AER consideration of demand side issues in making the Rate of Return Instrument

David Havyatt, Rabindra Nepal, David Johnstone

A REPORT FOR THE RATE OF RETURN CONSUMER REFERENCE GROUP

August 2022

All enquiries should be addressed to:

Ty Christopher Director, Energy Futures Network Faculty of Engineering and Information Sciences University of Wollongong NSW 2522 Australia tchristo@uow.edu.au

Purpose

The Rate of Return Consumer Reference Group (the CRG) has engaged the University of Wollongong (UOW) Energy Futures Network to assist the CRG in forming a view of how demand side considerations should be reflected in the Australian Energy Regulator's (AER) Rate of Return Instrument.

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Ty Christopher Director, Energy Futures Network Faculty of Engineering and Information Sciences University of Wollongong NSW 2522 Australia tchristo@uow.edu.au



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Glossary

A-J effect	Conclusion by Averch and Johnson in a 1962 paper that a profit maximising		
	regulated entity under cost-of-service regulation will inefficiently substitute		
	capital expenditure for operating expenditure if the allowed rate of return is		
	greater than the cost of capital		
AEMC	Australian Energy Market Commission		
AER	Australian Energy Regulator		
ARM	Attrition Relief Mechanism – a component of PBR		
Building	The UK RAB Model as adopted by Australian regulators (Victorian Office of the		
Block Model	Regulator General, IPART and AER)		
CAPM	Capital Asset Pricing Model		
CESS	Capital Efficiency Sharing Scheme		
CPI	Consumer Price Index (Australian measure of inflation)		
CPI-X	Australian implementation of the UK RPI-X regulatory framework		
CRG	Consumer Reference Group		
DER	Distributed Energy Resources, which includes generation, storage and loads that		
	can respond to price or non-price signals		
DNSP	Distribution Network Service Provider		
DMIS	Demand Management Incentive Scheme		
ECA	Energy Consumers Australia		
EBSS	Efficiency Benefit Sharing Scheme		
ENA	Energy Networks Australia		
ENERF	Electricity Network Economic Regulatory Framework		
ESB	Energy Security Board		
ESM	Efficiency Sharing Mechanism – a component of PBR		
Hilmer Trilogy	The break up of economic efficiency into three components of allocative		
	efficiency, productive (or technical efficiency) and dynamic efficiency.		
MRP	Multi-Year Rate Plan – used in the description of Performance Based Regulation		
NEL	National Electricity Law		
NEO	National Electricity Objective		
NER	National Electricity Rules		
NGL	National Gas Law		
NSP	Network Service Provider		
PBR	Performance Based Regulation		
PIM	Performance Incentive Mechanism – a component of PBR		
PUC	Public Utility Commission		
PV	Photovoltaic – a shorthand for solar panels located on consumer premises		
RAB	Regulatory Asset Base		
RAB Model	An approach to regulation first introduced by Ofwat in 1992 as a replacement for		
	RPI-X to ensure Financial Capital Maintenance		
RORI	Rate of Return Instrument		
RPI-X	Form of incentive regulation introduced in the UK as utilities were privatised		
RPP	Revenue and Pricing Principles		
SL-CAPM	Sharpe-Lintner Capital Asset Pricing Model		
STPIS	Service Target Performance Incentive Scheme		
TNCD			
INSP	Transmission Network Service Provider		
TRR	Transmission Network Service Provider Total Revenue Requirement		



Executive Summary

Economic regulation aims to emulate or mimic the competitive process (Jamasb & Nepal 2015; Sappington & Weisman 2021). The Australian Federal Court expressed this objective, saying:

[I]t is accepted by all parties that the regulatory scheme seeks to obtain the benefits of economic efficiency through mimicking the processes that would occur in a competitive market (Australian Energy Regulator v Australian Competition Tribunal (No 2) [2017] 2017 at 531).

Businesses in competitive markets are not rewarded for owning assets; they are rewarded for producing goods and services that consumers elect to buy. They will employ assets in doing so and be profitable to the extent that the prices consumers will pay is sufficient to also pay for the cost (the return of and on capital) of those assets.

The objective to mimic competitive processes underpins the choice of incentive-based regulation in Australia over the cost-of-service model used in the US. The simplest form of incentive regulation, revenue or price caps, has been augmented by two mechanisms. These mechanisms smooth out the incentive to become more efficient and provide output incentives to improve quality (or at least ensure it is not decreased as part of cost-saving). As a result, the term "Performance-based regulation (PBR)" is becoming a more preferred term for the type of regulation applied in Australia (Aweh & Shah 2022; Cross-Call et al. 2018; EnerKnol 2019; Lowry & Woolf 2016).

However, the starting point for incentive regulation and PBR is calculating the same Total Revenue Requirement (TRR) formula used in cost-of-service regulation. In the UK, it is called the "RAB model", and in Australia, the "building block model" (Beale et al. 2006; Biggar 2004; Bolt 2014; McDermott 2012). While all other actual costs of the regulated business are observable, its cost of capital, especially equity capital, is not. Consequently, the regulator needs to estimate an allowed rate of return to use in the TRR formula.

Finance theory provides some help for the regulator. However, ultimately the task is circular because the investors value the business based on its future cash flows. In contrast, at least partly, the regulator's decisions determine those cash flows. Additionally, finance theory is not a precise science, and all the estimators used only provide a confidence interval, not definitive answers.

However, finance theory also tells us that the regulator's task is different in the case of any incentivebased scheme than in cost-of-service. Under incentive regulation, total returns to the business are determined by returns allowed on assets and the outcome of incentive regimes. This is a necessary consequence of the objective of emulating or mimicking the competitive process; consumers reward businesses for what they do, not what they own.

Analysis of the AER's regulatory task highlights that the requirement to have regard for the revenue and pricing principles requires the AER to regard the way its decision interacts with the incentive regime. The principles also emphasise that three types of efficiency should be incentivized: investment, operation and use. Further analysis demonstrates that promoting efficient investment is insufficient to promote efficient use.

Efficient use depends on the price structure and the price level; however, the issue of price structure is not independent of the decision on the allowed rate of return. Incentives on outputs or outcomes can influence price structure, and regulators in setting the allowed rate of return must consider the design of the incentives.

The AER's explanatory statement can address consumption efficiency by considering demand effects in changes to the price level and the interaction between the allowed rate of return and incentives, especially their impact on price structures. The AER can include consideration of the outcome of previously allowed rates of return in this analysis.



Introduction

BRIEF DESCRIPTION OF THE PROJECT

The Australian Energy Regulator (AER) is required under the National Electricity Law (NEL) and the National Gas Law (NGL) to make a periodic Rate of Return Instrument (RORI) that is binding on the AER and networks for regulatory proceedings for the term of the Instrument. The AER is also required to form a Consumer Reference Group (CRG) to inform the AER in making the Instrument.

The CRG, with the financial support of Energy Consumers Australia (ECA), has requested the University of Wollongong to "develop a framework for undertaking an assessment of the relationship between the energy objectives of efficient investment and efficient operation and use of the network." They requested a high-level report in the following three parts.

Part A: The regulatory framework Part B: Market impacts Part C: Addressing consumer efficiency in regulatory decision making

The report expands on the work of Havyatt (2021b) and places it in the context of the AER's decisionmaking framework.

The AER's processes in making the RORI are not unusual. As Thompson (1991, p. 208) observed:

Rate of return analysts providing testimony in rate cases have been subject to the criticism that they present large amounts of data in their exhibit that, at best, contribute only marginally to the judgment they render regarding the required rate of return. This may very well be the practical manifestation of the inability to effectively use theory and statistics to accurately predict individual realizations of a random variable. Judgment will loom large when theory and methodology fall short of providing predictions.

The AER persists in this approach, devoting considerable effort trying to estimate a rate of return accurately. However, the AER is bound by legislative requirements that, if anything, expand the realm for judgement. One source that should inform that judgement is the outcome of previous decisions, as Professor Johnstone observed at the Concurrent Expert Session for the 2018 Guideline¹:

Given it's such a hard job, you know, the regulator needs the discretion to just, in either direction - depending on how the regulation works, and that's clearly, obviously, going to be a matter of judgment. There's a simple judgment in whether the previous settings were correct, or not - the regulator has to make that re-judgment all the time.

And later

Okay, so if it was me, I would work through the consequences because I don't think there's going to be an answer that I can just plug in as the right answer. So work through the consequences and then work back and think about the upshot, and so that's a bit of judgment to-ing and fro-ing.

The CRG requested a guide on how the AER might incorporate more discussion of the exercise of judgement in its decisions, particularly how this judgement is directed at the question of "customer efficiency".

The AER, in its *Assessing the long term interests of consumers; Position paper*, acknowledged the role of judgement in making the RORI, saying:

Setting the expected rate of return is a complex decision. In most instances, the National Electricity Rules (NER) and National Gas Rules (NGR) do not point to a single answer, either for our decision as a whole or in respect of particular components. This requires us to

¹ <u>https://www.aer.gov.au/system/files/AER-%20Concurrent%20Evidence%20Session%201-%20Proofed%20Transcript.pdf</u> Page 29 and Page 89



exercise our regulatory judgement under uncertainty. As such, in this space of uncertainty, we need to inform ourselves of consumer's interests.²

In the Draft RORI, the AER has outlined its criteria to help guide their judgements (section 2.1.5 of the Explanatory Statement). These are:

1) Reflective of economic and finance principles and market information

2) Fit for purpose

3) Implemented in accordance with good practice

4) Models are based on quantitative modelling that is sufficiently robust and avoids arbitrary filtering

5) Market data is credible, verifiable, comparable, timely and clearly sourced

6) Flexible to allow changing market conditions and new information

7) *Materiality*

8) Longevity or sustainability of new arrangements.

However, this list doesn't look so much as a basis for making judgments about issues such as where in a range a specific value should be chosen as the basis for including data or techniques in developing the range. Later in the Statement, the AER states:

We make decisions based on the evidence before us at the time and our regulatory judgement about the merits of a case. Our past decisions and the approaches taken by other regulators are relevant to the extent they inform our judgement – for example, by providing evidence or a line of argument in support of a particular position. As we assess the available evidence and exercise regulatory judgement, our positions may evolve over time.

It is instructive to note that the AER has not included in its list of matters relevant to exercising its judgement any of the matters listed in legislation as being relevant to making the RORI, in particular the energy objectives or the RPPs. Similarly, the AER regards past decisions as being relevant to inform judgement by way of precedent but not as the basis for analysis of the consequences of those decisions. As we will see, the reports of the Independent Panels for the 2018 and 2022 RORIs, respectively, suggest the AER has erred in not making doing so

STRUCTURE OF THE REPORT

At the request of the CRG, this report consists of three parts. The first part reviews the regulatory framework. This consists first of understanding the AER's task as defined in the National Electricity Law (NEL) and the National Electricity Rules (NER) and the corresponding requirements in the gas legislation and rules. To expand upon the AER's task, we then review some important conclusions from economic theory, covering both the theory of regulation and finance. We then discuss the application of this discussion to the AER's task, first by reviewing the outcome of previous decisions and then by reviewing the implications of theory for the task of making the RORI.

The second part describes the market impacts of the allowed rate of return. We explore both the impact of the average price level on demand and consumer behaviour, the need for efficient prices, and the motivations for network service providers (NSPs) to implement such prices.

The third part brings together these discussions. We return to the regulatory framework in the context of the demand discussion to demonstrate that the investment can be neither too low nor too high while the utilisation is still too low. That is, it is insufficient for the AER to base the RORI only on an unbiased estimate concerning investment.

