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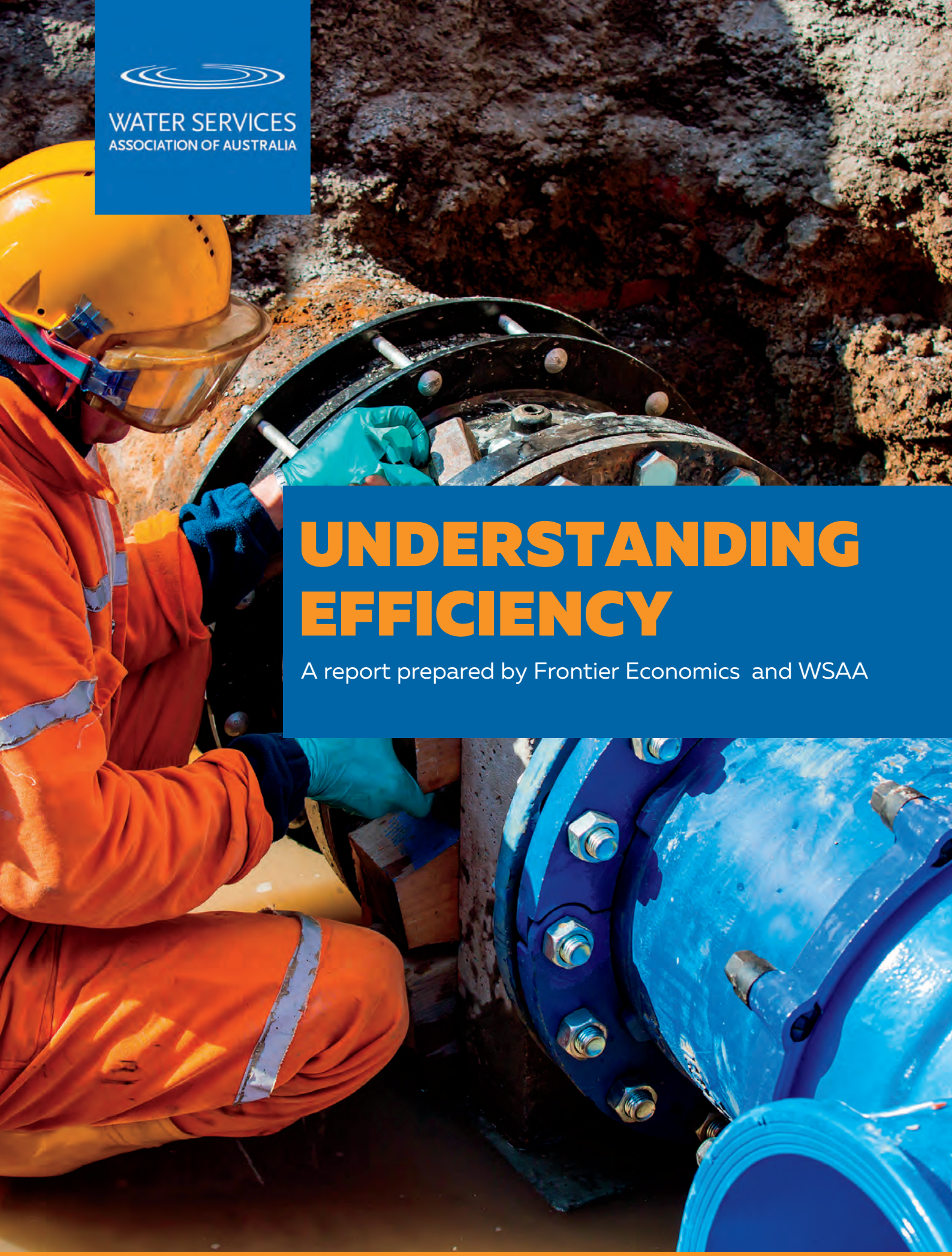

UNDERSTANDING EFFICIENCY

A report prepared by Frontier Economics and WSAA

ACKNOWLEDGEMENT

We acknowledge and pay respect to the past, present and future Traditional Custodians and Elders of this nation. We recognise their continuing connection to land and waters and thank them for protecting our waterways and environment since time immemorial.

Overview of WSAA

The Water Services Association of Australia (WSAA) is the peak body that supports the Australian urban water industry. Our members provide water and sewerage services to over 24 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises. WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. The collegiate approach of its members has led to industry-wide advances to national water issues. WSAA can demonstrate success in standardising industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The Executive of the Association retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance. WSAA is regularly consulted and its advice sought by decision makers when developing strategic directions for the water industry.

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About this report

The aim of this report is to explain in 'plain English' the concepts of efficiency and how these are utilised within businesses, by economic regulators and others to assess service and expenditure proposals in pricing submissions and business cases.

Efficiency in the urban water sector

It is important for businesses to be able to understand and demonstrate efficiency, not just to get approval of pricing submissions from regulators – but also to demonstrate they are providing value for money to customers, owners, and other stakeholders.

Common or dictionary definitions of 'efficiency' tend to focus on the relationship between inputs and outputs of producing a good or service, but this narrow interpretation may lead to misconceptions. Minimising costs may not necessarily be consistent with providing customers' desired service levels, maintenance and investment in asset capability and supply resilience, or delivering broader outcomes which are desired by customers or society.

Rather, economic efficiency can be seen as synonymous with value for money - providing the services customers want at the lowest long-term cost. The regulatory frameworks applied by most economic regulators do provide for broader 'value for money' outcomes in assessing efficiency.

Some common misconceptions about efficiency

There are a number of common misconceptions about demonstrating efficiency in the urban water sector. These related misconceptions include:

1. Efficiency means prices need to be flat or declining
2. Efficiency is about cutting costs to the minimum
3. Efficiency is incurring lowest possible costs over the upcoming determination period
4. Efficiency means providing services at the lowest possible standards consistent with regulatory and other obligations
5. Efficiency is about deferring new investment as long as possible and running assets to fail
6. Efficiency means minimising costs even if this leads to higher risks
7. Efficiency means neutralising the impact of other drivers of expenditure (e.g. growth) so prices remain constant overall without having to disaggregate the drivers
8. Efficiency means demonstrating on a once-off basis that a business is efficient relative to the industry standard.

A common thread underlying these misconceptions is that 'efficiency' is synonymous with cost minimisation. Not only is cost minimisation in itself not an appropriate objective - but it is not an appropriate interpretation of what it means to be 'efficient'. Minimising costs may not necessarily be consistent with:

- providing services at the level customers want
- maintaining and investing in asset capability and supply resilience
- delivering broader outcomes which are desired by customers or society.

How is efficiency measured and demonstrated?

While how best to demonstrate efficiency may depend on the audience, fundamentally it is about demonstrating that a proposal is in the long-term interests of customers.

The overarching approach of economic regulators in determining efficient levels of expenditure for regulated urban water businesses, which they then allow to be recovered in regulated prices, typically involves:

- Establishing the services to be provided to meet regulatory and other obligations and customers' preferences
- Establishing the minimum expenditure needed to efficiently deliver these services
- Setting prices which are forecast to enable the business to recover the total expenditure which the regulator has deemed to be 'prudent and efficient'.

Typically regulators adopt a ‘prudency and efficiency test’ to provide assurance that the businesses are (1) doing the right things; and (2) doing those things as efficiently as possible.

Regulators typically assess the prudency and efficiency of operating and capital expenditure individually, as well as the trade-off between these two types of expenditures:

- While both detailed ‘bottom up’ assessments of various operating expenditure items and broader ‘top down’ approaches which focus on broad categories of expenditure have been applied by regulators, the latter (particularly the base-step-trend approach) is becoming increasingly widespread.
- Approaches to assessing the efficiency of capital expenditure typically examine the business' capital governance frameworks, policies and procedures, and review a sample of the business's proposed capital expenditure projects. This generally requires reference to an identified need or cost driver, evidence that the business has considered alternate solutions including non-network solutions, and that the cost of the defined scope and standard of works is consistent with conditions prevailing in the relevant markets.

What lessons does recent regulatory experience provide?

We examined a number of recent regulatory reviews and decisions by state economic regulators. This provided a number of key insights and lessons that can be drawn upon for future periods.

- The Base Step Trend methodology is being adopted by a number of water regulators
- Capital projects exposed to uncertainty have the potential to be deferred to future periods
- Willingness to pay studies are helpful but should not be used in isolation to justify expenditure
- Consultation and analysis is required to demonstrate the prudency of projects
- The introduction of new services needs to predominately benefit customers
- Capital expenditure proposals should be supported by robust business cases
- Regulators often require alternative options to providing the service to be considered.

Guidance for demonstrating efficiency

We have identified some overarching guiding principles that should be adopted to demonstrate the efficiency of expenditure proposals regardless of the context in which efficiency is being measured or demonstrated:

- Adopt a business case (or cost-benefit analysis) approach to all expenditure proposals
- Focus on the long-term interests of customers, considering factors including operating and capital expenditure trade-offs and the impact on service standards over time and supported by Net Present Value NPV (analysis)
- Consider both prudency and efficiency of expenditure, including how cost proposals incorporate efficiency targets and continuing efficiencies (as would occur in a competitive market)
- Explain trends in operating and capital expenditure and key drivers of these trends
- Develop a narrative that explains the link between expenditure and outcomes for customers
- Conduct analysis that is proportionate to the size and impact of the potential expenditure.

However, there is no single methodology or technique that is appropriate to use in all circumstances to measure and demonstrate efficiency. The appropriate approach may vary depending on factors such as the nature of the:

- expenditure (i.e. operating vs capital expenditure or large 'step' in operating expenditure)
- activity (discretionary vs non-discretionary expenditure).

Table 1: Approach to demonstrating efficiency - a guide

Step	Type of expenditure	Evidence/ data required	Techniques	Example
Outline why the spending is in the long-term interest of customers	All	Link spending to specific outcomes for customers in terms of services and prices over the long term Clear 'golden thread' narrative	Investment Logic Mapping	See section 4.2 and 5.5
Prudency: Link spending to non-discretionary obligation	Non-discretionary opex & capex	Identify key drivers including relevant legislative or regulatory obligations	Understanding of non-discretionary service (and related) outcomes, including their timing	Central Coast Council (section 3.3.3)
Prudency: Demonstrate that customers want the proposed service/level or outcome	Discretionary opex & capex	Customer feedback	Surveys, customer forums	Case study 2

Step	Type of expenditure	Evidence/ data required	Techniques	Example
Prudency: Demonstrate tat customers are willing to pay for this service	Discretionary opex & capex	WTP studies	Choice modelling	Case study 2
Analyse a range of options to produce the desired outcome	All	List of alternative options including capital vs recurrent solutions – ideally in business case	Cost-benefit analysis	Case study 3
Identify a preferred option	All	Business case or similar	Cost-benefit analysis (benefit -cost ratio, NPV etc)	Case study 3
Undertake sensitivity analysis to demonstrate the preferred option is robust	Capex/major opex step change	Business case or similar (preferred option is superior under a range of assumptions/scenarios)	Sensitivity analysis Real options analysis Scenario analysis	Case study 3, Sydney Water resilience expenditure (section 3.6.3)
Ensure/demonstrate the preferred option/proposed services will be delivered at the lowest cost	Opex	Historical expenditure Productivity growth (continuing efficiency) forecasts Market-tested estimates	Base-step-trend Benchmarking	Case study 1
Ensure/demonstrate the preferred option/proposed services will be delivered at the lowest cost	Capex Step jump in opex	Robust procurement process (e.g. market-testing or similar) Detailed approach to managing delivery of project and associated risks Proposed expenditure is within long-term context & strategy Consideration of scope for application of continuing efficiency factor	Business case methodology	Powercor ICT investment (section 3.4.3)
Benefits realisation (ex pt)	All	Ex post assessment of benefits and costs	Post project review	See section 2.2

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1 INTRODUCTION AND BACKGROUND

1 Introduction and background

1.1 Background

The urban water sector is facing a range of challenges. Climate change is expected to increase temperatures and the frequency of extreme weather events leading to changes in customer behaviour and placing pressure on water resources and infrastructure. Population growth creates additional pressure on water resources and necessitates considerable investment. Changing community expectations on the role of the water sector in delivering liveability and environmental outcomes are transforming the traditional roles of urban water corporations.

Meeting these challenges while ensuring affordability for customers is a key challenge for urban water utilities across Australia. While recent years have been characterised by flat or falling water bills (in real terms), the need to replace ageing assets, provide for population growth, manage risks such as those posed by climate change, and accommodate emerging cost pressures in the economy will make these outcomes hard to maintain into the future. This will place even sharper focus on ensuring water utilities undertake their activities as efficiently as possible and are able to demonstrate this – both to themselves and to other key stakeholders such as customers, shareholders, and economic regulators which set or oversee their prices.

Water businesses are the custodians of customer funds: it is the responsibility of these businesses to ensure customers pay no more than they need to for the products and services they require. However, the concept of efficiency is not as straightforward as it often seems. And how to measure it and track it is often not well understood in water utilities beyond the regulatory and finance teams.

The absence of a shared understanding across water utilities of how to demonstrate that their activities and proposed expenditure programs are efficient can inhibit their ability to operate and invest in a manner which is in the best interests of their customers. It can also inhibit a water utility's ability to readily communicate this in a way that is accepted by customers, economic regulators, and other stakeholders.

1.2 Purpose and scope of this report

The aim of this report is to explain in 'plain English' the concepts of efficiency and how these are utilised within businesses, by economic regulators and others to assess service and expenditure proposals in pricing submissions and business cases. By doing so, it is intended to:

- Enable utilities to demonstrate to its customers that it is using their resources in the best possible way
- Improve internal conversations between regulatory and non-regulatory areas of a water business regarding efficiency
- Assist water businesses' assessment of the efficiency of proposed expenditure, and
- Ultimately improve the ability of water businesses to make business cases to regulators and other relevant parties.

In order to illustrate the key concepts in accessible manner, we have provided examples from the water and other sectors and have also developed a number of more detailed case studies.

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2 EFFICIENCY IN THE URBAN WATER SECTOR

2 Efficiency in the urban water sector

Key points

- It is important for businesses to be able to understand and demonstrate efficiency, not just to get approval of pricing submissions from regulators – but also to demonstrate they are providing value for money to customers, owners, and other stakeholders.
- Common or dictionary definitions of 'efficiency' tend to focus on the relationship between inputs and outputs of producing a good or service, but this narrow interpretation may lead to misconceptions.
- Minimising costs may not necessarily be consistent with providing customers' desired service levels, maintenance and investment in asset capability and supply resilience, or delivering broader outcomes which are desired by customers or society.
- Economic efficiency can be seen as synonymous with value for money - providing the services customers want at the lowest long-term cost.
- The regulatory frameworks applied by most economic regulators do provide for broader 'value for money' outcomes in assessing efficiency.

2.1 Introduction

This section:

- Explains why it is important to measure and demonstrate efficiency
- Seeks to define 'efficiency' and identifies some common misconceptions about defining and demonstrating efficiency in the urban water sector
- Highlights some key challenges in demonstrating efficiency in the urban water sector
- Explains why regulators are interested in measuring and assessing efficiency.

2.2 Why is it important to measure and demonstrate efficiency?

It is critical for businesses to be able to understand and demonstrate efficiency, not just to get approval for pricing submissions to regulators – but also to demonstrate value for money to customers, owners, and other stakeholders:

- **Customers**: will want to ensure that the business is providing good value for money by providing the services customers want at the lowest possible cost
- **Shareholders**: will want to ensure the business is generating an appropriate return on the capital and assets invested in it.
- **Economic regulators**: will want to ensure, on behalf of customers, that water businesses are providing good value for money by providing the services customers want at the lowest possible cost (see below).

While each of these parties will be concerned that water businesses are efficient, the way in which this is best demonstrated to them is likely to vary (see section 4.2).

It is also important to note that the need to measure and demonstrate efficiency may have both a forward- and backward-looking dimension:

- **Ex ante**: Demonstrating in advance that a proposed project or expenditure proposal is efficient and represents good value for money for customers may be critical to securing approval for a project to proceed, or to an economic regulator approving prices which a water business may charge over a forthcoming regulatory period.
- **Ex post**: Demonstrating that past projects or expenditure have been delivered efficiently can be integral to assessing and demonstrating 'benefits realisation' and in turn support arguments for forward-looking projects/expenditure. A final assessment of benefits can confirm the extent to which the benefits identified up front have been realised in practice by comparing the baseline benefits measures with the actual level of realisation.

The need to demonstrate efficiency may arise in relation to a specific project (e.g. via a business case) or more broadly across all of the activities of a business (e.g. via a pricing submission covering all expenditure for a defined future period).

Notwithstanding the need to demonstrate efficiency to a range of internal and external stakeholders in a range of contexts, there is a tendency to focus on demonstrating efficiency to regulators because of their role overseeing prices on behalf of customers.

2.3 What is efficiency?

2.3.1 Some definitions focus only on the relationship between inputs and outputs – but these may lead to misconceptions

The term "efficiency" is used to mean different things in different contexts. Common or dictionary definitions of 'efficiency' tend to focus on the relationship between inputs and outputs of producing a good or service such as:

- "ability to accomplish a job with a minimum expenditure of time and effort"
- "the ability to do something or produce something without wasting materials, time, or energy"
- "the peak level of performance that uses the least amount of inputs to achieve the highest amount of output. Efficiency requires reducing the number of unnecessary resources used to produce a given output, including personal time and energy".

Perhaps reflecting the above definitions, a common misconception is that 'efficiency' is synonymous with cost minimisation. This paper seeks to directly address this and a number of other related misconceptions (see section 3). Importantly, minimising costs may not necessarily be consistent with providing customers' desired service levels, maintaining and investing in asset capability and supply resilience, or delivering broader outcomes which are desired by customers or society. Not only is cost minimisation in itself not an appropriate objective – as would be readily accepted by most people both inside and outside the industry - but it is not an appropriate interpretation of what it means to be 'efficient'.

2.3.2 Economic efficiency equates to value for money

Economic concepts of efficiency, and in particular the term 'economic efficiency' include but go beyond the notion of producing goods or services with the least possible amounts of inputs. It also considers whether the optimal type and amount of good or services are being supplied and also how new products or processes are developed over time. Economic efficiency is typically defined as encompassing:

- **Technical efficiency**: delivering a given service for least cost.
  - How effectively businesses convert inputs (e.g., labour and capital) into outputs valued by customers (i.e. the delivery of drinking water and wastewater services).

