In mid-2008, SDP signed 20-year, fixed price contracts with Infigen for electricity and Renewable Energy Certificates (RECs) and a Project Deed for the construction and operation of the Capital Wind Farm.[19]

That is, in the face of uncertainties in the energy market (see below), and potentially high transaction costs of managing a very complex policy environment, SDP decided to strike an arrangement for the development of a renewable generator.

17 Ibid, p 9.

18 Ibid, p 9.

19 Ibid, p 17.

In a submission to IPART as part of the 2012 determination, SDP argued that this physical supply option was economically efficient at the time, citing the fact that when the electricity contract was signed the market prices for RECs was slightly higher than the price in the agreement. However, SDP noted that prices were highly volatile and largely reflected actual or expected changes in legislation and not necessarily market fundamentals.[20] SDP argued that a long-term contract that resulted in the development of a physical renewable plant ensured that it addressed the critical Project Approval criteria of "certainty, additionality, and availability of renewable energy for the duration of the project".

3.3 The state of the energy market

At the time that SDP was considering its electricity supply options to power the desalination plant, the future of the renewable energy industry and the electricity market more generally was highly uncertain. This would have complicated SDP's decision making as it had no certainty about the availability of renewable energy, or the rules and regulations associated with the means of exchange in the energy market. This presented a significant risk to SDP given the conditions of its Project Approval.

Below we provide a brief description of the policy debate regarding the electricity sector that was going on in the lead up to and during SDP's preparation of the GGRP. This shows the difficulties that SDP would have faced at the time in developing a GGRP that provided long term certainty that it could meet the conditions of its Project Approval over the life of the project. The contracts with Iberdrola provide certainty of renewable energy supply to SDP in an uncertain market environment.

Depending on which energy arrangement SDP selected in the GGRP, it potentially faced significant different risks, benefits and costs, including transactions costs, in securing approval of the GGRP and of ensuring the plant is powered by 100% renewable energy over its life.

3.3.1 The policy debate on energy

At the time the GGRP was being developed, the only two mandatory schemes that generated renewable or emission reduction certificates that had sufficient legal force, and therefore could be relied upon to verify a reduction in emissions or abatement of emissions with renewable energy, was the Mandatory Renewable Energy Target (MRET) and NSW Greenhouse Gas Abatement Scheme (GGAS).

While there were other statutory obligations placed upon electricity retailers to improve energy efficiency and on participants to report their greenhouse gas emissions, no other scheme existed at that time that SDP could rely upon for the production and sale of renewable certificates to guarantee that SDP's electricity consumption was offset with renewable generation over the life of the project.

At the point at which SDP was developing its GGRP, the MRET was legislated to achieve its renewable target of 9,500 GWh by 2020, after which the scheme would cease supporting any new projects. The then Federal Rudd Labor Government introduced a bill on 17 June 2009 to expand

[20] SDP Comments on Draft Halcrow Review Report: Review of Operating and Capital Expenditure by Sydney Desalination Plant Pty Ltd, Sally Walkom, Manager, Regulation, SDP Project, 5 September 2011.

the MRET to achieve a target of 45,000 GWh by 2020, which at the time would account for 20% of Australia's electricity demand (the MRET would become the RET).[21] SDP was in the midst of preparing its GGRP when these changes occurred. SDP's GGRP report was published in November 2009.

The amendments to the MRET were generally not supported at the time of its development. In general, green groups rejected the inclusion of carve outs for Renewable Energy Target (RET) Affected Trade Exposed (RATE) industries, while industry groups were concerned that the expansion of the scheme would raise electricity costs and reduce Australia's international competitiveness.[22]

While the Rudd Government sought the support of the Greens for the expanded RET, the Coalition agreed to support the expanded RET legislation provided the RATE support was included. However, Coalition support was withdrawn after the Rudd Government used the RET legislation to force the Opposition's hand on the Carbon Pricing Reduction Scheme (CPRS) legislation (discussed below) by withholding compensation under the expanded RET for RATE industries until the CPRS legislation was passed.[23] The Rudd Government ultimately detached RET legislation from the CPRS legislation and the expanded RET legislation was passed on 20 August 2009, but not before the Coalition raised many concerns about its future operation.[24] It was in this highly uncertain environment, where there was no political or industry consensus about the long term future of the RET, that SDP had to develop a long-term renewable supply plan.

At the same time the future of the RET was being debated, SDP would have been aware that the NSW GGAS was legislated to terminate if the NSW Energy Minister was satisfied that NSW would participate in a scheme with comparable objects to the GGAS scheme nationally, in NSW or in one other State.[25] This is important because, preceding these debates about the future of the renewable schemes, Australia was engaged in a debate about a broad ranging carbon pricing scheme that also involved a debate how this would work with schemes such as RET and GGAS.

The Rudd Government released its CPRS White Paper on 15 December 2008.[26] This White Paper arose from two separate streams of work. The first was the Task Group (the Shergold Review) established on 10 December 2006 by the then Prime Minister Howard to consider the

21 APH, Renewable Energy (Electricity) Amendment Bill 2009, Weblink: https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/bd/bd0809/09bd182

22 Department of Climate Change, Consultation the treatment of electricity intensive trade exposed industries under the Renewable Energy Target, viewed 23 June, 2009, http://www.climatechange.gov.au/renewabletarget/consultation/sub_rate/submissions.html.

23 Taylor, L. & M. Owen (2009) "ETS ploy hold coalition hostage", 17 August, Weblink: https://www.news.com.au/news/ets-ploy-holds-coalition-hostage/news-story/bdc62dffb8152fc4bd71527da08974fb.

24 APH (2009), Additional comments by Coalition Senators, Weblink: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Completed_inquiries/2008-10/renewable_energy_09/report/d01

25 Electricity Supply Amendment (Greenhouse gas Abatement Scheme) Part A, Division 12 Termination of operation https://www.parliament.nsw.gov.au/bill/files/1306/First%20Print.pdf

26 Carbon Pollution reduction scheme: Australia's low pollution future; white paper (15 December 2008), Weblink: https://trove.nla.gov.au/work/35145089

development of an Emission Trading scheme.[27] Four months after Prime Minister Howard established the Shergold Review, in April 2007, the then Opposition leader, Kevin Rudd, commissioned Professor Ross Garnaut to undertake a Climate Change Review.[28] Garnaut's Final Report was published in September 2008, ten months after the election of the Rudd Federal Government in November 2007.[29]

Upon forming government, Prime Minister Rudd commissioned Professor Ross Garnaut to develop an Emission Trading scheme, which became the CPRS. The Rudd Government subsequently introduced the CPRS legislation into Federal Parliament on 14 May 2009[30], the same time that the GGRP was being developed (with the final GGRP published in November 2009).