We follow this by noting that the lever the AER has to promote efficient use is output incentives. We then link back to the discussion of the implications of setting the allowed rate of return in the context

^{%20}Rate%20of%20return%20and%20assessing%20the%20long%20term%20interests%20of%20consumers%20-%20Position%20paper%20-%2021%20May%202021_1.pdf



² https://www.aer.gov.au/system/files/AER%20-

of incentives and note that increasing the incentives for efficient pricing would need to be accompanied by a reduction in the allowed rate of return included in the RORI.

Finally, we argue that this paper provides a framework for the AER to consider the consumption efficiency implications of its RORI decision. We further suggest that there is also scope for some changes to the regulatory framework to further increase the incentive characteristics of the regulatory framework and that an independent panel could investigate this.

PART A: The Regulatory Framework

This Part will explore the relationship between the allowed rate of return, the promotion of efficiency and incentive arrangements. A 1991 volume devoted to regulatory finance and rate of return regulation observed:

It is not at all clear how a price caps system would affect the cost of capital. But it is clear that it would depend very importantly on the parameters of that regulatory scheme. (Thompson 1991, p. 222)

This Part of the paper addresses this question directly. It concludes that not only does incentive regulation affect the calculation of allowed rates of return, but the provisions of Australian legislation also require the regulator to have regard to these impacts. It has three substantive sections.

The first section reviews the regulator's task from the perspectives of the legislative requirements, comments by the Independent Panel on the 2018 draft guideline and issues in interpreting the objectives of the energy laws. The second addresses some issues in regulatory economics, including the meaning of "efficient", the different forms of economic regulation, and the theory of finance basis of the CAPM. Finally, we conclude this Part with observations of the outcomes of previous regulatory decisions and the application of the theory to conclude that regulators need to consider allowed rates of return and incentive design together.

UNDERSTANDING THE AER'S TASK

This section begins with a review of the legislative provisions that bind the AER's work in making the RORI and then a summary of issues raised by the Independent Panel Review of the 2018 Draft Guideline. It concludes with a discussion of how the AER interprets the task of promoting the long-term interests of consumers through the RORI.

RATE OF RETURN INSTRUMENT LEGISLATION

Division 1B of Part 3 of the NEL and Division 1A of Part 1 of Chapter 2 of the NGL detail the requirement for the AER to make a Rate of Return Instrument (RORI); as these provisions are identical, we refer to them using will use the section numbers from the NEL.

The following sections of the legislation make provisions concerning the AER's exercise of its powers in, and responsibility for making, the Instrument.

- s18I(3) The AER may make an instrument only if satisfied the instrument will, or is most likely to, contribute to the achievement of the national electricity objective to the greatest degree.
- *s18I(5)* In making an instrument, the AER must have regard to (a) the revenue and pricing principles; and (b) other information the AER considers appropriate.
- *S18L(d)* In making a rate of return instrument, the AER must also regard the advice, recommendations or submissions given by a consumer reference group.
- s18Q The AER must publish explanatory information for a rate of return instrument on its website when publishing the instrument under section 18S.

Attachment 1 includes the sections of the NEL that include the National Electricity Objective (NEO), the revenue and pricing principles (RPPs) and the definition of explanatory information. The NEO, at its simplest, states that the objective of the law is to promote efficiency for the long-term interests of consumers. As Energy Consumers Australia has noted, promoting efficiency and the long-term interests of consumers fundamentally state the same criteria (ECA 2016, 2018).

The revenue and pricing principles require that the AER should provide a service provider with a reasonable opportunity to recover their efficient cost and with incentives to promote economic efficiency. They also require the AER to ensure the network operator earns a return "commensurate with the regulatory and commercial risks involved in providing" network services and regarding the economic and social consequences of under or over-investment. These principles are



theoretically consistent with the aims of an incentive-based regulation that combines a budget-balance constraint to the network companies while offering them incentives for maintaining and improving efficiency.

In both the NEO and the RPPs, the objective of economic efficiency applies to investment in the network, including the ability of the network companies to undertake adequate and timely investments, the efficient operation of the network and the efficient use of electricity services. Importantly, the RPPs refer to the efficiency concepts in the context of incentives, "A regulated network service provider should be provided with effective incentives in order to promote economic efficiency...."

The definition of explanatory information identifies a requirement to report on why the AER is satisfied the instrument will contribute to the achievement of the national electricity objective to the greatest degree; and how the AER had regard to the revenue and pricing principles (NEL s18F)

COMMENTARY ON THE 2018 RORI

In its request for this proposal, the CRG detailed elements of the report of the Independent Panel appointed to review the Draft 2018 Rate of Return Guideline, the AER's response to it and matters raised by the CRG in the 2022 process as a consequence. Therefore, rather than paraphrase this discussion, we have incorporated it in this report as Attachment 2. In addition, Attachment 3 provides the relevant extracts from the 2018 Independent Panel report.

All parties agree that the NEO and the RPPs refer to efficient investment in and efficient operation and use of network services. The latter two are described as "demand side issues", "consumption efficiency", or "consumer efficiency". In the explanatory statement to the 2018 RORI, the AER devoted chapter 2 to a discussion of the framework for setting the rate of return, and chapter 13 discussed the risk-cost tradeoff (AER 2018)³.

As detailed in Attachment 3, the Independent Panel fundamentally made two observations about how the AER addressed its legislative obligations. The first noted that the AER did not provide any explanation of why it is satisfied that the individual decisions on parameters taken together will contribute to the objectives:

While the Explanatory Statement addresses each technical step in the rate of return calculation, it does not sufficiently consider or demonstrate how each of the decisions about individual parameters, when taken together to produce a final estimate of the rate of return and value of imputation credits, will contribute to the achievement of the national gas and electricity objectives.

The AER should explain more clearly how the Final Guidelines promote the achievement of the national gas and electricity objectives, including why the AER is confident that the rate of return methodology that it has determined results in an outcome that is neither too high or too low.

The second noted that the AER was silent on consumption efficiency:

However, the national objectives also include consumption efficiency, which needs to be addressed as well. In achieving the national objectives, attracting capital is necessary but not sufficient.

There is a broader point to make. A particular rate of return does not achieve the national objectives just because finance theory says it should. The national objectives are achieved not by finance theory but by the rational, informed actions of the firms and individuals who comprise the regulated industries: debt investors, equity investors, the managers and employees of regulated firms, consumers large and small, and the practitioners who represent their interests before regulatory tribunals. The Draft Guidelines will be capable of promoting

³ It is unclear why the AER separates these two chapters given that the risk-cost trade-off is part of the framework.



the national objectives only if it wins the trust of, and **induces the efficient conduct of, all** *those parties*. [emphasis added]

COMMENTARY ON THE DRAFT 2022 RORI

The Independent Panel Report for the 2022 Draft RORI has not made the same comments as the 2018 Report. The Panel reports that its task was to answer two questions for the AER, namely:

- In the Panel's view, is the draft instrument supported by evidence and reasons, taking into account competing factors such as accuracy, consistency, accessibility and transparency?
- In the Panel's view, is the draft instrument likely to contribute to the achievement of the National Electricity Objective (NEO) and the National Gas Objective (NGO)?

We note that the legislative requirement for the report is that it "must include the panel's assessment of the evidence and reasons supporting the rate of return on capital or the value of imputation credits under the instrument" (NEL s18P(5)). It is unclear why the AER assigns the Panel different tasks than that assigned by legislation.

Presumably, the AER believes that the questions it asks fully encompass the task described by the legislation. However, as noted above, the definition of "explanatory information" includes the regard the AER had to the RPPs.

The Panel has reported that "The AER revised the question the Panel is asked to consider to sharpen the focus on promoting the achievement of the energy objectives" (page 10). However, due to misdirection by the AER, the RPPs and the full requirements of the legislation in terms of the expected content of the explanatory statement have not been fully explored in the Independent Panel Report; it could be argued that the Panel has not fully performed the task specified in legislation.⁴

ASSESSING THE LONG-TERM INTERESTS OF CONSUMERS

Since the 2018 Independent Panel report, legislative amendments required the AER to make the RORI. The RORI replaced the Guidelines and is binding on the AER and regulated networks. These changes also removed the reference to a "benchmark efficient entity". Arising from discussion with the CRG and Energy Networks Australia (ENA), the AER published a Position Paper on assessing the long-term interests of consumers to make the RORI (AER 2021). This paper concluded that:

In our view, for the 2022 Instrument to advance the NEO and NGO to the greatest degree, the expected rate of return should be an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services. (P. 12)

Havyatt Associates wrote to the AER, observing that the decision of the AER to form this view independent of any consultation beyond the CRG and ENA was unfortunate. This letter made the case that the phrase "an unbiased estimate of the expected efficient return" was essentially an impossible task. The letter proposed that AER should set the rate of return so that "current and future consumers pay no more than they need to for the quality and reliability they want".

In reply to the letter, the AER noted, "As we progress through the process of making the instrument we will continue to focus on the National Electricity Objective and the National Gas Objective."

In the Position Paper, the AER noted:

We agree with the CRG that achieving the legislative objectives requires more than just efficient investment in energy networks, but also requires efficient use of energy network services. We are open to improvements in how we assess consumption efficiency, but note we have considered consumption efficiency in a number of respects. (Pp 5-6)

⁴ We note that as a consequence of NEL s18R the failure to comply with the subdivision does not invalidate the RORI. However, this does leave open the prospect of someone applying for an injunction to require the AER to perform a function in the subdivision before making the RORI.



The AER identified three respects:

- 1. The AER argues that the efficient use of energy services and consumption efficiency are similar concepts and that use will be inefficient if prices are too high or too low. They concluded that an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services, will promote consumption efficiency.
- 2. The AER notes that consumption efficiency is related to the structure of prices and their level. Therefore, the AER noted that the price level is necessary for economic efficiency but not sufficient.
- 3. Consumers will invest as they see fit, but if the AER sets a best unbiased estimate of expected return, it will encourage good consumer decision-making.

In its Draft 2022 Rate of Return Instrument Explanatory Statement, the AER again devotes chapter 2 to considering how the RORI contributes to the legislative objectives. In response to the 2018 Independent Panel Report, the AER included in chapter 11 an analysis of the overall rate of return. It concludes that RAB multiples, financeability tests and sensitivity tests provide "value as a sense check and in a contextual role". It further considers that based on their review, historical profitability, investment trends, other regulators' rate of return and other practitioners' discount rates "offer little value". The chapter ends by considering the "decision in the round"; this does little more than restate the AER's position that the aggregation of the components provides an unbiased estimate consistent with the risks.

These responses to the Havyatt Associates letter and the Independent Panel's comments on consumption efficiency reflect a failure of the AER to consider all aspects of the RPPs in their approach to the RORI. In particular, the RPPs require a regulated network service provider to be provided with effective incentives in order to promote economic efficiency. The economic efficiency that the AER's decision is required to promote is efficient investment, provision, and use.

Additionally, the AER incorrectly equates the requirement in the RPPs that charges for the provision of a direct control network service "should allow for a return commensurate with the regulatory and commercial risks involved" in providing the direct control network service with the allowed rate of return on assets being commensurate with the risks involved. The return to the investors is a function of the entire regulatory determination, not just the allowed rate of return specified in the RORI.

ISSUES IN REGULATORY ECONOMICS

This paper is ultimately concerned with the relationship between the RORI and the achievement of "consumption efficiency". Consequently, our consideration of issues in regulatory economics begins with a discussion of the meaning of "efficient". We then outline our criticisms of the AER's interpretation of efficiency for the RORI.

The discussion of efficiency is followed by a history of the development of regulatory approaches leading up to the Performance Based Regulation (PBR) framework. (While PBR is sometimes used interchangeably with incentive regulation, we prefer the former, more inclusive term.) We then shift focus to finance theory before returning to PBR and the application of finance theory.