- **Allocative efficiency**: providing the optimal mix of services.
  - The allocation of scarce resources to uses that maximise overall benefit to society. Allocative efficiency is about doing the 'right thing', whereas technical and dynamic efficiency is about doing it as efficiently as possible.
  - An example is putting more resource into fixing pipeline breaks in areas where traffic or businesses are heavily impacted compared to those areas with lower economic impact.
- **Dynamic efficiency**: adopting new techniques or technologies to increase outputs.
  - Improvements in technical and allocative efficiency over time, particularly through investment. An example could be the use of new pipe-lining technology that enables a business to renew more kilometres of pipeline for the same cost.

In essence, 'economic efficiency' can be seen as synonymous with 'value for money': providing the services customers want at the lowest long-term cost. As noted by Havyatt (2017):

> *… in practical application, despite the variety of ways to dissect the concept of efficiency, the outcome of efficiency in all cases is the same – consumers, collectively now and in the future, pay no more than they need to.*

This is consistent with a key reference point or objective for most economic regulators: to mimic the outcomes that would occur in a competitive market (discussed further below). In purely competitive markets, businesses would strive to deliver the outcomes that customers' most value at lowest possible cost – to remain in business and increase market share. It follows that efficient costs are those that would be observed in a genuinely competitive market. As discussed below, the regulatory frameworks applied by most economic regulators do focus on broader 'value for money' outcomes.

2.4 Challenges in measuring and demonstrating efficiency in the urban water sector

Even when it is understood that demonstrating efficiency is about much more than demonstrating technical efficiency or reducing costs as far as possible, but rather is about demonstrating that a proposal or expenditure program is in the long-term interests of customers, doing this in practice is not necessarily straightforward.

Key challenges include:

- Customers not being able to choose their supplier (i.e. lack of a competitive market) prevents direct information on what services customers most value or what it costs an efficient competitor to provide the services
- Long-lived assets requiring investments over a long timeframe and decisions about maintenance and renewal of these assets over time
- Demonstrating how best to manage a number of risks inherent to the industry including the uncertain availability of water due to droughts and the impact of climate change on water availability and assets
- Determining reasonable estimates of the probability and consequences of key risks to factor into risk and cost-benefit analysis (in particular, risks associated with climate change)
- Forecasting efficient costs in uncertain or volatile market conditions (e.g. the current high inflation environment).

In light of these challenges, section 4 discusses what economic regulators expect from businesses in demonstrating that their expenditure proposals are prudent and efficient and how economic regulators have sought to assess this.

2.5 Why are economic regulators and others interested in 'economic efficiency'?

In order to understand why economic regulators (and others) are interested in 'economic efficiency' and how they approach assessing 'efficiency', it is first important to clarify the role and objectives of economic regulators.

Economic regulation is typically applied in industries (such as urban water) where there are concerns that network effects and/or economies of scale give rise to natural monopoly, meaning that effective competition is not feasible. In these circumstances, economic regulation is seen as necessary to ensure that businesses with considerable market power do not earn monopoly profits or provide sub-standard services, whilst ensuring that the prices they charge cover the efficient costs of operating and maintaining the network assets to provide services to customers.

Economic regulation aims to promote effective competition where this is possible, and to reproduce the disciplines otherwise provided by competition where it is not feasible to introduce competition. By seeking to reproduce the outcomes of a competitive market, economic regulators are in effect seeking to promote the long-term interests of customers by encouraging economically efficient outcomes (see Box 1).

Box 1: Why a competitive market outcome is a benchmark for efficiency

By seeking to reproduce the outcomes of a competitive market, economic regulators are in effect seeking to promote the long-term interests of customers by encouraging economically efficient outcomes. Competition can lead to improvements in the three key efficiency concepts that comprise economic efficiency:

- Competition can enhance **technical efficiency** by, for example, stimulating improvements in managerial performance, work practices, and the use of material inputs. In a competitive market, only firms which produce the goods and services that they offer to consumers at least cost will survive. Customers benefit by not having to pay any more than necessary for these goods or services.
- Competition also tends to increase **allocative efficiency**, because firms that can use particular resources more productively can afford to bid those resources away from firms that cannot achieve the same level of returns. In a competitive market, only those firms which use resources to supply a set of goods or services to customers that provide the greatest benefit relative to costs will survive. Customers will switch away from firms which do not provide the type and quality of services which customers want and are willing to pay for.
- Competition in markets for goods and services also promotes **dynamic efficiency,** including timely changes to technology and products in response to changes in consumer tastes, as well as in productive opportunities (e.g. to undertake research and development, effect innovation in product design, reform management structures and strategies and create new products and production processes). In a competitive market, firms which do not do this will not survive over the longer term.

Source: Frontier Economics

Typically, the regulatory frameworks applied by economic regulators explicitly provide for such 'value for money' outcomes: the overarching legislated objectives require them to focus on 'the long-term interests of customers' through promoting efficient investment in and operation of, network assets. This includes ensuring prices and service standards are appropriate and that businesses are financially sustainable[1]. Demonstrating to a regulator (or to another party) that expenditure is 'efficient' can therefore be broadly translated as demonstrating that it is in the long-term interests of customers. As noted by IPART:

> *"We do not want our framework to encourage a culture of cost cutting and short-term thinking, particularly if this leads to higher costs … or poor water services. Instead, these proposed principles enable businesses to put customers at the heart of what they do. Every business decision should be made to promote the long-term interests of customers[2]."*

To explain the implications of this broader concept of 'efficiency', the following section directly addresses some common misconceptions about measuring and demonstrating efficiency.

[1] For example, in undertaking its regulatory functions, ESCOSA's primary objective is "the protection of the long-term interests of South Australian consumers with respect to the price, quality and reliability of essential services". Similarly, the overarching objective in the QCA's terms of reference for its review of the long-term regulatory framework for the SEQ water distribution businesses is" to protect the long-term interests of the users of SEQ water and sewerage services by ensuring that the prices of these services reflect prudent and efficient costs, while promoting efficient investment in and the use of these services, having regard to the reliability, safety and security over the long term".

[2] IPART Draft Water Regulatory Framework: Technical Paper, p 5, 10, 14

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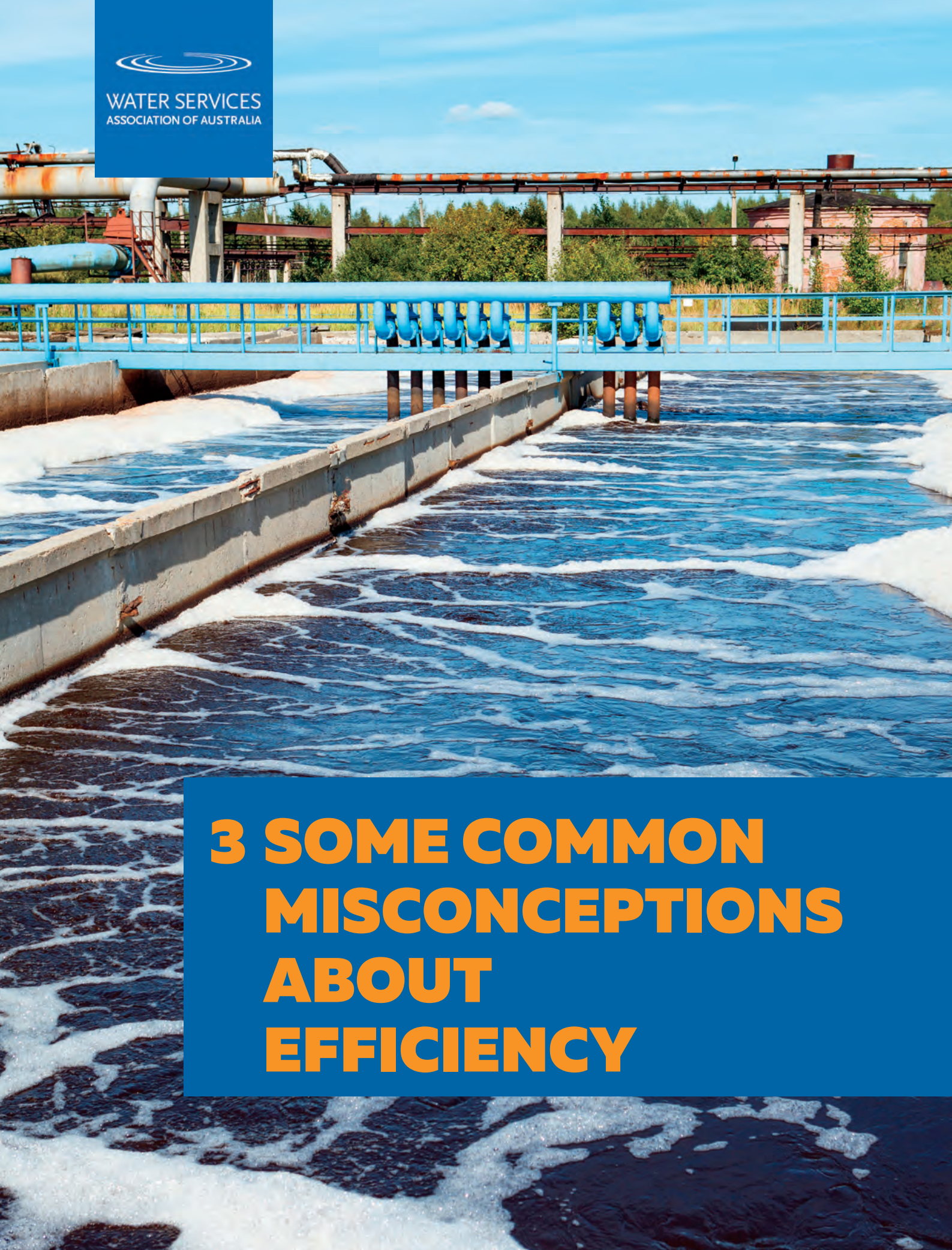


3 SOME COMMON MISCONCEPTIONS ABOUT EFFICIENCY

3 Some common misconceptions about efficiency

Key points

- A common misconception is that 'efficiency' is synonymous with cost minimisation.
- Not only is cost minimisation in itself not an appropriate objective - but it is not an appropriate interpretation of what it means to be 'efficient'.
- Minimising costs may not necessarily be consistent with:
  - providing services at the level customers want
  - maintaining and investing in asset capability and supply resilience
  - delivering broader outcomes which are desired by customers or society.
- Rather, economic efficiency can be seen as synonymous with value for money - providing the services customers want at the lowest long-term cost.

3.1 Introduction

Drawing on the discussion in Section 2, it is useful to directly address some common misconceptions about demonstrating efficiency in the urban water sector. These related misconceptions include:

- Efficiency means prices need to be flat or declining
- Efficiency is about cutting costs to the minimum
- Efficiency is incurring lowest possible costs over the upcoming determination period
- Efficiency means providing services at the lowest possible standards consistent with regulatory and other obligations
- Efficiency is about deferring new investment as long as possible and running assets to fail
- Efficiency means minimising costs even if this leads to higher risks
- Efficiency means neutralising the impact of other drivers of expenditure (e.g. growth) so prices remain constant overall without having to disaggregate the drivers
- Efficiency means demonstrating on a once-off basis that a business is efficient relative to the industry standard.

The following discussion addresses each of these misconceptions in turn.

3.2 Misconception 1: “Efficiency means prices need to be flat or declining”

3.2.1 The misconception

A common belief is that in order to demonstrate that a business is efficient, it needs to submit a pricing proposal with flat or declining prices.

3.2.2 The response

While it is certainly true that, all else equal, regulators, customers, and others would prefer to see prices to customers which are falling or flat than rising rapidly, this will only be efficient if such prices are consistent with the long-term interest of customers.

If flat or falling prices do not allow regulated businesses to properly maintain or invest in assets to provide services to customers, because for example input costs which are beyond the businesses’ control are rising, or ageing assets need maintaining or replacing, then such prices will not in fact be in the long-term interest of customers. Rather, regulators will be interested in ensuring that prices are as low as they can possibly be, whilst ensuring businesses are maintaining and investing in assets to provide the services that customers want.

While recent years have seen flat or falling water bills in many parts of Australia, looking forward this will become more challenging as cost pressures in the economy increase prices for key inputs.

3.2.3 An example

A recent example is the decision by Ofgem in the United Kingdom to increase the energy price cap to £3,549 per year for dual fuel for an average household from 1 October 2022. In doing so, Ofgem noted:

> *The price cap protects against the so called 'loyalty premium' where customers who do not move suppliers or switch to better deals can end up paying far more than others. Ultimately, the price cap cannot be set below the true cost of buying and supplying energy to our homes and so the rising costs of energy are reflected in it…*
>
> *The increase reflects the continued rise in global wholesale gas prices, which began to surge as the world unlocked from the Covid pandemic and have been driven still higher to record levels by Russia slowly switching off gas supplies to Europe.*
>
> *The price cap, as set out in law, puts a maximum per unit price on energy that reflects what it costs to buy energy on the wholesale market and supply it to our homes. It also sets a strict and modest profit rate that suppliers can make from domestic energy sales.*

Similarly, IPART's 2011 Determination of the Water Administration Ministerial Corporation's (WAMC's) water management prices resulted in significant price increases (although not as high as the NSW Office of Water, the entity responsible for delivering WAMC's services and developing its pricing submission, proposed) – so much so, that annual bill increases were capped under the determination at 20% per annum. IPART's Final Report noted:

> *"IPART's Determination will result in increases in water management prices for most valleys in NSW. We acknowledge that, in percentage terms, these increases will be significant for most users. However, we consider that, through these prices, water users will be paying for their fair share of NOW's efficient costs of its monopoly services. We have determined these efficient costs after careful consideration and independent review, and believe that users will ultimately benefit from NOW's monopoly services as they are aimed at maintaining and protecting the water property rights system."*

And that:

> *"to ensure a robust and enforceable system of water property rights, NOW must increase the level of its information collection, analysis, and compliance and enforcement activities. Such additional effort will benefit irrigators and the environment, as it will result in a more reliable system of water allocation and improved monitoring of the available resource."*

These examples clearly highlights that in circumstances where there are unavoidable increases in underlying costs, 'efficiency' will not be synonymous with flat or declining prices.

3.3 Misconception 2: "Efficiency is about cutting costs to the minimum"

3.3.1 The misconception

A common belief is that in order to demonstrate that a business is efficient, it needs to cut costs to the minimum.

3.3.2 The response

While economic regulators will want to ensure that cost are no higher than they need to be, they will also want to ensure that the regulated business is able to provide the services customers want. Expenditure will be inefficiently low if it means that service outcomes cannot meet the needs of customers over the long term.

3.3.3 An example

A recent example is IPART's decision for Central Coast Council Water (CCC Water) where it found that CCC Water must increase spending to provide acceptable services. IPART stated that:

> *We recognise that many in the Central Coast community do not support price increases. However:*
>
> - *Our review found that CCC Water must substantially increase its spending on water-related services so that it can adequately maintain the infrastructure required to provide these services. This should ensure that all customers receive good-quality drinking water, wherever they live in the region.*
> - *To enable this higher spending, prices must also rise. Our price decisions would increase typical household bills for water, wastewater and stormwater services on average by an equivalent of 28% over 4 years*
>
> *Last time we reviewed CCC Water's prices in 2019, we did not allow its proposed price increases. This was, in part, because CCC Water had for several years consistently spent less on operating costs than it recovered through prices (based on our previous pricing reviews (2013 reviews for the separate Wyong and Gosford councils) and in 2019 it could not justify that it needed any more funding than what it had been spending.*
>
> *Now there is new information that indicates CCC Water needs to spend more, and prices need to increase so that it can maintain its infrastructure and improve water services for its customers. This includes information from customers who told us there are persistent water quality problems in some parts of the water supply system[3].*

This example clearly illustrates that simply cutting costs to the minimum is not necessarily consistent with 'efficiency'.

[3] IPART, Review of Central Coast Council water prices – Summary Final Report May 2022, p.20

3.4 Misconception 3: “Efficiency is incurring lowest possible costs over the upcoming determination period”

3.4.1 The misconception

A common belief is that in order to demonstrate efficiency, businesses should focus on incurring lowest possible costs over the upcoming determination period, regardless of the impacts on costs in future periods.

3.4.2 The response

An expenditure option that results in lower costs over the upcoming determination period, but higher costs over the medium to longer term is not necessarily efficient nor in the long-term interests of customers. Such an approach would imply a focus only on short-term technical efficiency whilst ignoring longer-term dynamic efficiency (see section 2.3.2).

Indeed, economic regulators often explicitly require regulated businesses to frame their proposed expenditure program for the next regulatory period in the context of a longer-term expenditure program, recognising the long-lived nature of the assets in the water industry.

Thus in order to demonstrate efficiency, the costs (and benefits) of expenditure proposals should be assessed over the long term, to compare their net present values and assess their efficiency.

This is not to say that expenditure should not be deferred if the need for, or ability to effectively spend, the proposed funds in the next regulatory period has not been adequately justified. For example, there may be a case to defer expenditure if there is demand uncertainty or to re-phase expenditure allowances if there are questions about whether a business can efficiently deliver a significant increase in capital expenditure over a relatively short period of time.

The need to optimise expenditure over a long-term planning horizon is well-accepted by economic regulators. For example, in its 2021 guidance paper, the Victorian ESC states that:

> *The forecast operating expenditure to be included for the purposes of determining the required revenue is operating expenditure that would be incurred by a prudent service provider acting efficiently to achieve the lowest cost of delivering service outcomes, **taking into account a long-term planning horizon** (prudent and efficient forecast operating expenditure[4]).[bolding added]*

It makes a similar statement with regard to capital expenditure.

Similarly, ESCOSA has stressed in its review of SA Water's prices for the period from 1 July 2024 to 30 June 2028 that while "the regulatory determination, while for a four-year period, [it] is made in a long-term context:

- The four-year expenditure proposals must relate to (and should be drawn from) SA Water's existing long-term asset management, financing and service delivery plans.
- Those plans, in turn, should have been developed through ongoing, transparent and genuine customer, community and stakeholder engagement".

3.4.3 An example

A common example of an upfront investment which is expected to generate efficiencies over a period extending beyond the next regulatory period relate to investments in ICT.

In its decision on prices for Powercor to apply over the 2021-26 period, the AER included a step change in operating expenditure of $5.6 million ($2020-21) for the migration of a number of information and communications technology (ICT) applications to cloud hosting, on the basis that the IT cloud proposal was an efficient capex-opex trade-off and the lowest cost option to meet their ICT infrastructure needs[5].

[4] ESC guidance paper p. 33

[5] AER, Attachment 6: Operating expenditure Final decision – Powercor 2021–26, pp. C35-36

3.5 Misconception 4: “Efficiency means providing services at the lowest possible standards consistent with regulatory and other obligations”

3.5.1 The misconception

A common belief is that in efficiency means providing services at the lowest possible standards consistent with regulatory and other obligations.