The CPRS legislation became a significant point of contention within the Federal Opposition, with Tony Abbott leading a group within the Coalition to block the legislation and the then Opposition Leader, Malcolm Turnbull, seeking ways to negotiate with the Government so the Opposition could support the legislation. This issue led to a leadership change and the Opposition refused to support the CPRS legislation.

The above conveys the highly uncertain environment in which SDP had to decide on a renewable energy supply solution that satisfied its conditions of Project Approval.

In the context of this uncertain environment and outlook for the renewable energy market, SDP's long-term energy contract with Iberdrola provided it with certainty that it could meet its requirement to be powered by 100% renewable energy, while minimising transaction costs and risks.

27 APH (2006), prime Ministerial task Group on Emission Trading, Weblink: https://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;query=Id:%22media/pressrel/68QL6%22

28 Garnaut Climate Change Review, Weblink: https://web.archive.org/web/20100722073431/http://www.garnautreview.org.au/CA25734E0016A131/pages/about.html

29 Garnaut Climate Change Review, Final Report. Weblink: https://webarchive.nla.gov.au/awa/20190510002336/http://www.garnautreview.org.au/

30 APH, Bills Digest 165, 2008-09, Carbon Pollution Reduction Scheme Bill 2009, Weblink: https://www.aph.gov.au/binaries/library/pubs/bd/2008-09/09bd165.pdf

4 Desalination and renewable cost structures

In addition to the market, regulatory and policy circumstances prevailing at the time SDP entered its long-term energy contract (discussed in Chapter 3), it is also important to consider the cost structures of the both the desalination plant and wind (and other renewable energy) generators.

This is relevant because:

- SDP's large fixed and sunk costs increased its risks associated with not complying with the conditions of its Project Approval, thus strengthening the case for a long-term contract. This is because non-compliance with these conditions would put SDP's large upfront and sunk investment (i.e. unavoidable costs) in the desalination plant at risk.
- Similarly, given the large fixed, sunk costs of the Capital Wind Farm and the uncertain outlook for the renewable energy market, a long-term contract that guaranteed revenue to the windfarm's investors was likely necessary for investment in the windfarm (or any other potential long-term sources of guaranteed renewable energy at the time) to occur.

In this chapter, we discuss the importance of considering cost structures when evaluating the efficiency of SDP's long-term contract and provide information on the cost structures of the desalination plant and wind generation.

4.1 The relevance of cost structures

Cost structure can have a major bearing on the nature of commercial arrangements required to ensure a project is developed. In general, projects with high fixed costs face a higher risk of financial failure because fewer costs can be avoided if the market price and/or sales decline. The more volatile the product market that a high fixed cost project supplies, the higher the risks of financial failure. This higher risk will be reflected in less commercially attractive financing terms. Project developers are unlikely to develop a high fixed cost project that sells into a volatile product market without some form of revenue hedge over the life of the project.

As discussed in Chapter 2, IPART's regulatory framework and approach should provide SDP (and its investors and financiers) with assurance that, through its regulated prices, SDP will have the opportunity to recover its efficient capital costs over the economic life of the assets and earn a reasonable return on this investment. By providing secure revenue for SDP to recover its fixed costs, the regulatory arrangement can facilitate competitive financing and result in a lower cost of supplying manufactured drinking water than would otherwise occur if IPART did not recognise SDP's prudent and efficient fixed costs.

The Capital Wind Farm that supplies renewable power offsets to SDP is also a high fixed cost asset, as shown below. Moreover, it sells into an extremely volatile market. Without a long-term contract for its output, it is very unlikely that this plant (or other similar plants) would have been built. Without certainty that this wind farm would be built and supply additional renewable

power to the system that would not have otherwise been supplied to the market, there is a risk that SDP would not have met its conditions of Project Approval.

4.2 Sydney Desalination Plant's cost structure

The Sydney Desalination Plant and associated pipeline was built by the NSW Government for a reported cost of $1.8b. The plant was then refinanced with a book value of $[redacted] and then soon after the government entered a 50 year, $[redacted] lease arrangement with SDP. While the plant was built to produce 250 megalitres per day (ML/d) of drinking water, much of the base infrastructure is configured so the plant can be expanded to produce 500 ML/d.

When the plant is not operating, fixed, plant-related costs account for nearly 70% and variable costs between 24% and 27% of total costs. Other costs include items such as payments under the Energy Adjustment Mechanism (EAM).

4.3 Wind generation cost structure

On average, we estimate that fixed costs (capital costs and fixed O&M costs) account for about 95% of wind generators' total costs (see **Table 1**). Other potential types of renewable energy generation available to SDP would also have a high proportion of fixed costs.

Table 1: NEM wind cost structure

Cost	Costs per MWh	Percentage
Capital costs per MWh	50.87	76%
Fixed O&M per MWh	13.23	20%
Variable O&M per MWh	3.00	4%
Total cost per MWh	**67.09**	**100%**

Source: AEMO ISP assumptions workbook 2020

These very high fixed costs affect the nature of the commercial arrangements associated with the development of wind farms. Wind farms, and generally all forms of renewable energy generation, are almost always developed by an investor who has already negotiated a long-term, fixed price contract with one or more retailers, or they are developed by vertically integrated businesses who 'monetise' the output through retail prices.

There are very few examples of private merchant wind farms being developed without long-term secure revenues in the form of long-term contracts, and very few around 2009 given the market environment at the time SDP entered its contract with Iberdrola. This is because of the high transactions costs (lending, due diligence and refinancing costs) and risks associated with attempting to develop a renewable generator, or in fact a large-scale generator of any kind, without some form of revenue hedge that matches the term of the project financing. Lenders will be reluctant to lend against a renewable project that doesn't have some form of revenue hedge

(e.g. long-term contract with an offtake customer or the government, or a customer load that can be used to 'monetise' the investment).