THE MEANING OF "EFFICIENT"

In both the Position Paper on the long-term interests of consumers (Table 3) and the 2018 Explanatory Statement (Table 2), the AER presents a table for applying efficiency concepts to the rate of return. This table presents the concepts (or components) as *allocative, productive,* and *dynamic efficiency*. Havyatt (2017) dubbed this the "Hilmer trilogy" in a paper exploring the origin of the description (as the "Treasury troika") and interpretation of these concepts. The paper explains that dynamic efficiency is not the process of new investment; dynamic efficiency refers to the process of innovation. Investment is necessary for innovation and hence dynamic efficiency, but it is not sufficient.

To expand on this point, consider the difference between "productivity" and "efficiency" as described by Coelli et al. (1998). Using a case of a single input and single output process, they describe a production frontier for the existing technology. Any point below this line is technically



efficient. However, a technically efficient firm may still be able to increase the ratio of output to input by moving along the production frontier to higher output and realise economies of scale.

However, our point is even more complex. Both preceding approaches only achieve varieties of productive efficiency. Dynamic efficiency involves innovation that changes the production frontier. Coelli et al. (1998) distinguish this from productivity and efficiency by labelling it "technical change".

The AER describes the role of each of these with the rate of return, as shown in Table 1. The table also includes our alternative description. This alternative draws on the important observation that the return investors make on their network assets is both the return allowed as a rate of return on the regulatory asset base plus the value of any incentive payments.

Component	AER interpretation	Our interpretation
Productive Efficiency	For our determinations to be productively efficient we need to incentivise service providers to seek the lowest cost financing (all else being equal).	The rate of return is productively efficient if it is as low as possible consistent with the provider making sufficient returns to deliver the price and quality of network services required by current and future consumers.
Allocative Efficiency	Allocative efficiency can be achieved by setting an allowed return consistent with the expected return in the competitive capital market (determined by demand and supply) for an investment of similar degree of risk as a service provider supplying regulated services.	The allowed rate of return must be no more than the actual cost of capital to the service provider.
Dynamic Efficiency	Refers to the existence of appropriate incentives. We can encourage dynamic efficiency by setting an allowance that does not distort investment or consumption decisions. Dynamic efficiency is advanced through incentive regulation rather than cost of service regulation that compensates a service provider for its actual costs no matter how inefficient.	Dynamic efficiency involves doing the same things cheaper or doing new things valued more by consumers (e.g. integrating DER). Incentive regulation is designed to promote dynamic efficiency. The allowed rate of return needs to be consistent with incentive regulation.

Table 1: The components of efficiency

Our first observation is that once the regulator sets the rate of return for a revenue determination, the service provider always has an incentive to seek lower financing costs as the network business retains all the benefits of the lower return. Incentive regulation provides incentives for regulated network companies to optimize their processes. So the AER conceptualization of productive efficiency for the rate of return does not provide guidance on how to set the rate. Productive efficiency ultimately requires network services to be provided at the lowest possible cost; the rate of return needs to be as low as possible while still delivering the price and quality of services current and future consumers are prepared to pay for. The consideration of future consumers provides an additional perspective on what a rate of return "as low as possible" means.

The second observation is that allocative efficiency takes many forms. The typical allocative efficiency requirement is that prices equal costs; no monopoly rents exist. The AER interprets allocative efficiency this way, but only with prices (rates of return) in capital markets. However, we already incorporate this interpretation of allocative efficiency in our interpretation of productive

efficiency.⁵ So instead, the focus on allocative efficiency turns to the question of the efficient allocation of expenditure between capital and operating expenditure. For example, the often misunderstood "Averch-Johnson effect" (A-J effect) describes the behaviour of a profit-maximising firm subject to cost of service regulation when the allowed rate of return is higher than the actual cost of capital. In this circumstance, the firm will inefficiently favour capital expenditure over operating expenditure (Averch & Johnson 1962).

Our final observation is that dynamic efficiency is concerned with innovation, not investment, to achieve productive or allocative efficiency in the future. We agree that the incentive regime promotes dynamic efficiency. We observe, however, that the operation of distribution networks does not today promote the efficient use of distributed energy resources, especially demand response services. This is the focus of Part B of the report.

FORMS OF ECONOMIC REGULATION

That the framework for economic regulation used in Australia for energy networks is "of the prospective CPI minus X form, or some incentive-based variant of the prospective CPI minus X form" (e.g. NER 6.2.6(a)) is often restated, but the significance is frequently underestimated.

The academic literature on economic regulation is mostly based on the North American approach that has been progressively implemented since 1907. This model is based on successive "rate cases" initiated by either the regulated utility or a consumer advocate and adjudicated by a public utilities commission (PUC). In 1944 the US Supreme Court established what came to be known as the End Result Doctrine and firmly established the cost-of-service regulatory model, also known as the rate of return or cost plus model (Lazar 2016; McDermott 2012). The consequence of the decision was the development of the formula for the Total Revenue Requirement, which was set equal to total cost:

$$TRR = TC = [RB - D]ROR + OE + d + T$$

Where:

TRR = total revenue TC = total cost RB = rate base or value of capital D = accumulated depreciation ROR = weighted average cost of capital equals the cost of equity (profit to owners) multiplied by the per cent of equity used to fund the firm plus the cost of debt (average interest rate paid on bonds) multiplied by the per cent of debt used to fund the firm OE = operating expenses d = annual depreciation cost T = taxes

The same judgement (re-established) the "comparable earnings" principle (Roseman 1970), that:

The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.

While the A-J effect identified the problem of setting the allowed rate of return higher than the actual cost of capital, no standard approach was developed to estimate the actual cost (Joskow 1972). Some studies analysed the implications of the A-J effect as a means to determine what rate of return to allow for implications of different managerial objectives (Baumol & Klevorick 1970; Klevorick 1966, 1971).

⁵ ACCC economist Dr Rob Albon has suggested that the only component of efficiency is allocative efficiency, as allocative efficiency in factor markets delivers productive efficiency in downstream markets; and in the alternative, productive inefficiency in a market results in allocative inefficiency in downstream markets.



The standard approach to cost of service regulation is then established as allowing revenue equal to costs where the allowed rate of return is estimated as the actual cost of capital. This approach has as its focus the elimination of monopoly rents by setting revenue equal to costs. In doing so, it is an approach that tries to emulate the outcome of theoretical competitive markets.

In the environment of continuous growth of demand realising economies of scale, the cost of providing services was declining, and utilities did not seek frequent rate revision. US economists observed that the lag between rate cases created an incentive to reduce costs and speculated whether this should become a feature of regulation (Baumol 1967). They subsequently noted that indexation for inflation needed to be a feature of this design (Baumol 1982).

The privatisation of utility businesses in the United Kingdom in the 1980s necessitated developing a regulatory approach. Littlechild (1983) proposed a simple price cap summarised as RPI-X to privatise British Telecom.⁶ The same approach was then identified for electricity privatisation to avoid the extensive regulatory machinery developed in the US for cost-of-service regulation (Parker 2009, 2012).

UK regulators recognised that for the second controls reset, they needed to assess the networks' costs and consequently adapted price-cap regulation to the "RAB model" (Bolt 2014; Helm 2009; Stern 2014a, 2014b)⁷. Australia adopted the same model calling it the "building block model" (Biggar 2004). Lowry and Kaufman (2002) provide a thorough, accessible comparison of cost-of-service, price or revenue caps, and benchmarking.

Interest in price caps for electric utility regulation spread to the US in the early 1990s (Lowry 1991), sometimes using the title of "performance-based ratemaking [or regulation]" (Cross 1995; Joskow 2007). Comnes et al. (1995) summarise 11 instances of PBR in electric utilities in 1995. Since 1995 the term 'Performance-Based Regulation' (PBR) has gained increasing prominence.

Sappington et al. (2001) defined PBR as the "implementation of rules, including explicit financial incentives, that encourage a regulated firm to achieve certain performance goals, while affording the firm significant discretion in how the goals are achieved". They noted this enabled its "superior knowledge of its operating environment" to achieve these goals and that PBR differs from rate of return regulation affording more discretion to the regulated firm.

While interest has grown generally in institutionalizing regulatory lag as Multi-Year Rate Plans (Costello 2017), this has been accompanied by a recognition that such plans create an opportunity and incentive for cuts to expenditure by reducing quality (Alexander 1996; Costello 2019). Meitzen et al. (2018) note that regulatory mandates are not interchangeable with enhanced incentives in eliciting superior utility performance.

The nature of electricity distribution is changing from one-way power delivery to platforms for "transactive energy" utilising Distributed Energy Resources (Abrishambaf et al. 2019; Huang et al. 2021). This change increases the outputs of the network (e.g. generation connection, hosting capacity), which is a solid basis for greater use of PBR (Jamasb & Nepal 2015; Lowry & Woolf 2016; McDermott & Hemphill 2017). On the basis that performance incentives can address the incentive to reduce quality, Davis (2000) concludes, "It is time that electric distribution companies learn to love PBR".

As the above discussion reveals, the terminology used to describe different forms of economic regulation is not applied consistently across the academic or policy literature. Consequently, we must

⁷ The RAB model was primarily introduced to guarantee 'financeability' and as a solution to the time inconsistency problem. Helm is quite succinct in his description of the naivety of the initial Austrian approach.



⁶ Biggar (2011) posits that Littlechild's advocacy of this form of incentive regulation was a consequence of Baumol's (1982) paper. However, the author's discussion with Littlechild and the account by Littlechild (2014) and Valentine (2006) makes it clear that this wasn't the case.

define the terms we use. In this paper, we use the broadest definition of PBR, which is a regulatory scheme that has four characteristics (Biewald et al. 1997; Lowry & Woolf 2016; Navarro 1996)⁸:

- Multi-year rate plans (MRP) typically five years setting a starting revenue and indexed at CPI
- Attrition relief mechanisms (ARMs) automatically adjust for factors outside management control (typically X and Z, but also S and K see below)
- Efficiency sharing mechanisms (ESMs) how the rewards of efficiency improvement are shared between networks and consumers
- Performance incentive mechanisms (PIMs) rewards for specific outputs/outcomes, consisting of goals, metrics, targets and financial rewards.

In the Australian context, the Efficiency Benefit Sharing Scheme (EBSS) and the Capital Efficiency Sharing Scheme (CESS) are types of ESM. The Service Target Performance Schemes (STPIS), Demand Management Incentive Scheme (DMIS) and, more recently, the Customer Services Incentive Scheme (CSIS) are all varieties of PIM.

All implementations of PBR need some mechanism for calculating the starting revenues or prices for the MRP to which CPI and ARMs are applied. The UK term "RAB model" and the Australian term "building block model" both refer to this element and use the same approach as the TRR specified in the US. Consequently, all forms of regulation need a means of determining a return rate to be applied.

The rate of return is typically determined as a weighted average cost of capital which requires estimating a cost of equity capital, a cost of debt capital and a gearing ratio. The last two can be directly observed in cost-of-service regulation. In all cases, the cost of equity capital needs to be estimated. Unfortunately, the implications of the differences between cost-of-service regulation and PBR have not been properly considered in the academy or practice.

ASPECTS OF FINANCE THEORY

Myers (1972) established finance theory's role in cost-of-service regulation by proposing the Sharpe-Lintner Capital Asset Pricing Model (SL-CAPM) to estimate the cost of equity capital. Based on Markowitz's mean-variance portfolio theory (Lintner 1965; Markowitz 1952; Sharpe 1964), this model views future cash flows as probability distributions summarised by their mean and variance (with the variance understood as a measure of payoff unpredictability or risk).