3.5.2 The response

Because customer may often prefer to have higher quality services even if this costs more, simply providing services at lowest possible standards consistent with regulatory and other obligations is not necessarily an ‘efficient’ outcome. Rather, in line with their objective of seeking to replicate the outcomes of competition to promote the long-term interests of customers, regulators typically seek to incentivise businesses to achieve the outcomes their customers want at lowest cost over the long term. This means they should support expenditure to achieve outcomes above minimum standards where the benefits received by customers exceed the costs of supply.

Customer support to incur costs to meet outcomes above minimum standards is best measured and demonstrated by willingness to pay analysis. Such analysis should be proportionate to the level of cost involved and follow best practice principles.

3.5.3 An example

It is quite clear that regulators will allow for price increases to cover costs associated with meeting higher service standards imposed on regulated businesses (i.e. will consider that meeting prescribed service standards is integral to assessing ‘efficiency’). For example, in 2006 IPART approved price increases to enable a number of the Distribution Network Service Providers (DNSPs) to pass through

to Distribution Customers additional costs associated with the introduction of new licence conditions[6]. The New Licence Condition imposed the following new obligations upon the DNSPs:

- minimum and average reliability standards, specified by feeder type
- minimum network design planning criteria
- guaranteed customer service standards (GCSS), requiring the DNSPs to make payments to customers (on application) if they experience more than a certain number or duration of interruptions in a given year.

However, it is also clear that regulators will also consider spending more to achieve higher service standards to be 'efficient', provided businesses can demonstrate that their customers want these higher standards and are prepared to pay for them.

Continuing with an energy sector example, the AER recently approved significant increases in expenditure to help transitioning the network to meet customer expectations:

> *Facilitating the transition of the energy system is a key theme for this Victorian regulatory determination process. Mechanisms such as expenditure to physically accommodate greater solar exports, tariff price signals and demand management initiatives can help. We consider the transition of the energy system so important that we have made incentivising networks to become platforms for energy services a strategic objective in our regulation of networks.*
>
> *We accepted AusNet Services' initial proposal on the amount of capex required to facilitate and integrate distributed energy resources (DER) on its network. Our decision supports AusNet Services accommodating solar PV growth on its networks to achieve consumer expectations regarding the Victorian Government's Solar Homes program.*

However, where service standards above minimum requirements are being proposed, evidence of customers' willingness to pay for the higher standards will become critical to the assessment of 'efficiency'.

For example, in its 2018 proposal, Icon Water conducted research into the appropriate balance between network reliability and the price that customers were willing to pay for that reliability. Icon Water undertook targeted consumer research to identify these preferences and priorities. It conducted both a willingness to pay study of water supply interruptions and sewerage overflows and a cost-benefit analysis of water and sewerage network management options. In its 2018 decision, the ICRC commended Icon Water for its efforts to engage with consumers on these service levels.

Another example of where a business undertook a significant customer willingness to pay assessment is provided in the case study of Hunter Water's approach to setting customer performance standards (see Appendix B). In this case, the WTP study provides support for maintaining current service levels.

These examples illustrate that 'efficiency' does not simply mean providing services at the lowest possible standards consistent with regulatory and other obligations.

[6] Independent Pricing and Regulatory Tribunal of New South Wales, Draft Statement of Reasons, Energy Australia Public Lighting Price Proposals Decision, 4 May 2006

3.6 Misconception 5: "Efficiency is about deferring new investment as long as possible and running assets to fail"

3.6.1 The misconception

A common belief is that efficiency means that existing assets should be run as hard as possible, in order to minimise expenditure on maintenance and/or renewals.

3.6.2 The response

Efficiency requires an optimal level of renewal and/or maintenance expenditure to ensure ongoing service delivery, rather than simply minimising such expenditure. In addition, the business should consider operating and capital expenditure trade-offs, and the optimal combination of operating and capital expenditure required to meet customers' needs over the long-term.

This may mean, for example, higher capital expenditure in the short term leads to lower operating expenditure and more efficient overall expenditure in the long term; or higher operating expenditure offsets the need for future capital expenditure and leads to more efficient overall expenditure in the long term.

3.6.3 An example

In its review of Sydney Water's prices for the period from 1 July 2020 to 30 June 2024, IPART noted that its decision on Sydney Water's efficient capital expenditure allowance includes provision for additional capital expenditure items that will improve the resilience of Sydney Water's water and wastewater networks. Of particular note, IPART approved expenditure of some $126 million on Sydney Water's Wastewater pumping stations renewals program which was in excess of the amount originally proposed by Sydney Water. As stated by IPART:

> *Sydney Water has 680 wastewater pump stations within its wastewater network that it considers require renewal. Over the 2020-24 period, Sydney Water proposed expenditure of $26.6 million per annum ($106 million over 2020-24), a 15.6% increase on the $23.0m per annum expenditure in the previous period (2017-20). We decided to include $126 million of expenditure in the 2020 period, a $20 million increase on Sydney Water's proposal, to recognise the need for additional costs to build resilience of the network and manage risk of asset failure over the forward period*[7]*.*

This highlights that in assessing what expenditure is 'efficient', regulators will seek to ensure that this encompasses appropriate maintenance and renewals expenditure to ensure ongoing service provision, rather than simply minimising such expenditure.

[7] IPART June 2020, Review of Prices for Sydney Water from 1 July 2020, Final Report, p. 30

3.7 Misconception 6: "Efficiency means minimising costs even if this leads to higher risks"

3.7.1 The misconception

A common belief is that efficiency means minimising costs even if this leads to higher risks.

3.7.2 The response

Simply minimising cost regardless of risk is unlikely to be consistent with the long-term interests of customers.

An expenditure option may be lower cost in the absence of risk analysis, but higher cost compared to an alternative once risk is considered. The most efficient option will be the one that delivers the outcomes that customers need and want over the long term, incorporating robust risk analysis.

Managing risk effectively is a fundamental part of operating and investing in the water sector. This is well understood and expected by economic regulators. For example, the Essential Services Commission of Victoria has clearly stated that:

> *Efficiency is promoted when risk is adequately identified, quantified, and allocated. Prices should reflect the costs incurred in delivering services, incorporating reasonable assumptions about risk.*
>
> *A water business's price submission must be informed by a robust risk identification process, taking into account a long term planning horizon. We anticipate such analysis is undertaken by businesses as part of their normal business planning. Significant risks must be identified in price submissions. Price submissions must also demonstrate that risk has been allocated appropriately, and where a business has decided it is best placed to do so, identify the approaches it proposes to manage the risk[8].*

Similarly, IPART's Draft Report on its recent review of its regulatory framework notes that it expects businesses to weigh up the benefits and risks to customers of investment decisions, and consider how consistent they are with delivering long-term asset and service performance. It also notes that, as a standard expectation, it expects businesses to outline their approach to manage long-term risks, including climate change.[9]

3.7.3 An example

One key risk in the water sector is managing the impact of impending drought on the ability to supply customers (see Box 2). This example indicates that where it can be justified, regulators will accept the incurring of additional costs to manage such risks where it can be demonstrated to be prudent and efficient to do so.

[8] ESC Guidance paper p. 16

[9] IPART, Draft Water Regulatory Framework: Technical Paper, May 2022, p 17.

Box 2: Queensland Competition Authority (QCA) allowance of additional costs of managing risk of water supply during approaching drought

Seqwater claimed costs associated with undertaking various measures in the drought readiness and drought response phases, as well as costs incurred before the drought readiness trigger was reached. The key cost items related to Seqwater's two manufactured water assets—the GCDP and WCRWS. [With respect to the latter, SeqWater first recommissioned one train and then another two trains as storage levels continued to drop].

Seqwater submitted that drought response measures pertain to all measures required to respond to declining dam levels, including drought readiness measures. Seqwater also describes the WSP as an adaptive approach that is not intended to be an exhaustive and exclusive list of actions that are only warranted and legitimate at or below a specific trigger point.

We undertook an initial assessment of Seqwater's cost claim for the draft report. Based on that assessment, we found that some costs may not meet the review event definition because they resulted from taking actions that were not drought response measures, or the actions were taken too early according to the drought response triggers in the WSP. However, we also recognised that no water planning document could precisely determine the optimal approach to prepare for and respond to drought, as the optimal approach was likely to reflect the relevant circumstances.

We also acknowledged that Seqwater may not have been adequately compensated for drought readiness costs through the current opex allowance. We concluded that it may be appropriate to apply a more flexible assessment approach, which would consider whether Seqwater had prudently and efficiently prepared for, and managed its response to, drought conditions. We acknowledge Seqwater's concern that without an opportunity to recover its efficiently incurred costs, it may not be appropriately incentivised to prudently manage water security and prepare for drought in future.

We found that Seqwater undertook some actions ahead of the relevant triggers in the WSP. The main action undertaken early was the partial recommissioning of the recycled water scheme. The decision to recommission a single train at the Luggage Point Advanced Water Treatment Plant (AWTP) was made in December 2017. At the time of the decision, dam levels were at around 78 per cent, which was well above the trigger for taking the action in the WSP (dam levels at 60 per cent) and also above the drought readiness trigger (70 per cent).While it is difficult to definitively conclude that the decision [to recommission one train at Luggage Point] was prudent in the circumstances, we acknowledge the potentially significant impacts on water security if Seqwater had not taken pre-emptive action to mitigate the risk of full recommissioning. We also note that Seqwater would likely have incurred some of these costs later, as dam levels eventually dropped below 60 per cent, when full recommissioning was supported by the WSP.

In March 2021, Seqwater decided to recommission the remaining two Luggage Point trains to increase supply to industrial customers in drought and reduce demand on Wivenhoe Dam.

We considered the decision was likely to be prudent. Dam levels were around 56 per cent at the time the recommissioning decision was made, so it was consistent with the WSP, and forecast supply and storage depletion scenarios indicated that additional supply was needed.

Source: QCA final report on Seqwater, pp.81-84

Not relining pipes in the water distribution network may be a higher cost option than relining pipes, in the absence of risk analysis. However, risk analysis (e.g. likelihood and consequence of pipe failure under each option) may show that relining pipes is the lowest cost option to customers over the long term – and hence is the most efficient option.

Another example from another sector relates to a proposal by Queensland Rail for higher expenditure to manage the risk of land slips which could impact on its future ability to deliver services.

Box 3: Pre-approval of expenditure to manage risk of land slips

Queensland Rail proposed to undertake major remedial works to stabilise two high risk sites within the Toowoomba Range rail corridor where slope instabilities have previously resulted in 'severe land slips and track closures requiring immediate and costly remediation. It sought pre-approval Queensland Rail then sought preapproval in 2018 for the scope and standard of its planned stabilisation project, as the expected scale and cost of the project exceeded what had been included in the forecasts when its tariff was assessed

The QCA accepted Queensland Rail's request for preapproval for its Toowoomba Range slope stabilisation project. In doing so it accepted that:

- the works are needed to address known slope instabilities which pose risks to the existing rail infrastructure, rail operations and/or access roads. Reducing the ongoing risk of slope failure will reduce the risk of service cancellations and system outage (in the absence of an alternative route up/down the Toowoomba Range in the near term) and is consistent with Queensland Rail's obligations to provide a safe railway for its customers, employees and stakeholders.
- the proposed works are of a reasonable standard to meet the project scope and are not overdesigned.
- Queensland Rail had used appropriate processes to evaluate and select its proposed project solution, including consulting with relevant stakeholders.

Source: QCA Discussion paper Approach to climate change related expenditure October 2022, p.21.

3.8 Misconception 7: Efficiency means simply neutralising drivers of expenditure so prices remain constant overall

3.8.1 The misconception

A common belief is that rather than demonstrating how it can minimise costs due to efficiency improvements, it will be sufficient for a water business to simply nominate efficiency savings which offset the impacts of other cost drivers such as growth or compliance obligations.

3.8.2 The response

Such a 'broadbrush' approach may lead to costs which are inefficiently low or inefficiently high. Costs may need to increase to meet, for example, growing demand, more stringent environmental regulatory requirements, or higher service levels required by customers. Such costs will be efficient if they represent the least-cost means of achieving the required outcomes over the long term, even if this increases costs in aggregate. Indeed, if expenditure does not increase to allow the utility to efficiently meet required service outcomes, the expenditure will be inefficiently low. Conversely, it may be that the business can adopt efficiency measures which means that overall cost can fall, despite the impact of these other cost drivers.

This highlights the need to separately disaggregate the impact of various cost drivers and to robustly demonstrate the efficiency of the costs proposed by the business to deliver services taking into account all of the various cost drivers.

This approach is typically adopted by economic regulators. For example, the ESC requires forecast operating expenditure to be presented relative to a reference or baseline operating year), with allowance for expenditure growth (e.g. based on customers or demand growth) and proposed cost efficiency improvements. In doing so, the need to disaggregate cost drivers in the context of the pandemic has recently been highlighted by the ESC (see Box 4).

Box 4: Relationship between growth allowance and efficiency improvement rate

In previous price reviews, water businesses have mostly based their operating expenditure growth rate on forecast customer growth over the relevant regulatory period. The coronavirus pandemic has significantly impacted customer growth rates over the past two years, with some businesses experiencing customer growth above forecast and others below. Based on the information currently available to us, it is unclear whether the direct relationship between customer growth and operating expenditure growth has continued or could reasonably be expected in the next regulatory period.

As such, we expect that businesses will use their price submissions to clearly justify why the proposed operating expenditure growth rate chosen is most appropriate, particularly whether a growth factor other than customer growth is more accurate. This should be supported by recent evidence (e.g. based on the latest expenditure, customer number and usage data).

Source: Essential Services Commission, p.31

3.8.3 An example

Several examples of the base step trend approach to disaggregating costs and increases in costs are provided in Attachment A. These examples demonstrate that the Base Step Trend methodology provides a framework that enables the regulated business and the regulator to focus on key elements of forecast operating expenditure rather than scrutinising each individual cost item. This reduces the regulatory burden for businesses and the regulator, and generally also limits the scope for disputes over the reliability of forecasts at cost category levels.

The use of a Base Step Trend methodology is not a recipe that will guarantee that the business's forecasts will be accepted as efficient and prudent. The regulated business needs to justify each element of the Base Step Trend methodology, ensuring each component meets the key concepts of prudency and efficiency. An example of this is the ESC's 2021 decision for Melbourne Water where it noted that:

> *We also requested further justification for the proposed relationship between customer growth and expenditure growth. We appreciate that Melbourne Water's response provides analysis to establish a correlation between customer growth and the regulatory asset base, and subsequently between the regulatory asset base and operating expenditure. However, Melbourne Water's response to our draft decision maintains the provisional growth and efficiency rates, and does not clarify how these correlations establish a one-to-one relationship between customer and expenditure growth in both of its business areas. While we note Melbourne Water's statement that the net efficiency rate is the only element that matters for prices and customers, we reiterate that simply focusing on the net efficiency rate does not follow the approach set out in our guidance. After considering Melbourne Water's response, we have decided to accept it in our final decision because it delivers the savings to customers proposed in our draft decision, even though it has not fully addressed the expectations set out in our draft decision. Melbourne Water will need to provide a more robust justification for its proposed expenditure growth rates in its next price review submission, as stipulated in our guidance[10].*

[10] Essential Services Commission, 16 June 2021, Melbourne Water Final Decision 2021 water price review, p. 28

3.9 Misconception 8: Efficiency means demonstrating on a once-off basis that a business is efficient relative to the industry standard

3.9.1 The misconception

A common belief is that it will be sufficient for a water business to simply demonstrate on a once-off basis that it is efficient relative to the industry standard, rather than demonstrating how it will continue to generate ongoing productivity improvements.

3.9.2 The response

Such an approach focuses exclusively on technical and allocative efficiency, and overlooks the critical dynamic efficiency component which relates to the adoption of new techniques or technology to increase outputs and/or lower costs over time.

The need to demonstrate dynamic efficiency is reflected in guidance typically issued by economic regulators on the rate of ongoing productivity improvements which it expects businesses to achieve and to be embodied in their expenditure proposals. This makes it clear the efficiency is not a 'static' concept but rather that the pursuit of 'efficiency' is an ongoing task.

3.9.3 An example

The base step trend approach adopted by a number of economic regulators (see Attachment A) includes a 'trend' component which incorporates expected productivity growth.

Similarly, Ofwat's approach to setting cost allowances (see Attachment D) explicitly incorporates both a 'catch-up' efficiency component reflecting efficiency gains required by a business to ensure it is operating at the 'efficiency frontier' of the industry (defined as the upper quartile), as well as a 'frontier shift' component reflecting further efficiency improvements which should be achieved by the industry over time.

3.10 Key take-outs

A key message from the above discussion of common misconceptions is that minimising costs may not necessarily be consistent with providing the services at the level customers want, maintaining and investing in asset capability and supply resilience, or delivering broader outcomes which are desired by customers or society. Not only is cost minimisation in itself not an appropriate objective – as would be readily accepted by most people both inside and outside the industry - but it is not an appropriate interpretation of what it means to be 'efficient'. Rather, economic efficiency can be seen as synonymous with value for money - providing the services customers want at the lowest long-term cost.

WATER SERVICES
ASSOCIATION OF AUSTRALIA

4 HOW IS EFFICIENCY MEASURED AND DEMONSTRATED?

4 How is efficiency measured and demonstrated?

Key points

- While how best to demonstrate efficiency may depend on the audience, fundamentally it is about demonstrating that a proposal is in the long-term interests of customers.
- The overarching approach of economic regulators in determining efficient levels of expenditure for regulated urban water businesses, which they then allow to be recovered in regulated prices, typically involves:
  - Establishing the services to be provided to meet regulatory and other obligations and customers' preferences
  - Establishing the minimum expenditure needed to efficiently deliver these services
  - Setting prices which are forecast to enable the business to recover the total expenditure which the regulator has deemed to be 'prudent and efficient'.
- Typically regulators adopt a ‘prudency and efficiency test’ to provide assurance that the businesses are (1) doing the right things; and (2) doing those things as efficiently as possible.
- Regulators typically assess the prudency and efficiency of operating and capital expenditure individually, as well as the trade-off between these two types of expenditures.
- While both detailed ‘bottom up’ assessments of various operating expenditure items and broader ‘top down’ approaches which focus on broad categories of expenditure have been applied by regulators, the latter (particularly the base-step-trend approach) is becoming increasingly widespread.
- Approaches to assessing the efficiency of capital expenditure typically examine the business' capital governance frameworks, policies and procedures, and review a sample of the business's proposed capital expenditure projects. This generally requires reference to an identified need or cost driver, evidence that the business has considered alternate solutions including non-network solutions, and that the cost of the defined scope and standard of works is consistent with conditions prevailing in the relevant markets.