The main reasons investors would likely be reluctant to invest in a wind project without a secure long term off-take arrangement include:

- The very high fixed costs (95%) of these projects. This means that most of the costs cannot be avoided irrespective of whether the plant is making money or not.
- The product market is highly volatile and the risks of having to meet regular debt repayments in such a market are too high for most investors.

Off-takers are prepared to enter into these contractual arrangements either because they have a regulatory obligation to ensure they have a commercial arrangement that results in additional renewable generation, such as SDP's conditions of Project Approval, or as required by the Commonwealth's RET. Alternatively, off-takers may have made a commitment to ensure that their electricity consumption will be offset by 100% new renewables – so called Corporate Renewable Power Purchase Agreements (Corporate PPAs).[31]

There are now options to purchase renewable certificates in the secondary market, at least until 2030 under the RET. However, as explained in Section 3.3, the future of renewable energy and carbon trading was far from certain *at the time* that SDP was considering its options for electricity supply to the desalination plant.

[31] ARENA, Corporate Renewable Power Purchase Agreements in Australia, Weblink: https://arena.gov.au/knowledge-bank/corporate-renewable-power-purchase-agreements-in-australia-state-of-the-market-2019/

5 The justification for SDP's contract

In this chapter, we explain that in the circumstances it faced SDP's decision to enter a long-term PPA for renewable energy at fixed prices and fixed volumes is supported by economic theory. This is because such a contract can be an efficient way to manage risks and transaction costs, given:

- SDP's large fixed and sunk costs;
- SDP's reliance on a secure supply of renewable energy to comply with the conditions of its Project Approval; and
- the uncertain outlook for the renewable energy market at the time SDP was required to develop the GGRP and hence confirm how it would ensure it would be powered by 100% renewable energy.

That is, economic literature suggests that such a long-term contract can be an efficient way of dealing with risk, managing transaction costs and accommodating investment, particularly when investing in large fixed and sunk assets that would otherwise be dependent on an input from an illiquid and uncertain market.

To complement this theory, we also show that SDP's decision to enter such a contract is supported by regulatory precedent, the practices of entities in similar circumstances (including other desalination plants around Australia at the time), and the findings of IPART's own consultant.

5.1 The economic justification for a long-term PPA

There are two aspects that potentially relate to IPART's consideration of SDP's long-term, fixed price contract that effectively provided the financial underwriting for Iberdrola to build the Capital Wind Farm.

The first is whether SDP is required to legally comply with the GGRP that was approved, which lists its long-term contracts with Iberdrola (then Infigen) as the means of ensuring it is powered by 100% renewable energy. If so, we note that IPART's standard practice (and the standard practice of other economic regulators) is to set prices to allow regulated entities to recover their efficient costs of complying with their legal and regulatory requirements. We understand that SDP is making a separate submission to IPART on this matter.

The second is whether SDP made an economically efficient decision to enter its long-term energy contracts, considering the possible transactions costs and risks associated with the range of feasible options available to SDP at the time it was developing its GGRP to ensure it would be powered by 100% renewable energy (consistent with the conditions of its Project Approval).

SDP faced a choice between different electricity supply options that could potentially satisfy the conditions of its Project Approval (noting, however, that it is far from certain that the NSW Government would have approved a GGRP that did not involve a long-term contract and the construction of a new wind farm, particularly given the state of the renewable energy market and the policy imperatives at the time). Each option had its own costs, benefits and risks. A long-term

contract was more certain of satisfying the requirement that it be powered by 100% renewable energy, but had the risk that the contract may be 'out of the money' at certain times. SDP could have sought to avoid these potential stranding costs/risks by pursuing a series of short-term contracts that aligned with IPART's determination cycle. However, this would involve:

- managing the risk that products like *GreenPower* may not be available
- managing significant transaction costs, in SDP having to search for, negotiate, conclude and coordinate electricity contracts for its uncertain load.

Moreover, the costs and risks of meeting the GGRP would have increased over time as it became increasingly difficult to address the GGRP criteria in the Project Approval such as those relating to certainty and additionality.[32]

If SDP could not satisfy the conditions of its Project Approval on an ongoing basis, it would threaten the viability of the plant and its sunk investment. A long-term contract for renewable energy provided greater certainty that it could comply with the requirement to be powered by 100% renewable energy throughout its life (and so increased the likelihood that the GGRP would be approved and then that SDP would be able to comply with the GGRP over time). In all likelihood, this meant that investors perceived the project was subject to limited risk. This would have resulted in more competitive financing terms and conditions as compared to not securing the plant's renewable energy requirements (such as avoiding shorter financing periods and the transactions costs of more regular refinancing).

Managing this kind of project uncertainty and risk is a central concept of economic efficiency. Investment and operational decisions are rarely made with complete information. The challenges to investors of making economically efficient decisions is greater when the investments involve fixed, sunk costs and long-lived assets. This is because:

- the costs of investments such as these are less likely to be recovered if economic circumstances conspire against the financeability of the project, and
- the accuracy of forecasts of business outcomes are likely to be less accurate the further out predictions are made.

In the presence of uncertainty, decisions makers must determine the range of potential outcomes and their likelihood when making investment decisions, so the least cost solution can be determined to maximise the probability that the project will remain viable over its life. If there is little to no regard for uncertainty and risk, then it is very unlikely that a decision will be economically efficient.[33]

As outlined below, economic theory shows that a long-term contract can be an efficient way of dealing with risk, managing transaction costs and accommodating investment, particularly when investing large fixed and sunk costs into a business that would otherwise be dependent on an input from an illiquid and uncertain market.

[32] In the context of renewable generation, *additionality* means that a commercial arrangement results in the development of a renewable generator that would not otherwise have been developed but for that commercial arrangement. Additionality progressively becomes more difficult to establish as all new generators being built are renewable, like what is now occurring.

[33] See for example Kochenderfel, M. J. et al (2015), Decision Making Under Uncertainty, Theory and Application, the MIT Press.