Other approaches to determining the cost of capital have since been proposed. These include the many variants of the CAPM, such as the Black CAPM, Fama-French Three-Factor Model and the Arbitrage Pricing Model (or Theory). They also include more basic and largely discredited discounted cash flow concepts such as dividend growth models. Other less accepted and largely heuristic approaches include market-to-book ratios, Q-ratios, and comparable earnings of other businesses. However, all but the last of these models are consistently based on the false assumption that the business's cash flows are "exogenous" or independent of the regulatory decision-making process (as if "from nature"). One, the contingent claims or option-based model, attempts to address the unpredictable stochastic element of regulators' endogenous rate-making in the analysis. However, this requires an estimate of when a new rate case will be called for, or a new rate is set, a question that is much less relevant in PBR (Morin 2006; Thompson 1991).

Finance theory starts with the principle that an investment is defined as the current commitment of resources to achieve later random and hopefully worthwhile benefits. More specifically, an investment is defined in terms of its predicted cash flow sequence. No matter how the cash flows are distributed over time, we can compare them to the cash flows arising from the same investment at a fixed guaranteed rate of return (Luenberger 1998).

⁸ Navarro (1996) described the elements as the baseline revenue requirement, the sharing mechanism and the quality control mechanism, Biewald et al. (1997) described the elements as a price cap with inflation, productivity and a Z-factor for costs outside control of the utility, with profit/loss sharing mechanisms and targeted incentives.



In practice, we are uncertain about the future cash flows of most investments. Mean-variance portfolio theory is based on the observation that investors compensate for this variability by seeking a higher rate of return when future payoffs are more unpredictable. In deciding what return is required, the investor makes an assumption (a subjective evaluation) of the probability distribution of future cash flows. Under CAPM, investors in the capital market value a future payoff by its mean minus a penalty for its risk. Risk is understood primarily as payoff variability or variance but is regarded as higher when the payoff variation is more highly correlated with other assets in the market. The intuition is that a lower correlation is desirable because the payoff is not so subject to economic downturns; ideally, a payoff will have a low correlation with the economy and act as a hedge against general boom/bust risk.

APPLICATION OF FINANCE THEORY

There are two problems with applying finance theory to estimating the cost of equity; the first deals with how regulation methods and discretion affect cash flow risk, while the second relates specifically to the impact of incentive schemes.

The first problem is best illustrated by assuming we were to start afresh; we want to contract with a business to make an investment and provide direct control services. What return on equity would investors require? That depends on future cash flows, which critically depend on regulatory design and regulators' decisions. Specifically, the investor's required return or the value of the investment has no existence that is not dependent on regulatory decisions. There is, thus, an inherent circularity in the idea of regulators rewarding risk with a higher rate of return. The risk to investors is largely from the regulators' discretionary decisions (e.g. potential reductions in the regulated revenue stream) rather than from exogenous effects.

In practice, regulatory risk might make little difference to the allowed rate of return if the regulations and settings are not changed and the regulator is pursuing a relatively stable approach to estimation. Repeated regulatory cycles should build stable expectations among investors. Regulators starting from a position of no information will perhaps do the "least damage" if they initially err on setting rates too high but continue to massage them lower based on revelations of the impact of the rate decision. Any later cuts will, however, raise the possibility of more cuts, raising the perceived risk to investors when they consider new capital investments.

Our second concern arises when the regulatory scheme includes incentives, be they simple costsaving sharing incentives or explicit outcome-oriented incentives. How these should impact the cost of equity as determined by portfolio theory is then a question. At their simplest, incentive schemes add a stochastic cash flow to the existing (subjective) future cash flow distribution.

Importantly, suppose incentives imply an opportunity for a higher expected (mean) cash flow while not increasing its variance. In that case, the asset's CAPM beta is reduced (beta is driven by risk per unit of mean) (Johnstone & Havyatt 2021). This result is an important but usually overlooked CAPM corollary.

Therefore, by CAPM logic, the design of incentive schemes impacts beta and the returns required by investors. On further consideration, this is not a surprising result. For example, if the initial anticipated but uncertain cash flow is X, with given variance, and incentives make it X+k with the same variance S, the sum X+k approaches a risk-free investment as k gets larger. Similarly, if k has a lower variance per unit than X, the weighted average of the two has a lower risk than X alone.

This CAPM-based analysis raises important questions about incentive design. For example, operating a revenue cap with variable realised costs results in the chance that the NSP makes a profit (or loss) based on its cost performance. This is the incentive effect of MRPs. The regulator could set the revenue cap at a level where the likelihood of over- and under-performance/reward is equal. However, people respond better to the prospect of reward than to the threat of punishment. Management teams are no different; given the opportunity for a reward, they will attempt cost reductions. Given the prospect of punishment, they will mount complaints and be less cooperative. Consequently, regulators usually set the expenditure allowance at a level the business is more likely to outperform than underperform.



Although the CAPM-based regulatory regime is meant to capture and reward all risk, implementing that framework requires counter-intuitive considerations. For example, suppose a reward scheme has only an upside. In that case, there are grounds for seeing the overall payoff as less risky and hence reducing the regulated return (thus penalising the asset owner for its being potentially rewarded for making cost cuts). This tangled way of thinking shows the inherent circularity problem we raised above, which cannot be avoided under a finance model of regulation.

APPLICATION TO REGULATORY PRACTICE

This section briefly discusses elements of electricity network performance before returning to a more detailed discussion of setting allowed rates of return in incentive regulation.

RECENT NETWORK PERFORMANCE

The comparison between allowed rates of return and actual regulatory return is provided in the AER's 2022 Electricity Network Performance Reports⁹, reproduced in Figure 1. The equivalent chart for just the return on equity is reproduced in Figure 2.





Figure 1: Realised and allowed returns on assets



⁹ https://www.aer.gov.au/networks-pipelines/electricity-network-performance-report-2022



Figure 4-5 Real returns on regulated equity compared to forecast returns on equity— DNSPs and TNSPs

Figure 2: Realised and allowed return on equity

That the spread between the realised and allowed returns on equity are greater than the spread for return on assets indicates that the NSPs have benefited from a lower cost of debt. The AER breaks down the contributions of different factors over the entire period from 2014 to 2021, reproduced in Figure 3. The two biggest factors could be considered 'estimation errors'; they relate to gearing and interest rates. They can alternatively be thought of as realised incentives for efficient capital management.

The next three categories – labelled incentive schemes, opex and capex – should all be considered incentives. It is just that the ESMs (especially the EBSS) operate to ensure the NSP always gets six years of benefit from cost reduction.



Figure 4-6 Incremental contributions to returns on regulated equity – simple average of all NSPs over 2014–2021

Figure 3: Factor contributions to spread

The report also provides a breakdown of the incentive scheme payments by year and type. This detail, presented in Figure 4, reveals that a large part of the incentive scheme payment is STPIS payments.





Figure 3-4 Composition of reported incentive scheme payments

Figure 4: Breakdown of incentive payments

In our discussion of forms of regulation, we note that a quality incentive is an essential addition to any MRP-based incentive scheme, despite there also being regulated reliability standards. However, this partially invalidates the presumption, borrowed from cost-of-service regulation, that an allowed rate of return that is too low will decrease reliability.

We note that the Independent Panel Report on the 2022 Draft RORI has recommended that "the AER undertake a more conclusive analysis of the efficacy of the 2018 RORI". We alluded to this conclusion of the Independent Panel in our comments on the exercise of judgement in the Introduction. The discussion in this subsection has gone to only one specific element of that analysis.

SETTING ALLOWED RATES OF RETURN FOR INCENTIVE REGULATION

The cash flows that investors evaluate in assessing the return on investment are the cashflows after applying incentive schemes. For the reasons given above, incentive schemes are best designed to ensure that these cash flows are higher than the cash flows ascribed only to the allowed rate of return. The consequence is a loss of allocative efficiency; prices will be higher than costs. However, this loss of allocative efficiency is designed to provide greater productive and dynamic efficiency. The opportunity to earn economic profit motivates effort in cost reduction and promotes innovation.

We will first consider only the efficiency incentive from an MRP. In a simple, capital-maintained model (where new capital investment equals depreciation each year), two decisions determine the revenue cap, the allowed rate of return and the allowed operating expenditure. The incentive for cost reduction is the opportunity to earn profit by reducing costs. The regulator has a choice in assessing the allowed operating expenditure. Fundamentally they can either decide to maintain it at current levels or assume that it will decline at some rate of change (often determined by recent rates of change).

The regulator should not take this decision in isolation; the total return to the business is the sum of the return on the asset and outperformance on operating expenditure. Suppose the regulator wants to target a certain level of expenditure reduction. In that case, they can do so by reducing the allowed operating expenditure, or they can preserve the level of operating expenditure and reduce the allowed rate of return on assets.

However, the two alternatives targeting the same endpoint cashflows do not have the same impact on the business. Because the quantum of "incentive payment" is greater in the second case, it provides greater motivation for business executives.

The second case is the case of output incentives. Once again, the available incentives should be considered in the context of the total cashflows. The regulator has a choice to allow the regulated



business to enjoy the same level of economic profit from the current situation by increasing the reward for outputs and reducing the return allowed on investment.

Neither of these propositions is particularly surprising once we understand the objective of regulation as mimicking competition's process rather than its theoretical outcome. Competitive businesses do not make their income from a return on assets employed; they make it by sales. To achieve those sales, they either have a cost advantage over a competitor or a product that better meets the customer's preferences.

CONCLUSION

The objectives of the energy laws are simple: to promote economic efficiency for the long-term interests of consumers. The RPPs add that NSPs should be provided incentives to promote economic efficiency. We argue that the AER has erred in its interpretation of the objectives; the Independent Panel that reviewed the 2018 guideline also criticised the AER for inadequately considering demandside, or consumer, efficiency.

In this part, we have outlined how and why incentive regulatory models culminating in PBR evolved out of cost-of-service regulation. In addition, we have demonstrated that the finance theory relied on by regulators to establish allowed rates of return needs adjustment when used for incentive regulation to deal with the additional cash flows generated by incentive schemes.

Specifically, a regulator needs to consider the design and operation of incentive schemes together with the determination of an allowed rate of return on investment. In the next part, we will examine the market impacts of different settings.



Part B: Market impacts

In this part, we address the market impacts of the RORI. We begin by establishing the context for the discussion: the relationship between the RORI and the retail market. Our focus in this section is primarily on the electricity market. After a brief description of the context, we consider two specific issues. The first is the relationship between demand and the overall price level, measured by the average price per unit of electricity. The second is a return to a discussion of incentives to identify how well-designed incentives can promote efficient prices.

CONTEXT

MARKET STRUCTURE AND CONSUMER DECISION MAKING

The market for end-use consumption of energy services is complex. Households and businesses do not "consume energy"; they live their lives and run their businesses in ways that use energy. The direct purchase decision they make is a choice of supplier of their network delivered energy (electricity and possibly also gas); this is a decision made infrequently, seldom more frequently than annually. They also make a series of other decisions – the choice of dwelling they own or rent, the appliances they buy, and, if they own the premises, decisions on insulation and possible self-generation or other distributed energy resources.

The infrequency of these purchasing decisions results in the conclusion that there is little own price elasticity in demand for grid-delivered energy in the short run. However, there is significant own price elasticity in the long run. Here we are defining the short and long run regarding the consumer's investments; in the short run, investment choices are fixed.

A second complicating factor for consideration of the impact is that consumers respond to prices while the AER's RORI decision only affects allowed revenue. That is, it affects a price level overall, not the individual prices. As part of the Power of Choice reforms, electricity NSPs must submit a Tariff Structure Statement with their revenue proposal.

One of the perceived benefits of the original UK price cap arrangements was that they included an inherent incentive for the business to implement efficient prices. Given the large fixed cost component in electricity services, economic theory tells us these fixed costs should be distributed among the services using Ramsey-Boiteux prices (Höffler 2006).¹⁰ The use of revenue caps removes this incentive.

CONSUMER CONFIDENCE

Energy Consumers Australia measured consumer confidence in the energy market, including regulation, as part of the half-yearly Energy Consumer Sentiment Survey. Figure 5 shows consumer confidence has increased since a low in December 2017. It may have started declining in June 2021, but the movement is not statistically significant.