4.1 Introduction

This section:

- Notes the various contexts in which water businesses may need to measure and demonstrate efficiency
- Outlines how economic regulators in Australia generally interpret, measure and assess efficiency. Where there are jurisdictional differences identified by the case studies, we have highlighted those.
- Identifies the key types of analysis, arguments and evidence that regulators (and others) find persuasive for the purposes of demonstrating the efficiency of expenditure proposals.

4.2 Approaches for assessing efficiency in different contexts

At the highest level, as discussed above, demonstrating that a project or program of expenditure is 'efficient' is akin to demonstrating value for money (i.e. that it is in the long-term interests of customers).

However, the precise approach to measuring and demonstrating efficiency varies according to the specific context:

- For individual projects, this typically involves developing a robust business case that justifies the proposed investment or expenditure as the best means of addressing an identified problem or objectives, having considered and evaluated potential alternatives.
- For broader expenditure programs, such as those embodied in pricing submissions to economic regulators, the same underlying thinking applies, although specific methodologies and approaches have been developed.

The approach to demonstrating efficiency may also vary depending on the stakeholder involved. For example, demonstrating 'efficiency' to an economic regulator may involve the application of specific methodologies whereas demonstrating 'efficiency' to customers may entail a higher-level narrative which spells out what services the business is providing and why, and how this is reflected in customers' bills.

That said, we note that, in recent times regulators have increasingly required the businesses they regulate to demonstrate that they have consulted closely with their customers in developing expenditure proposals. After all, ultimately regulators are concerned about whether businesses are providing services in the long-term interests of customers. Thus the ESC's Guidance paper for the 2023 price review states that:

> *Price submissions must clearly and succinctly identify and explain how a business's proposals demonstrate value for money for customers — that is, what outcomes will be delivered to customers in return for the prices they pay, and how this reflects what customers value most*[11].

Given this, and the dominant role economic regulators play in assessing efficiency on behalf of customers in the urban water sector in Australia, the following discussion largely focuses on the approaches adopted by these regulators to assess efficiency. We emphasise, however, that these approaches are also relevant to demonstrating efficiency to other stakeholders.

[11] ESC

4.3 Broad approach by economic regulators to establishing 'efficient' expenditure

The overarching approach of economic regulators to determine efficient levels of expenditure for regulated urban water businesses, which they then allow to be recovered in regulated prices, typically involves:

- Establishing the services (including service type, levels and outcomes) to be provided to meet regulatory and other obligations and customers' preferences
- Establishing the minimum expenditure or 'revenue requirement' needed to efficiently deliver these services (typically via the 'building block' methodology – see Box 5).
- Setting prices which are forecast to enable the business to recover the total expenditure or 'revenue requirement' which the regulator has deemed to be 'prudent and efficient'.

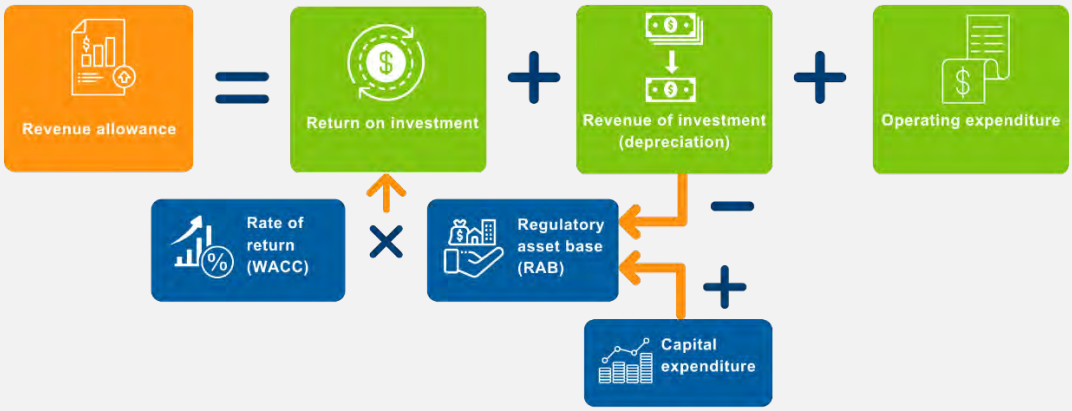
For example, the ESC guidance paper states that for a defined regulatory period the building block methodology involves the following steps:

1. Outcomes that a water business proposes to deliver to its customers will be assessed to validate that they reflect government (and technical regulator) obligations or demonstrated customer needs.
2. The required revenue for a water business for the next regulatory period to deliver these outcomes will be estimated by the building block approach, under which the building blocks are:
    a. prudent and efficient forecast operating expenditure
    b. prudent and efficient forecast capital expenditure.
    c. return on the regulatory asset base (RAB).

Box 5: Building block regulation

Under a building block approach allowed revenue for each regulated business is set to recover:

- **Return on capital:** The return on capital is intended to reflect the efficient financing costs of a benchmark efficient entity with a similar degree of risk. The asset base on which the return is allowed is known as the **regulatory asset base** (RAB). The RAB is adjusted over time to take account of inflation, depreciation and capital expenditure.
- **Return of capital:** Water corporations are allowed to earn an amount to compensate for **depreciation** on their RAB, known as regulatory depreciation. The regulator usually adopts a straight-line methodology over remaining economic asset lives.
- **Capital expenditure:** Water corporations are allowed to recover prudent and efficient capital expenditure (or capex) to cover the cost of new investments and replacement of existing networks. Capital expenditure is scrutinised by the regulator to ensure it is prudent and efficient and necessary to maintain or improve safety, maintain integrity, comply with a regulatory obligation or meet customer demand. Capital expenditure that meets these criteria is added to the RAB.
- **Operating and maintenance expenditure:** Water corporations are allowed to recover forecast operating expenditure (or OPEX) that is consistent with a prudent service provider acting efficiently and in accordance with accepted industry practice to deliver services at the lowest sustainable cost.
- **Taxation:** Water businesses are provided with an allowance for the estimated cost of their corporate income tax.



4.4 The “prudency and efficiency” test

Economic regulators tend to take specific approaches to assessing the efficiency of operating and capital expenditure respectively (as discussed in turn below). First, however, it is helpful to understand their high-level approach to assessing efficiency.

Regulators in Australia typically refer not just to ‘efficiency’ but to the term ‘prudency and efficiency’ and subject proposed expenditure to a ‘prudency and efficiency’ test.

As we have set out above, the term ‘efficiency’ has a generally accepted definition in economics. While the definition of prudent expenditure, however, is less clear-cut, it often refers to making the right investment decision given ‘the circumstances prevailing at the time’. This appears to recognise that decisions are made under uncertainty and that water utilities will rarely have perfect information. While the prudency tests applied by regulators recognises that forecasts are generated with an

imperfect information, they typically require businesses to demonstrate that they have drawn on sound decision-making processes, analysis and longer-term strategic plans.

The ICRC summarised its approach as follow:

> *The Commission assesses Icon Water's proposed operating expenditure for the forward regulatory period on the basis of prudency and efficiency. Economically efficient operation and investment is integral to achieving the Commission's regulatory objectives. The Commission adopts the following definitions for tests for prudency and efficiency:*
>
> - *Prudent expenditure. This encompasses whether the project, program or activity would reasonably be expected of a utility operating in the circumstances that apply. Evidence considered for prudency would include substantiation of the benefits of and the need for the project, program or activity.*
> - *Efficient expenditure. This entails whether the project, program or activity is delivered or proposed to be delivered with the best value for money. Evidence considered for efficiency would include exploration of alternative service delivery options, assessment of lowest cost over the life cycle, and the 'deliverability' of the proposed project, program or activity*[12]*.*

In similar terms, IPART has previously provided guidance which set out the key elements of this approach (See Box 6).

Box 6: IPART's efficiency test

The efficiency test examines whether a utility's capital and operating expenditure represents the best and most cost-effective way of delivering services to customers.

Broadly, the efficiency test considers both the investment decision (sometimes referred to as the 'prudence test') and how the investment is executed or delivered, having regard to, amongst other matters, the following:

- customer needs, subject to the utility's regulatory requirements
- customer preferences for service levels, including customers' willingness to pay
- trade-offs between operating and capital expenditure, where relevant
- the utility's capacity to deliver planned expenditure
- the utility's expenditure planning and decision-making processes.

The efficiency test is applied to:

- historical capital expenditure
- forecast capital and operating expenditure

that is included in the utility's revenue requirement, for the purposes of setting regulated prices.

The efficiency test is based on the information available to the utility at the relevant point in time. That is:

[12] ICRC Final report: Regulated water and sewerage services prices 2018–23, p. 48

- 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.

Source: IPART

ESCOSA has stated that under its approach:

> *Broadly speaking, expenditure on an activity will be considered prudent where there is a clear justification for that activity. This will be informed by an assessment of whether the expenditure is driven by:*
>
> - *a legislative or regulatory obligation, which SA Water must comply with*
> - *an expectation that the activity will deliver benefits to consumers that outweigh the costs, or*
> - *a clear expectation from customers that an outcome should be achieved, and that they are willing to pay for that outcome.*
>
> *Expenditure is likely to be considered efficient where it represents the lowest sustainable (or 'long-term') cost of achieving the intended outcome[13].*

In similar terms, the Queensland Competition Authority (QCA) summarises its approach as follows[14]:

> *The QCA has for almost two decades applied a prudency approach to assessing capital and operating expenditures.*
>
> *The capital expenditure process is designed to promote appropriate investment by giving regulated infrastructure owners comfort that, if they invest in accordance with the framework, they will be able to recover their efficient costs over time. The approach considers three aspects of prudency:*
>
> *• Scope—are the works needed?*
>
> *• Standard—are the works of an appropriate standard and not over-designed?*
>
> *• Cost—are the costs reasonable for the work done?*

The 'prudency and efficiency ' test is also applied in other regulated sectors. For example, the Australian Energy Regulator (AER) has stated that:

[13] ESCOSA, SA Water regulatory determination 2020, Guidance paper No 4, Prudent and efficient expenditure, Nov 2018

[14] Queensland Competition Authority, Discussion paper - Approach to climate change related expenditure October 2022, p.19

> *Efficiency and prudence are complementary. We consider that the notion of efficient costs complements the costs that a prudent operator would require to achieve the expenditure objectives. Prudent expenditure is that which reflects the best course of action, considering available alternatives. Efficient expenditure results in the lowest cost to consumers over the long term. That is, prudent and efficient expenditure reflects the lowest long term cost to consumers for the most appropriate investment or activity required to achieve the expenditure objective*[15].

It is worth utilities understanding the subtlety of how 'prudency' is applied in their jurisdiction. Overall, however, these distinctions are more apparent than real. As prudency is always combined with efficiency it does not affect the overall approach adopted by regulators. Indeed, many of the requirements for prudent expenditure cannot be separated from general tests for efficiency. For example, that an investment be 'the best course of action' (AER) or that 'benefits outweigh costs (ESCOSA) or that it be necessary to deliver regulated services (QCA, ESCOSA) is inherent in any proper definition of efficiency. It may, in fact, be an attempt, to split the economic understanding of efficiency into two more plain English components.

In broad terms the prudency and efficiency test can be seen as addressing both allocative efficiency ('doing the right thing') and technical and dynamic efficiency (doing those things as efficiently as possible).

This report therefore takes 'prudency and efficiency' to be synonymous with 'efficiency' for practical purposes.

The need to demonstrate both 'prudency' and 'efficiency' will depend on the nature of the activity /expenditure involved. For example, if complying with regulatory obligations there may only be a need to demonstrate that this is being done in the most efficient way, whereas for discretionary activities businesses will also need to demonstrate the prudency of the proposed activity and associated expenditure. By way of example, in the UK water sector, where Ofwat regulates the water companies in England & Wales, Ofwat's price control methodology distinguishes between 'non-discretionary spend' and 'discretionary spend' – see Box 7 (more detail of Ofwat's approach to setting cost allowances is provided in Attachment D).

Box 7: Ofwat distinction between 'discretionary' and 'non-discretionary' expenditure

Ofwat's price control methodology distinguishes between non-discretionary spend (referred to as 'base') and discretionary spend ('enhancement').

- For non-discretionary expenditure the focus of efficiency is on ensuring that the desired level of service is delivered at least cost. This involves the analysis of historical expenditure across the companies to test the scope for improving cost efficiency and also checking that historical levels of expenditure are sufficient to meet future needs.
- For discretionary expenditure the efficiency focus is centred on demonstrating 'value for money'. In other words, do the benefits to customers (or wider society) exceed the costs and do the activities have the support of customers? There is also an increasing focus on the timing of investment (i.e., even if a scheme is cost-beneficial now is there a stronger case to defer the investment decision to a later period (perhaps in the case of demand uncertainty).

Source: Ofwat

Regulators can also consider the efficient timing of expenditure. For example, there may be a case to defer expenditure if there is demand uncertainty or to re-phase expenditure allowances if there are questions about whether a business can efficiently deliver a significant increase in capital expenditure over a relatively short period of time.

[15] https://www.aer.gov.au/system/files/AER%20-%20Expenditure%20forecast%20assessment%20guideline%20-%20distribution%20-%20August%202022.pdf

4.5 Assessing the prudency and efficiency of operating expenditure

A number of approaches have been adopted by regulators to assess the prudency and efficiency of operating expenditure proposals put forward by water businesses. These can be broadly categorised as detailed 'bottom up' assessments of various operating expenditure items versus broader 'top down' approaches which focus on broad categories of expenditure.

Regardless of the precise approach adopted, the objective is to ensure that the proposed expenditure is 'prudent and efficient', as encapsulated in a recent ESC guidance paper:

> *The forecast operating expenditure to be included for the purposes of calculating the revenue requirement is operating expenditure which would be incurred by a prudent service provider acting efficiently to achieve the lowest cost of delivering on service outcomes over the regulatory period, taking into account a long-term planning horizon (prudent and efficient forecast operating expenditure)*[16].

Typically regulators have an expectation that businesses will over time become more productively efficient (all else remaining equal) – reflected in an ongoing or continuing productivity assumption.

A traditional bottom-up approach involves building up an estimate of the efficient level of operating expenditure in the base year by:

- Identifying each of the individual categories of costs relevant to the regulated business;
- Estimating (using unit cost analysis and engineering estimates of volume of individual inputs to production) the efficient level of operating expenditure for each cost category; and
- Summing up the estimates of efficient costs across all categories.

However, this approach has a number of disadvantages, including the following:

- The results can be highly sensitive to the assumptions and (sometimes subjective) judgements made by the experts conducting the analysis;
- Regulators are often wary of an asymmetry of information between themselves and regulated businesses, so can view bottom-up analysis of this kind (which requires a detailed understanding of the business in question) with scepticism;
- Presentation of bottom-up analysis can invite regulators to scrutinise the costs of the business very closely. Given the asymmetry of information problem, this can potentially result in the regulator drawing erroneous conclusions based on incomplete information; and
- Bottom-up analyses can be resource-intensive exercises for both the regulator and the regulated business.

It is for these reasons that some regulators, including some State based water regulators, are moving away from bottom-up approaches and towards top-down approaches that focus more on the overall levels of operating expenditure across a regulatory period.

A top-down approach, such as Base Step Trend, does not involve calculating and justifying expenditure forecasts at each cost category level but, rather, calculating a total efficient level of operating expenditure within which a business needs to operate. This approach focuses on identifying key changes as noted by the ESC:

[16] ESC guidance paper pp. 28-29

> *We consider that a prudent and efficient operating expenditure forecast has the following characteristics:*
>
> - *baseline year expenditure is reflective of efficient operating costs and is used as a basis to forecast expenditure*
> - *forecast operating expenditure incorporates reasonable expectations for expenditure growth and cost efficiency improvement*
> - *expenditure requirements above the baseline year (adjusted for growth and efficiency improvements) are fully explained and justified*[17].

The key benefit of this style of approach are that it reduces the regulatory costs for both the regulator and the regulated business. By removing a lot of the granularity, the regulatory review can focus on the big elements of the forecast in a clear and systematic way. Furthermore, the adoption of a top-down approach to expenditure forecasting has also reduced the opportunities for disputes and disagreements between regulators and regulated businesses about the efficiency and prudency of individual cost categories—allowing the regulator to focus more on the 'bigger picture'. This is also a benefit in more clearly being able to demonstrate efficiency to other parties, not just a regulator.

4.6 Assessing the prudency and efficiency of capital expenditure

Again, in assessing efficiency of capital expenditure, the objective is to ensure that the proposed expenditure is 'prudent and efficient'. As articulated by the ESC:

> *The forecast capital expenditure to be included for the purposes of determining the required revenue is capital expenditure that would be incurred by a prudent service provider acting efficiently to achieve the lowest cost of delivering service outcomes, taking into account a long-term planning horizon (prudent and efficient forecast capital expenditure*[18]*).*

In assessing the efficiency of proposed capital expenditure, regulators typically:

- Examine the business' capital governance frameworks, policies and procedures
- Review a sample of the business's proposed capex projects (usually covering the largest). From this sample (and review of capital governance frameworks), the regulator can determine whether any adjustments are required to:
  - the allowances of individual projects (I.e. those examined in the sample)
  - the aggregate capex allowances, to reflect any systemic findings
- Require reference to an identified need or cost driver (e.g. compliance, growth, replacement/renewal)
- Seek evidence that the business has considered alternate solutions including non-network solutions and opex/capex trade-offs, and considered the costs and benefits of all viable options to achieve the required outcome /s.
- Assess whether the business has put in place appropriate mechanisms to consider and manage risk, rather than simply apply contingency allowances
- Examine whether forecast capital expenditure for renewals incorporates expectations for a reasonable rate of improvement in cost efficiency.

17 ESC guidance paper pp. 28-29

18 ESC guidance paper p. 33

The approach set out by the QCA (see Box 8) is typical.

Box 8: QCA guidance on assessing capital expenditure efficiency

We consider capex is prudent if it:

- can be justified by reference to an identified need or cost driver—for example, investment required as a result of a legal or regulatory obligation (compliance), growth, replacement or renewal of existing infrastructure, or
- achieves an outcome that is explicitly endorsed or desired by customers, external agencies, or participating councils—for example, improved reliability or quality of supply of services.

We consider capex is efficient if:

- the scope of the works represents the best means of achieving the desired outcomes after having regard to the options available, including non-network solutions, and substitution possibilities between operating expenditure (opex) and capex
- the standard of the works conforms to technical, design and construction requirements in legislation, industry and other standards, codes and manuals
- the cost of the defined scope and standard of works is consistent with conditions prevailing in the relevant markets.