5.1.1 Transaction costs can make long-term contacts efficient

To comply with its requirement to be powered by 100% renewable energy, SDP considered a range of options, including an agreement with a retailer or some other third party to organise its electricity supply arrangements, buying energy and renewable energy certificates on an ongoing basis in the open market, or a power purchase agreement, which is a long-term direct commercial arrangement between SDP and the power supplier.

These options could be seen as representing choices between organisational structure. That is, how an organisation should structure itself to operate in terms of the extent to which it 'buys' versus 'makes' inputs, or the extent to which it enters a series of short-term arrangements versus a long-term contract.

In choosing between these options, transaction costs are an important consideration. Transaction cost economics provides a well-developed and accepted framework for considering the efficiency of SDP's decisions with respect to its energy contract (see, for example, the work of Coase in Box 4).

Box 4: Transaction costs and their implications for contracts

In *The Nature of the Firm* (1937),[34] the economist Ronald Coase found that the explanation for choosing between internal production (vertical integration) and purchasing factor inputs from a market is due to *differential transaction costs*. In seeking to understand what makes a firm choose an approach for production, Coase distinguishes between coordination of resources required for production through a series of "exchange transactions", relying entirely on price to determine production, and an entrepreneur who centrally coordinates production.

Coase explains that one explanation for choosing to centrally coordinate rather than relying on the price mechanism to coordinate production is that there is a cost associated with organising production through markets. These costs are known as transaction costs.[35] Coase identifies a range of potential transactions costs that raise the costs of relying on markets to coordinate production. The first of these is the costs of discovering the price. The second is the transaction costs associated with negotiating contracts for each exchange required for production.[36]

Coase also identifies that another disadvantage of using the price system is that the entrepreneur may prefer a longer-term contract rather than rely on using a series of shorter-term supply contracts. Longer-term contracting may be preferred because it avoids the transactions costs (price discovery process, haggling and negotiating costs, etc). The entrepreneur may also wish to manage the risks of shorter-term contracts compared to a longer-term contract – for example, uncertain supply and price.

Notably, transaction costs are generally considered to be higher where there is uncertainty. For example, Coase considers it is more likely that a 'firm' will form (i.e. where internal, vertically integrated production occurs) where there is uncertainty since the transactions costs of relying purely on the market will result in more risk and greater transactions costs.[37]

As Whyte puts it:

> "The costs of transacting are roughly the costs of maintaining the economic system. They represent resources expended by attempts to adapt efficiently to *uncertainty* [emphasis added]"[38]

34 Coase, R. (1937) "The Nature of the Firm", *Economica*, Vol 4, Issue 16, November, Wiley Online, pp 386-405. Weblink: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1468-0335.1937.tb00002.x

35 Joskow, P. L. (1984), "Vertical Integration and Long Term Contracts, The Case of Coal Burning Electric Generating Plants", *MIT Working paper, #361*, December, p 5. Also published in Joskow, P. (1987), Contract Duration and Relationship Specific Investments: Empirical Evidence from Coal Markets, American Economic Review, Vol 77, No 1. Pp 168-185.

36 *Op. cit.*, Coase (1937), pp 390-391.

37 *Ibid*, p 392.

38 Whyte, G. (1994) "The role of asset specificity in the vertical integration decision", *Journal of Economic Behavior and Organisation*, 23, p 287.

This stands to reason because if there is no uncertainty there is, by definition, complete information about future prices and supply and the market will allow efficient coordination of resources. This highlights critical links between economic efficiency and uncertainty.

Differences in transaction costs can therefore determine the nature and extent of use of vertical integration (or long-term contacts) or use of markets to coordinate production. One system is no more efficient than another. What is efficient depends entirely on the circumstances and the nature of the transaction costs faced by firms.

Transactions costs arise from two attributes of human nature, *bounded rationality* and, most importantly for the issue at hand, *opportunism*.

5.1.2 Bounded rationality contributes to transaction costs

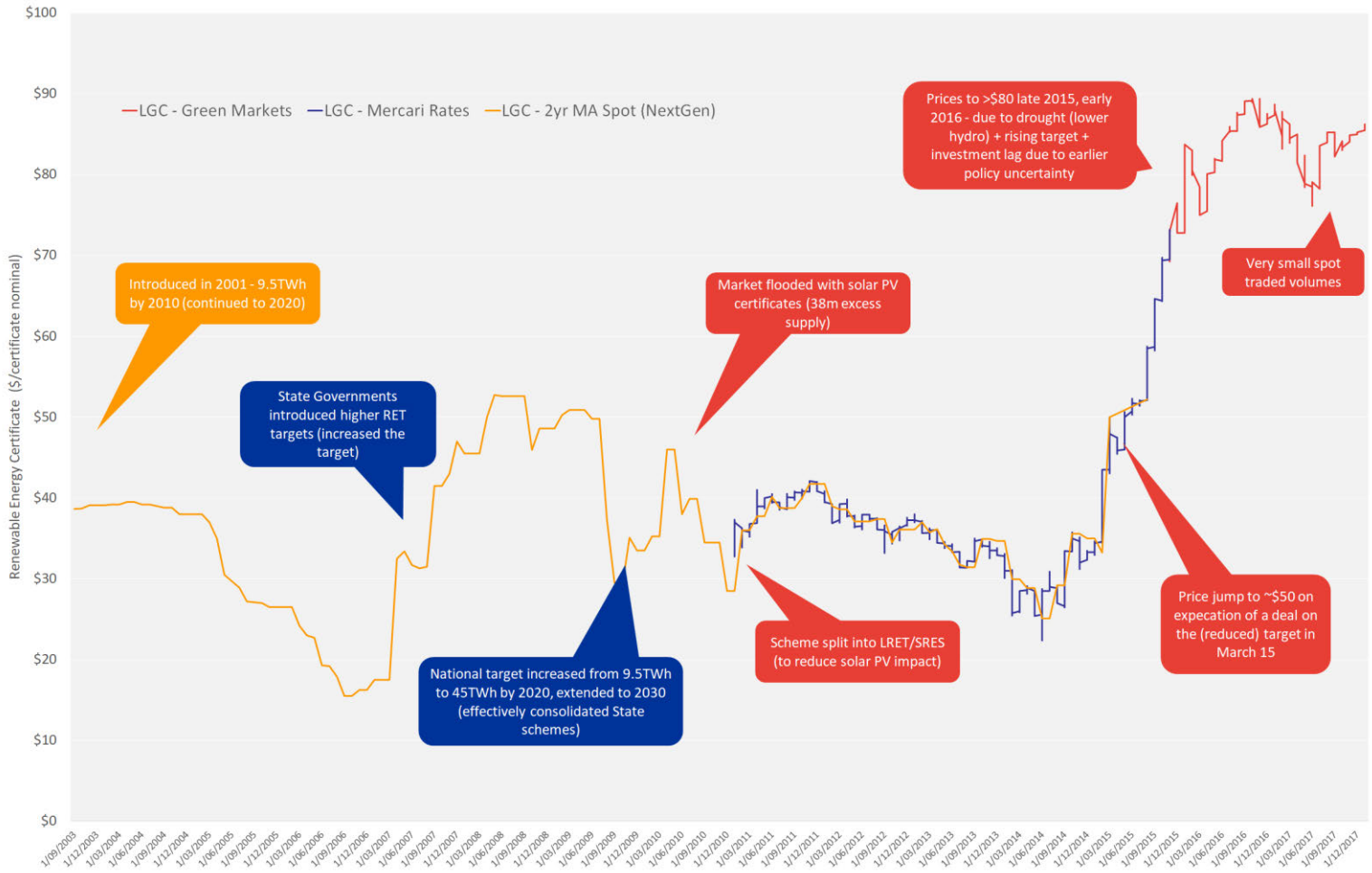
Bounded rationality refers to the fact that, although people tend to behave in an economically rational manner, their ability to do so is limited by their access to information, foresight, skills and time available to them. This is an important aspect of the circumstances facing SDP at the time it had to make a choice about its electricity supply arrangements.