In the 2012 amendments to the rules (NER and NGR) covering economic regulation, the AEMC increased the focus on consumer engagement. This development was contemporaneous with developments in the UK. Those developments have been interpreted as "a response to regulation in crisis. This crisis covers a crisis of confidence in regulators, a crisis of confidence in regulated firms, and, finally, a crisis of confidence in delivering essential services through private-sector firms" (Havyatt 2022b; Heims & Lodge 2016).



¹⁰ Note, the reference identifies there will be a difference between monopoly and R-B prices in the case where the monopolist is earning rent, as the quantity will be different and hence the elasticity (unless demand has constant elasticity) but this is not our case.

For a good review of Ramsey-Boiteux prices see

https://www.accc.gov.au/system/files/Appendix%20B%20to%20AAPT%20submission%20on%20Ramsey-

Boiteux%20pricing%20issues%20%E2%80%94%20October%202005.pdf

Confidence in overall market

Confidence that energy market is working in long-term interest of consumers

Q. How confident are you that the overall market is working in your long-term interests?

By 'the market' we mean, the energy industry and energy regulators.



Figure 5: Consumer confidence in the overall market

The Independent Panel Report on the Draft 2022 RORI noted that "consumer confidence in the energy market is being undermined by higher energy costs and fears of potential blackouts." Reflecting on this observation, the Panel recommended that the AER:

- 1. Undertake a more conclusive analysis of the efficacy of the 2018 RORI,
- 2. Discuss the effect of the RORI under a wider range of scenarios to better inform consumers regarding the potential impact of the regulatory system combined with changes in macroeconomic variables on energy bills and thus help retain their confidence.

In making this observation, the Independent Panel echoed concerns of the 2018 Panel that:

A particular rate of return does not achieve the national objectives just because finance theory says it should. The national objectives are achieved not by finance theory but by the rational, informed actions of the firms and individuals who comprise the regulated industries: debt investors, equity investors, the managers and employees of regulated firms, consumers large and small, and the practitioners who represent their interests before regulatory tribunals. The Draft Guidelines will be capable of promoting the national objectives only if it wins the trust of, and induces the efficient conduct of, all those parties.

The Panel acknowledges that the AER, in its Explanatory Statement, noted that the limited change between the 2018 and 2022 RORI " supports stability and predictability of the regulatory regime that enables investors and consumers to make commitments with confidence." Although consistency of outcome is one means to provide confidence, clarity in the statement on how the RORI promotes (all) the energy objectives and has regard to the RPPs is also essential.

AVERAGE PRICE AND DEMAND FOR ELECTRICITY

HISTORIC PRICES

A long view of the history of electricity prices in Australia provides the basis for analysing the demand and price relationship for electricity in Australia. Figure 6 provides historic Australian



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average residential and non-residential electricity prices in 2020 dollars over nearly 70 years (Havyatt 2021a). Also shown in columns using the right-hand access is the average consumption per household. Figure 7 provides the same price curves and compares them to total Australian electricity consumption. While we have not thoroughly studied the causes of the price changes, some relationships are easily observed.

The first twenty years in Figure 6 show a clear relationship between declining prices and increased consumption per household. However, because of the large economies of scale in the industry post World War II it is unclear whether growth in demand driven by declining appliance costs drove prices down or whether declining prices from scale economies drove prices down, creating the demand for appliances. This is particularly difficult to untangle as electricity distribution businesses actively promoted – and in some cases sold – appliances throughout this era.



Figure 6: Historic average retail prices compared with average household demand





Figure 7: Historic average retail prices compared with total electricity consumption

When household consumption stopped growing, average prices flattened before increasing to the mid-1980s. This is the period of over-investment in generation that was a key element in the decision to facilitate interstate trade in electricity through a "national" market (Havyatt 2022a).

Another change in the mid-1980s was the separation of residential and non-residential prices. As seen in Figure 7, the growth in total consumption continued fairly steadily even though per household consumption growth had slowed. The interpretation that can be placed on this is that businesses continued to benefit from increased economies of scale while residential consumers did not.

The growth rate of total consumption slows dramatically from about 2006, and at the same time, the average consumption per household starts to decline. In response, average prices start to increase. Just as before, it is impossible to determine whether changes in prices (a shift in the supply curve) resulted in lower consumption or whether a shift in the demand curve resulted in higher prices. We know there was an increase in distribution network charges following the transfer of network pricing responsibility to the national regulator from state regulators. However, part of this increase is due to the forecast of increased consumption growth that did not eventuate (ACCC 2018).

Figure 8 charts the divergence between electricity consumption forecasts and realised consumption from 2009. It supports the conclusion that consumption forecasts used in determining the amount of new network investment resulted in excessive investment. It is not, however, the only basis on which over-investment potentially occurs. For example, governments' response to several loss-of-supply





events in NSW and Queensland resulted in Ministerial determination of higher network reliability standards.

Figure 8: Consumption forecasting errors in the NEM

However, there is an alternative explanation for higher investment in this period. From the mid-1990s, some governments identified their distribution utilities as "hollow logs" with excessive cash holdings. This extraction as higher dividend payments resulted in several years of under-investment. The process of market reform, especially corporatization and formal price regulation, brought this to an end, resulting in "catch-up" investment.

IMPACT OF PRICE EFFECTS

The ANU's Hugh Saddler has provided the most detailed analysis of this decline in demand. In December 2013, he attributed 19% of the shortfall in fiscal 2012-13 to consumer price response.¹¹ He wrote:

The most interesting finding of this part of the modelling is the abrupt change in consumer responsiveness to higher prices after 2010. It is surely not a coincidence that 2009-10 was the year in which the possible effect of a carbon price on electricity prices became a major national political issue. It was also the year when increasing political attention was paid to the rapid increases in electricity prices already occurring, mainly because of higher network costs.

Electricity prices remain a major preoccupation of political debate. The hypothesis is that the political attention being paid to electricity prices led consumers to pay more attention than they had previously done to their expenditure on electricity.

Once they paid attention, consumers responded by reducing their consumption to limit their spending. The outcome showed up strongly in the total electricity demand figures from 2011 on.

¹¹ https://theconversation.com/why-is-electricity-consumption-decreasing-in-australia-20998



This commentary was based on his report *Power Down* for The Australia Institute (Saddler 2013). Figure 9 reproduces the study's conclusions on the contribution of various factors to the decline in demand from 2006 to 2013.



We show in Figure 10 and Figure 11 his later separate analysis for the business and residential sectors (Saddler 2015).



Figure 10: Contribution of identified explanatory factors to changes in General business electricity demand in the NEM since 2005-06





Figure 11: Contribution of identified explanatory factors to changes in residential electricity demand in the NEM since 2005-06

It is beyond the scope of this report to update Saddler's analysis.

It is beyond the scope of this report to update Saddler's analysis.

These charts show the significant impact of efficiency programs in both sectors and what was then a relatively minor impact of "behind the meter PV". Industry changes (shown as other) were also a major contributor to changes in business demand. Price effects themselves were small for business users, and while still minor for residential they were nonetheless significant.

SELF-GENERATION AND ENERGY EFFICIENCY

The impact of self-generation on grid-supplied electricity was still relatively small in 2014. However, its growth stimulated Energy Consumers Australia in 2016 to research " the lived experience of households who had considered, and are considering, investing in solar and battery storage technologies to inform energy market and policy development".¹² Market research conducted by UMR for this study revealed interesting motivations, which we show in Figure 12.

¹² <u>https://energyconsumersaustralia.com.au/publications/consumer-participation-in-solar-and-battery-storage-markets</u>





Figure 12: Primary motivation for installing solar PV

Eighty-four per cent of respondents strongly or mostly agreed that reducing household energy bills were a factor in their decision to install PV. The second most commonly agreed factor was "becoming less dependent on mains electricity". Although these consumers were not identifiably "survivalists" concerned about future grid reliability, this response suggests a concern with future electricity prices.

Importantly, these price effects were more commonly acknowledged as decision-making factors than protecting the environment, access to grants or (then generous) feed-in tariffs. This brings us back to our observations in the context of this part; energy demand is partly derived from other decisions. Unsurprisingly, consumers identified the price increase as a motivation for buying PV.

Saddler's analysis concludes that most demand reductions are due to efficiency programs. For these programs to have an effect, consumers usually need to make a purchase decision, whether in more energy-efficient appliances or other measures such as additional insulation. Consumers are more likely to make these investments if prices are rising or, possibly, more importantly, expected to rise further.

CHANGING SCOPE FOR CONSUMER AGENCY

The discussion above refers only to one aspect of consumer agency, the choice to self-generate. The options for consumers to make choices with significant implications for the energy system are broader than that.

The first option is investing in energy-efficient appliances and housing. The subsection on the changes to demand caused by price effects said these were small especially compared to the impact of energy efficiency. While energy efficiency can be ascribed partly to stronger regulation of standards and labelling, there is also a price effect. A fully rational and informed consumer without time constraints making a choice between two appliances with different energy ratings would calculate the lifetime saving in operating costs and compare it to the price difference. However, consumers are more likely to use heuristics (or rules of thumb) to decide. Therefore, high or increasing prices could result in



inefficient overinvestment in efficiency. Here "high or increasing" can include prices not declining as fast as they should.

The decision to install self-generation can also be accompanied by a decision to install a battery. Prices also determine battery economics, including the differential between supply and feed-in tariffs. Further, battery economics and technology can also result in a different decision regarding the size of the solar PV facility since excess generation can be stored.

Finally, there is the issue of "controllable loads", which may be controlled centrally (e.g. by ripple control) or by the consumer (or their agent) in response to market (price) signals. The value of investing in controllable load also depends on price, but the decision will be based on price expectations.

IMPLICATIONS FOR THE RORI

Network costs make up between 40 and 55 per cent of retail prices; the allowance for return on assets can make up half of network costs. Consequently, the value assigned to the allowed rate of return has a direct and significant impact on average retail prices.

Increasing retail prices have reduced demand through their overall impact and impact on consumer decisions on other investments, including solar PV and energy-efficient appliances. Setting the RORI too high can trigger a deleterious negative spiral as high fixed costs get distributed over smaller amounts of average household electricity consumption.

It has historically been argued by "experts" that erring on the side of too high a RORI has a less deleterious outcome than setting it too low. For example, in the first concurrent evidence session for the 2018 RORI, Stephen Grey claimed¹³:

The New Zealand Commerce Commission has a formal process for determining how judgment is exercised. So, they take into account the distribution, if you like, of each parameter and how that aggregates up to an uncertainty about the WACC and then they adopt an allowed return, and I think it's now at the 67th percentile, on the basis that - the judgment should be applied on the basis that setting the number too low produces a more severe outcome than setting the number too high. So, it's an institutionalised way of balancing those risks. I'm just saying, that's a way that other regulators have applied this.

In making the 2018 instrument, the AER rejected this view. It recognised that consumers were more concerned about high prices than reliability. The current analysis reinforces this decision; a too high allowed rate of return creates a negative spiral of reduced consumption.

However, it isn't only the rate that is set by the RORI that matters. As the Independent Panel Report on the 2022 Draft RORI noted:

The consumer has a role to play in achieving an efficient transition. Determining the most cost-effective and efficient transition pathway requires the active engagement of consumers as well as network businesses. To the extent that demand management can forestall additional investment it can contribute to the achievement of the Energy Objectives. Building and maintaining trust of all stakeholders is an important part of this process. Given the heightened sensitivity of energy pricing and the cost implications for consumers of increased investment in network assets, there should be increased focus on ensuring maximum efficiency of existing network assets.

Although consideration of most of these issues is outside of the scope of Panel's review, we believe that it is important to highlight the role that they play in determining whether the Energy Objectives are achieved.