Source: QCA final report on Seqwater

4.7 Assessing trade-offs between operating and capital expenditure

There is also a need to recognise that efficiency also involves making optimal trade-offs between operating and capital expenditure.

IPART's treatment of the sale of Hunter Water's head office in its 2015-16 price review is an example of how regulators consider the efficiency of capex/opex trade-offs. Hunter Water sold its head office and leased it back (i.e. reduced its RAB, but increased its opex). However, IPART (and its consultant, Jacobs) found that the least cost option to customers would have been for Hunter Water to retain ownership. Therefore, IPART reduced Hunter Water's proposed revenue requirement to reflect what it would have been had it retained ownership (thus recovering an allowance for the return on and off the head office, but not Hunter Water's actual lease costs)[19].

[19] See page 51 of IPART's Final Report.

5 WHAT LESSONS DOES RECENT REGULATORY EXPERIENCE PROVIDE?

5 What lessons does recent regulatory experience provide?

Key points

- Recent regulatory experience provides a number of key lessons
- The Base Step Trend methodology is being adopted by a number of water regulators
- Capital projects exposed to uncertainty have the potential to be deferred to future periods
- Willingness to pay studies are important but should not be used in isolation to justify expenditure
- Consultation and analysis is required to demonstrate the prudency of projects
- The introduction of new services needs to predominately benefit customers
- Capital expenditure proposals should be supported by robust business cases and supporting evidence
- Regulators are open to, and often require, alternative options to providing the service to be considered

In order to identify key lessons from recent regulatory experience, we examined a number of recent regulatory reviews and decisions by state economic regulators. This provided a number of key insights and lessons that can be drawn upon for future periods. These relate to both the methodologies regulators use to assess expenditure, as well as examples of projects that have been accepted or rejected and reasons for those decisions.

5.1 The Base Step Trend methodology is being adopted by a number of economic regulators

A recent development has been the introduction of the base step trend methodology as a 'top down' approach to assessing the operating expenditure of a water business. This approach has been used consistently in the electricity industry, but is now being adopted by a number of water regulators. We provide a further explanation of the base step trend methodology in Attachment A.

In its 2020 review of Seqwater, the QCA decided to move to assessing operating expenditure at an overall level rather than separately assessing fixed and variable costs. The QCA considered this approach was appropriate as it:

- removed contention as to where efficiency targets are realised – the key issue is that the regulated business is accountable to at least meet (but ideally exceed) those targets.
- avoided the situation where Seqwater must 'lock in' the categorisation of savings (as fixed or variable) at the start of each regulatory period, which could distort their incentives to pursue initiatives.
- was reasonable to have commercial discretion and flexibility regarding realising efficiencies recognising that the business will remain accountable in demonstrating the efficiencies that they realised at the end of each regulatory period.

- recognised that the classification of savings as fixed or variable costs has no implications for the realisation of those savings or how they will ultimately flow through to prices.
- removed unnecessary complexity when realised efficiencies differ from forecast allocations at the start of the regulatory period.[20]

The Base Step Trend approach to operating expenditure was also incorporated into the ICRC's 2018 decision for ICON Water and has also been flagged for use by IPART and the ESC in their upcoming pricing reviews.

5.2 Capital projects exposed to uncertainty have the potential to be deferred to future periods

Increasing uncertainty, in part driven by the onset of coronavirus, led to a number of water businesses having their proposed capital expenditure programs reduced by their respective regulators. Regulators showed a tendency to defer projects to the next determination period where there was uncertainty that a project would be completed within the determination period. For example:

- The ESC included a $250 million reduction across the capital program of Melbourne Water in its 2021 decision to address uncertainty that Melbourne Water would not deliver the entire capital program in the regulatory period, given the ongoing uncertainty caused by the coronavirus pandemic.
- Sydney Water proposed $484 million in capital expenditure for the Prospect to Macarthur Link project in its 2020 proposal, however IPART approved only $205 million. Sydney Water stated that the project was required to cater for new customer demand and improve system resilience. IPART considered it was not prudent to proceed with the project in the next determination period and that the scheme should be deferred. This was to allow a more comprehensive drought response and long-term supply-demand plan to be developed, before proceeding with large-scale resilience investments. However, the $285 million of the project associated with servicing increasing customer demand was approved.
- In its 2020 decision, ECOSA made a $33 million reduction to SA Water's capital expenditure forecasts for capital projects intended to meet increased customer demand, given the highly uncertain nature of that demand.
- ICRC did not make many reductions in its 2018 decision to ICON Water's forecasts, however it noted the high level of early stage developments included in the forecast. It stated that capital expenditure proposal should be constituted from later stage projects that are well defined, scoped and approved, particularly large scale projects. It also stated that it would consider following the approach (such as the ESC) of excluding uncertain capital expenditure in future price inquiries.

5.3 Willingness to pay studies are important but should not be used in isolation to justify expenditure

Willingness to pay studies are an important aspect of justifying that a project will deliver value to customers. However these studies should not be used as sole justification of a project and need to be combined with other forms of analysis. Below is one example where willingness to pay studies were successful and one where the studies were unsuccessful.

- In its 2018 proposal, Icon Water conducted research into the appropriate balance between network reliability and the price that customers were willing to pay for that reliability. Icon Water undertook targeted consumer research to identify these preferences and priorities. It conducted both a willingness to pay study of water supply interruptions and sewerage overflows and a cost benefit

[20] https://www.qca.org.au/wp-content/uploads/2022/04/seqwater-review-qca-final-report.pdf, p.20

analysis of water and sewerage network management options. In its 2018 decision, the ICRC commended Icon Water for its efforts to engage with consumers.

- In its 2021 proposal, Melbourne Water used a Simultaneous Multi-Attribute Trade Off (SIMLATO) method to establish customer's willingness to pay for additional investment in waterways and drainage services. This led to Melbourne Water increasing its charges by $43.5 million. The ESC considered SIMALTO was not a valid tool for estimating a customer's willing to pay. It also considered that the study should not be used as standalone justification for the prudency and efficiency of expenditure and that it should have been further justified through business cases.

As noted in section 4.2, this highlights the need for businesses to undertake broader customer engagement as a core part of their ongoing business which should ultimately be reflected in pricing submissions to regulators. Typically this will require a 'triangulation' approach where a number of different stream of evidence and methodologies can be drawn on to provide evidence of customer support for specific expenditure proposals. This could involve consultation or negotiation with customer forums. For example, SA Water has a customer challenge group that challenges its investment decisions on a program level, which provides further insights into its customers and helps SA Water with setting its levels of service.

5.4 Consultation and analysis is required to demonstrate the prudency of projects

Where a project or capital programme is not clearly defined and is not subject to appropriate analysis, there may be insufficient evidence for a regulator to approve it. For example:

- ESCOSA removed the proposed regional water quality improvement program from SA Water's 2020 capital expenditure forecasts. ESCOSA considered that SA Water needed to undertake further analysis, including community consultation, to better define the need, scope, location and efficient costs of meeting the proposed outcomes.
- In its 2020 review, IPART reduced Hunter Water's minor wastewater asset renewals expenditure by $9.2 million as Hunter Water had not provided sufficient evidence to justify the proposed cost increase. IPART also considered that the scale of the program was overly risk averse.

5.5 The introduction of new services needs to predominately benefit customers

In its 2020 pricing proposal, SA Water sought to have its Zero Cost Energy Future (ZCEF) initiative included in its revenue allowance. The initiative involves installing solar generation and battery storage at various SA Water sites and is designed to deliver low and stable prices of electricity to its customers.

ESCOSA acknowledged that the program is designed to reduce SA Water's overall electricity purchase costs, which is a major component of its overall operating expenditure. However, ESCOSA considered the primary benefit of this initiative was to earn revenue by producing and selling electricity into the National Electricity Market, rather than offsetting SA Water's electricity purchases as a retail operating cost. In coming to this decision, ESCOSA considered the benefits from exporting outweighed the avoided purchase costs and was therefore not primarily part of its water retail service.[21]

[21] https://www.escosa.sa.gov.au/ArticleDocuments/21489/20200611-Water-SAWRD20-FinalDetermination-StatementOfReasons.pdf.aspx?Embed=Y, pp. 46-47

5.6 Capital expenditure proposals should be supported by robust business cases and supporting evidence

Where business are able to support proposed capital expenditure with robust business cases and other evidence, regulators will accept the expenditure as efficient. For example, in its 2018 review of the water businesses, the ESC accepted in full a number of businesses' gross capital expenditure forecasts for the 2018–23 period. The reasons given for this were:

- The business's price submission and business cases provided evidence that its forecasts for capital expenditure are efficient.
- The ESC considered the planned capital expenditure program is achievable, given the business's past track record delivering its capital expenditure program.
- The business has an appropriate approach for managing expenditure associated with uncertain projects.
- The ESC considered the business's approach to forecasting its capital expenditure is consistent with the requirements of our guidance[22].

5.7 Regulators are open to, and often require, alternative options to providing the service to be considered

As a fundamental part of assessing the prudency and efficiency of expenditure, regulators will typically ask whether alternative options for achieving the desired outcomes have been fully identified and considered, prior to recommending a preferred project or program. This is also a key step in a standard business case process.

In recent years a particular focus has been on assessing whether non-network options have been considered.

Box 9: Different way of providing a service

The Petrie Water Treatment Plant (operated by Seqwater) was built in the late 1950s.

As it would have required a substantial refurbishment to continue to safely supply customers, a more efficient solution was to connect the Petrie Water Supply Zone to the South East Queensland Water Grid and decommission the plant.

At the conclusion of this project about 100,000 residents in Dakabin, North Lakes, Mango Hill, Kallangur, Murrumba Downs, Griffin, Petrie, Lawnton and Strathpine were connected to the SEQ Water Grid for the first time.

In essence, SeqWater contributed funding for the bring-forward cost to Unitywater for constructing a pipeline earlier than in their planning, which allowed it to decommission an old WTP and avoid an upgrade.

Source: SeqWater

[22] For example, see Essential Services Commission, Barwon Water final decision 2018 Water Price Review 19 June 2018, p.17

WATER SERVICES
ASSOCIATION OF AUSTRALIA

6 GUIDANCE FOR DEMONSTRATING EFFICIENCY

6 Guidance for demonstrating efficiency

Key points

We have identified some overarching guiding principles that should be adopted to demonstrate the efficiency of expenditure proposals regardless of the context in which efficiency is being measured or demonstrated:

- Adopt a business case (or cost-benefit analysis) approach to all expenditure proposals
- Focus on the long-term interests of customers, considering factors including opex/capex trade-offs and the impact on service standards over time and supported by Net Present Value NPV (analysis)
- Consider both prudency and efficiency of expenditure, including how cost proposals incorporate efficiency targets and continuing efficiencies (as would occur in a competitive market)
- Explain trends in opex and capex and key drivers of these trends
- Develop a narrative that explains the link between expenditure and outcomes for customers
- Conduct analysis that is proportionate to the size and impact of the potential expenditure.

However, there is no single methodology or technique that is appropriate to use in all circumstances to measure and demonstrate efficiency. The appropriate approach may vary depending on factors such as the nature of the:

- expenditure (i.e. operating vs capital expenditure or large 'step' in operating expenditure)
- activity (discretionary vs non-discretionary expenditure).

6.1 Pathway to demonstrating efficiency

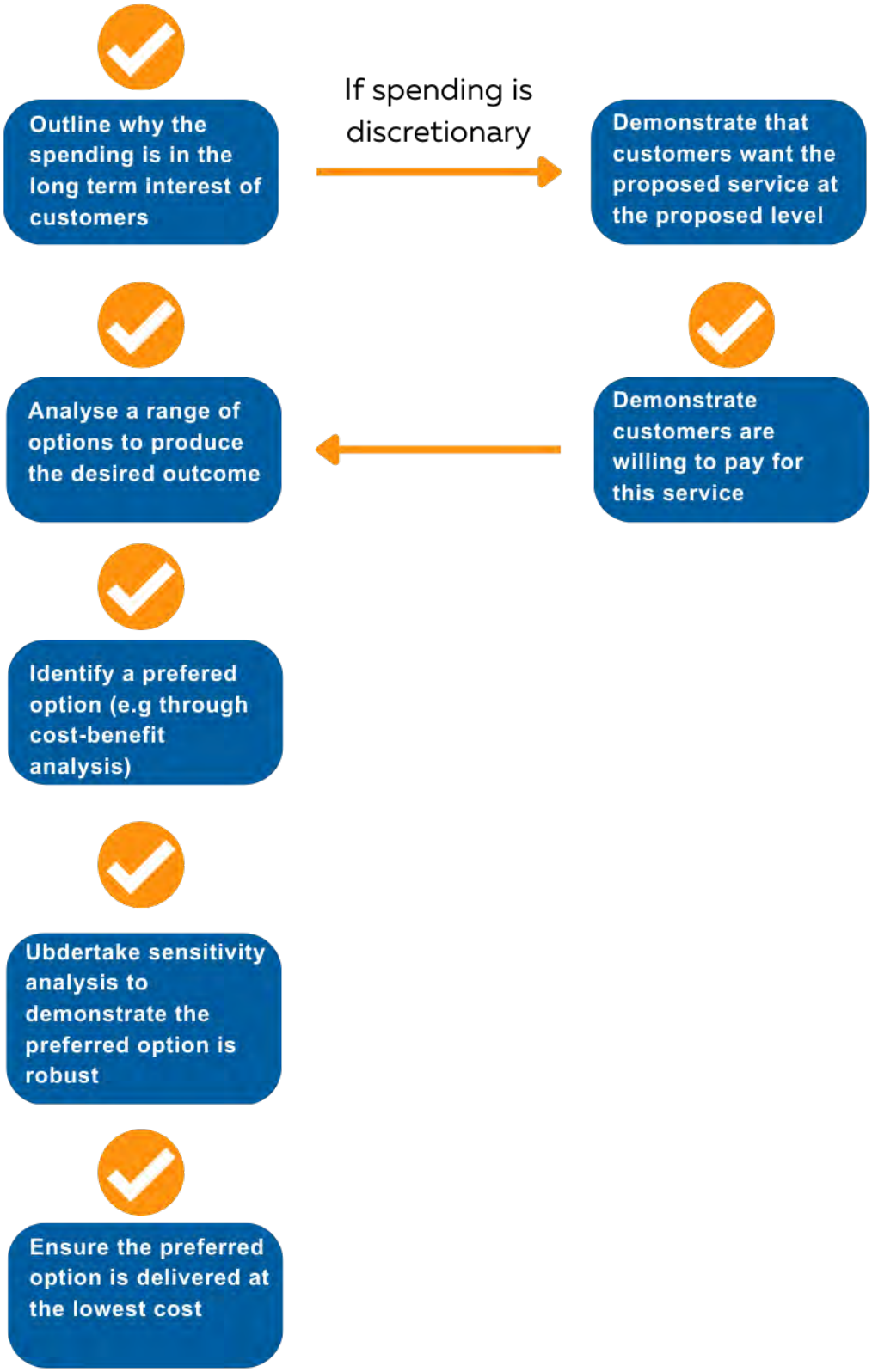
The brief for this report seeks the development of a checklist or breakdown of what regulators would generally expect a 'prudent' and 'efficient' business case to contain.

It is important to recognise that the evidence that regulators would require to be persuaded about the prudency and efficiency of a regulatory proposal may be very circumstance-specific, and is likely to vary between jurisdictions in line with the differences in regulatory frameworks that operate in different parts of Australia.

Nevertheless, this pathway reflects some universal guiding principles which apply to justifying almost any activity or expenditure proposal undertaken or proposed to be undertaken by a water business.

Importantly, these principles are relevant regardless of whether the expenditures are required to be approved by an economic regulator or not: they are steps which should be undertaken in any due diligence exercise.

Figure 1: Pathway to demonstrating efficiency



Source: Frontier Economics

It is not possible to develop a detailed set of guidance that, if followed, would guarantee acceptance by regulators in all situations. Rather, the guidance here is more high-level and relates to the nature, quality, focus and standard of evidence that regulators will generally find persuasive. The guidance highlights the sorts of questions that businesses should ask themselves before undertaking or proposing to undertake certain activities or expenditures. In doing so, it seeks to distil the analysis and discussion in the preceding section of this report and covers both:

- Overarching guiding principles which should be adopted regardless of the context in which efficiency is being measured or demonstrated
- Guidance on the use of specific methodologies or techniques.

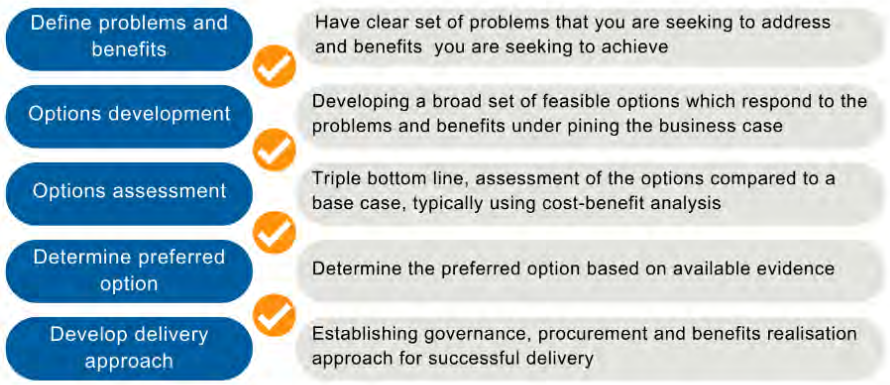
6.2 Apply a robust business case approach to all expenditure proposals

A general rule, it is often appropriate to follow a business case methodology along the lines set out in **Figure 2**. This is pertinent not just when a business case is already formally or routinely undertaken (e.g., for major capital expenditure projects), but is also relevant for other types of expenditure proposals (e.g. proposing material changes in operating expenditure).

In broad terms, this will involve setting out the need for utilities to demonstrate:

- What is the activity the business is undertaking?
- What service outcomes will it lead to for customers?
- Why are these service outcomes required (e.g., mandated by regulation or reflective of customer preferences and their willingness to pay)?
- How is the business undertaking this activity?
- Why is this activity the best way to achieve the required service outcomes (after considering all viable options)?

Figure 2: Business case methodology



Source: Frontier Economics

While a formal business case will typically be required for significant capital expenditure, the broad steps involved remain relevant for justifying the efficiency of any proposed expenditure. However, as outlined below, analysis to determine and support efficient expenditure should be proportionate to the potential size and impact of the expenditure.

6.3 Focus on the long-term interests of customers

Water businesses should consider and present all expenditure proposals through the lens of "how is this in the long-term interests of customers?", rather than just from the perspective of the business's internal operations.