SDP faced a regulatory requirement to be powered by 100% renewable energy, and to develop and have approved a GGRP consistent with this outcome. In meeting this requirement, it was required to make the decision to 'make' (or enter a long-term contract) or 'buy' (short-term contacts) and the form of this make-or-buy decision in a highly uncertain policy environment where the basis of price setting in the NEM and the form, nature, scope, extent and pricing arrangements for renewable energy was highly uncertain.

It would have been very challenging to make a decision in this policy environment, particularly given the intense public interest in the outcome and the urgency with which the government needed to develop the desalination plant. Choosing an option that provided more certainty, in the development of a dedicated renewable electricity generator for the long-term, would have greatly reduced project risk and allowed SDP to focus on ensuring the desalination project was completed and operational on time and on budget.

To provide an indication of the difficulties that SDP was facing at the time it was considering its energy supply options, consider the *monthly average* REC price series in **Figure 1**. From 2003 until November 2009, the standard deviation of the monthly average REC (LGC) prices was $11 compared to a monthly average of $36. More importantly, **Figure 1** indicates the influence policy decisions have on prices. If SDP chose to meet its conditions of Project Approval via short-term purchases of renewable energy or RECs from the market, SDP and its customers would have been beholden to the vicissitudes of constantly changing policy. A long-term contract provides a hedge against this volatility which, as can be seen from **Figure 1**, became more intense over the 10 years after SDP settled its energy contract.

Figure 1: Time series of REC (LGC) prices



Source: Frontier Economics

5.1.3 Long-term contracts can protect against opportunism

Opportunism refers to parties' propensity to exploit the weaknesses of their trading partner to realise a greater share of the gains from their exchange.[39]

To the extent that an input is critical to a production process (e.g. renewable electricity for SDP), and especially a production process that involves large fixed and sunk costs (such as a desalination plant), a producer will want to ensure that input is always available, otherwise its absence could imperil the producer's viability.

At the time that SDP was considering its electricity supply options there wasn't the certainty that exists now about the availability of sufficient renewable electricity supplies. In part, this uncertainty probably explains the reasons the conditions of Project Approval included requirements to consider factors such as additionality, certainty and availability. If SDP bought from the market on a short-term basis, this potentially exposed SDP and its customers to opportunism in the future. Renewable energy suppliers would know the requirement for SDP to ensure 100% renewable power offsets. If in the future renewable power supplies were scarce, SDP would be exposed to the risk of opportunism. As explained in Section 3.3, at the time that SDP was considering its options, the future of renewable power supplies and the basis of pricing was subject to considerable policy debate and the future was highly uncertain.

SDP underwriting the development of the Capital Wind Farm with a long-term, fixed price contract, which provided SDP with a dedicated asset for the supply of renewable energy, overcomes any scope for a supplier to engage in any future opportunistic behaviour with SDP and its customers.

From the above sections, we conclude that:

Widely accepted economics literature shows that it can be economically efficient, considering transaction costs, for a firm to contract long-term for the development of a physical asset to provide a critical input (which is akin to vertical integration – or a make-rather-than buy decision) if:

- **this decision is being made in a complex environment with a lot of uncertainty, such as that faced by SDP (which was required to make a decision in a rapidly and dramatically changing policy environment), or**
- **the firm would otherwise be vulnerable to future opportunism (by entering a long-term contract with Capital Wind Farm to supply renewable electricity offsets over the long term, SDP shielded itself and its customers from potential opportunism in the future).**

[39] Not all individuals are opportunistic, but bounded rationality makes it difficult to distinguish between the opportunistic and those who are not. This makes an assumption that opportunism is the most prudent way to conduct business.

5.1.4 Long-term contracts are associated with idiosyncratic investment

Related to the above, long-term contracts (or ownership) for the supply of a critical input, such as renewable power to a desalination plant, are generally associated with *idiosyncratic* investment. That is, investment that is specific to that particular transaction (see Box 5).[40]

Box 5: Idiosyncratic investment

Idiosyncratic investments can be classified into four categories:

Physical asset specificity: the investment can only be used for a specific application. Examples are the investment in power plants that are designed to use a particular type of fuel or investments in capability that can only be used to service a particular customer.

Site specificity: this is the case when a supplier or buyer locates their facility next to the other to economise on transportation, inventory and/or processing costs. An example is the location of power plants next to coal mines or gas pipelines connecting to a gas field.