¹³. <u>https://www.aer.gov.au/system/files/AER-%20Concurrent%20Evidence%20Session%201-%20Proofed%20Transcript.pdf</u> at page 95

In this the Panel reflects on the need for "increased focus on ensuring maximum efficiency of existing network assets."

This is, in different words, exactly the same issue as the 2018 Independent Panel's call for an assessment of the RORI against the limbs of efficiency beyond investment, that is, efficient use and efficient operation.

EFFICIENT PRICES

THE PROBLEM

Based on the notes provided by the CRG in Attachment 2, the AER and CRG agree that the price level alone is insufficient to ensure efficient use; the price structure also needs to be appropriate. In particular, we note that declining demand for the bulk power system in the middle of the day is occurring in conjunction with still increasing peak demand.

Efficient prices would charge more for that peak demand or reward demand response that shifted load. The alternative to a direct price incentive is the DNSP getting active in either owning community batteries or encouraging their deployment.

The DNSP has little incentive to pursue either efficient pricing structures or otherwise to promote activities that will improve network utilisation. To the extent that DNSPs are pursuing investment in community batteries, there are reasonable grounds for concern that they are leveraging their monopoly position into potentially competitive markets. For example, pole-mounted community batteries or community batteries collocated with substation infrastructure benefit from the DNSPs monopoly position that does not get eliminated merely through ring-fencing of the assets.

One of the great promises of electricity market reform was that price signals would elicit demand response. That this has not occurred in the small energy consumer markets (small business and residential) can be attributed to two factors. First, retailers relied on insurance for price volatility (through the contracts market). The second was that other costs faced by the retailer blunted the relative size of the price signal. For example, the ACCC's Electricity market monitoring report for November 2021 shows that wholesale electricity accounts for 20 to 40 per cent of retail prices, while network costs make up 40 to 60 per cent. This created a "chicken-and-egg" conundrum. The absence of retail pricing promoting demand response saw networks consider there was no value in creating more efficient prices; retailers saw no value in promoting demand response as they saw no benefit in network costs.

INCENTIVES

The need for:

- A change in the operation of distribution networks from one-way flow to two-way;
- Transmission Network Service Providers (TNSP) innovation to support system strength for additional renewable investment; and
- New large-scale investment;

will not be supported by a simple revenue cap incentive scheme. These needs underscore the growing interest in PBR schemes, especially the ability to reward outputs or outcomes.

For a Distribution Network Service Provider (DNSP), a potential PIM to support innovation could target an increase in the ratio of all energy consumption (including self-generation) in a distribution area to the total network assets calculated at the real value of the original purchase cost. This incentive gives the DNSP a reward for maximally utilising the customer generation assets in the area, which they can do by tariff changes, community battery projects, or both. The DNSP may also need to invest in additional network monitoring capability.

For a TNSP, system strength can be supported by installing synchronous condensers alongside large amounts of variable renewable energy (especially where that connects through multiple inverters). The problem is that everyone in the vicinity benefits from the congestion relief the investment offers.



Providing incentives to TNSPs on system strength creates a funding base for the local public good of the synchronous condenser (Jamasb & Nepal 2015).

An advantage of these output incentives is that they further reduce the work the AER needs to do in assessing whether costs are efficient (i.e., the NSP is technically efficient). The incentive regime can support innovation by targeting the desired outcome rather than micro-managing inputs.

INCENTIVES AND THE RORI

Achieving the energy transition at least cost to current and future consumers while retaining system reliability and service quality requires changes in network operation and end energy use. These outcomes can be achieved more quickly and at a lower cost through properly designed incentive schemes that reward outputs and outcomes. One of the tools networks can use is efficient prices.

However, an increase in the available incentives without a change (reduction) in the allowed rate of return will over-compensate investors. Hence in making the RORI, the AER needs to explain the relationship between the chosen allowed rate of return and the operation of outcome incentives to deliver the energy transition.

CONCLUSION

In this part, we have demonstrated the link between the allowed rate of return and market outcomes.

We began by demonstrating that the overall price level alone (the average price per unit of energy) can have a deleterious effect on the market. There are two ways this occurs. The first is that an allowed rate of return that is too high will result in a reduction in demand for electricity; if this reduction results in demand forecasts used to make new investments not being realised, then this becomes a vicious cycle. The second is that an allowed rate of return that is too high creates an incorrect incentive for consumers in their investment decisions; they will potentially over-invest in energy efficiency or self-generation.

The first of these circumstances is still a reasonably recent development. In the era of constantly increasing demand, over-investment was readily absorbed through subsequent demand growth. The *2022 Integrated System Plan* indicates that the requirement to electrify the residential and industrial heat market currently served by gas and the transportation sector will result in consumption growth returning to levels seen last century. However, the changing nature of generation and consumption provides no guarantee that any over-investment made today will be utilised by demand growth in the future.

The second of these circumstances, especially the potential over-investment in self-generation without matching strategies for storage or changed consumption patterns, has only exacerbated the inefficient use of network services. Reducing overall consumption while maintaining the same peak will result in a declining load factor, reducing network utilisation.

In the second section of the part, we moved the attention from the price level to the structure of prices. First, we outlined the value of efficient prices and the lack of incentive for the NSP through simple revenue cap regulation to institute efficient prices. We then gave examples of output incentives that would provide incentives for networks to increase the electricity use efficiency, which we call here consumption efficiency. We then returned to the evidence from Part A that the AER has to consider the cashflows available to the NSPs from incentive schemes in making the Rate of Return Instrument.



Part C: Addressing consumer efficiency in regulatory decision making

THE AER'S TASK

We have primarily relied on the material provided by the CRG on its discussions with the AER to ascertain the AER's response to the Independent Panel's call for clarity on how the RORI promotes consumption efficiency. We think the AER has acknowledged the need to consider the issue, but we think the AER makes two inconsistent responses.

The first response is the AER's belief that setting the allowed rate of return at the rate that promotes efficient investment will automatically generate consumption efficiency. We do not support this contention, both on the basis of the discussion in Part A and as a matter of legislative interpretation.

The second is that the AER acknowledges the need to do something more, but that they cannot determine what that is. Consequently, the AER's position is that unless someone can tell them what that something more is, they will just continue what they are doing. This is an inadequate response; the AER has a a legislative obligation to detail in its explanatory statement how it had regard to the RPPs and how the proposed RORI will contribute to the achievement of the NEO to the greatest degree.

The next two sections will address each of these AER responses. A final section in this Part looks beyond the current RORI process.

MORE THAN INVESTMENT EFFICIENCY

THE LEGISLATIVE REQUIREMENTS

The legislation imposes two standards specified in the legislation on the AER in making the RORI. The AER must only make an instrument if it is:

satisfied the instrument will, or is most likely to, contribute to the achievement of the national electricity objective to the greatest degree. (NEL s18I(3))

In making an instrument, the AER must have regard to:

(a) the revenue and pricing principles; and (b) other information the AER considers appropriate. (NEL s18I(5))

Both of these requirements refer to the objective of economic efficiency; the NEO as an end in itself, while the RPPs refer to the requirement to provide "effective incentives to promote economic efficiency". Apart from this distinction between the ends (NEO) and the means to that end (RPPs), the two differ in how the threefold aspect of economic efficiency is detailed. In the NEO, they all pile up together ("promote efficient investment in, and efficient operation and use of, electricity services"), and it is very easy to focus on the objective of promoting efficient investment (or even simply promoting investment).

The RPPs are not expressed in this way; they deliberately lay out the three aspects of efficiency that need to be promoted: efficient investment, efficient service provision, and efficient use. As a matter of statutory interpretation, the other words are redundant if efficient investment was sufficient to guarantee efficient operation and use. Put another way, the makers of the statute intended those extra words to mean something, and it is incumbent on the AER to understand them and execute them.

The RPPs include two other important requirements on the RORI; the commensurate return standard and the error costs rule. The first, which we have called the "commensurate return standard", is that regulated prices "should allow for a return commensurate with the regulatory and commercial risks involved in providing the...service" (NEL s7A(5)).

The second, the error costs rule, has two parts. The first is that "regard should be had to the economic costs and risks of the potential for under and over investment" in the network (NEL s7A(6)). The second is that "regard should be had to the economic costs and risks of the potential for under and over utilization" of the network (NEL s7A(7)). These two requirements are closely related; one would expect that if there is over-investment, as in too much network has been built, there is under-utilization. However, once again, having both conditions exist in the legislation is meant to mean something.

Both the 2018 and 2022 Independent Panel Reports identified the need for the AER to explicitly address efficient use and efficient operation. This is a legislative requirement. We would add that it is also a legislative requirement to consider how the incentive regimes work to promote efficiency and how the incentive regimes mean that investors' return on investment does not equal the allowed rate of return multiplied by the RAB.

UNDERSTANDING THE ERROR COSTS RULES

From an economics standpoint, the "right" level of investment depends on the realized demand. However, the realized demand depends on the cost curve and hence what price is offered to utilise that capacity. There can be the right amount of investment for the average price level, but it can be under-utilized if the wrong price structure is applied. There can even be the right level of investment that is under-utilized because the overall price level is too high. Both these cases have been demonstrated previously.

We can, however, conclude something about the allowed rate of return from this discussion. That is, an allowed rate of return that is so high as to result in over-investment will result in both investment and consumer inefficiency. However, we cannot conclude that an allowed rate of return that is so low as to result in underinvestment will necessarily result in consumer inefficiency.

The application of finance theory, extensive econometric estimation, and expert testimony can, therefore, at best, give the AER a starting point for choosing the allowed rate of return. The AER has defined the rate of return that results in neither under nor over-investment as the "unbiased estimate."¹⁴ However, at best, the AER gathers evidence that provides some boundaries within which the "unbiased estimate" sits.

As we noted in the Introduction, there is no means for a regulator to set an allowed rate of return that does not include judgement. That judgement can be applied at the level of each parameter or, more generally, to the overall decision. The core criticism of the 2018 draft by the Independent Panel was that the AER had not explained how it had made the overall judgement. This criticism is repeated by the 2022 Independent Panel, including the absence of a consideration of the consequence of the 2018 RORI.

The need to exercise judgement is not new. As we noted above, in an era of growing consumption and no need for innovation, it was reasonable to assume that, if anything, the regulator should err on the high side in setting the allowed rate of return. The error costs were not symmetrical around the "correct" rate of return. In making the 2018 instrument, the AER acknowledged this was no longer the case and noted consumers' appetite to risk a decrease in reliability in return for lower prices. The need to ensure consumer efficiency means that absent any consideration of the impact of incentives, the regulator should be more prepared to risk setting the rate of return too low rather than too high.

Consumers have benefited from declining electricity prices over recent years, as shown in Figure 6. However, this trend will end, hopefully soon. Further, the networks' allowed revenues will increase due to the increase in official interest rates. The nature of current inflation also suggests that networks may benefit from CPI being a higher rate of increase than network costs.

¹⁴ As Havyatt Associates noted in their letter to the AER this remains an incorrect term, because the term "unbiased" is a moderator of "estimators" not "estimates".



CONSUMPTION EFFICIENCY AND THE AER'S EXPLANATORY STATEMENT

THE SIGNIFICANCE OF THE REQUIRED EXPLANATION

We have noted above the comments made in both the 2018 and 2022 Independent Panel Reports on the role of consumers in the energy transition and the importance that they have confidence in regulatory decision making. Both have emphasised the need to do more to discuss the impact of the RORI on efficient use and efficient operation. In addition, both have emphasised the need for the AER to assess the question of the consequence of the allowed rate of return as a whole, with the 2022 Panel specifically suggesting more consideration of the consequences of the 2018 RORI.