This requires consideration of the optimal opex/capex trade-offs over the long-term and potential impacts on service standards. For example, an option that involves lower opex over the short-term may actually be higher cost to customers in Net Present Value (NPV) terms if it brings forward the need to incur capex and/or lowers service standards below appropriate levels. Given regulators' focus on the long-term interests of customers, NPV analysis is a common and valuable tool to test and support the efficiency of expenditure proposals.

To assist in forming its argument (and supporting analysis) for proposed expenditure, the water business could ask itself (and ultimately also present to the regulator): what would be the impact on customers (e.g., prices paid and/or services received) over the short, medium and longer-term if the expenditure (and related project and activities) was not incurred.

A critical part of this is placing the proposed expenditure in a long-term context. Businesses should develop and articulate long-term expenditure plans, and relate their proposed expenditure for the upcoming determination period to these long-term plans - to assure regulators that businesses are forward looking and strategic in developing their proposals.

6.4 Consider both prudency and efficiency

Another key requirement in demonstrating that an expenditure proposal or program represents good value for money is to show that it is both prudent and efficient (see section 4.4). While, as discussed in section 4.4, 'prudency and efficiency' can be regarded as synonymous with 'efficiency', it is likely to be helpful to present proposals in this way because regulators adopt both these terms in assessing expenditure proposals:

- Prudent: there is a clear justification for that activity, based on either a clear obligation or an objective supported by customers.
- Efficient: the activity is the least cost way of achieving the relevant objective, taking into account feasible alternatives.

Demonstrating prudency is particularly important for 'discretionary' expenditure, which goes beyond formal legislated/regulatory obligations. In such cases, robust evidence of customer willingness to pay will be critical in supporting the proposed expenditure. This may benefit from 'triangulation' of approaches to demonstrate customer support, rather than relying on a single study or methodology.

To assist in forming its argument (and supporting analysis) for proposed expenditure, the water business could ask itself: is our proposed expenditure consistent with what would be observed in a competitive market, where businesses continually strive to deliver maximum value to customers, at lowest possible price?

Consistent with what would occur in a competitive market, it is important for the water business to consider how its cost proposals incorporate efficiency targets and continuing efficiencies. Regulators are often interested in understanding how the business has challenged or stretched itself in pursuing efficiencies through its proposed expenditure allowance.

6.5 Identify and explain expenditure trends

At a 'top down'', aggregate level it is important for the water business to be able to understand, explain and justify trends in its expenditure over time, key drivers of these trends and implications for customers. This can be in terms of differences between:

- actual versus 'allowed' opex and capex over the current regulatory period
- actual opex and capex over the current regulatory period versus proposed expenditure over the upcoming period
- actual and/or proposed opex and capex over the current/upcoming period versus a longer historical time-series – where relevant in explaining or justifying expenditure proposals.

This can assist the business in developing the overarching narrative for its pricing proposal (see below) and in explaining key elements of its expenditure proposal. It can also directly feed into key expenditure forecasting/evaluation techniques (i.e., the base-step-trend approach to forecasting/assessing opex) and help the water business identify the likely key focus areas of the regulator.

6.6 Develop the overarching expenditure narrative

Following on from above, it is important to develop an overarching narrative or 'golden thread' to support the efficiency and prudency of the proposed expenditure allowance. This should clearly link the proposed expenditure to the outcomes it is seeking to achieve, considering the circumstances faced by the water business and its continuing pursuit of efficiency and optimal outcomes for its customers (informed by a strong understanding of customer views and preferences). This may also include explaining how key elements of the expenditure proposal relate to each other.

This narrative could tie proposed expenditure to key drivers – such as customer preferences, regulatory requirements, new or emerging risks (provided there is optimal management and distribution of such risks), changes to the operating role or environment of the business, relevant changes to Government policy or market conditions, etc.

In developing such a narrative, consideration should also be given to the stated objectives of the economic regulator – which will generally focus on the long-term interests of customers, but may also include other, related objectives.

6.7 Conduct proportionate analysis

Consistent with best practice project evaluation and regulatory principles, analysis should be proportionate to the potential size of the expenditure and its impacts (e.g., the risks, costs and benefits of an option under consideration).

For instance, capital expenditure and/or a step change in operating expenditure for a large project (e.g., a major water supply augmentation project) should be subject to thorough options and cost benefit analysis – involving the consideration of potential options, assessing the costs and benefits of viable options, incorporating or testing key risks, and identifying the option that delivers the greatest net benefit to customers or achieves required outcomes at least net cost.

On the other hand, expenditure on a smaller project may be supported by a similar cost benefit analysis approach, including the elements of analysis mentioned above, but with proportionally less analysis in each element or stage.

Along similar lines, if the business case for a large discretionary project,[23] which has the potential to materially increase prices, hinges on customers' willingness to pay, then it is important that the willingness to pay estimates are derived from a robust study. Whereas the evidence of customer willingness to pay to support a discretionary project that has minimal or minor impact on prices is likely to be proportionally less.

[23] That is, to achieve a service outcome above and beyond that required by regulation or minimum standards.

6.8 Utilise fit-for-purpose methodologies

While the above principles provide general guidance on how to demonstrate efficiency, there is no single methodology or technique which is appropriate to use to measure and demonstrate efficiency in all circumstances.

Rather, the appropriate precise methodologies or techniques may vary depending on the context, including the nature of the:

- expenditure (i.e. operating vs capital expenditure or large 'step' in operating expenditure)
- activity (discretionary vs non-discretionary).

As evident in the discussion of regulators' approaches to assessing efficiency in section 4, somewhat different methodologies may be appropriate for considering operating expenditure as opposed to capital expenditure (or recurrent expenditure versus one-off or more sporadic expenditure).

For demonstrating the efficiency of capital expenditure, while a formal business case is likely to be required in any event, a regulator will likely require evidence that each of these steps has been followed and undertaken in a robust manner. This includes clearly articulating the objective for the expenditure, full exploration of alternatives, robust cost-benefit and risk analysis of feasible options, and market testing of delivery of the preferred option.

For demonstrating the efficiency of operating expenditure, a broader 'top down' methodology such as a 'base step trend' may be more appropriate and acceptable to a regulator – given its recurrent nature. Within this, methodologies such as benchmarking may be seen as useful in justifying the base or the trend components, provided the like-for-like comparisons can be made and the underlying data is sufficiently robust. Where a significant 'step' change in expenditure is proposed, however, a 'business case' approach may also be needed to justify this. As noted in Attachment A, such an assessment generally involves:

- Identifying the various options available to the regulated business to deal with the change in circumstances;
- Quantifying the costs associated with each; and
- Proposing the least-cost option that meets the requirements of the step change.

The need for a step change in opex could arise, for example, due to:

- A new or increased regulatory obligation: in which case, the business would have to demonstrate that its proposed expenditure is the most efficient (least cost) means of complying with this obligation over time
- Opex substituting capex: in which case, the business would have to demonstrate that the avoided capex more than offsets the increase in opex in NPV terms (i.e., that it is an efficient opex substitution)
- A major external factor, outside the control of the business – e.g., a material increase in insurance premiums across the insurance market due to significant and enduring changes to the fundamentals of the market. In this instance, the business would likely need to provide evidence of the market change, and that its proposal reflects best estimates of efficient costs in the 'new market'(e.g., based on competitively procured rates or benchmark costs).

In all cases, the business would need to demonstrate that the step-up in costs should not already be reflected in other components of the base-step-trend allowance, such the 'trend''.

Another distinction relates to discretionary and non-discretionary expenditure. To support discretionary expenditure, a regulator is likely to require compelling evidence of customers' willingness to pay for activities or services which go beyond the legislated/regulated requirements. That is, a regulator will likely require evidence that the benefits of the expenditure (as measured by customers' willingness to pay for outcomes of the expenditure) exceed its costs and that, of all viable options, it provides the greatest net benefit to customers.

For non-discretionary expenditure (e.g., to meet a mandated service outcome), the focus is on ensuring the proposed solution and its delivery is the least-cost way of achieving the underlying objective of the expenditure.

6.9 An indicative guide

While it is difficult to provide a single, definitive guide on how to demonstrate efficiency in all situations, the following table provides an indicative (rather than comprehensive) guide drawing on the key learnings from this report.

Table 2: Approach to demonstrating efficiency - a guide

Step	Type of expenditure	Evidence/ data required	Techniques	Example
Outline why the spending is in the long-term interest of customers	All	Link spending to specific outcomes for customers in terms of services and prices over the long term Clear 'golden thread' narrative	Investment Logic Mapping	See section 4.2 and 5.5
Prudency: Link spending to non-discretionary obligation	Non-discretionary opex & capex	Identify key drivers including relevant legislative or regulatory obligations	Understanding of non-discretionary service (and related) outcomes, including their timing	Central Coast Council (section 3.3.3)
Prudency: Demonstrate that customers want the proposed service/level or outcome	Discretionary opex & capex	Customer feedback	Surveys, customer forums	Case study 2
Prudency: Demonstrate that customers are willing to pay for this service	Discretionary opex & capex	WTP studies	Choice modelling	Case study 2
Analyse a range of options to produce the desired outcome	All	List of alternative options including capital vs recurrent solutions – ideally in business case	Cost-benefit analysis	Case study 3
Identify a preferred option	All	Business case or similar	Cost-benefit analysis (benefit -cost ratio, NPV etc)	Case study 3

Step	Type of expenditure	Evidence/ data required	Techniques	Example
Undertake sensitivity analysis to demonstrate the preferred option is robust	Capex/major opex step change	Business case or similar (preferred option is superior under a range of assumptions/scenarios)	Sensitivity analysis Real options analysis Scenario analysis	Case study 3, Sydney Water resilience expenditure (section 3.6.3)
Ensure/demonstrate the preferred option/proposed services will be delivered at the lowest cost	Opex	Historical expenditure Productivity growth (continuing efficiency) forecasts Market-tested estimates	Base-step-trend Benchmarking	Case study 1
Ensure/demonstrate the preferred option/proposed services will be delivered at the lowest cost	Capex Step jump in opex	Robust procurement process (e.g. market-testing or similar) Detailed approach to managing delivery of project and associated risks Proposed expenditure is within long-term context & strategy Consideration of scope for application of continuing efficiency factor	Business case methodology	Powercor ICT investment (section 3.4.3)
Benefits realisation (ex post)	All	Ex post assessment of benefits and costs	Post project review	See section 2.2

WATER SERVICES
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CASE STUDY 1

ONGOING OPERATIONAL EFFICIENCY

A Case study 1: Ongoing operational efficiency

Nature of the issue/proposal

A traditional bottom-up approach involves building up an estimate of the efficient level of operating expenditure in the base year by:

- Identifying each of the individual categories of costs relevant to the regulated business;
- Estimating (using unit cost analysis and engineering estimates of volume of individual inputs to production) the efficient level of operating expenditure for each cost category; and
- Summing up the estimates of efficient costs across all categories.

However, as noted in section 4.5, this approach has a number of disadvantages.

It is for these reasons that some regulators, including some State based water regulators, are moving away from bottom-up approaches and towards top-down approaches that focus more on the overall levels of operating expenditure across a regulatory period.

A top-down approach, such as Base Step Trend, does not involve calculating and justifying expenditure forecasts at each cost category level but, rather, calculating a total efficient level of operating expenditure within which a business needs to operate.

The key benefit of this style of approach are that it reduces the regulatory costs for both the regulator and the regulated business. By removing a lot of the granularity, the regulatory review can focus on the big elements of the forecast in a clear and systematic way. Furthermore, the adoption of a top-down approach to expenditure forecasting has also reduced the opportunities for disputes and disagreements between regulators and regulated businesses about the efficiency and prudency of individual cost categories—allowing the regulator to focus more on the 'bigger picture'.

One drawback of the Base Step Trend approach (and any top-down forecasting approach generally) is that it is difficult to obtain reliable forecasts of capital expenditure, elements of which can be highly lumpy and non-recurring. All regulators that have adopted the Base Step Trend approach have done so only to forecast operating expenditure, which tends to be smoother and more recurrent than capital expenditure.

With many water regulators having started to implement Base Step Trend into their pricing reviews and many others indicating that they will be incorporating it into their next pricing reviews, it is important that water utilities have a clear understanding of what they need to provide under this top-down methodology to demonstrate their spending is both prudent and efficient.

Overview of the Base Step Trend methodology

The Base Step Trend methodology is used to forecast operating expenditure. It is comprised of three key components:

- **Base** – the efficient recurring expenditure required each year, typically based on the most recently available 'full year' of actual expenditure.
- **Step** – changes that are typically the result of new requirements or new ways of doing things, so past expenditure (including expenditure in the base year) or trends cannot predict this change in expenditure.
- **Trend** – the predictable (and efficient) change in recurring expenditure over time due to input price changes, population/demand growth and improvements in productivity.

Base year

Calculating the base year operating expenditure involves several steps:

- The first step is to choose a base year. This is usually the most recent year for which actual operating expenditure data is available.
- The next step is to identify base year operating expenditure and to remove operating expenditure that may need to be forecast differently (for example through a bottom-up approach) or may not be recurrent.
- The final step is for the regulator to assess the efficiency of base year operating expenditure. If the regulator does not believe that an efficient business would incur the operating expenditure it will remove that operating expenditure from the base year. This is often achieved through benchmarking the regulated business against its peers or against previous periods of expenditure.

Trend

The efficient base year is then subject to a trend (accounting for expected changes in input costs, output growth and productivity) to develop a forecast of operating expenditure for each year of the forthcoming regulatory period.

Figure 3: Trend components

Output growth

Output growth refers to the forecast annual rate of change in operating expenditure to reflect changes in the scale of the network (or outputs delivered by the network) over time.

Real price growth

Real price growth is the forecast annual increase in the real price of inputs (i.e., the rate of increase in inputs to production—such as labour and materials—over and above the rate of general price inflation).

Productivity growth

Productivity growth may be affected by the following factors:

- forecast output growth;
- forecast changes in specific business conditions;
- forecast technological change;
- how close the business under consideration is to the efficient frontier;
- historical productivity performance; and
- any difference between industry average productivity change and the rate of productivity change at the efficient frontier.

Step changes in operating expenditure

If a business expects to have operating expenditure that is not captured in the base year or the trend due to some significant change in circumstances (e.g. a new regulatory obligation), then it can apply for a step change. If the expenditure associated with the step change is deemed prudent and efficient, it is added to the trended base year expenditure to form the forecast operating expenditure for each year of the regulatory period.

The standard approach for approaching step changes is to conduct a bottom-up assessment of the step-change. This assessment generally involves:

- Identifying the various options available to the regulated business to deal with the change in circumstances;
- Quantifying the costs associated with each; and
- Proposing the least-cost option that meets the requirements of the step change.

Step change outcomes in the electricity sector

The following section focuses on the step change component of the Base Step Trend methodology, as this has commonly been the component that has produced the most contentious issues. Select examples from the electricity sector are presented because Base Step Trend was first developed by the Australian Energy Regulator (AER). This means that the AER has the most extensive experience utilising the Base Step Trend methodology for setting operating expenditure allowances, and has consequently provided the most guidance on how the framework can be applied to Australian regulated businesses.

Box 10 below provides an overview of how the AER sets out its Base Step Trend formula.

Box 10: AER Base-Step-Tend Operating expenditure forecasting approach

$$Opex_t = \prod_{i=1}^{t}(1 + rate\ of\ change_i) \times \left(A_f^* - efficiency\ adjustment\right) \pm step\ changes_t$$

where:

- $rate\ of\ change_i$ is the annual percentage rate of change in year i
- A_f^* is the estimated actual opex in the final year of the preceding regulatory control period
- $efficiency\ adjustment$ is the difference between efficient opex and deemed final year opex
- $step\ changes_t$ is the determined step change in year t.

Source: AER Expenditure Forecast Assessment Guideline for Electricity Distribution, August 2022, *p.24.*

The AER has interpreted step changes within the Base Step Trend framework very narrowly, in practice, to only mean changes in operating expenditure arising from either:

- A change in regulatory obligations (i.e., a factor beyond the control of the business); or
- An efficient trade-off between operating expenditure and capital expenditure that is not funded through other aspects of the expenditure allowance (including incentive schemes).

This very narrow interpretation of step changes in expenditure has sometimes precluded allowances to accommodate genuine increases in costs that were not incurred by regulated networks in the past, but which are arguably efficient for them to incur in future. It is not yet clear if the water sector regulators will follow this narrow interpretation. The reason the AER has placed strict criteria on what might qualify as an acceptable step change is to limit the number of step changes claimed by regulated businesses to only the most material items. This has likely limited the scope for disputes between the regulator and the regulated business—a key objective for adopting a top-down forecasting approach.

The following examples examine a range of proposed step changes in operating expenditure that were both allowed and disallowed by the AER, followed by a distillation of the key lessons from this experience.

Table 3: Overview and outcomes of proposed step changes in expenditure

Proposed step change	Allowed	Disallowed
Critical infrastructure	✓	
Bushfire insurance premiums	✓	✗
Cyber security		✗
ICT infrastructure (cloud migration)	✓	✗

Critical infrastructure step change

In 2017, the Australian Government introduced a series of requirements to address national security risks in critical infrastructure. This brought about new obligations that were to apply to the electricity distribution systems. As a result, the distribution providers were likely to incur additional material operating expenditure in the next regulatory period that would be in addition to the base year expenditure.

To demonstrate the need for a step change in operating expenditure, some of the Victorian distribution providers provided a joint business case outlining potential options for meeting the regulatory obligations. They also conducted market testing processes to ensure that the proposed option was being delivered at an appropriate price.

The competitive tender process was led by an independent party, who undertook an evaluation of the vendor responses and assessed technical competencies and approaches, as well as commercial criteria. The value included in the proposal was the average of the costs from the vendors, given that no vendor had been selected prior to the submission of the proposal. The tender was to deliver the services for all 3 distribution providers with the cost allocation apportioned across the networks.

Following market testing, one of the providers decided to use insourcing for its recommended approach rather than outsource the services to a third party.

The AER was satisfied that the distribution providers were subject to new regulatory obligations which required them to comply with critical infrastructure system requirements. It was also satisfied that the competitive tender process undertaken ensured the most cost-effective option to meet the regulatory obligations was being undertaken.[24]

[24] AER(2021), *Final decision - CitiPower distribution determination 2021 –26 - Attachment 6 - Operating expenditure - April 2021*, pp.33-34

Bushfire insurance premium step change

Bushfire insurance premiums and their forecasts increased significantly following the bushfires in Victoria and New South Wales in 2019. While the premium increases were identified for the next regulatory period, the timing of the premium increases meant that they were not included in the providers' base year operating expenditure. Electricity distribution providers therefore sought a step change for the increased incremental cost of insurance above what had been included in the base year operating expenditure.