Dedicated assets: these are investments made to supply a particular customer, which while not specific to that customer would result in significant excess capacity if the customer was to end its purchases. Similarly, a customer who has built a facility that relies on a large volume of input may find it difficult and costly to replace those inputs in short notice. An example might include the construction of new generation capacity to meet the energy needs of the customer. Similarly, a customer contemplating a major investment, such as a new desalination plant, will invariably seek to negotiate a long-term contract to lock in their energy prices and supply, given this input is fundamental to determining the financial viability of the project (and, in SDP's case, fundamental to gaining regulatory approval for the desalination plant).

Specific investments in human capital: these arise when either a supplier or buyer develops skills or knowledge which are only valuable when trading with a specific partner. For instance, to provide auditing services an accounting firm must make an investment in learning about their customer's business. Similarly, a supplier of automotive parts not only makes investment in equipment, but also in the manufacturing skills of its employees. Before committing to invest in training or to undertake research on a particular issue, a firm may seek to support that investment with a long-term contract.

It is more likely that firms will 'make' (or enter long-term contracts) rather than 'buy' (shorter-term arrangements) where these idiosyncrasies exist, because it is more economically efficient. In practice, a decision to 'make' could mean a decision by a firm to contract with a specialist third party to develop and operate a dedicated plant to supply the contracting firm.

[40] This section draws on Joskow, P. (1987), p 170; Williamson, O. E. (1983) "Credible Commitments: using Hostages to Support Exchange", *American Economic Review*, September 73, p 526; Whyte (1994) and Kleindorfer, P. & G. Knieps (1982), "Vertical integration and transaction specific sunk costs", *European Economic Review*, 19, pp 71-87.

Idiosyncrasies of SDP

Of the idiosyncratic characteristics identified in Box 5 above, the one that applies to the contractual arrangement between SDP and Iberdrola relates to *dedicated assets*. As Joskow explains in more detail, these are investments made by a "... supplier that would not be made but for the prospects of selling a significant amount of product to a particular customer. If the contract is terminated prematurely, it would leave the supplier with significant excess capacity". Joskow goes on to say that there is a buyer analogy as well: "A buyer that relies on a single supplier for a large volume of an input may find it difficult and costly to quickly replace these supplies if they are terminated suddenly and effectively withdrawn from the market and, as a result, a large unanticipated demand is suddenly thrown on the market". [41]

At the time that SDP was considering its renewable power supply options, the future of existing renewables, carbon pricing and the electricity market arrangements more generally was highly uncertain (as described in Section 3.3). In fact, even now there is ongoing debate in Australia about how to manage the country's transition towards meeting its international climate commitments. While there are State based schemes in place, these have only recently been implemented (VRET 2016[42] and QRET 2015[43]) or, in the case of the NSW Roadmap, only recently legislated but with the arrangements for delivering projects and the opportunities to use projects as legitimate offsets not yet publicly clear.

A buyer (SDP) that relies on a single supplier (RET/GGAS) for a large volume of an input may find it difficult and costly to quickly replace these supplies if they are terminated suddenly and effectively withdrawn from the market and, as a result, a large unanticipated demand is suddenly thrown on the market.

Faced with uncertainties about the future of the only schemes that existed at the time that the GGRP was being developed, and the critical importance of having a reliable, financially secure supply of renewable power to ensure it met its conditions of Project Approval, SDP evidently considered the most economically efficient way of managing this risk was to enter a long-term contract.

Similarly, given the large fixed, sunk costs of the Capital Wind Farm and the uncertain outlook for the renewable energy market, a long-term contract that guaranteed revenue to the windfarm's investors was likely necessary for investment in the windfarm (or any other potential long-term sources of guaranteed renewable energy at the time) to occur.

5.1.5 Long-term contracts can manage the risk of sunk investments

A related aspect of the *dedicated asset* characteristic is the risks associated with the sunk costs of the desalination plant. In the presence of sunk costs, the nature of the bargaining position between contracting parties changes considerably and the investor in the sunk cost asset is

41 *Op. cit.* Joskow, P. (1987), p 170.

42 VRET, 2017-18 progress Report, p 2, Weblink: https://www.energy.vic.gov.au/__data/assets/pdf_file/0025/397123/VRET-2017-18-Progress-Report.pdf

43 Queensland Department of Energy and Public Works, Achieving our renewable energy target, Weblink: https://www.epw.qld.gov.au/about/initiatives/renewable-energy-targets

subject to *hold-up* or *opportunism*, raising the possibility that they will not recover their investment.

Joskow explored this hold-up problem resulting from sunk costs using the relationship between coal fired generators and coal mines.[44] If an electricity company builds a generating plant near a coal mine it is possible to realise efficiencies in transportation. These gains can be shared between the coal producer and the electricity generator. However, by building near the coal mine, the electricity generator is limiting its options for coal supply, since coal from other sources will be more expensive as a result of the plant's location. This loss of other opportunities for sourcing coal once the plant is built would reduce the generator's bargaining power in relation to the coal mine. Once the plant is built there is a risk that the coal mine would exploit the generator's captive position and charge higher prices.

Joskow's coal example is applicable to SDP's situation at the time it was choosing between renewable supply options. If SDP built the desalination plant, which required the development of a renewable generator, without some arrangement with the renewable generator that effectively made it a part of SDP's production system (via 'make' or long-term contracting arrangements), the renewable generator could exploit SDP's ongoing obligation to have renewable supply by threatening to withhold supply unless the renewable generator extracted a higher price. While this seems fanciful nowadays when there are numerous suppliers and projects are being regularly developed, this was not the case in 2009, as described above.

The renewable generator would likely face similar considerations as SDP when deciding the commercial arrangements that best suits its risk management. As indicated in Section 4.3, renewable generation involves even greater fixed costs than desalination plants. It may be the case that wind farms have less sunk costs than a desalination plant because they potentially can be dismantled and taken to another site. However, the costs of removing and relocating a renewable plant would not be immaterial. To manage these fixed and sunk cost risks, the renewable generator would likely have similar incentives as SDP.

As a result of this potential for opportunism, suppliers and/or buyers will be unlikely to make transaction-specific investments without some protection from hold-up or opportunism on the part of their counterparty in the transaction. A long-term contract protects against this risk and paves the way for the development of complementary assets.