Neither Panel, unfortunately, explored the requirement in the RPPs that networks be provided with incentives to achieve all three limbs of efficiency. Part A of this paper demonstrated that both finance theory and the RPPs require the AER consider the operation of the incentive schemes in determining the allowed rate of return to be included in the RORI.

Part B of the paper demonstrated the importance of incentives in generating consumption efficiency by motivating NSPs to apply efficient prices and change operation practices. We noted that the way the expenditure incentives operate through the determination of allowed expenditure and the output incentives needs to be considered, including the possibility of additional output incentives.

SUGGESTIONS FOR THE AER

Unfortunately, none of the analyses provides a mechanistic way of determining the relationship. Also, the separation of the determination of the allowed rate of return from individual NSP regulatory decisions means the AER cannot be sensitive to the design of specific incentives designed to meet the particular circumstances of individual networks. This, however, does not mean the AER can simply ignore the relationship. Our analysis suggests that to give effect to the Independent Panel's view that the AER should consider how the allowed rate of return impacts consumption efficiency, the AER needs to engage in its explanatory statement on the question of the relationship between the RORI and incentives.

We suggest the AER analyse the question of consumption efficiency by conducting a thought experiment in which the number of connection points of a distribution network remained unchanged and that capital investment was constrained to only contributing directly to efficient use and operation. In doing so, the AER should consider the incentives that can be applied by the AER to increase efficient use and operation. The significance of this thought experiment is that the nature of capital expenditure is no longer considered to be a simple mechanism of expanding capacity but of changing network characteristics. Further, it reveals that the returns from incentive schemes for outputs rather than cost reduction need greater attention.

In making these observations about the operation of incentives, we note the position advanced by the Network of Illawarra Consumers of Energy (NICE) to the AER's review of expenditure incentives.¹⁵ This submission highlighted the difference between incentivizing the efficient use of existing assets and the efficient addition of new ones. The distinction can be simply made by considering an issue of the duck curve: the changing profile of consumption reducing in the middle of the day yet increasing late in the day. Suppose we define the problem as 'increasing peak'. In that case, the solution is an investment to carry more electricity during the peak. The AER's approach to capex incentives is rewarding the business for making this expenditure cheaper. The second approach is to say how we make more effective use of the already employed assets. The conclusion is for the network to make necessary investments and arrangements to facilitate community batteries. The network has to be involved in community batteries by (a) providing pricing signals to support efficient charge and discharge approaches (b) coordinating these signals across multiple batteries within a substation zone

 $https://assets.nationbuilder.com/nice/pages/21/attachments/original/1647502843/NICE_Submission_on_AER's_Review_of_Incentives.pdf?1647502843$



¹⁵

and (c) providing the opportunity for these to be pole or pad mounted using DNSP infrastructure deployment powers.

This analysis of the AER's approach to capital expenditure incentives reflects a previously unrecognized fallacy in the AER's entire assessment of the concept of the unbiased estimate of the rate of return. The AER reasoning is based on the presumption that it is exclusively the allowed rate of return that determines new investment. However, in practice, the AER scrutinizes all investment proposals and subjects large investments to specific regulatory investment tests. A consequence of these processes is that even if the allowed rate of return was well in excess of the network business' actual cost of capital, there would not be massive over-investment because proposals would not meet these additional tests.

In its explanatory statement for the draft 2022 RORI, the AER has considered questions of "financeability". This concept does not appear explicitly in the legislative requirements or Rules. However, it may be inferred by an assumption that an insufficient rate for financeability would result in under-investment. Therefore, considering the impacts of the RORI on consumption efficiency is of equal, if not greater, importance to financeability.

BEYOND THE 2022 RORI

Our analysis also suggests that a wider review of economic regulation in the energy transition context might be valuable. In addition to the matters considered here, the Australian Energy Market Commission (AEMC) has recently dealt with a rule change request and has now initiated a review to address financeability in transmission.¹⁶

The AEMC was, at least until 2020, conducting annual reviews of the electricity network economic regulatory framework. The AEMC explained these reviews¹⁷ as:

In light of the significant growth in decentralised energy resources, the Ministerial Forum of Energy Ministers (formerly COAG Energy Council) directed the AEMC to annually examine and report on whether the economic regulatory framework is robust, flexible and continues to support the efficient operation of the energy market in the long-term interest of consumers.

The AEMC's Electricity Network Economic Regulatory Framework (ENERF) 2020 review final report¹⁸ concluded:

The 2020 Review has highlighted a clear need for a holistic consideration of the regulatory framework for distribution networks. Stakeholders have raised a number of issues relevant to the evolving role of distribution networks. They have also highlighted the desire for a coordinated and strategic approach to manage the electricity sector's transformation, especially in relation to DER integration.

The AEMC in the report also alluded to the transmission issues that came to the fore in rule change requests and the new review.

Our analysis suggests that such a review would be timely. It would need to be informed by and support decisions on the role of DNSPs in facilitating the participation of demand-side resources in the wholesale market. The opportunity to improve the incentive framework and the associated issues of estimating cost-of-capital is at risk of being lost by focusing on technical issues and wholesale market outcomes from deploying distribution-based resources.



¹⁶ See <u>https://www.aemc.gov.au/rule-changes/participant-derogation-financeability-isp-projects-transgrid,</u> <u>https://www.aemc.gov.au/rule-changes/participant-derogation-financeability-isp-projects-electranet</u> and <u>https://www.aemc.gov.au/market-reviews-advice/transmission-planning-and-investment-review.</u>

¹⁷ https://www.aemc.gov.au/market-reviews-advice/electricity-network-economic-regulatory-framework-review-2020

¹⁸ <u>https://www.aemc.gov.au/sites/default/files/documents/epr0085 - enerf 2020 - final report for publication 1 oct 2020.pdf</u>

In making this suggestion, we are mindful that the AEMC was conducting ENERF reviews annually and that in the 2020 report, the AEMC proposed not conducting one in 2021. However, it is probably time for an independent review similar to the 2006 Expert Panel on Energy Access Pricing (Beale et al. 2006).

We also note that the earlier "expert panel" was primarily composed of economic consultants. We regard it as somewhat surprising that neither the Expert Panel nor the AEMC in their respective reports contains a single reference to any economic theory or principles of regulation. Apart from being independent and hence permitting the appointment of at least one economist who has published on economic regulation (which may need to come from overseas), the terms of reference need to include a requirement for the panel to consider the latest academic studies on regulation. The panel could be supported by resources provided by the AEMC and AER.



Attachment 1: NEL extracts

The National Electricity Objective (NEO) is specified in s7 of the NEL.

The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—

- (a) price, quality, safety, reliability and security of supply of electricity; and
- (b) the reliability, safety and security of the national electricity system.

The revenue and pricing principles are specified in s7A of the NEL.

- (1) The revenue and pricing principles are the principles set out in subsections (2) to (7).
- (2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in
 - (a) providing direct control network services; and
 - *(b) complying with a regulatory obligation or requirement or making a regulatory payment.*
- (3) A regulated network service provider should be provided with effective incentives in order to promote economic efficiency with respect to direct control network services the operator provides. The economic efficiency that should be promoted includes—
 - (a) efficient investment in a distribution system or transmission system with which the operator provides direct control network services; and
 - (b) the efficient provision of electricity network services; and
 - (c) the efficient use of the distribution system or transmission system with which the operator provides direct control network services.
- (4) Regard should be had to the regulatory asset base with respect to a distribution system or transmission system adopted—
 - (a) in any previous—
 - *(i) as the case requires, distribution determination or transmission determination; or*
 - *(ii) determination or decision under the National Electricity Code or*
 - *(iii) jurisdictional electricity legislation regulating the revenue earned, or*
 - *(iv) prices charged, by a person providing services by means of that distribution system or transmission system; or*
 - (b) in the Rules.
- (5) A price or charge for the provision of a direct control network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the direct control network service to which that price or charge relates.
- (6) Regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides direct control network services.
- (7) Regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides direct control network services.





"Explanatory information" required under s18Q is defined in s18F of the NEL.

In this Division—

explanatory information, for a rate of return instrument, means information about the content of the instrument, including (but not limited to) information explaining—

- (a) the reasons for the rate of return on capital or the value of imputation credits under the instrument; and
- (b) how the stated value, or the way to calculate the rate or value, was decided; and
- (c) if the instrument replaces another instrument—
 - *(i) the differences (if any) between the instrument and the replaced instrument; and*
 - (ii) the reasons for any differences; and
- (d) why the AER is satisfied the instrument will, or is most likely to, contribute to the achievement of the national electricity objective to the greatest degree; and
- (e) how the AER had regard to the following in making the instrument:
 - *(i) the revenue and pricing principles;*
 - (ii) the matters mentioned in section 18L;
 - *(iii) estimation methods, financial models, market data and other evidence relevant to making the instrument;*
 - (iv) prevailing conditions in the market for equity funds;
 - (v) the interrelationships between financial parameters used, or to be used, in relation to deciding the rate or value.



Attachment 2: CRG Issues with AER approach

NATIONAL GAS AND ELECTRICITY NETWORK REVENUE REGULATION

The Australian Energy Regulator (AER) is responsible for determining the revenue allowances for regulated electricity and gas distribution and transmission networks³ in accordance with the National Energy Laws in all Australian states and territories except Western Australia. The AER's decisions on the regulated rate of return accounts for around 50% of energy networks' total revenue allowances. Therefore, the AER's revenue decisions and the AER's decisions on the rate of return, significantly impact on energy costs for all consumers and on the overall Australian economy.

These revenue decisions, including the AER's rate of return decision, must be made such that they best satisfy the efficiency objectives and other provisions of the energy laws. The AER is considering how best to estimate the rate of return to apply to regulated gas and electricity networks for the 4-year period from 2023 to 2026. The CRG is concerned that the AER's decisions on the rate of return will not sufficiently apply the twin efficiency objectives prescribed.

EFFICIENCY OBJECTIVES

The National Electricity Objective (NEO)⁴ and the National Gas Objective (NGO) define the ultimate objectives of the AER Rate of Return Instrument (RoRI). In both cases, the objectives are to promote **efficient investment** in, and **efficient operation and use of**, the relevant electricity and gas services, for the **long-term interests of consumers** with respect to the price, quality, safety, reliability, and security of supply.

So, central to the RoRI are the energy objectives that the AER must make its RoRI, *only if it is satisfied the RoRI will, or is most likely to, contribute to the achievement of the national electricity and gas objectives to the greatest degree.*¹⁹

The statutory test for the RORI incorporates twin efficiency objectives, the first being efficient network investment and the second efficient operation and use. To date, the focus of the AER has been on the former while largely dismissing the latter. An outstanding issue is how best to interpret and assess the twin efficiency objective and the regulatory pricing principles (RPPs), which are set out in the National Electricity Law (NEL) and National Gas Law (NGL). (Energy Laws). The efficiency objectives and RPPs explicitly require consideration of both efficient investment and the efficient operation and use, of energy networks in the long-term interests of consumers.

CONSUMPTION EFFICIENCY IN THE RORI

Consumption efficiency is a collective term (though not one specified in the law) to integrate those elements of the energy laws which take account of conduct on the consumers side of the meter. It is comprised of the elements of the relevant laws and rules which go to the efficient operation and use of network services, the economic costs and risks falling on consumers of the potential for under and over investment by a regulated network service provider and economic costs and risks of the potential for under and number and over utilisation of a network which are borne by consumers. These are to be found in the NEL and the NGL.

THE CONSUMER REFERENCE GROUP (CRG)

The CRG was appointed by the AER in June 2020. Its role is to help the AER implement an effective consumer consultation process during the development of the AER's making of a Rate of Return Instrument (2022 RoRI).