Allowed

Jemena noted that commencing in September 2019, the rate of change in insurance premiums was significant—in the order of 20% p.a. above the current regulatory period—which was well above the rate of change component in the AER's final decision over the current regulatory period.

To meet this increased cost, Jemena completed an options assessment to manage the increases in public liability insurance premiums. The options considered included doing nothing, self-insuring or seeking prudent and efficient insurances. From this analysis Jemena was able to demonstrate that the best value for money was to continue to seek prudent and efficient insurances even with the increased insurance premiums. The cost of the step change was $28.2 million across the regulatory period.

The AER noted that it was satisfied that the proposed step change was prudent, the estimates reasonable and the increasing insurance premium costs were not captured through the non-labour price growth forecast, or would reasonably be offset by decreases in other cost categories over the regulatory control period.

Disallowed

Another energy business, Powercor, proposed its step change based on the incremental increase in actual insurance premiums between the base year (2019) and 2019-20 at a cost of $5 million. While it expected the costs of insurance to continue to grow over the regulatory period it did not propose that these be included in the step change. This was in contrast to the similar step change for increasing insurance premiums proposed by Jemena, where Jemena forecasted significant premium increases over the 2021–26 regulatory control period.

The AER was not satisfied that the step change was efficient as it was unclear the increasing costs were not already captured through the allowed rate of change, specifically non-labour price growth (the trend component of Base Step Trend). The AER also set out a number of factors that it considered in coming to this view, which included:

- The proposed insurance premium increases were not related to a new regulatory obligation or a capital expenditure / operating expenditure substitution, the most common circumstances for which the AER considers allowing a step change.
- The AER's trend forecast includes non-labour price growth and this covers any potential increases in costs like insurance premiums.

The AER expects some non-labour components in operating expenditure will increase by more than CPI and some by less than CPI. To the extent that insurance premiums rise by more than CPI, the AER expects this will to an extent be offset by other non-labour costs rising by less than CPI. CPI includes household insurance premiums, which cover bushfires. While there are differences between household and utility insurance premium increases, there are similar drivers impacting both and their future growth.

A key factor for the AER's decision not to include this step change was the relatively low materiality of the costs proposed (representing 0.4 per cent of total operating expenditure). The AER expected that at that magnitude the business should be able to manage such proposed costs within both the trend forecast and reflecting the likely offsetting impact of decreases in cost categories over the regulatory period.[25]

Cyber security step change

Ausnet Services proposed a step change in operating expenditure to meet an uplift in its cyber security capability. It sought to undertake a program of work that would enable it to proactively comply with and maintain the anticipated cyber security obligations to meet the standards set by the Australian Energy Market Operator's (AEMO) Australian Energy Sector Cyber Security Framework. While the new obligation had not yet been announced, Ausnet Services anticipated the obligation would be announced in the near future.

After consultation with AEMO, who would be responsible for imposing the new obligation., the AER considered the exact implementation timing of this legislation remained uncertain, particularly in the context of COVID–19. It noted that in the absence of certainty about the implementation of this legislation, the specific requirements and that it was not yet a proven regulatory obligation, it could not be considered a compliance obligation.

The AER acknowledged the current context of evolving threat of cyber security risk, and the Australian Government's recent warning to organisations to take action to mitigate these risks of increased frequency and sophistication of cyber-attacks. It therefore deemed it prudent for the business to meet the required standard but did not consider AusNet Services' proposed approach and cost to achieve and maintain the standard was efficient.[26] The AER also considered that all of the incremental costs should be allocated to the transmission section of the business and not the distribution section.

ICT infrastructure (cloud migration) step change

Allowed

Powercor and CitiPower reviewed their existing on-premise ICT infrastructure and considered the ICT infrastructure needed to be refreshed to maintain currency and accommodate data growth over the regulatory period. This included risk monetisation to evaluate the potential cost of failing to maintain its ICT infrastructure. The two providers submitted forecasts of combined costs for moving to cloud services as the businesses have fully integrated ICT infrastructure.

Powercor and CitiPower conducted a net present value (NPV) options analysis that looked at the costs and benefits of refreshing its ICT infrastructure and the potential for migration to cloud hosting. To do this, the two networks evaluated the NPVs of a range of options including:

- Do nothing;
- An on-premise refresh;
- A balanced cloud migration supported by refresh on remaining on-premises infrastructure; and
- An aggressive cloud migration.

The two providers were able to demonstrate that the balanced cloud migration option had the lowest NPV cost to customers, while also having unquantified benefits of the cloud, such as easy scalability and adaptability of the ICT infrastructure to changing requirements, which ensures customers only pay for the capacity and services needed.

[25] AER(2021), *Final decision - Powercor distribution determination 2021 –26 - Attachment 6 - Operating expenditure - April 2021*, p.57.

[26] AER (2020),*Draft decision - AusNet Services distribution de termination 2021 -26 - Attachment 6 - Operating expenditure - September 2020* , p.55

In the business case, the providers calculated forecast operating expenditure based on vendor advice sourced from external advisors. The AER's expert consultant that examined this step change on behalf of the AER considered it was appropriate to source vendor estimates as a basis for operating expenditure forecast for cloud migration, and found the estimates proposed to be reasonable.[27]

Initially disallowed but allowed following further documentation

AusNet Services sought a step change in operating expenditure to implement a cloud-based client management software (CRM) that would allow it to better understand its customers and improve customer outcomes. It also sought to add an Outage Management system that would provide timely and accurate information to customers in relation to outages.

AusNet Services also provided a cost benefit analysis for these systems, with the CRM software having a positive NPV value, while the Outage Management system was only marginally positive.

The expert consultant who examined the step change on behalf of the AER considered the systems were likely the best approaches to achieve the require functionality, but considered the lack of avoided capital cost in the cost-benefit analysis did not satisfy a step change based on a capital expenditure-operating expenditure trade off.

The AER stated that for it to accept a step change on the basis of capital expenditure / operating expenditure trade-off criteria, it would need to be satisfied the proposed expenditure is material, prudent and efficient through robust cost–benefit analysis, to demonstrate clearly how increased operating expenditure would be more than offset by capital expenditure savings.

AusNet Services provided additional analysis that demonstrated the increased capital expenditure and program operating expenditure that would be incurred if the step change was not implemented. It also provided evidence that the cost forecasts had undergone an external review using industry benchmarks for internal and contract labour, material costs and time estimates.

Following the additional analysis provided by AusNet Services the AER was satisfied that the proposed step change met the requirements for a capital expenditure/operating expenditure trade off.

Key lessons

Base Step Trend

The Base Step Trend methodology provides a framework that enables the regulated business and the regulator to focus on key elements of forecast operating expenditure rather than scrutinising each individual cost item. This reduces the regulatory burden for businesses and the regulator, and generally also limits the scope for disputes over the reliability of forecasts at cost category levels.

The use of a Base Step Trend methodology is not a recipe that will guarantee that the business's forecasts will be accepted as efficient and prudent. The regulated business needs to justify each element of the Base Step Trend methodology, ensuring each component meets the key concepts of prudency and efficiency.

Engaging early with the regulator while developing the pricing proposal is important. The regulator may be able to provide key information as to how a particular cost may fit into the Base Step Trend methodology and the type of information the regulator would likely need to consider the expenditure to be prudent and efficient.

[27] AER (2020), *Draft decision - Powercor distribution determination 2021-26 - Attachment 6 - Operating expenditure - September 2020*, p.54

Step changes

- The most common circumstances where the AER has accepted step changes includes when there is a new regulatory obligation or a capital expenditure/operating expenditure substitution[28]. The AER has limited the types of costs that will generally be considered under the step change component of the methodology. However, as the example on insurance premium increases indicates, there are exceptions that may also be considered appropriate step changes. It is not yet clear how the water regulators will treat step changes and whether they will follow a similar approach.
- Some non-labour components in operating expenditure will increase by more than CPI and some less than CPI. These changes may offset each other and, in those circumstances, do not require step changes. Step changes are generally only approved when they are material in nature and not captured in trend growths. This was demonstrated in the bushfire insurance premium example, where Powercor's smaller one-year $5 million proposed step change was not considered material but Jemena's $28.2 million forecast across the full regulatory period was.
- For a step change that seeks a capital expenditure/operating expenditure trade off, it is important to demonstrate clearly how the increased operating expenditure will be more than offset by capital expenditure savings through a robust cost-benefit analysis.
- Where possible ensure the costs of the step change are appropriately benchmarked to demonstrate the step change is delivering value for money to consumers. If the step change is likely to involve outsourcing, testing the market (through measures such as a competitive tender process) is an important step in demonstrating that the proposed approach is providing the best value for money proposal.

[28] This is where an activity which previously involved capital expenditure is undertaken in a different way which involves higher ongoing operating costs but lower capital costs (e.g. extending the life of existing assets through higher maintenance rather than replacing them).

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CASE STUDY 2

PROVIDING THE OPTIMAL LEVEL OF SERVICE

B Case study 2: Providing the optimal level of service

Nature of the issue/proposal

In order to replicate the outcomes achieved in competitive markets, water utilities are required to meet certain requirements. This includes pricing principles as well as mandatory service standards to ensure service level outcomes are met.

These service level outcomes or system performance standards are set out in each water utilities operating licence. These standards set out prescriptive standards in relation to services such as water continuity, water pressure and wastewater overflows. Each system performance standard sets a limit on the maximum number of affected properties in any one year. A result above the target level for any of the performance standards would represent a breach of a water utilities' operating licence.

These performance standards need to be reviewed regularly to ensure they continue to meet the needs of the community. However, given the nature of these standards are not always fully understood it can be difficult for water business to get an accurate understanding of the desired level of service from the community. This case study examines the approach taken by Hunter Water in establishing the communities view on key service standards and their willingness to pay for different levels of service.

Approach adopted to demonstrate efficiency

Hunter Water undertook a two phase approach to understand whether its system performance standards were meeting the requirements of its customers.

- Phase 1 – Understanding customer preferences
- Phase 2 – establishing customers willing to pay to develop an appropriate cost-service mix

Phase 1

Phase one of the service levels project sought customer feedback on:

- service level attributes that Hunter Water's customers considered important
- where there is a gap between the relative importance and current level of satisfaction in relation to service level outcomes and attributes
- service level failures for which customers and consumers expect a rebate.

Between April and June 2020 almost 1,200 residential households participated in telephone interviews, an online bulletin board and an online survey. The activities were informed by an internal working group drawing on expertise from across the Hunter Water business. In establishing the questions, Hunter Water reviewed 30 customer research initiatives it completed over recent years. It also drew on a literature review of 107 service outcomes and 220 attribute measures across the Australian water industry.

From the data collected from its household Hunter Water was able to confirm that water continuity, water pressure and dry weather wastewater overflows are appropriate service level attributes for performance standards. It also confirmed that four of the five measures underpinning the current

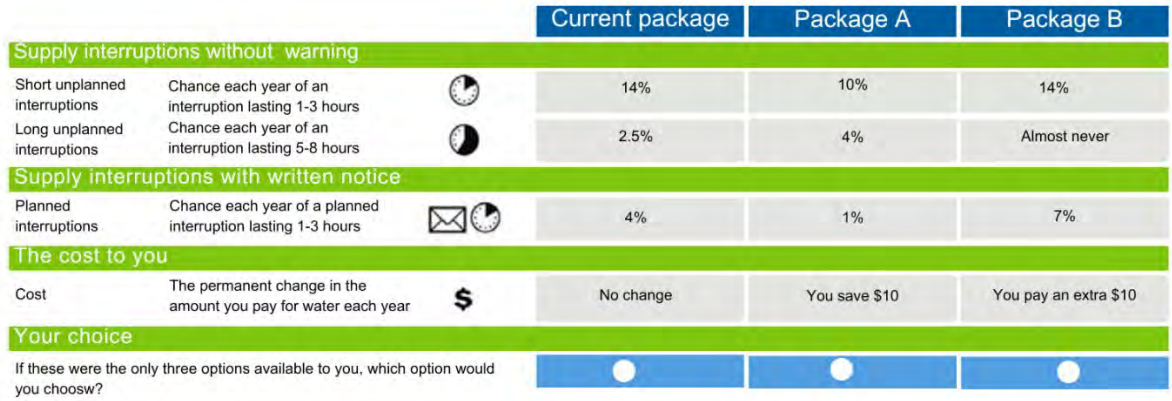
system performance standards were based on service qualities that were valued by customers, and were appropriate for a mandatory threshold in a licence.[29]

Phase 2

Phase 2 then tested whether there were water and wastewater network management approaches that would result in an improved price-service mix for customers.

In May and June 2021, 674 households and 62 businesses participated in an online survey about water continuity, water pressure and rebates. Participants selected their preferred cost-service level point across 4,416 choice sets and 736 contingent valuation questions, an example is shown in **Figure 4**. A similarly sized group also participated in an online survey about wastewater overflows, where participants again selected their preferred cost-service level point across a variety of choice sets.

Figure 4: Example of a choice task on water continuity



Source: The CIE - Customer willingness to pay: water and wastewater performance Appendix

The large number of responses enabled Hunter Water to estimate the value to customers of very small changes in performance in the service level attribute it was seeking to influence, as well as any associated attributes that may be impacted by those actions.

The results of the survey indicated that:

- Unplanned interruptions are about 70% as bad as planned interruptions
- Long interruptions are about twice as bad as short interruptions
- Customers' value avoiding wastewater overflows more highly than they value avoiding water supply interruptions
- Customers' willingness to pay for service improvement is lower than the compensation they would require for an equivalent service degradation.

Cost-benefit analysis

Hunter Water then used the data gathered from the choice modelling and contingent valuation questions to undertake a cost-benefit analysis for each of the service standards. The cost-benefits analysis sought to identify whether the current standards provided the most benefit to customers or whether services should be altered to better reflect customer's needs.

[29] For further detail on Hunter Water's method in coming to these outcomes please see *Hunter Water Operating Licence Review – Additional information System performance standards*, 1 November 2021, p. 11.

A cost-benefit analysis was undertaken for each of the service standards, however this case study focuses on the wastewater overflow standard. The report summarising the method, results and findings for each of the service standards is available at www.thecie.com.au/hunter-water-wtp.

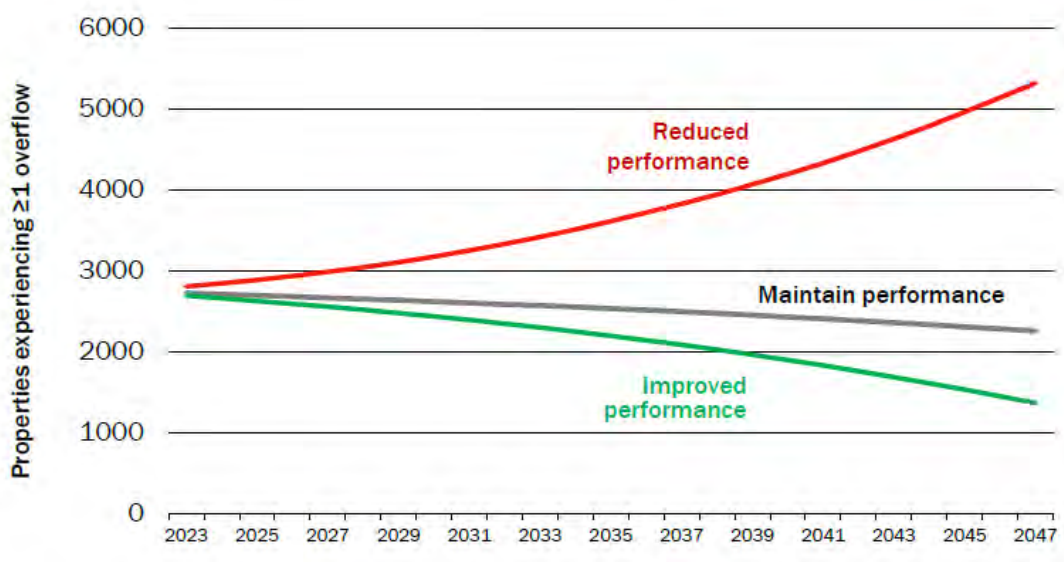
For the wastewater overflow standard, options included:

- A base case that maintained the current service standards
- Undertaking additional activities to reduce the number and/or impact of interruptions, with the additional activities ultimately recovered from customers via water and wastewater bills
- Spending less on managing the networks that would increase the number and/or impact of interruptions, with the reduced activities resulting in lower customer water and wastewater bills

The activities included altering the amount of lining of wastewater pipes to prevent breaks and preventative jetting to remove obstructions (chokes).

Hunter Water also developed a time series to indicate the likely implications of varying levels of performance (**Figure 5**). The differences in the number of overflows experienced by customers across the options grow wider over time, with the improvement option results in a smaller change in performance than the options of allowing performance to degrade.

Figure 5: Forecast performance against wastewater overflows standard for one or more overflows over time



Source: The CIE, 2021, Cost-benefit analysis: system performance standards, Final report, prepared for Hunter Water.

The present value of the benefits and the costs were used to establish the net benefit of each of the options as outlined in **Table 4**.

Table 4: Net benefits of wastewater overflow options

	PV Cost ($m)	PV Benefit ($m)	PV Net Benefit ($m)
Maintain performance	0	0	0
Reduced performance	34.7	-77.6	-112.3
Increased performance	6.9	2.2	-4.7

Source: The CIE, 2021, Cost-benefit analysis: system performance standards, Final report, prepared for Hunter Water, p. 20.

The base case option of maintaining the current performance level is the most economically efficient of the wastewater overflow options considered in the cost-benefit analysis. Both the improvement and degradation wastewater options are forecast to result in a net cost relative to the 'maintain performance' option. The improvement option results in slightly better service, but the cost involved exceeds customer willingness to pay for the improvement.

Importantly sensitivity analysis was also conducted on the results for key components such as:

- the discount rate
- altering the willingness to pay for non-residential customers
- increasing the number of people affected by each overflow event

Outcome

While the outcome involved maintaining the service standards already provided by Hunter Water, the customer surveys and cost-benefit analysis provided a strong basis for quantifying why the standard should remain as it is and why it is in the best interests of customers. This was reflected in IPART's evaluation of Hunter Water's Operating Licence proposal, with key statements from IPART included in Box 11 below.