In the context of the above discussion, we note that:

SDP and the renewable energy generator had complementary needs in an uncertain renewable energy market, which likely pointed both parties to require a long-term PPA with fixed prices and volumes:

- **SDP to obtain a secure and reliable supply of renewable energy to ensure its compliance with its Project Approval and hence ensure its ongoing viability and recovery of its fixed and sunk costs, while also managing its transaction costs**
- **the renewable energy generator to recover its fixed and sunk costs.**

[44] *Op. cit.* Joskow, P. (1987), p 170.

5.2 Other long-term energy agreements for desalination plants

At the time that SDP was considering how to meet the conditions of its Project Approval, it was more common than not for desalination plants in Australia to enter long-term energy supply arrangements. This was most likely for the same reasons that SDP ultimately entered a long-term contract itself – to efficiently manage transactions costs and risks, in response to Government commitments in relation to the use of renewable energy. For example:

- Victoria - the Melbourne Desalination Plant was originally developed with a 30-year contract to supply electricity (860 GWh) and RECs to AquaSure, with a fixed price agreement with AGL Energy.
- South Australia - the Adelaide Desalination Plant was developed with a 20-year contract with AGL to supply 500 GWh of electricity and associated GreenPower accredited renewable energy certificates sourced in South Australia.
- Western Australia – Perth has two desalination plants: the Perth Seawater Desalination Plant and the Southern Seawater Desalination Plant.
    - The Perth plant was developed with a long-term contact between Emu Downs wind farm and Synergy, which has a 10-year contract with the WA Water Corporation to supply electricity and RECs.[45]
    - To support the power and REC requirements of the Southern Seawater plant, WA Water Corporation negotiated a long-term supply agreement to purchase all outputs from the Mumbida Wind Farm and Stage 1 of Greenough River Solar Farm.[46]

Contrary to all the plants identified above, the Gold Coast Desalination Plant was developed without a long-term contract, instead opting to rely on a series of short term (2 year) deals to meet its electricity and REC requirements.[47]

SDP's long-term contact with a renewable energy generator is broadly consistent with other Australian desalination plants.

5.3 Regulatory recognition of the role of long-term contracts

The role of long-term contracts in generating efficiencies by reducing transaction costs has been recognised by the Australian Competition Tribunal (the Tribunal), as well as economic regulators.

In a 1997 decision regarding long-term natural gas supply contracts in New South Wales and South Australia, the Tribunal concluded that:

45 Auditor General for Western Australia (2007), *Auditor General's Report, Performance Examination, Renewable Energy: Knowing What We Are Getting*, Report 12, November, p 21. Weblink: https://audit.wa.gov.au/wp-content/uploads/2013/05/report2007_12.pdf

46 WA Water Corporation, Environment and sustainability, Website: https://www.watercorporation.com.au/Our-water/Sustainability-and-innovation/Environment-and-sustainability

47 Seqwater Bulk Water prices 2015 to 2018, Submission to the Queensland Competition Authority, 31 July 2014. p 111, Website: https://www.qca.org.au/wp-content/uploads/2019/05/25585_Seqwater-bulk-water-price-submission-FY16-18-FINAL-2-Sept-1.pdf

> "A distinction can be drawn between those long-term contracts that are necessary to sustain substantial, long-lived, sunk investments, as in this matter, and those long term contracts that create no such social utility but are, rather, an instrument of foreclosure."[48]

Having noted in the same decision that long term contractual arrangements covering production, sale and distribution are characteristic of many Australian industries, the Tribunal was at pains to make, in addition to its specific findings, a number of general observations including the following:

> "The first of these pertains to the terms for which a long-term contract may operate, without excessive detriment to the public interest arising. In respect of a major new development requiring the funding of significant capital expenditure, so that borrowings must be secured against the cash flow of the venture, the term of the contract that provides the necessary cash flow is properly related to the period within which borrowings are to be amortized. There may also be other commercial circumstances where the assurance of a lengthy contract term is required if the public benefit to be derived from a major development is to be realized. In such circumstances, as it appears to the Tribunal, a lengthy contract term does not necessarily represent a detriment, but rather may contribute to the achievement of a benefit."[49]

Economies in transactions costs was also accepted by the Tribunal as an argument in favour of long-term contracts between vertically related firms in its 1981 decision on *Application by Broken Hill Pty Co. Ltd & Anor pursuant to s. 101A for review of notice by the commission re purchasing agreement with Koppers Pty Ltd.* In this case, long term contracts that helped overcome transactions costs such as those that relate to the management of opportunism, simplifying a transaction and managing sunk cost risks were seen as generating a benefit to the public that might justify the grant of authorisation to a joint venture that involved a long-term exclusive supply contract. [50]

Similarly, SDP's development of a desalination plant generates a public benefit by improving drinking water security for Sydney. It is a project that is characterised by large fixed and sunk costs. It could only be granted approval by the government if it could guarantee the government that the plant would have sufficient renewable electricity offsets. To achieve this, SDP agreed a long-term contract that resulted in the desalination plant and the wind farm being developed as a complementary set. This is consistent with the Competition Tribunal's reasoning in its decision on the ACCC's determination on the revocation of the AGL Cooper Basin Natural Gas Arrangements (outlined above).

Other economic regulators have recognised long-term contracts in their decisions on efficient expenditure allowances. For example, in its 2017 final decision on the Water Corporation's prices, the Economic Regulation Authority (ERA) in Western Australia included the costs of the Corporation's contracts, including its long-term energy contracts, in its expenditure allowance on

48 Australian Competition Tribunal, 1997, *Application for a Review of a Determination of the Australian Competition and Consumer Commission made on 27 March 1996 Revoking Authorization No A90424 and Granting a Further Authorization (AGL Cooper Basin Natural Gas Supply Arrangements),* p107.