The CRG's role is to act as an independent adviser to help inform the AER's decisions about consumer interests. The CRG provides inputs and challenge to the AER, which might not come through to the



¹⁹ See National Electricity Law ^{Section} 18(I)(3)

AER by other means. Full details of the role and composition of the CRG can be found on the AER's website.²⁰

CONTEXT AND ISSUES

The legislative expression of the NEO and the NGO are well known²¹ but have a complicated history. With roots in the economic regulation of telecommunications and having undergone numerous policy and legislative changes there remains a degree of controversy about their meaning and application.

A specific point of contention is the extent to which the AER has regard to under and overinvestment by networks and under or over utilisation of networks (as specified in the statutory RPPs) in the making of the RoRI.²²

For example, the issue was brought to light by the Independent Panel (the **Panel**)²³ in their review of the AER's 2018 Draft RoRI. The IP stated its position very clearly, as follows:

"Submissions to the AER focused on a specific risk – the effect on investment incentives of over or underestimating the rate of return. But that the national objectives also include consumption efficiency, which needs to be addressed as well. In achieving the national objectives, **attracting capital is necessary but not sufficient**." (p77)

The Independent Panel went on to spell out in more detail its views on consumption efficiency:

"There is a broader point to make. A particular rate of return does not achieve the national objectives just because finance theory says it should. The national objectives are achieved not by finance theory but by the rational, informed actions of the firms and individuals who comprise the regulated industries: debt investors, equity investors, the managers and employees of regulated firms, consumers large and small, and the practitioners who represent their interests before regulatory tribunals."

In its Final Decision on the 2018 RoRI, the AER responded to this challenge by stating that:

"We have explored a range of issues and submissions relevant to the costs that might arise if our rate of return is too high or too low. Overall, we do not consider the evidence supports the application of a bias toward a higher or lower rate of return. Reasonable points are made in support of both direction"²⁴

The CRG considered that the AER's response to the Panel in in its 2018 Final Decision was not sufficient. The AER's response largely ignored the essential critique by the Panel that the energy

²⁰ See <u>https://www.aer.gov.au/about-us/stakeholder-engagement/consumer-reference-group</u>

²¹ The National Electricity Objective as stated in the National Electricity Law (NEL) is: "to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

price, quality, safety and reliability and security of supply of electricity

[•] the reliability, safety and security of the national electricity system." The National Gas Objective as stated in the National Gas Law (NGL) is: "to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas."

²² See http://classic.austlii.edu.au/au/legis/nsw/consol_act/nel282/s7a.html

National Electricity (NSW) Law - Sect 7a Revenue and Pricing Principles

⁽⁶⁾ Regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides direct control network services.

⁽⁷⁾ Regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides direct control network services.

²³ The AER established an independent panel (Panel) to review its Draft RoRI as a means of promoting stakeholder confidence in the review process and confidence that the Final RoRI is capable of achieving the national gas and electricity objective (see Independent Panel Review of the AER's Rate of Return Draft Guidelines REPORT 20180907.docx)

²⁴ AER, Rate of Return Instrument - Explanatory Statement, December 2018, p. 415, available from <u>https://www.aer.gov.au/system/files/Rate%20of%20Return%20Instrument%20-%20Explanatory%20Statement.pdf</u>

objectives need to be also addressed, and attracting capital is not sufficient. For this reason, in the CRG's response to the AER's 2020 Draft Working paper on the efficient return on equity, the CRG strongly supported the Panel's concerns that the objectives require the AER to explicitly consider both efficient investment and efficient consumption. The CRG stated:²⁵

"The AER's selection of model(s) and the approach to each parameter in the model(s) must clearly address both efficient investment and efficient consumption.

Further, we contend to date, the AER has not adequately addressed its obligation to equally consider efficient investment and efficient consumption. For example, the AER has not formally considered the impact of its decisions on consumer behavioural response to any potential price increases arising from its RoR decisions.

Further, the AER has not adequately considered that consumers have greater opportunities to withdraw from using network services if they believe prices do not represent value for money and/or network charges will continue to rise (as they did between 2009 and 2015). As one advocate for commercial enterprises said, increases in network prices would leave customers *"turning away from the network, not towards it"*.

THE AER'S RESPONSE TO THE CRG'S CONCERNS

In responding to the CRG's submission, the AER agreed that achieving the legislative objectives requires more than just efficient investment in energy networks, but also **requires efficient use of energy network services**.²⁶ The AER then concluded that an unbiased estimate of efficient investment is a sufficient condition to promote the efficient use of energy, and that therefore it could achieve its statutory objectives by focussing on an unbiased estimate of the rate of return required to achieve "efficient investment".

The AER expressed itself open to considering improvements in how it might assess efficient use of the network (i.e., consumption efficiency). The AER also acknowledged that "errors" in the rate of return can affect the broader economy. For example, the AER states:

"A biased expected rate of return is likely to have a broader effect across the economy. Energy supply is an essential service, supporting the broadest range of economic activity. If this essential activity is incorrectly priced it is likely to distort decisions throughout the economy. This may result in efficiency losses where consumers use more or less energy network services than otherwise. It may also lead to consumers making incorrect downstream investment decisions. The impacts are likely extended beyond monetary effects, such as the consequences for vulnerable consumers that may be disconnected."²⁷

Having expressed its openness to improvements in how it might assess consumption efficiency, the AER goes on to provide several arguments to demonstrate that it has considered the issue.²⁸

Firstly, the AER considers the efficient use of energy services and consumption efficiency to be similar concepts. Secondly, consumption efficiency is linked to the structure of prices in addition to their level. The level of prices is necessary for economic efficiency, but it is not sufficient. Prices also need to reflect the underlying costs of providing the service. Thirdly an unbiased estimate of the expected efficient return, consistent with the relevant risks involved in providing regulated network services, it will encourage correct pricing which supports good decisions by consumers.



 ²⁵ CRG, Submission to AER Return on Equity, 9 October 2020, available from <u>https://www.aer.gov.au/system/files/CRG%20-</u> <u>%20Submission%20to%20AER%20RoE%20and%20International%20RoR%20working%20paper%20%20-</u> <u>%209%20October%202020.pdf</u>, p. 13

²⁶ AER, May 2021, p. 4

²⁷ AER, May 2021 p. 7

²⁸ AER, May 2021 p. 6 and AER, Rate of return, Assessing the long-term interests of consumers, Position paper, May 2021, available from <u>https://www.aer.gov.au/system/files/AER%20-</u>

^{%20}Rate%20of%20return%20and%20assessing%20the%20long%20term%20interests%20of%20consumers%20-%20Position%20paper%20-%2021%20May%202021_1.pdf

Attachment 3: Extract from 2018 Independent Panel Report

BEING SATISFIED THAT THE OVERALL OUTCOME IS NEITHER TOO HIGH NOR TOO LOW

The third issue deserving fuller explanation is the tradeoff between risk and cost. The relevant submissions to the AER focused on a specific risk – the effect on investment incentives of over or underestimating the rate of return. Since estimating the rate or return involves uncertainties, there is a 50 per cent chance that the decisions on each of the components is higher than the efficient level and a 50 per cent chance that they are lower than the efficient level.

Results that differ from the efficient level cause significant costs. If the result is lower than the efficient level, then investment may be lower than is efficient; whereas a result higher than the efficient level will result in an inefficient price that suppresses efficient consumption and may incentivise investment that does not provide benefits commensurate with the cost recouped from consumers.

At a theoretical level, a rate of return that reflects the cost of capital faced by a benchmark efficient utility, and properly considers the risk-cost tradeoff summarised above, is necessarily capable of meeting the national gas and electricity objectives – to the extent the rate of return itself contributes to those objectives.

While the Explanatory Statement addresses each technical step in the rate of return calculation, it does not sufficiently consider or demonstrate how each of the decisions about individual parameters, when taken together to produce a final estimate of the rate of return and value of imputation credits, will contribute to the achievement of the national gas and electricity objectives.

The AER should explain more clearly how the Final Guidelines promote the achievement of the national gas and electricity objectives, including why the AER is confident that the rate of return methodology that it has determined results in an outcome that is neither too high or too low.

(Pp iv-v)

10.6 ACHIEVING THE NATIONAL OBJECTIVES

In the preceding technical chapters, the Panel has assessed the Draft Guidelines' components individually. The Panel is also tasked to address their combined effects by answering these questions:

- Is the Guideline consistent with the revenue and pricing principles in the NEL/NGL?
- Is the Guideline consistent with the rate of return provisions in the NER and NGR?
- Is the Guideline consistent with the COAG Energy Council's ongoing reforms to implement a binding rate of return instrument?
- Overall, is the Guideline consistent with, and capable of promoting, achievement of the objectives of the NEL and NGL?

The Panel has not identified anything in the Draft Guidelines that appears to be inconsistent with the revenue and pricing principles in the NEL/NGL, the NER and NGR, and COAG Energy Council's ongoing reforms as reflected in the legislative amendments introduced into the South Australian Parliament on 2 August 2018.

About promoting achievement of the national objectives, the Draft Guidelines aim to produce a rate of return reflecting a "benchmark efficient entity". A benchmark efficient utility, by definition, is an efficient utility carries out its service responsibilities, as defined by the regulator, efficiently. It raises capital efficiently, it operates and spends money efficiently, it plans capital expenditures program

efficiently, and it carries out that capital expenditures program efficiently. An industry whose members perform that way is an industry that achieves the national objectives.

At a theoretical level, then, a rate of return that satisfies the criterion of "benchmark efficient utility", and properly considers the risk-cost tradeoff discussed above, is necessarily capable of meeting the national objectives – to the extent the rate of return itself contributes to those objectives.

This last phrase reflects the fact that the rate of return contributes only one Part of the revenue stream that flows to a regulated company. Thus, the rate of return is only one contributor to the national objective. The other contributors are the other building blocks. So, the regulator must place in those building blocks amounts sufficient to allow an efficient company to recover its actual operating expenses and capital expenditures.

If the regulator does so, then the rate of return in conjunction with these other revenue flows will, by definition, be able to attract the voluntary debt capital and equity capital sufficient to satisfy the aspects of the national objectives that depend on capital. However, the national objectives also include consumption efficiency, which needs to be addressed as well. In achieving the national objectives, attracting capital is necessary but not sufficient.

There is a broader point to make. A particular rate of return does not achieve the national objectives just because finance theory says it should. The national objectives are achieved not by finance theory but by the rational, informed actions of the firms and individuals who comprise the regulated industries: debt investors, equity investors, the managers and employees of regulated firms, consumers large and small, and the practitioners who represent their interests before regulatory tribunals. The Draft Guidelines will be capable of promoting the national objectives only if it wins the trust of, and induces the efficient conduct of, all those parties.

The Panel's comments in this Chapter thus far have focused on whether the Draft Guidelines, taken as a whole, are capable of achieving the national objectives. While the Explanatory Statement addresses each technical step in the rate or return calculation, it does not sufficiently consider or demonstrate how each of the decisions about individual parameters, when taken together to produce a final estimate of the rate of return and value of imputation credits, will contribute to the achievement of the national objectives.

The AER should explain more clearly how the Final Guidelines promote the achievement of the national objectives, including why the AER is confident that the value that it has adopted results in an outcome that is neither too high or too low.

The Draft Guidelines can win trust and induce efficient conduct if they are more fully explained, with the risk-cost tradeoff being appropriately considered. In the preceding technical chapters, the Panel has cited examples of where fuller explanation is necessary to provide confidence that the approach to estimating the rate of return is soundly based and appropriately reflects the available evidence. If the AER follows these recommendations and addresses the risk-cost tradeoff appropriately, then in the Panel's view the resulting Guidelines will be capable of promoting the national objectives.

RECOMMENDATION

The AER should explain more clearly how the Final Guidelines promote achievement of the national objectives, including why it is confident that the rate of return methodology it has determined results in an outcome that is neither too high nor too low having regard to the risk-cost tradeoff involved.

(Pp 66-68)





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