Box 11: IPART's comments on Hunter Water's WTP analysis

IPART's recommendation was consistent with Hunter Water's customer preferences. Hunter Water consulted its customers to understand their preferences about the service standards that the customers value as well as the service failures for which customers would expect a rebate. This consultation showed that retaining the current system performance standards for water continuity, water pressure and dry weather wastewater overflows reflects customer preferences.[30]

Hunter Water's CBA indicated that the current service levels remain appropriate because they act as an adequate safety net, preventing unacceptable deteriorations in service standards, but do not drive overinvestment. Overinvestment would exceed the cost that customers are willing to pay - a risk with high standards. Conversely, the cost savings associated with reducing performance are valued by customers far less than the disbenefits that customers would suffer.[31]

Hunter Water applied a robust CBA methodology and implemented it in a disciplined, professional manner. We consider that Hunter Water's CBA results were reasonable, and the results provided weight to Hunter Water's proposal.[32]

Source: IPART

Key lessons learned

- The linking of key decisions to customer preferences provides strong evidence that a regulated business is trying to make customer focussed decisions that provide value to customers.
- Cost-benefit analysis is a useful tool for comparing a range of options, but it is equally important to include sensitivity analysis to demonstrate that findings are robust.

[30] IPART,*Hunter Water Operating Licence Review – Final Report*, May 2022, p.22

[31] IPART, *Hunter Water Operating Licence Review – Final Report*, May 2022, p.22

[32] IPART, *Hunter Water Operating Licence Review – Final Report*, May 2022, p.23

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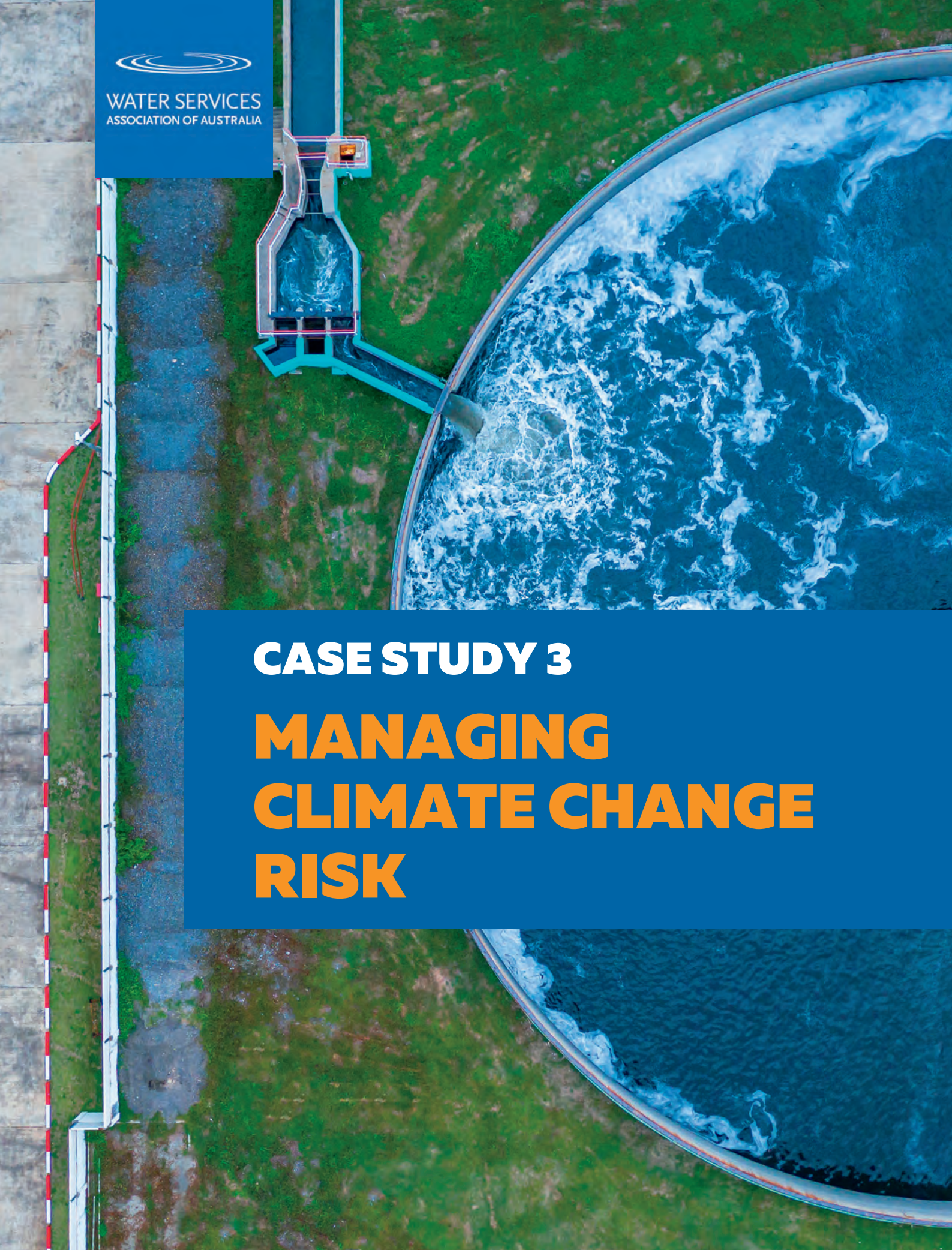


CASE STUDY 3

MANAGING CLIMATE CHANGE RISK

C Case study 3: Managing climate change risk

Nature of the issue/proposal

The key issue for this case study is demonstrating efficiency for managing climate risk.

During January 2011, South East Queensland experienced a major flooding event which caused substantial damage to key Urban Utilities (UU) infrastructure. In particular, several sewage treatment plants (STPs) were rendered inoperable due to inundation of mechanical and electrical equipment.

Restoring the treatment plants to operation was a costly and complex exercise as a result of the sheer volume of equipment that was damaged. This impairment to operations also resulted in UU having to deploy costly emergency response teams to minimise impacts to service delivery.

Having treatment plants offline impacted on services to the community and negatively impacted on environmental outcomes by reducing the level of sewage treatment undertaken prior to discharge into the region's rivers and Moreton Bay.

UU undertook a project with the objective is to reduce the recovery time and cost of critical STP assets after future floods. As a result, UU raised its electrical boxes at a number of sites.

Approach adopted to demonstrating efficiency

UU undertook a series of studies to identify and then justify its proposed investment to improve flood resilience. These included:

1. A flood resilience study looking at a broad range of flood mitigation options, which found that the majority of the flood risk can be mitigated through targeted works to STPS, priority pumping stations and key water assets.
2. A more detailed assessment of options relating to STPs which supported raising its electrical boxes at a number of sites.

Flood resilience study

This study, which incorporated aspects of a business case framework, undertook analysis to determine how best to mitigate flood risk to key UU assets.

Objective

While not formally structed as a business case, the document clearly states the problem being addressed as being "how to make the asset network more flood resilient so that business continuity can be maintained in the event of a repeat of a January 2011 intensity flood". The study explicitly emphasised that "the objective of this study is not to develop a strategy to make the UU network resistant to any conceivable flood event, rather the objective was to treat the January 2011 floods as the new 'baseline' flood".

In order to prioritise the assets at risk, UU:

- Undertook an 'exposure assessment' based on flood maps and modelling, under a repeat of the 2011 flood
- Estimated the consequences of asset outages including social, environmental, and economic consequences
- integrated the exposure and consequences metrics data into a form so that the risks to each specific asset during flood events can be compared, thus enabling prioritisation of the assets in terms of priority for flood mitigation actions.

Options identification

The study identified a number of alterative options for increasing the flood resilience of an asset network, including:

1. No change
2. Permanent bunding or construction of a flood proof structure
3. Relocation of the entire asset
4. Permanently protect or raise critical equipment such as switch rooms or switchboards in sewage treatment plants
5. Flood-proofing buildings/structures
6. Temporary dams
7. Redirecting Flows to Nearby Facilities

Options assessment

The broad costs of these options were estimated using unit cost rates used based on and agreed with rates used by UU for Master Plan costing pipelines and wastewater treatment plants.

The prioritisation process developed in this study established a list of priority assets that should be targeted for flood mitigation. The previous section also details a set of possible approaches and specific methods by which the risk can be offset. Therefore the next step was to develop a framework whereby the appropriate mitigation approach/method can be matched to the appropriate asset. This was undertaken by using two methods:

1. develop a marginal abatement curve (MAC) so that the relative contributions to risk reduction for various mitigation approaches can be compared.
2. develop and apply a set of decision flowcharts to guide investment for individual priority assets.

The risk mitigation abatement curve suggested that the majority of the risk to business continuity could be mitigated through targeted works to the sewage treatment plants, key water mains and protecting the integrity of highest priority pumping stations through protecting key components.

The remainder of the risk can only be mitigated through either completely through bunding, relocating or elevating the priority assets. Sewage treatment plants are located at low points in the catchment and therefore making these plants completely flood proof is limited to the option of surrounding the facility with bunding.

Preferred option

When prioritised according to the number of people impacted and environmental harm, assets with the highest risk profile were found to be the sewage treatment plants, followed by key sewage pumping stations and then water civil assets such as water mains. However, if it is deemed that the provision of freshwater is more important than the transfer of sewage through the network during extreme events, the risk prioritisation becomes:

- Sewage Treatment Plants
- Key water distribution assets
- Sewage pumping stations

Short-term flood resilience project justification - STPS

UU undertook a study (broadly based on business case framework) to support targeted investment in STPs.

Identification of the objective/problem to be addressed

The key drivers for the project were identified as:

- Improved asset resilience
- Reduced cost and time of recovery from future floods.

In doing so UU estimated current exposure levels to a potential future flood event (of similar magnitude to the 2011 flood).

Options identification

UU identified the key barrier to full recovery as being the long lead times associated with critical electrical infrastructure, such as switchboards and motor control centres (MCCs). The raising of electrical equipment above flood levels was therefore a major focus of the solution development.

UU considered a number of options including:

- Option 1 – “Do nothing/status quo”. This option involves leaving the assets “as is” and performing a similar post-flood recovery effort after a future flood.
- Option 2a – “Relocate/protect Area 1 Assets”. This option involves providing protection for assets in the inlet works and preliminary treatment area. This option allows more rapid recovery to primary treatment levels.
- Option 2b - “Relocate/protect Area 1-3 Assets”. This option expands protection to biological treatment and solids dewatering equipment. This option allows more rapid recovery to secondary treatment levels.
- Option 2c - “Relocate/protect Area 1-5 Assets”. This option further expands protection to site services, disinfection and for Oxley STP, the Cambria/cogeneration facility.

Options assessment

The NPV of each option was estimated incorporating a Capital Cost of Option Implementation and Expected Post-Flood Recovery Costs, based on flood impact modelling.

Each option was then considered in a UU multi-criteria options evaluation (MCOE).

Preferred option

When the impact of insurance premiums is considered, Option 2c was found to have the lowest NPV (i.e. lowest whole of life cost This held whether the first flood event was assumed to occur immediately after project implementation, or much later.

On a non-cost basis, Option 2c was preferred having the highest score due to superior overall outcomes related to the greater level of protection. When financial analysis is considered, Option 2c was favoured even more strongly due to the lower NPV.

The recommended solution is to proceed with Option 2c, at a capital cost of $23 million.

Delivery strategy

Detailed design and development of a specification to take to market was undertaken by Cardno under an existing contract. After finalisation of design offers for construction services was then invited on the open market.

Risk identification

UU developed a project risk register documenting a number of key risks to the successful implementation of the preferred option that were identified as a result of risk workshops.

Outcome

While the investment did not undergo independent assessment by an economic regulator (given the institutional arrangements governing the SEQ water sector), the approach adopted by UU broadly followed the key steps expected in business cases.

Detailed risk assessment based on flood modelling was key to this evaluation.

UU was able to clearly articulate the value to customers of increasing the resilience of their system.

Key lessons learned

Detailed risk assessments will be needed to underpin major investments including those designed to manage risks such as those associated with climate change.

WATER SERVICES
ASSOCIATION OF AUSTRALIA

OFWAT'S APPROACH TO SETTING COST ALLOWANCES

D Ofwat's approach to setting cost allowances

This appendix summarises the approach that Ofwat adopted at PR19 to set cost allowances, and highlights key changes in their methodology that Ofwat is considering for PR24.

Overview of Ofwat's approach

Figure 6 below provides a high-level illustration of Ofwat's building block approach to setting cost allowances. Cost allowances are made up of two main components:

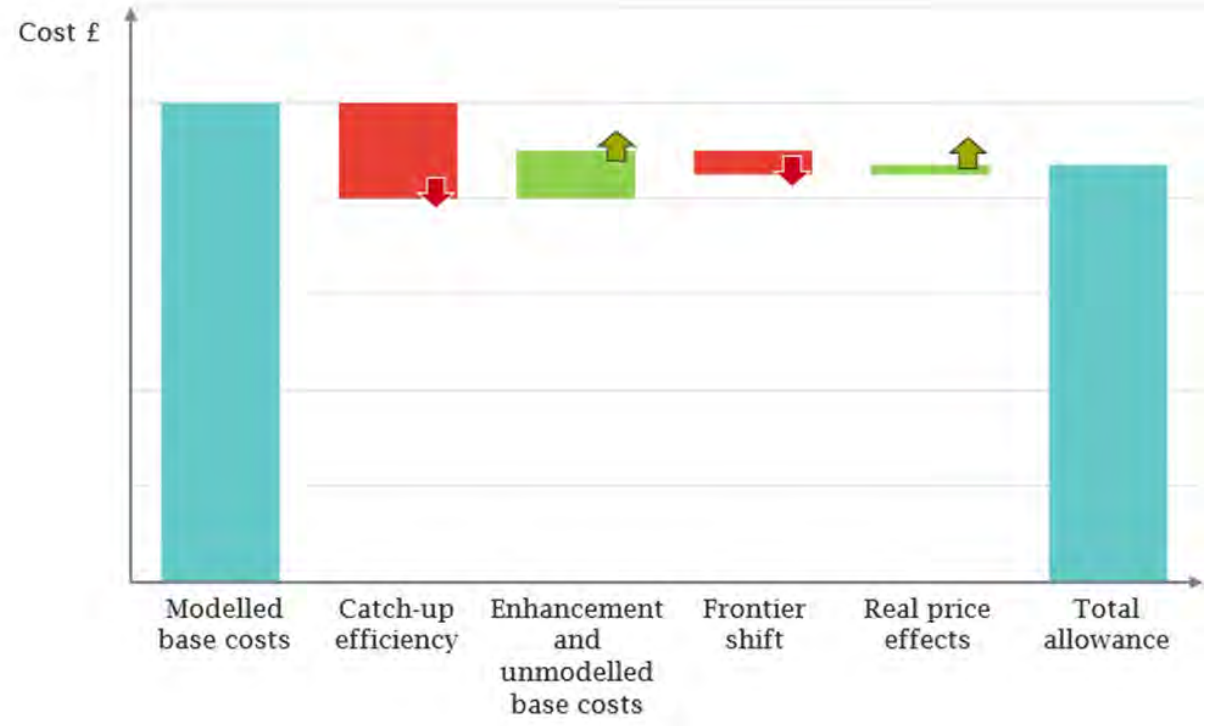
- Wholesale base costs. These are those costs that companies incur to continue providing existing services. Ofwat distinguish between modelled and unmodelled base costs.
    - Modelled base costs are costs that are in common across companies and that Ofwat estimates using econometric benchmarking models.
    - Unmodelled base costs are a small number of cost items that Ofwat considers are more suitable for a separate assessment (because driven by regional requirements, or largely outside of company control).
- Enhancement costs. These are those costs that companies incur to provide improved or new services. For instance, these costs may be driven by population growth or new statutory obligations.

Ofwat's approach to determine total cost allowances is the following:

- First, Ofwat uses econometric analysis to explain modelled base costs. It applies an efficiency challenge to these costs.
- Second, Ofwat assessed separately unmodelled costs and enhancement costs. It applies an efficiency challenge to these costs.
- Third, a frontier shift / productivity challenge is applied to modelled costs and some of enhancement and unmodelled costs.
- Fourth, Ofwat applies an allowance for any real price effect.

In the sections below we summarise Ofwat's approach to setting wholesale base costs and enhancement costs.

Figure 6: Building blocks of Ofwat's approach to cost allowances



Source: Ofwat

Modelled base costs

At PR19, Ofwat used econometric models at different level of aggregation to determine efficient cost allowances. Ofwat estimated a separate suites of models for the three controls: wholesale water; wholesale wastewater; and retail. Each suite of models includes bottom-up and top-down models. Ofwat argued that any difference between actual costs and modelled costs for a given company can be largely attributed to inefficiency. Ofwat set the efficiency frontier at the upper quartile and then uses the econometric model to determine the efficient base costs. Companies can submit requests for additional cost allowances due to their specific circumstances, if they can prove that the models do not accurately captures these costs. These requests are called 'cost adjustment claims'.

At RP24, Ofwat intends to use a similar approach to determine companies' efficient base costs. Key changes are:

- The potential inclusion of forecast data in the models (at PR19 Ofwat only used historical data. Use of forecast data is similar to Ofgem's approach)
- A tougher efficiency challenge (85th percentile rather than 75th percentile, similar to Ofgem's approach).
- Removal of bottom-up models for the retail cost assessment (e.g. bad debt specific models)
- A separate control for bioresources (so separate models and efficiency challenge)
- On cost adjustment claims, Ofwat asked companies to submit symmetrical cost adjustment claims, i.e. to explain the monetary impact of the claim on all companies.

Unmodelled costs

On top of the modelled base costs (less any catch-up challenge) Ofwat then makes an allowance for unmodelled base costs. For example, unmodeled costs include pension deficit recovery costs, business rates, abstraction and discharge charges. Ofwat assessed these costs separately at PR19. They intend to follow a similar approach at PR24.

Enhancement costs

On top of the modelled base costs (less any catch-up challenge), at PR19 Ofwat then made an allowance for enhancement expenditures. To assess companies' forecasts of enhancement costs Ofwat used three approaches:

- **Cost benchmarking**. Ofwat's preference is to use a cost benchmarking analysis to assess enhancement expenditures. If this approach is not feasible, then Ofwat uses two engineering assessments that depends on the materiality of the cost items.
- **Engineering deep dives**. These assessments are applied to material cost items when cost benchmarking is not feasible.
- **Engineering shallow dives**. These assessments are applied to cost items that are not material when cost benchmarking is not feasible.

Ofwat applied efficiency challenges to these expenditures.

At PR19 Ofwat assessed about 40 cost items across water and wastewater. They used benchmarking for about 10 of those cost items.

At PR24, Ofwat signalled that it intends to (amongst under things): 1) make more use of cost benchmarking to assess enhancement costs; 2) make use of outturn data and information from industry databases.