49 Ibid, p 117.

50 ATPR 40-203 (1981), at 42,831, as cited in Hanks and Williams (1987), *The Treatment of Vertical Restraints under the Trade Practices Act*, p 163.

the basis they were competitively procured.[51] Likewise, the Essential Services Commission of South Australia (ESOCSA) has recognised the Adelaide Desalination Plant's energy contract costs in its determinations of SA Water's expenditure allowances, noting that competitive tendering can help ensure that contracts reflect efficient prices.[52]

5.4 Review of SDP's contract

In 2017, IPART commissioned Marsden Jacob Associates to review SDP's energy costs. Marsden Jacob found SDP's energy contract to be prudent. Consistent with our discussion above, it stated:

> "The situation of a number of large industry demands in recent years has illustrated the risks of being uncontracted and attempting to secure contracts when required. The risk for SDP also includes the need to be 100% renewable before it can operate. Therefore medium to long term contracting for electricity and renewable requirements for the energy needs of SDP is considered prudent.
>
> [Redacted]
>
> **"On this basis the Infigen contracts are considered to be prudent."** [53]

51 Economic Regulation Authority of Western Australia, the Efficient Costs and Tariffs of the Water Corporation, Aqwest and Busselton Water, Final Report, November 2017, pp 34, 319.

52 Essential Services Commission of South Australia (ESCOSA), SA Water's water and sewerage revenues 2013-14 – 15-16 Draft Determination Statement of Reasons February 2013, p 85.

53 Marsden Jacob Associates, Final Report Reviewing Energy Costs for Sydney Desalination Plant (SDP), Report Prepared for IPART, p 53, February 2017.

6 Conclusion

This report has considered:

- whether there was economic justification for a long-term renewable energy contract in the circumstances faced by SDP, and for a long-term contract of the form SDP entered (ie, a Power Purchase Agreement for fixed volumes, at fixed prices)
- the implications of this for IPART's assessment of SDP's energy cost allowance, when it is setting SDP's notional revenue requirement and prices.

Our findings are summarised below.

6.1 There is economic justification for SDP's long-term contract

In response to the conditions of its Project Approval and the circumstances prevailing at the time, SDP concluded a long-term (20-year) contract with Infigen Energy (now Iberdrola[54]) to supply electricity and renewable energy offsets (RECs) at fixed prices from a dedicated asset built in respect to the contract – the Capital Wind Farm.

Given the large fixed and sunk costs of the desalination plant itself, the need for SDP to assure its compliance with its Project Approval requirement to be powered by 100% renewable energy over the life of the plant and the uncertain outlook for the renewable energy market, there was economic justification for SDP to enter such a long-term contract.

The uncertain outlook for the renewable energy market created a risk that unless SDP entered such a long-term contract for guaranteed renewable energy:

- it could not meet its conditions of Project Approval- which would put the large, upfront/sunk investment in the desalination plant at risk, and/or
- the costs of meeting its conditions of Project Approval would be excessively high – due to high transactions costs in an illiquid and/or uncertain renewable energy market.

Similarly, given the large fixed, sunk costs of the Capital Wind Farm and the uncertain outlook for the renewable energy market, a long-term contract that guaranteed revenue to the windfarm's investors was likely necessary for investment in the windfarm (or any other potential long-term sources of guaranteed renewable energy at the time) to occur.

That is, to facilitate and protect its investment in the desalination plant (by assuring its compliance with its conditions of Project Approval) and avoid potentially high transaction costs in engaging with an uncertain and illiquid renewable energy market, SDP entered a long-term contract to underwrite the Capital Wind Farm, which was akin to its own complementary investment or vertical integration.

In such circumstances the decision to enter such a long-term contract is supported by:

[54] And referred to throughout this report as Iberdrola.

- economic theory, as it can be an efficient way to manage risks and transaction costs given the importance of a reliable supply of renewable energy to the desalination plant and the uncertain outlook for the renewable energy market at the time
    - that is, a long-term contract can be an efficient way of dealing with risk, managing transaction costs and accommodating investment, particularly when investing large fixed and sunk costs into a business that would otherwise be dependent on an input from an illiquid and uncertain market.
- the practices of entities in similar circumstances (including other desalination plants around Australia at the time) – ie, entities with large energy requirements and fixed costs will often seek long-term procurement
- regulatory precedent, and
- IPART's own consultant – in 2017 Marsden Jacob stated "medium to long term contracting for electricity and renewable requirements for the energy needs of SDP is considered prudent."

6.2 IPART should assess SDP's contract based on the circumstances at the time and reflect its findings in the cost allowance

It is standard economic regulatory practice to assess fixed, sunk costs based on the *circumstances prevailing and information available at the time the costs were incurred*, which is directly relevant to the regulatory treatment of SDP's energy contracts.

There are good economic reasons to think that, at the time, the only practical option available to SDP to procure energy for the desalination plant in compliance with its conditions of Project Approval was through a long-term contract. A long-term energy contract is effectively a sunk investment in the desalination plant, deemed necessary to efficiently comply with the conditions of Project Approval. Given this, IPART should assess SDP's energy contract akin to how it conducts ex-post reviews of sunk capital expenditure. That is, it should assess the efficiency of SDP's energy contract based on the circumstances *prevailing at the time* the contract was executed and reflect its findings in SDP's energy cost allowance when setting its regulated prices.

In this context, we note that:

- SDP followed an extensive competitive procurement process in arriving at its decision to enter this contract, and
- IPART's own consultant has found the contract to be prudent given the circumstances faced by SDP.

In the absence of any evidence to suggest that SDP's long-term, fixed price contract with Iberdrola was inefficient given the circumstances prevailing at the time, IPART should allow the costs of this contract to be recovered from SDP's regulated prices to its customer (Sydney Water), with SDP's regulated prices adjusted for gains and losses from the sale of surplus energy and RECs through the Energy Adjustment Mechanism.

This does not necessarily mean that SDP's efficient energy costs should be added to its Regulatory Asset Base (RAB). Given SDP's periodic payments to Iberdrola and the workings of the

Energy Adjustment Mechanism (EAM), it is simplest and most appropriate for these costs to continue to be recovered as operating expenditure in the revenue requirements.

If IPART does not recognise SDP's energy costs as a sunk cost, and instead sets SDP's energy cost allowance according to a contemporary benchmark price, or one that ignores the costs of managing the risks of investing a large amount into a fixed and sunk cost investment, then it risks undermining investment certainty within the regulatory regime.

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